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Artificial intelligence in the halal industry: Trends and global research opportunities

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Abstract

Purpose – This study provides a comprehensive mapping of research developments on the role of artificial intelligence (AI) in the halal industry and identifies global trends, collaboration patterns, and contributing regions.

Methodology – A bibliometric analysis was conducted using data from the Scopus database covering the period 2000 to March 2025.

Findings – The results reveal significant growth in publications on AI and the halal industry in recent years. Salaheldeen Mohamed is identified as the most prolific author with four publications, while the most cited work is *Applying the Theory of Planned Behavior (TPB) in Halal Food Purchasing* by Shah Alam S. and Mohamed Sayuti N., cited 493 times. The *Journal of Islamic Marketing* is the leading publication outlet, and Universiti Teknologi MARA ranks the highest among institutional contributions. At the national level, Indonesia and Malaysia are leading contributors, with 39 publications each. Keyword analysis shows key research themes such as technology, systems, markets, and data. Emerging trends include AI in supply chain management, blockchain, and consumer trust, particularly in enhancing traceability and efficiency. Underexplored areas such as halal cosmetics and religiosity present future research opportunities.

Implications – The findings have important implications for the development of AI-driven halal industry research, indicating that AI is no longer a conceptual discourse, but is actively applied in various aspects such as marketing, supply chain management, and halal certification.

Originality – This study offers a novel bibliometric analysis that maps key trends and research gaps to guide future AI-driven innovation in the halal sector.

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Introduction

Artificial intelligence (AI) technology has had a significant impact on various industries worldwide (Amane et al. 2023). AI, which involves advanced algorithms and high computational power to process vast amounts of data, has fundamentally transformed the operation of different industries (Satria et al., 2025; Yogaswara, 2019). One sector that has benefited greatly from this technology is the halal industry (Iswanto, 2024). This industry encompasses various fields, including food, beverages, cosmetics, pharmaceuticals, financial services, and halal tourism (Zahrah & Fawaid, 2019). It is not only expanding in Muslim-majority countries but also in Western nations that recognize the substantial potential of the global halal market.

The halal industry has become an integral part of the global economy, with its market value continuously increasing in tandem with global Muslim population growth (Iskandar et al., 2020).

According to the Global Islamic Economy Report, the halal market is projected to reach trillion dollars in the coming years. However, this rapid growth presents significant challenges, particularly for ensuring the integrity of halal products throughout the supply chain. Traditional manual processes used in production, monitoring, and certification are often time-consuming, costly, and prone to human error (Muhamad, 2020). AI holds immense potential in providing innovative solutions to address these challenges effectively.

The application of AI in the halal industry offers numerous benefits. During production, AI can automate quality monitoring processes, detect non-halal ingredients, and ensure compliance with halal standards throughout the production cycle (Ridho, 2025). Technologies such as machine learning and computer vision enable faster and more accurate analyses of raw materials and finished products (Bakar & Rosbi, 2019). In logistics, AI can enhance halal product traceability across the supply chain, ensuring transparency, and strengthening consumer trust in halal certification. Additionally, in halal certification processes, AI can facilitate and accelerate verification by employing specially designed algorithms to assess compliance with halal standards (Alourani and Khan, 2024).

Despite its potential, the adoption of artificial intelligence (AI) in the halal industry remains relatively new and unevenly distributed. Research on AI integration across various halal industry sectors is still limited in terms of both quantity and scope. Most existing studies are case based or focus on specific technological applications. For example, Alourani and Khan (2024) explored a blockchain- and AI-based system to ensure halal product traceability. Their study proposed a blockchain-based system for creating an immutable transaction ledger combined with AI for pattern recognition and data analysis. This system enables end-to-end supply chain tracking from raw material sourcing and production to distribution, ensuring the integrity of halal products.

Bakar and Rosbi (2019) developed a robust framework for halal certification processes by integrating AI methods. Their study aimed to evaluate the halal certification framework using AI-driven scientific detection analysis. It introduced two AI techniques, genetic algorithms and neural networks, to enhance the reliability of halal monitoring systems. Ridho (2025) investigated the integration of AI and blockchain technology in halal certification to enhance accuracy, transparency, and efficiency. Focusing on Indonesia's SiHalal platform, developed by the Halal Product Assurance Agency (BPJPH), this study found that AI automates error detection and improves accuracy, whereas blockchain prevents fraud through immutable records. The SiHalal platform successfully integrated both technologies, streamlining certification processes, increasing public trust, and enhancing user satisfaction.

Although these studies provide valuable insights, they remain fragmented and do not present a comprehensive overview of the potential and challenges of AI adoption in the halal industry. This underscores the need to map existing research contributions to gain a more complete picture of the developments in this field. Such mapping facilitates the identification of research trends, patterns, and gaps. A deeper understanding of AI's role of AI in the halal industry can also benefit various stakeholders, including researchers, industry players, and regulators, by formulating more effective strategies for leveraging this technology (Donthu et al., 2021; Ozturk, 2021).

For example, research mapping can reveal key geographic regions leading AI research in the halal industry, identify the most active institutions, and highlight the most studied application areas. Moreover, it can uncover research gaps such as a lack of focus on Shariah compliance or ethical considerations in AI applications within the halal industry. Understanding these gaps will enable future research to address them, ultimately making a more significant impact on the sustainable development of the halal industry.

Therefore, a comprehensive study is required to fill this research gap by providing a holistic mapping of the trends, patterns, and contributions of AI research in the halal industry. This study is of critical urgency as it lies at the intersection of modern technological advancements and the need to ensure the sustainability of the halal industry amid global challenges. The halal industry, which continues to grow alongside the increasing Muslim population and rising awareness of halal product significance, faces pressure to meet market demand efficiently and reliably. Moreover, by understanding global research trends and existing gaps, stakeholders can direct their efforts toward areas that require the most innovation. This research is also essential for supporting a sustainable

and innovative halal ecosystem where modern technology enhances transparency, efficiency, and global competitiveness without compromising Shariah principles. The ethical integration of AI, including aspects of data protection, fairness, and compliance with Islamic values, is a strategic step toward ensuring the sustainability of the halal economy. As a rapidly expanding segment of the Islamic economy, the halal industry has potential to become a key pillar of the global economy. This research is relevant not only for Muslim-majority countries but also for non-Muslim nations investing in the halal sector to attract Muslim consumers.

Based on the above discussion, this study aims to provide a comprehensive mapping of research developments regarding the role of AI in the halal industry. Specifically, it seeks to identify the global trends, collaboration patterns among researchers, and geographic regions that actively contribute to this field. Additionally, this study aimed to uncover unexplored research gaps, open strategic opportunities for further studies, and generate practical and relevant recommendations for the advancement of research and AI implementation within the halal ecosystem. The benefits of this study include several important aspects. Academically, this study serves as a strong theoretical foundation for further research, both in the field of AI technology and within the context of the halal industry. For industry players, this research can act as a guide for effectively integrating AI technology to enhance efficiency, transparency, and competitiveness. From a regulatory perspective, this study provides valuable insights for policymakers in designing regulations aligned with technological dynamics and the needs of the halal market. For a broader society, this study is expected to support the availability of more reliable, easily accessible, and Shariah-compliant halal products and services.

Literature Review

In recent years, the convergence of artificial intelligence (AI) and the halal industry has emerged as an area of growing academic and industrial interest, driven by the increasing demand for digital transformation in halal value chains. The global halal market, which spans sectors such as food, pharmaceuticals, cosmetics, finance, tourism, and logistics, is projected to reach trillions of dollars, prompting scholars and practitioners to explore how AI technologies can enhance operational efficiency, transparency, and consumer trust in halal-certified products and services.

A review of the existing literature reveals that most studies have primarily focused on niche applications of AI within the halal context. These include the use of machine learning and image processing for halal food traceability, natural language processing in halal certification processes, AI-driven marketing strategies for halal products, and predictive analytics for understanding Muslim consumer behavior (Ellahi et al., 2025; Sunmola et al., 2025). Despite the evident contributions of these studies, they tend to be fragmented, case-specific, and often limited to particular geographical contexts, such as Southeast Asia or the Middle East.

Furthermore, much of the current scholarship is conceptual or experimental in nature, lacking large-scale data-driven insights into how AI influences the halal industry at a global level. There is a noticeable absence of integrative reviews or comprehensive mappings that offer a bird'seye view of the developmental trajectory of this interdisciplinary domain. Scholars, policymakers, and industry stakeholders have limited access to synthesized information on global trends, influential contributors, and emerging research priorities.

