

Emerging Research Trends in Islamic Finance Compliance, Blockchain, and Halal Governance: A Bibliometric Review

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DOI: <https://doi.org/10.47772/IJRISS.2026.100800788>

Received: 30 August 2026; Accepted: 04 September 2026; Published: 17 September 2026

ABSTRACT

The increasing digital transformation of Islamic economic systems has accelerated scholarly interest in the integration of blockchain technology, compliance mechanisms, and halal governance frameworks. Despite the growing body of literature, a comprehensive understanding of the intellectual structure and emerging research trends within this field remains limited. Therefore, this study employs a bibliometric review to systematically map the knowledge landscape of research on Islamic finance compliance, blockchain technology, and halal governance. Bibliographic data were retrieved from the Scopus database and analyzed using VOSviewer. Two complementary bibliometric techniques, namely bibliographic coupling and keyword co-occurrence analysis, were applied to identify influential publications, thematic clusters, and evolving research themes. The bibliographic coupling analysis revealed four major research streams focusing on halal supply chain integrity, governance and compliance systems, digital traceability and sustainability, and halal logistics transparency. The keyword co-occurrence analysis highlighted blockchain, halal certification, smart contracts, artificial intelligence, transparency, fintech, cybersecurity, and risk management as the dominant themes shaping contemporary research. The findings indicate a significant shift from conventional compliance approaches toward technology-enabled governance systems that enhance transparency, traceability, accountability, and stakeholder trust. Furthermore, sustainability and ESG-related governance practices are emerging as important dimensions within Islamic economic ecosystems. This study contributes to the literature by providing a comprehensive overview of the intellectual and conceptual evolution of the field and offers valuable insights for researchers, policymakers, regulators, certification bodies, and industry practitioners seeking to strengthen governance and compliance through digital innovation. Future research opportunities and strategic directions for advancing technology-driven Islamic governance systems are also discussed.

Keywords: Islamic finance compliance; blockchain technology; halal governance; bibliometric analysis; halal certification; fintech; transparency; traceability.

INTRODUCTION

The rapid growth of the global Islamic economy has increased scholarly and industrial interest in mechanisms that ensure compliance with Sharia principles across financial and commercial activities. Islamic finance, halal certification systems, and halal supply chain governance have emerged as interconnected domains that collectively aim to promote transparency, accountability, ethical conduct, and stakeholder trust (Jaradat & Oudat, 2024). As the global halal economy continues to expand beyond traditional food sectors into finance, logistics, healthcare, tourism, and digital services, ensuring compliance with Islamic principles has become increasingly complex and requires more sophisticated governance and monitoring mechanisms.

Islamic finance is founded on principles of justice, transparency, risk sharing, and the prohibition of interest (riba), excessive uncertainty (gharar), and unethical business practices. These principles distinguish Islamic financial systems from conventional financial models and require robust compliance frameworks to ensure

adherence to Sharia requirements. Similarly, halal governance systems seek to maintain integrity throughout production, certification, distribution, and consumption processes by ensuring that products and services comply with Islamic regulations. Consequently, both Islamic finance and halal industries rely heavily on effective governance structures, compliance mechanisms, and transparent information systems to preserve stakeholder confidence and institutional legitimacy (Abdulrahman et al., 2024).

Despite significant progress in regulatory development and certification practices, numerous challenges continue to affect Islamic finance and halal governance ecosystems. Regulatory fragmentation, differences in certification standards, limited interoperability among institutions, traceability concerns, information asymmetry, and compliance monitoring difficulties have created barriers to efficient implementation (Azam et al., 2021). These challenges are particularly evident in cross-border transactions and international halal trade, where variations in regulatory frameworks and certification procedures can undermine transparency and consumer trust. As a result, researchers and practitioners increasingly recognize the need for innovative solutions capable of enhancing compliance, accountability, and operational efficiency across Islamic economic systems.

Recent technological advancements have introduced new opportunities for addressing these challenges. Emerging technologies such as blockchain, artificial intelligence (AI), smart contracts, cybersecurity systems, and digital traceability platforms have attracted growing attention due to their potential to improve transparency, automate compliance verification, reduce fraud risks, and strengthen governance processes (Khan et al., 2026). Blockchain technology, in particular, has been widely recognized for its ability to provide immutable and decentralized record-keeping systems that support secure transactions and transparent auditing procedures. Likewise, AI-driven analytics and smart contract applications offer opportunities for real-time monitoring, automated decision-making, and enhanced risk management within Islamic financial institutions and halal supply chains.

The increasing integration of digital technologies has also expanded the scope of Islamic compliance research. Contemporary studies increasingly examine the relationship between blockchain-enabled governance, halal certification systems, Sharia-compliant fintech, environmental, social, and governance (ESG) frameworks, corporate governance mechanisms, and sustainable business practices (Hammad, Rahamaddulla, Fauzi, et al., 2025; Shahzad et al., 2025). This convergence reflects a broader transformation in which compliance is no longer viewed solely as a regulatory obligation but rather as a strategic capability that contributes to organizational performance, stakeholder trust, and long-term sustainability.

Given the rapid evolution of this research field, a comprehensive understanding of its intellectual structure and emerging themes is necessary. Although previous studies have investigated specific aspects of Islamic finance, halal supply chains, blockchain applications, and governance systems, a holistic assessment of the knowledge landscape remains limited. Bibliometric analysis offers a systematic approach for mapping research developments, identifying influential publications, uncovering thematic clusters, and revealing emerging research trends (Sohail, 2026). By analyzing relationships among publications, authors, and keywords, bibliometric methods provide valuable insights into the evolution and future direction of a research domain.

Therefore, this study aims to examine the intellectual structure and emerging research trends related to Islamic finance compliance, blockchain technologies, and halal governance through bibliometric analysis. Specifically, the study employs bibliographic coupling and keyword co-occurrence analyses to identify influential research