To address this gap, this study employs bibliometric analysis, a well-established method in science mapping that facilitates the quantitative assessment of academic literature. Bibliometric techniques allow researchers to systematically analyze patterns, such as publication growth, co-authorship networks, institutional and national contributions, frequently used keywords, and citation dynamics. These indicators are particularly valuable in identifying knowledge clusters, research frontiers, and potential avenues for future research. By leveraging the Scopus database, which is known for its wide coverage of peer-reviewed journals and bibliographic data, this study ensured the reliability and comprehensiveness of its analysis.

Bibliometric studies have been used to explore AI adoption in other sectors, such as agriculture (Songol et al., 2021; Sood et al., 2024), healthcare (Khanijahani et al., 2022), and Islamic finance (Sarea et al., 2021), but there is a noticeable lack of similar research focused on the halal

industry. This makes the present study not only timely but also essential for positioning the halal industry within the broader digital transformation landscape. By comparing the bibliometric trends and patterns in this study with those found in adjacent domains, we further highlight the unique trajectory, challenges, and opportunities of integrating AI into halal systems. Ultimately, this study contributes to the literature by offering the first structured bibliometric mapping of AI-related research in the halal industry. This provides a foundation for academics, practitioners, and policymakers to better understand the state of knowledge, locate research gaps, and foster interdisciplinary collaboration in shaping the future of AI-enhanced halal ecosystems.

Research Methods

This study employed a bibliometric analysis approach to map the development of research on the role of AI in the halal industry. Bibliometric analysis was chosen as it enables the systematic identification of trends, collaboration patterns, and relevant scientific contributions based on scholarly publication data (Öztürk et al., 2024). The data used in this study were sourced from internationally reputable journal databases, specifically, Scopus. The search focused on articles published over the past 25 years, ensuring relevant and up-to-date coverage.

The analysis began with data collection on publications, including titles, abstracts, keywords, author names, institutions, country of origin, and publication years. The collected data were then analyzed using bibliometric software such as VOSviewer to identify collaboration patterns among researchers, research trends, and active geographical regions in this field (Van Eck et al., 2010; Van-Eck & Waltman, 2022).

The data collection process follows these steps:

1. Keyword selection: relevant keywords, such as artificial intelligence, machine learning, natural language processing, big data, data mining, chatbot, halal industry, halal business, halal tourism, halal authentication, halal fashion, and halal certification, are used to retrieve relevant publications, using the following search query: ((TITLE-ABS-KEY(artificial intelligence) OR TITLE-ABS-KEY(Machine Learning) OR TITLE-ABS-KEY(Natural Language Processing) OR TITLE-ABS-KEY(Big Data) OR TITLE-ABS-KEY(Data Mining) OR TITLE-ABS-KEY(chatbot) AND TITLE-ABS-KEY(halal industry) OR TITLE-ABS-KEY(halal business) OR TITLE-ABS-KEY(halal food) OR TITLE-ABS-KEY(halal tourism) OR TITLE-ABS-KEY(halal authentication) OR TITLE-ABS-KEY(halal fashion) OR TITLE-ABS-KEY(halal certification))).
2. Database selection: The selected databases included platforms with broad coverage and leading scopus-indexed journals.
   Inclusion and exclusion criteria: The selected publications were those published in reputable international journals indexed by Scopus from 2008 to March 2025, as no relevant publications were found before 2008.
3. Data cleaning: The collected data were subjected to rigorous verification to ensure consistency and accuracy. This involved removing duplicates, verifying metadata (such as titles, authors, institutions, and abstracts), and coding the primary topics of each publication.

Following data collection, bibliometric analysis was conducted using specialized software, namely VOSviewer, to identify patterns and trends in the literature (Van-Eck & Waltman, 2022).

1. Publication analysis: Identifying the number of publications per year to determine research trends over time.
2. Author analysis: identifying the most productive and influential authors in the field.
3. Institutional and country analysis: identifying the most active institutions/affiliations and countries that significantly contribute to the relevant research.
4. Keyword and topic analysis: Identifying frequently occurring keywords and core topics in the literature to understand research focus and trends.

The bibliometric analysis results were then presented in the form of network maps, graphs, or tables to facilitate interpretation. This visualization aids in understanding the relationships and

patterns in the data and identifying areas requiring further research. To ensure the reliability of the findings, data and insights from the bibliometric analysis are validated through triangulation with additional relevant literature (Donthu et al., 2021; Gera et al., 2024; Öztürk et al., 2024).

Results and Discussion

Publication trends

Following the extraction and mapping of scientific publication databases related to AI and the halal industry from the Scopus database, data on the growth of publication numbers were obtained (Table 1).

Table 1. Growth of publication numbers

Year	Frequency	Percentage (%)
2008	2	2.1
2011	1	1.1
2012	1	1.1
2013	1	1.1
2017	3	3.2
2018	6	6.3
2019	7	7.4
2020	10	10.5
2021	7	7.4
2022	9	9.5
2023	23	24.2
2024	24	25.3
2025	1	1.1
Total	95	100.0

Source: Scopus.com (Processed data, 2025)

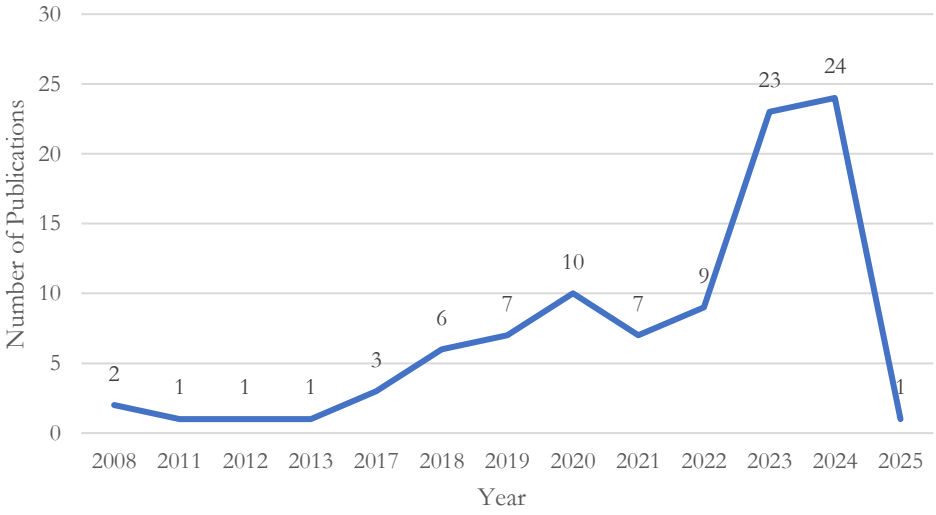

Figure 1. Trends in publication growth
Source: Scopus.com (Processed data, 2025)

Table 1 and Figure 1 illustrate the development of publication numbers related to the role of Artificial Intelligence (AI) in the halal industry from 2008 to March 2025, based on data from Scopus. A total of 95 publications were recorded during this period, with a significant upward trend, particularly in recent years. In the early phase (2008–2016), research output was minimal and sporadic. For instance, there were only two publications in 2008 (2.1%) and one per year in 2011, 2012, and 2013 (1.1% each). This limited activity likely reflects the early stage of AI adoption in halal-related sectors and the lack of awareness of its potential in Islamic economic domains.

A gradual increase began in 2017, with three publications (3.2%), which may be attributed to the growing global awareness of AI applications and early interest in integrating digital technologies with halal industry needs. Momentum continued in 2018 (six publications, 6.3%) and 2019 (seven publications, 7.4%), showing that AI began to be recognized as a strategic tool for halal supply chains, certification, and product innovation. A more noticeable spike occurred in 2020, with ten publications (10.5%). This increase may be influenced by the COVID-19 pandemic, which accelerated digital transformation across industries, including halal commerce, pushing researchers to explore technological solutions, such as AI, to ensure product traceability and operational efficiency.

The highest growth occurred in 2023 (23 publications; 24.2%) and 2024 (24 publications; 25.3%), accounting for nearly half of the total output. Several factors may explain this peak: (1) increasing government and institutional investments in halal innovation hubs, particularly in Southeast Asia; (2) rising demand for automation and digital certification in global halal trade; and (3) enhanced collaboration between the tech and Islamic economic sectors. Countries such as Malaysia and Indonesia have been especially proactive in integrating AI into halal systems, which is reflected in the publication trends. Although 2025 (as of March) records only one publication (1.1%), this is expected because of limited time coverage. Overall, the data suggest a strong upward trajectory and growing scholarly attention on the intersection of AI and the halal industry, especially after 2020.

This increase can be attributed to the relevance of the topic in addressing modernization and digitalization challenges within the halal industry amid global development. The results highlight a significant opportunity for further research, particularly in exploring gaps that have not yet been addressed. Scopus data provide valuable insights into the academic dynamics and global trends in this field.

Table 2. Types of published documents

Document type	Frequency	Percentage (%)
Article	38	40.00
Conference Paper	25	26.32
Book Chapter	13	13.68
Conference Review	7	7.37
Review	5	5.26
Book	2	2.11
Erratum	2	2.11
Data Paper	1	1.05
Editorial	1	1.05
Short Survey	1	1.05
	95	100.0

Sumber: Scopus.Com (Data diolah, 2025)

Furthermore, Table 2 presents the distribution of document types discussing the role of Artificial Intelligence (AI) in the halal industry based on data processed from Scopus up to March 2025. A total of 95 documents were analyzed, encompassing various academic publication formats.

Most of the documents were journal articles, accounting for 38 publications (40%). This dominance is expected because journal articles typically undergo rigorous peer-review processes and are preferred for disseminating comprehensive, theory-driven, and impactful research findings. In recent years, the growing maturity of research in the AI-halal domain has encouraged more scholars to target reputable journals. Conference papers were followed by 25 publications (26.32%). This significant portion suggests that the AI-halal discourse is still evolving, with conferences serving as primary venues for early stage research dissemination, networking, and collaborative exploration, especially suitable for an interdisciplinary and rapidly developing topic like AI. Many of these papers likely represent work-in-progress studies or pilot findings later developed into journal articles.

The third most frequent type was book chapters (13 publications; 13.68%). This suggests a growing interest in integrating AI halal discussions within broader edited volumes on the Islamic economy, digital transformation, and ethical technology. Book chapters are often thematic and provide narrative-driven contributions, indicating that this topic is also being explored from philosophical, regulatory, and regional perspectives. Other publication types, such as conference reviews (seven documents, 7.37%) and review articles (five documents, 5.26%), show that scholars are starting to synthesize the literature, although still in small numbers. The relatively low number of review articles could provide an opportunity for future work to consolidate and critically evaluate the rapidly expanding literature. Books and errata each represent only two publications (2.11%), and formats such as editorials, short surveys, and data papers appear only once each (1.05%). These minimal counts suggest that, while the field is growing, it has not yet reached the level of foundational textbook development or widespread editorial commentary.

This variety of formats demonstrates that research on AI and the halal industry is being disseminated to diverse academic and professional audiences. However, the concentration in journal articles and conference papers underscores a field that is still in the process of academic consolidation, where scholarly debates are actively taking place and the body of knowledge is steadily expanding.

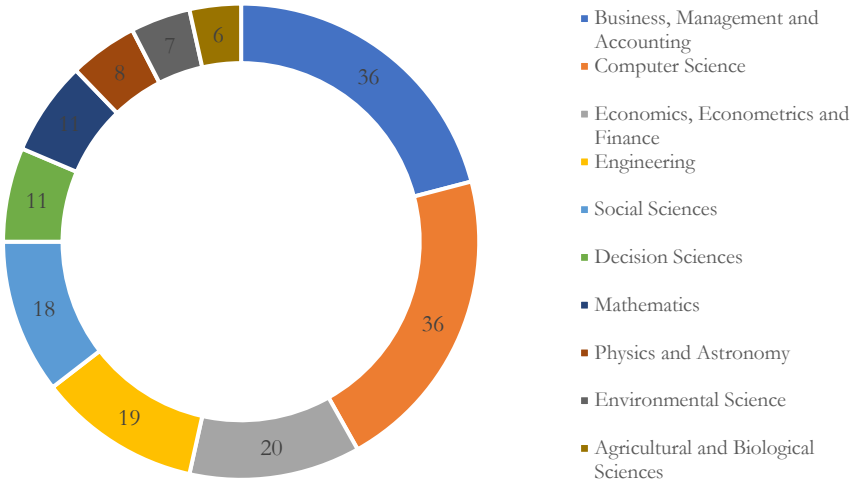

Figure 2. Top 10 research areas of publications
Source: Scopus.com (Processed data, 2025)

Figure 2 illustrates the distribution of research topics related to the role of Artificial Intelligence (AI) in the halal industry, based on major academic disciplines. *Business, Management and Accounting* and *Computer Science* emerged as the two most dominant research areas, each accounting for 36 publications. This reflects the primary focus on the application of AI in supporting halal business management and the development of relevant technologies for the industry. *Economics, Econometrics and Finance* rank third with 20 publications, followed by *Engineering* (19 publications) and *Social Sciences* (18 publications). This distribution indicates that the economic, technical, and social aspects have garnered significant attention in AI-related research within the halal industry. Other extensively explored fields include *Decision Sciences* and *Mathematics*, each with 11 publications. These disciplines are crucial for developing AI-based algorithms and decision support systems to ensure compliance with halal principles. More specialized fields, such as *Physics and Astronomy* (eight publications), *Environmental Science* (seven publications), and *Agricultural and Biological Sciences* (six publications), while having fewer publications, still make significant contributions to the development of unique aspects of the halal industry, such as raw material traceability and environmental impact management.

This distribution highlights that AI research in the halal industry spans multiple disciplines, reflecting a multidisciplinary and comprehensive approach to supporting industry growth. This

trend also underscores the potential of cross-disciplinary collaboration in developing innovative technology-driven solutions to address future challenges in the halal industry.

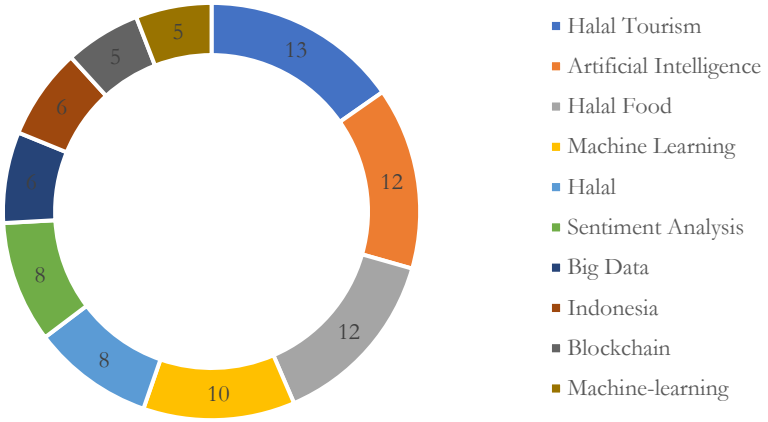

Figure 3. Top 10 research keywords in publications
Source: Scopus.com (Processed data, 2025)

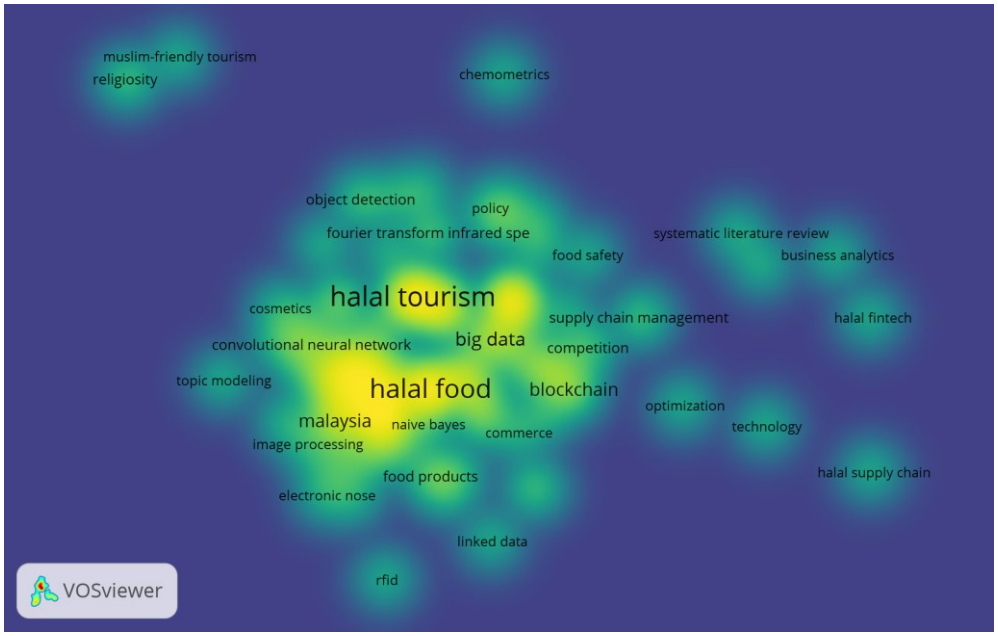

Figure 4. Mapping results of the top 10 research keywords in publications using density visualization mode
Source: Scopus.com (Processed data, 2025)

Figure 3 and 4 illustrate the distribution of the most frequently used keywords in publications on the role of Artificial Intelligence (AI) in the halal industry. The keyword *Halal Tourism* ranked first with 13 occurrences, reflecting significant attention to the application of AI in supporting and developing the halal tourism sector, which is one of the key pillars of the global halal industry. The keywords *Artificial Intelligence* and *Halal Food* held the second position, each appearing 12 times. This indicates that AI is widely applied in halal food management, encompassing aspects such as production, certification and distribution.

Machine Learning follows with 10 occurrences, signaling a strong focus on the development of algorithms and machine learning technologies to support automation and innovation in the halal industry. Keywords such as *Halal* and *Sentiment Analysis*, each appearing eight times, highlight the growing interest in analyzing public perceptions of halal products and reinforcing halal values more broadly. Other notable keywords include *Big Data* and *Indonesia* (each with six occurrences) as well as *Blockchain* and *Machine Learning* (each with five occurrences), indicating an exploration of emerging technologies and specific geographical relevance, particularly in the context of Indonesia

as one of the world's largest halal markets. The distribution of these keywords reflects a comprehensive research approach that integrates various technologies and key concepts relevant to the advancement of halal industry. The emphasis on these keywords underscores their significant potential for further research and innovation in this field.

Figure 4 presents a keyword mapping of the top ten research keywords in publications related to the role of AI in the halal industry. This visualization, generated using VOSviewer software in *Density Visualization* mode, displays the frequency intensity of keyword occurrences across various studies. In this mapping, areas with brighter colors (yellow) indicate a higher keyword density, signifying topics that are more frequently discussed in publications. Conversely, the darker areas (deep blue) represent lower frequencies.

The visualization reveals that *Halal Food* and *Halal Tourism* are the two keywords with the highest intensity, highlighting them as central themes in AI-related research within the halal industry. These topics are at the forefront because of AI's significant role in enhancing efficiency, safety, and quality in halal food production, as well as in managing halal tourism destinations. The mapping further illustrates that research on AI's role of AI in the halal industry is rapidly expanding, with a primary focus on the halal food and tourism sectors, followed by the application of advanced technologies in supply chain management, food security, and digital transformation of the global halal industry.

Authors and citations

From the perspective of authorship, several researchers have made dominant contributions in terms of publication volume.

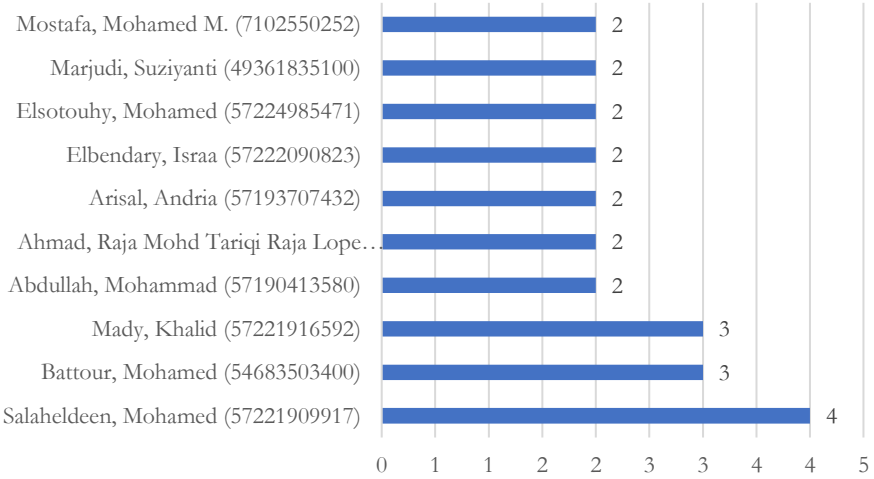

Figure 5. Number of publications by author
Source: Scopus.com (Processed Data, 2025)

Figure 5 presents a list of the ten authors with the highest number of publications in the field of artificial intelligence and the halal industry, based on Scopus data from 2025. At the top of the list, Salaheldeen Mohamed was recorded as the most prolific author with four published documents. This consistent contribution highlights his active role in advancing the research in this area. The second and third places are Battour, Mohamed, and Mady Khalid, each with three publications. Both authors made significant contributions to the scholarly literature on this subject.

The remaining seven authors—Abdullah, Mohammad; Ahmad, Raja Mohd Tariqi Raja Lope, Arisal, Andria, Elbendary, Israa, Elsotouhy, Mohamed, Marjudi, Suziyanti, and Mostafa, Mohamed M.—each have two publications. Their presence reflects a broad engagement in research exploring the integration of intelligent technology with the halal industry. The distribution of publication volumes provides insights into the key authors influencing research in artificial intelligence and the halal industry. These data can also serve as references for academics and researchers seeking collaboration or relevant sources.

Table 3. Top ten most-cited publications

Ranking	Author	Article	Year	Publication media	Number of citations	Type
1	Shah Alam S.; Mohamed Sayuti N.	Applying the Theory of Planned Behavior (TPB) in halal food purchasing	2011	International Journal of Commerce and Management	493	Article
2	Wilson J.A.J.; Belk R.W.; Bamossy G.J.; Sandikci Ö.; Kartajaya H.; Sobh R.; Liu J.; Scott L.	Crescent marketing, Muslim geographies and brand Islam: Reflections from the JIMA Senior Advisory Board	2013	Journal of Islamic Marketing	176	Review
3	Feizollah A.; Ainin S.; Anuar N.B.; Abdullah N.A.B.; Hazim M.	Halal Products on Twitter: Data Extraction and Sentiment Analysis Using Stack of Deep Learning Algorithms	2019	IEEE Access	77	Article
4	Xu L.; Cai C.B.; Cui H.F.; Ye Z.H.; Yu X.P.	Rapid discrimination of pork in Halal and non-Halal Chinese ham sausages by Fourier transform infrared (FTIR) spectroscopy and chemometrics	2012	Meat Science	65	Article
5	Chandra G.R.; Liaqat I.A.; Sharma B.	Blockchain Redefining: The Halal Food Sector	2019	Proceedings - 2019 Amity International Conference on Artificial Intelligence, AICAI 2019	60	Conference paper
6	Mostafa M.M.	Clustering halal food consumers: A Twitter sentiment analysis	2019	International Journal of Market Research	58	Article
7	Abror A.; Patrisia D.; Trinanda O.; Omar M.W.; Wardi Y.	Antecedents of word of mouth in Muslim-friendly tourism marketing: the role of religiosity	2020	Journal of Islamic Marketing	50	Article
8	Anir N.A.; Nizam M.D.N.M.H.; Masliyana A.	The users perceptions and opportunities in Malaysia in introducing RFID system for Halal food tracking	2008	WSEAS Transactions on Information Science and Applications	46	Article
9	Jannat B.; Ghorbani K.; Shafieyan H.; Kouchaki S.; Behfar A.; Sadeghi N.; Beyramysoltan S.; Rabbani F.; Dashtifard S.; Sadeghi M.	Gelatin speciation using real-time PCR and analysis of mass spectrometry-based proteomics datasets	2018	Food Control	30	Article
10	Hossain M.S.; Rahman M.F.; Uddin M.K.; Hossain M.K.	Customer sentiment analysis and prediction of halal restaurants using machine learning approaches	2023	Journal of Islamic Marketing	28	Article

Sumber: Scopus.Com (Data diolah, 2025)

Table 3 presents the citation counts for research works in related publications. The data reveal that the article authored by Shah Alam S. and Mohamed Sayuti N., titled *"Applying the Theory of Planned Behavior (TPB) in Halal Food Purchasing,"* published in the *International Journal of Commerce*

and Management in 2011, ranks first with 493 citations. This indicates the paper's significant impact on understanding Muslim consumer behavior regarding halal food purchases, making it a frequently referenced source in this research field.

In second place is the article by Wilson J.A.J. and colleagues, titled *"Crescent Marketing, Muslim Geographies, and Brand Islam,"* published in the *Journal of Islamic Marketing* in 2013. This article received 176 citations, reflecting its vital contribution to understanding marketing strategies based on Islamic values, particularly in shaping brand identity that aligns with the needs of the global Muslim community.

Following in third place is the study by Feizollah A. and his team, titled *"Halal Products on Twitter: Data Extraction and Sentiment Analysis Using a Stack of Deep Learning Algorithms,"* published in *IEEE Access* in 2019, with a total of 77 citations. This study underscores the role of deep learning technologies in analyzing consumer opinions on halal products via social media, a key trend in technology-driven research. The article by Xu L. and colleagues, *"Rapid Discrimination of Pork in Halal and Non-Halal Chinese Ham Sausages by Fourier Transform Infrared (FTIR) Spectroscopy and Chemometrics,"* published in *Meat Science* in 2012, ranks fourth with 65 citations. This study demonstrates the application of FTIR technology to ensure food product halal compliance, marking a significant innovation in halal food security.

In the subsequent position, the article by Chandra G.R. and colleagues, titled *"Blockchain Redefining: The Halal Food Sector,"* published in *Proceedings - 2019 Amity International Conference on Artificial Intelligence (AICAI 2019),* has amassed 60 citations. This study highlights the potential of blockchain technology in tracking and ensuring the halal status of food supply chains, a topic that is increasingly relevant in the digital era. Other notable works on the list include Mostafa M.M.'s study on halal food consumer sentiment analysis via Twitter and Abror A.'s research on the role of religiosity in Muslim-friendly tourism marketing, with citation counts of 58 and 50, respectively. These articles illustrate the diversity of research approaches within halal studies, including technology, consumer behavior, and marketing.

Overall, Table 3 not only ranks the most widely cited scholarly works, but also highlights the substantial contributions of each researcher in advancing knowledge within the halal sector. These studies offer not only an academic impact but also significant practical relevance, benefiting both industries and global communities seeking halal-based solutions.

Publication media, affiliations, and countries

An analysis of the 48 publications retrieved from the Scopus database revealed the top ten publication outlets, as illustrated in Figure 6.

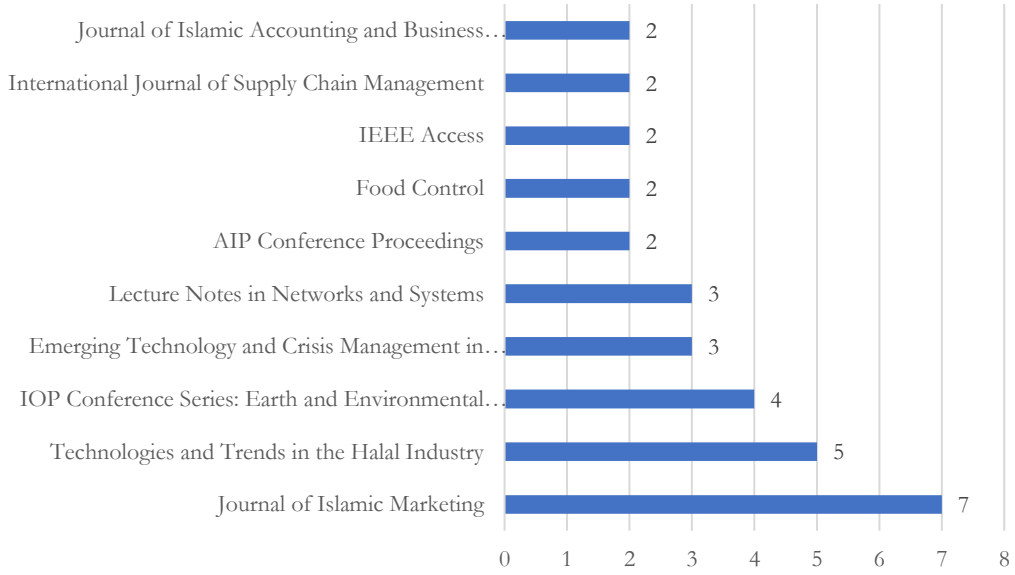

Figure 6. Top ten publication outlets and number of publications
Source: Scopus.com (Processed data, 2025)

Figure 6 presents the ten most prominent publication venues serving as key platforms for research on the halal industry, based on data processed from Scopus in 2025. The leading journal is the *Journal of Islamic Marketing,* with seven published articles. This reflects the journal's dominant role as a primary platform for research on Islamic value-based marketing, including trends and innovation in the halal industry.

Second, *Technologies and Trends in the Halal Industry* have recorded five publications. This outlet focuses on emerging technologies and trends that support the growth of the halal industry, a crucial subject in the era of digitalization. Meanwhile, *IOP Conference Series: Earth and Environmental Science* ranks third with four publications, indicating the significant contribution of research linking the halal industry to environmental and sustainability issues. The fourth position is occupied by two publication venues—*Emerging Technology and Crisis Management in the Halal Industry: Issues and Recent Developments* and *Lecture Notes in Networks and Systems*, each with three publications. These media emphasize technological innovations and crisis management challenges faced by the halal industry. Additionally, five other publication outlets hosted two articles: *AIP Conference Proceedings, Food Control, IEEE Access, International Journal of Supply Chain Management,* and *Journal of Islamic Accounting and Business Research.* These venues cover a broad range of topics including halal product quality control, advanced technology applications, supply chain management, and Islamic finance and business.

Overall, these data underscore the diversity of publication platforms that contribute to the development of the academic literature in the halal industry. These journals and conference proceedings not only provide spaces for research on marketing and technology, but also address environmental concerns, sustainability, and crisis management—issues of increasing importance in today's globalized world.

Table 4. Top ten institutions with the most publications in artificial intelligence and the halal industry

No.	Institution	Number of publications
1	Universiti Teknologi MARA	6
2	Universiti Utara Malaysia	4
3	Institut Teknologi Sepuluh Nopember	4
4	Universiti Sains Islam Malaysia	4
5	International Islamic University Malaysia	3
6	Universiti Teknologi Malaysia	3
7	Menoufia University	3
8	Universiti Kuala Lumpur	3
9	Universitas Gadjah Mada	3
10	Universiti Tun Hussein Onn Malaysia	3

Sumber: Scopus.Com (Data diolah, 2024)

Furthermore, regarding research institutions, Table 4 presents the ten leading institutions in Indonesia with the highest number of publications in the field of artificial intelligence and the halal industry, based on processed Scopus data from 2025. According to the table, Universiti Teknologi MARA ranks first with a total of six scholarly publications. This dominance highlights the institution's significant contribution to research in this field, particularly within Southeast Asia. The second to fourth positions are occupied by three institutions with equal numbers of publications, each contributing four publications: Universiti Utara Malaysia, Institut Teknologi Sepuluh Nopember, and Universiti Sains Islam Malaysia. These institutions play a crucial role in advancing research on intelligent technologies and their applications to support the halal industry at both the national and international levels.

In the fifth to tenth positions, six institutions recorded three publications each: International Islamic University Malaysia, Universiti Teknologi Malaysia, Menoufia University (Egypt), Universiti Kuala Lumpur, Universitas Gadjah Mada, and Universiti Tun Hussein Onn Malaysia. The presence of institutions from various countries, such as Egypt and Indonesia, in this

ranking indicates that research in artificial intelligence and the halal industry is not confined to Southeast Asia but is expanding to other regions as well.

Overall, these data suggest that cross-institutional and international collaboration in this field continues to grow. The dominance of Malaysian institutions in this list reflects the country's role as a key center for research on technology-driven halal industry development. Additionally, the participation of institutions from Indonesia and Egypt underscores the increasing global relevance of this research area, aligning with the ongoing advancements in technology and ever-growing demand within the halal market.

Table 5. Top 10 countries with the highest number of publications in the field of artificial intelligence and the halal industry

No.	Country	Number of publications
1	Indonesia	39
2	Malaysia	39
3	Saudi Arabia	5
4	Turkey	5
5	Egypt	4
6	United Kingdom	4
7	Bangladesh	3
8	China	3
9	India	2
10	Kuwait	2

Sumber: Scopus.Com (Data diolah, 2025)

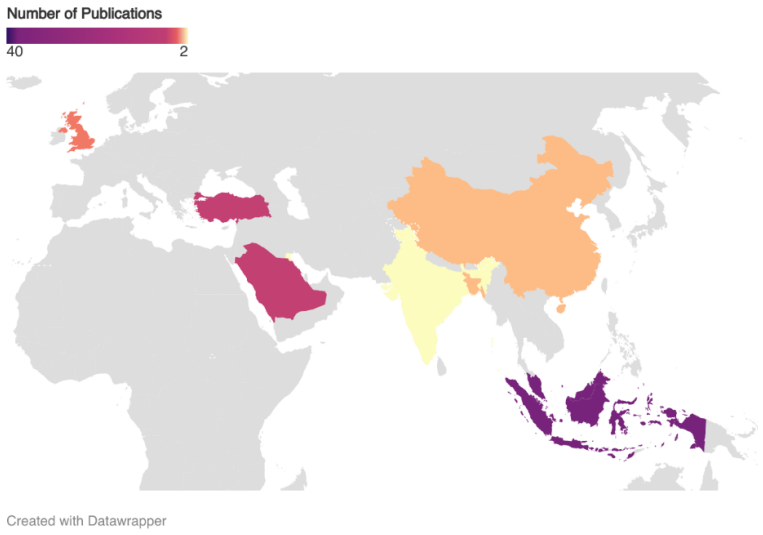

Figure 7. Geographic distribution of publications based on the country affiliation of authors
Source: Scopus.com (Processed data, 2025)

Based on the data presented in Table 5, Indonesia and Malaysia jointly dominate the list of countries with the highest number of publications in the field of artificial intelligence and halal industry, each contributing 39 publications. This dominance reflects the strong interest of academics and researchers from both countries in the development of intelligent technologies integrated with the needs of the halal industry, given their strategic roles as centers of Islamic economics and finance in the Asian region.

Saudi Arabia and Turkey ranked third and fourth, respectively, with five publications each. The presence of these two countries highlights their active efforts to promote research relevant to the application of technology in the halal industry, particularly to support the rapidly expanding global halal market. Following them, Egypt and the United Kingdom occupy the fifth and sixth positions, respectively, with four publications each. The inclusion of a country like the United Kingdom indicates that studies on artificial intelligence and the halal industry are also attracting

attention from non-Muslim-majority countries, particularly in the context of integrating technology with the global halal market. Other countries on this list, such as Bangladesh and China, each with three publications, and India and Kuwait, each with two publications, illustrate the expanding distribution of research across different regions. This suggests that interest in technology and the halal industry is not confined to the Middle East and Southeast Asia but also extends to South and East Asia.

Overall, these findings indicate an increasingly widespread global distribution of studies on artificial intelligence and halal industry. The dominance of Indonesia and Malaysia underscores their active role in supporting research in this field, while contributions from other countries demonstrate the growing global relevance of these studies, in line with the increasing demand for advancements in the halal industry worldwide.

Mapping the research development of artificial intelligence and the halal industry

The mapping of research development in artificial intelligence and the halal industry, using VOSviewer, produces a visualization that illustrates the relationships between various topics frequently appearing in the literature on artificial intelligence and the halal industry. In selecting the type of data, the researchers used the "create a map based on text data" feature. For the data source, they opted for the "read data from the reference manager files" option with supported file types in RIS format on the VOSviewer application. The counting method employed was Binary Counting, with the minimum number of term occurrences set at 3, resulting in the selection of 268 terms from 95 documents. The topic mapping of artificial intelligence and the halal industry, displayed in the Network Visualization mode, is shown in Figure 1.

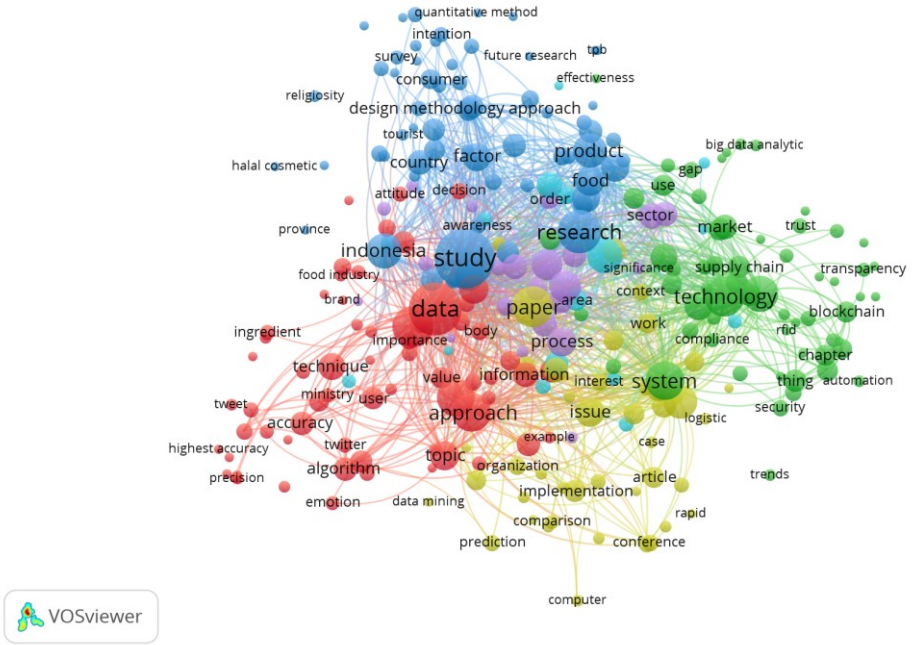

Figure 8. Topic mapping of artificial intelligence and the halal industry using network visualization mode
Source: Scopus.com (Processed data, 2025)

In Figure 8, each node in the map represents a topic or keyword frequently appearing in studies on artificial intelligence and the halal industry based on bibliometric analysis. The size of the node indicates the frequency of keyword occurrences in the analyzed publications; the larger the node, the more frequently the topic is discussed. The key keywords that stand out in this visualization include *study, research, data, technology, approach, system*, and *market*, reflecting the primary research focus in this field. The lines connecting the nodes indicate the relationships or linkages between topics. The thicker the line, the stronger the connection between the two topics, signifying

that these keywords frequently appear together in the research. Additionally, closely related topic groups were clustered and color-coded for differentiation.

In this visualization, several major clusters categorized topics based on their thematic interconnections. Each cluster represents a research area closely linked to the application of artificial intelligence (AI) in the halal industry. One prominent group in this mapping is the red cluster, which focuses on aspects such as *data, algorithm, accuracy, technique*, and *emotion*. The presence of these keywords indicates that research in the halal industry is increasingly relying on AI technology to enhance the accuracy and efficiency of data analysis. The utilization of advanced algorithms enables more precise information processing, both in halal data management and in the analytical techniques used to develop AI systems capable of comprehending and interpreting halal standards more effectively. However, a closer examination of the related studies reveals certain limitations; many of these studies tend to adopt technical or engineering-focused methodologies, often lacking a comprehensive understanding of the religious and cultural nuances embedded within halal compliance. Additionally, a significant portion of these studies was conducted in laboratory or simulation-based settings, which may not adequately capture the complexities of real-world halal industry environments.

Meanwhile, the blue cluster highlights various aspects related to research methodology and social factors in halal industry studies. The key terms in this group, such as *study, design methodology approach, consumer, Indonesia*, and *factor*, suggest that research in this field is not solely focused on technical aspects, but also considers social dynamics and consumer behavior. The emphasis on research methodology reinforces the importance of scientific approaches in understanding halal market demands, particularly in countries such as Indonesia, which has the world's largest Muslim population. Nonetheless, a critical review shows that much of this research remains limited in geographic scope, with heavy concentrations in Southeast Asia, especially Indonesia and Malaysia. There is a lack of comparative analysis involving diverse global Muslim communities that could provide richer insights into how sociocultural factors affect AI adoption in different halal ecosystems. Furthermore, many studies in this cluster adopt quantitative survey methods with relatively little engagement in qualitative or mixed-methods approaches that could provide a deeper understanding of consumer attitudes and ethical considerations.

On the other hand, the green cluster emphasizes the role of technology in halal supply chains and trade system transparency. Keywords appearing in this group, such as *technology, market, supply chain, blockchain*, and *trust*, indicate that technological innovation plays a crucial role in improving halal product distribution efficiency. For instance, blockchain technology has been extensively studied for its potential to enhance transparency and security in halal supply chains, ensuring that market-distributed products adhere to established halal standards. While this area is gaining momentum, several studies have tended to overemphasize technological potential without adequately addressing regulatory and infrastructure challenges, particularly in developing countries. Moreover, many conceptual papers have proposed blockchain solutions without empirical validation or pilot testing, which limits the practical applicability and scalability of their findings.

Furthermore, the yellow cluster focuses primarily on the implementation of AI-based systems in the halal industry. Keywords such as *system, process, implementation, organization*, and *comparison* highlight how AI-based systems can be effectively applied in various halal industry organizations and sectors. Research within this group aims to evaluate and compare different implemented systems to identify the optimal approach for enhancing efficiency and compliance with halal standards. Although these studies provide valuable insights into technological deployment, they often lack a theoretical grounding in organizational change, adoption models, or Islamic business ethics, which are essential for assessing the suitability and sustainability of such systems in halal institutions.

Finally, the light blue cluster is more closely related to halal products and marketing strategies. Keywords such as *product, food*, and *order* indicate that research within this group tends to be oriented towards the halal food industry and strategies to improve efficiency in the distribution and ordering of halal products. The focus on this aspect highlights that halal product development not only depends on adherence to Shariah compliance but also requires effective marketing

strategies to reach consumers more efficiently. While this shows interest in practical and commercial aspects, a review of these works reveals a narrow focus on e-commerce and ordering systems, often ignoring broader supply chain logistics, certification challenges, and cross-border trade issues that are vital in the global halal market.

Overall, this mapping reveals that studies on artificial intelligence in the halal industry are not limited to technological aspects alone, but also involve social factors, research methodologies, business systems, and technological implementations in the halal supply chain. This indicates that AI-driven developments in the halal industry are becoming increasingly complex and require a multidisciplinary approach to ensure that developed technologies provide maximum benefits to consumers and industry stakeholders. These findings offer insights into emerging research trends and potential further exploration in this field, serving as a foundation for the development of innovations and policies that are more effective and beneficial for the AI-based halal industry.

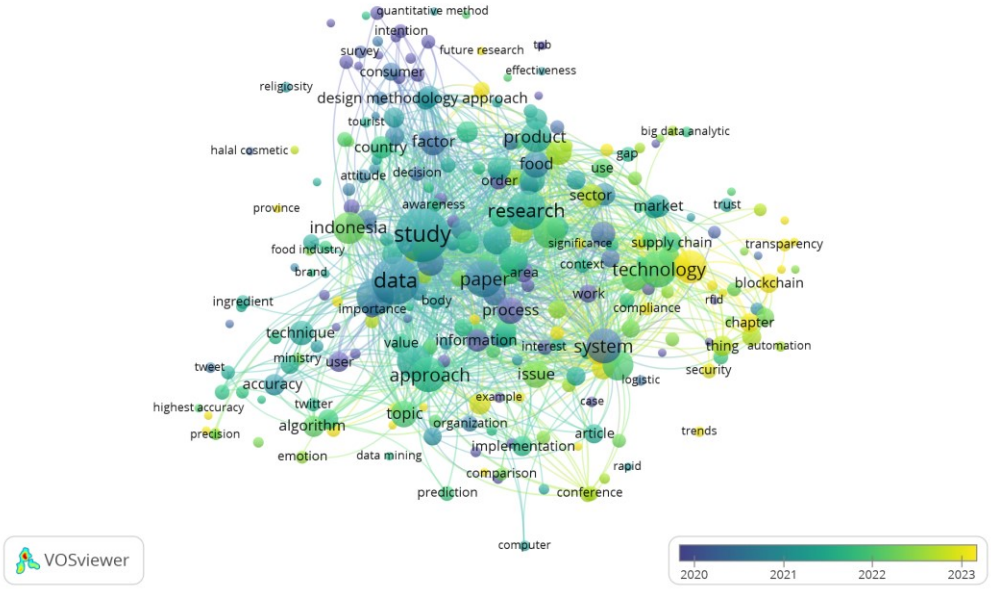

Figure 9. Topic mapping results of artificial intelligence and the halal industry studies using overlay visualization mode
Source: Data processing results (2025)

Figure 9 presents the topic mapping results of Artificial Intelligence and halal industry studies using the *Overlay Visualization* mode in the VOSviewer application. This visualization illustrates the development of research topics in this field over the years, with colors representing the age of publications. Blue indicates older topics, whereas yellow signifies more recent topics.

In this visualization, several key keywords emerged as central nodes within the research network. Keywords such as *data*, *study*, and *technology* appear in larger sizes and occupy central positions in mapping. This indicates that AI research on artificial intelligence in the halal industry relies heavily on data processing, methodological studies, and technological advancements. *Data* serves as a crucial element in AI applications, while *research methodology* forms the foundation for developing more sophisticated and applicable AI-based systems.

Additionally, keywords such as *supply chain*, *blockchain*, and *trust*, highlighted in yellow, indicate that research on transparency and security in halal supply chains using technology has remained an evolving topic in recent years. This trend suggests a growing focus on enhancing traceability, logistical efficiency, and consumer trust in halal products using AI and blockchain applications. As the demand for transparent and verifiable systems has increased, research on *blockchain* in the halal industry has become increasingly relevant and promising.

Furthermore, this mapping also reveals how research developments in this field are categorized into various thematic clusters. Keywords such as *algorithm*, *accuracy*, and *emotion*, appearing in green to yellow hues, indicate that innovations in artificial intelligence continue to progress, particularly in data analysis, machine learning, and information-processing techniques.

This suggests that research focusing on more accurate *algorithms* to support the halal industry has become a primary area of interest in recent years.

On the other hand, keywords such as *consumer*, *design methodology approach*, and *factor*, which are positioned around the main topics, indicate that social aspects and research methodologies remain integral components in developing a technology-based halal industry. This underscores that research is not solely oriented toward the technical aspects of AI, but also considers how artificial intelligence influences consumer behavior, inclusive system design, and the factors that support AI implementation in the halal industry.

This topic map also highlights the importance of *implementation* and *evaluation* processes in AI technology development within the halal industry. The presence of keywords such as *implementation*, *process*, and *comparison* distributed across different colors suggests that research on AI-based system applications undergoes continuous evaluation and testing over time. This demonstrates that AI research in the halal industry does not merely focus on technological advancements but also on how these systems can be effectively adapted and implemented in real-world scenarios. For instance, the application of AI in the halal food industry necessitates a thorough analysis of the accuracy of *halal verification systems*, *supply chain* efficiency, and market responses to technology-driven halal certifications. Studies in this context have evolved over the years, as reflected in the color transition from blue to green and yellow in visualization.

The distribution of colors in this visualization indicates that recent research trends have tended to focus on integrating advanced technology into the halal industry. Key areas experiencing rapid development include the use of *blockchain*, *emerging trends*, and *transparency* in halal systems. This research emphasis reflects an increasing concern regarding reliability and accountability in AI-based halal industry operations. Earlier research predominantly concentrated on fundamental AI concepts and data analysis methodologies. However, recent studies have shifted towards practical implementation within the global halal system. This shift signifies a paradigm change in AI and halal industry research, in which solution-oriented and application-based approaches are gaining greater interest among academics and industry practitioners.

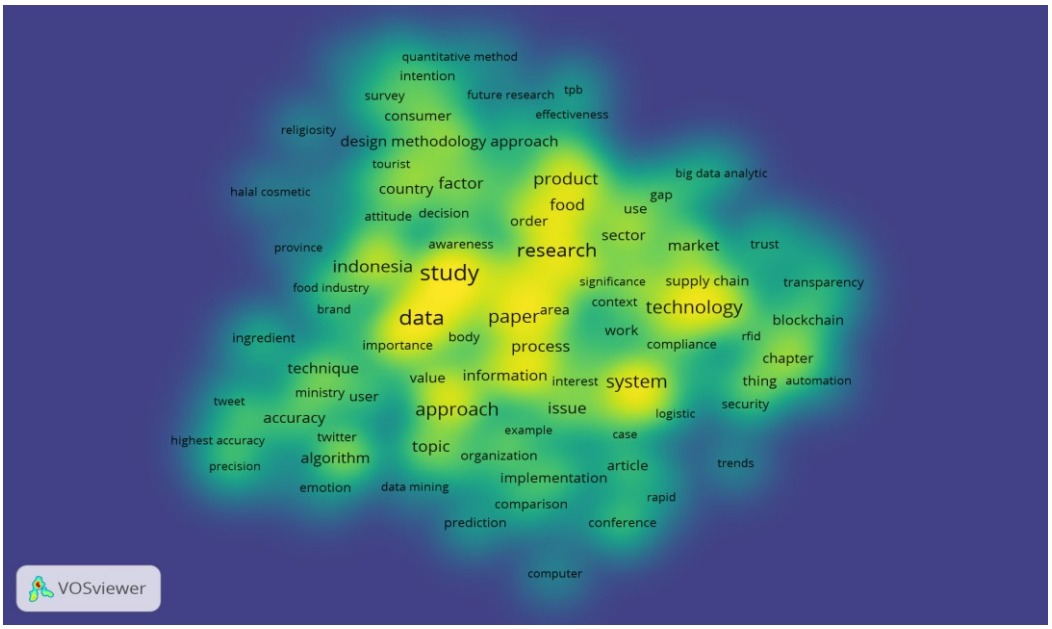

Figure 10. Mapping of artificial intelligence and halal industry research topics using density visualization mode
Source: Data processing results (2025)

Overall, this mapping provides valuable insights into the evolving landscape of Artificial Intelligence and halal industry studies. The visualization not only depicts current research trends but also serves as a guide for future research directions. By examining the development patterns presented, researchers can identify areas that remain open to further exploration. These findings

also serve as a foundation for formulating strategies for developing more effective AI technologies that align with the needs of the halal industry. Furthermore, this mapping highlights the significance of collaboration among academics, industry practitioners, and policymakers in driving innovations that enhance the quality, efficiency, and transparency of the global halal ecosystem. With the rapid advancement of AI technology, research in this field is expected to contribute to the creation of a more modern, reliable, and adaptive halal system. Therefore, researchers are encouraged to pursue studies that support the optimal implementation of AI in the halal industry, ultimately benefiting the broader global community.

Figure 10 presents the mapping of research topics related to Artificial Intelligence and the halal industry using the Density Visualization mode in the VOSviewer application. This visualization illustrates the density or intensity of occurrence of various topics in the literature. Brighter colors, such as yellow, indicate areas with a high topic density, whereas green to blue shades represent areas with a lower density.

In this visualization, colors play a crucial role in depicting the distribution of the topic density. Bright yellow areas signify high-density regions, indicating that these topics frequently appear in published research. Conversely, the green to blue areas indicate lower density, suggesting that these topics are either less frequently discussed or are still emerging in academic studies related to AI and the halal industry. Based on this density mapping, several key terms such as *study*, *data*, *research*, *paper*, and *system* appear at the center of the map with bright yellow colors. This indicates that research in the AI and halal industries is heavily reliant on scientific studies, data processing, and the systems utilized in the application of this technology.

The presence of *study*, *research*, and *paper* emphasizes that academic publications play a central role in the development of knowledge in this field. Numerous studies have explored how artificial intelligence can be integrated into the halal industry from both theoretical and applied perspectives. *data* and *system* suggest that research in this area frequently involves data-driven analysis and the development of AI-based systems to support the halal industry.

Interestingly, the presence of the term *Indonesia* in a high-density area indicates that research within the Indonesian context has gained significant attention. This reflects the crucial role of the halal industry in Indonesia—one of the world's largest Muslim-majority countries—in advancing AI-based technology. Studies conducted in Indonesia appear to contribute significantly to the understanding of AI applications in the halal industry, including certification systems, supply chain management, and development of halal technology-based products.

Beyond the dominant central topics, this mapping also highlights keywords such as *technology*, *process*, *approach*, *algorithm*, and *product*, which exhibit a high density around the map's core. This suggests that research in this field extensively discusses the technological aspects and methodologies employed in AI implementation in the halal industry.

- *Technology* reinforces that AI research in the halal industry is not solely conceptual, but also focuses on the development and application of new technologies.
- *Process* and *approach* indicate that studies have frequently examined methods to optimize AI-based systems in the halal industry.
- *Algorithm* has emerged as a dominant topic, signifying that innovations in algorithm modeling are crucial for enhancing the efficiency and accuracy of AI-driven systems.
- *Product* highlights how AI is leveraged in halal product development and certification, including an analysis of the halal-haram status of various products.

The high density of these topics reflects the growing academic interest in AI applications within the halal industry, particularly in terms of operational efficiency, accuracy of halal certification systems, and development of more innovative and reliable technology-driven halal products.

However, some topics appear in areas with darker colors, indicating that their occurrence frequency is lower than that of the main topics. Keywords such as *halal cosmetic*, *religiosity*, *province*, and *trends* appear on the periphery of the map with a lower density.

Although these topics have not yet become the central focus of AI and halal industry research, their presence remains significant as they open opportunities for further exploration. For instance:

- *Halal cosmetic* suggests that Research on artificial intelligence in the halal cosmetics industry is still limited. AI has the potential to be utilized in cosmetic ingredient analysis, halal certification, and the marketing of halal products to Muslim consumers.
- *Religiosity* indicates that the relationship between religious aspects and AI technology remains under-explored. However, consumers' levels of religiosity may influence their acceptance of technology in determining a product's halal status.
- *Province* implies that regional studies or variations in AI implementation in the halal industry are still minimal. In reality, the application of this technology may differ depending on local regulations and infrastructure.
- *Trends* highlight that research on the evolving trends of AI technology in the halal industry can still be expanded, such as sustainability aspects, the digital economy, and AI-driven marketing strategies.

These topics present research gaps that warrant further exploration, and offer potential areas for future studies.

Overall, this density mapping provides valuable insights into research trends in the AI and halal industries. By understanding the distribution of topic density, researchers can identify emerging trends and uncover gaps that require further investigation. Some key implications of this mapping include the following.

1. Increased Focus on Technological and Methodological Aspects
   Topics such as *technology*, *algorithm*, and *process* indicate that the current research heavily discusses the technical aspects of AI in the halal industry. Future research could delve deeper into optimizing these technologies, for example, in AI-based halal certification, halal supply chain management systems, and the automated detection of halal and non-halal content in products.
2. Expansion of Research into Underexplored Sectors
   Topics such as *halal cosmetic* and *religiosity* currently have lower density, but possess significant potential as future research areas. The application of AI in halal cosmetics and an understanding of religious factors in AI acceptance could become crucial aspects that require further study.
3. Development of Region-Based Studies and Industry Trends
   The presence of keywords, such as *province* and *trends* suggests that regional studies and industrial trend analyses remain limited. However, geographical factors and market trends play a substantial role in the implementation of AI in the halal industry.

Thus, this mapping serves as a strategic reference for designing more relevant research agendas that can contribute significantly to future academic advancements. Researchers are encouraged to utilize these findings to develop more comprehensive and applicable studies, ultimately optimizing AI to support a modern, efficient, and reliable halal industry.

Conclusion

Several conclusions can be drawn based on the findings and discussion regarding the development of AI studies in the halal industry. First, the number of publications related to the role of AI in the halal industry reached 95, with a trend indicating significant growth in recent years. This reflects the increasing attention of academics, practitioners, and policymakers toward the application of AI in various aspects of the halal industry. Second, in terms of authorship, one prominent contributor is Salaheldeen Mohamed, who has been recorded as the most prolific author with a total of four publications. His consistent contributions highlight his active role in advancing the research in this field. The most cited work in this area is the study by Shah Alam S. and Mohamed Sayuti N., titled *"Applying the Theory of Planned Behavior (TPB) in Halal Food Purchasing,"* published in the *International Journal of Commerce and Management* in 2011. This study ranks first, with a total of 493 citations, demonstrating its significant impact on understanding Muslim consumer behavior in halal food purchasing, making it a key reference for other researchers in the field.

Third, in terms of publication outlets, the *Journal of Islamic Marketing* leads with seven published articles, indicating its dominance as a primary platform for marketing research based on Islamic values, including trends and innovations in the halal industry. *Universiti Teknologi MARA* has emerged as the institution with the highest number of publications, totaling six. This highlights

its leading role in research in this field, particularly within the Southeast Asian region. At the national level, Indonesia and Malaysia jointly dominate the list of countries with the highest number of publications in artificial intelligence and national finance studies, each contributing 39 publications. This dominance reflects the strong interest of academics and researchers from both countries in the development of intelligent technology integrated with national financial needs, given their strategic roles as centers of Islamic economics and finance in the Asian region.

Fourth, topic mapping revealed that the most prominent keywords in this research trend included *study, research, data, technology, approach, system,* and *market,* reflecting the primary focus of research in this area. Topics related to *supply chain, blockchain,* and *trust* have emerged as new research trends, highlighting efforts to enhance traceability, logistics efficiency, and consumer trust in halal products using AI and blockchain technology. As the demand for transparent and verifiable systems has grown, studies on blockchain in national finance have become increasingly relevant and promising. In terms of research density, several terms fall into lower-density areas such as *halal cosmetic, religiosity, province,* and *trends.* This suggests that these topics appear less frequently than the primary ones and present significant opportunities for further exploration.

Implications, research limitations, and future research directions

Based on these findings, this study has several important implications for advancing research on the role of artificial intelligence (AI) in the halal industry. An increasing number of publications indicate that academics, practitioners, and policymakers are paying more attention to AI applications in the halal industry. This suggests that AI is no longer merely a conceptual discourse, but is gradually being implemented across various aspects of the halal industry, including marketing, supply chain management, and halal certification. The dominance of publications from Indonesia and Malaysia also reflects the strategic role of these two countries in developing halal technology at a global level. As this research ecosystem continues to grow, the findings are expected to provide tangible contributions to the halal industry, in terms of both improving operational efficiency and establishing more transparent and reliable systems.

However, this study has several limitations. One primary limitation is that the number of analyzed publications is restricted to specific sources, which may not fully represent the entire global research landscape on this topic. Additionally, while bibliometric analysis provides a broad overview of research trends, it has limitations in assessing the substantive quality of each analyzed study. Several topics with lower research density, such as *halal cosmetic, religiosity, province,* and *trends,* indicate potential areas for further exploration but still require more in-depth investigation to understand their relevance and contribution within the context of AI and the halal industry.

Exploring topics with lower research densities could provide promising opportunities for future research. Further studies should focus on how AI can be applied in the halal cosmetics industry, how religiosity influences the acceptance of AI technology in the halal context, and how AI implementation varies based on geographical and regulatory factors across different regions. Additionally, with the growing integration of blockchain technology in the halal industry, more in-depth research on AI and blockchain integration to enhance traceability and transparency in halal products is highly relevant. Studies combining qualitative and quantitative approaches will also provide a more comprehensive understanding of the dynamics of AI development in the halal industry. By doing so, future research can make significant contributions to driving innovation and advancing the halal industry through technology.

Author contributions

Conceptualization: Azwar
Data curation: Azwar
Formal analysis: Azwar
Investigation: Azwar, Abur Hamdi Usman
Methodology: Azwar, Abur Hamdi Usman
Project administration: Azwar
Supervision: Azwar, Abur Hamdi Usman

Validation: Azwar, Abur Hamdi Usman
Visualization: Azwar
Writing – original draft: Azwar, Abur Hamdi Usman
Writing – review & editing: Azwar, Abur Hamdi Usman

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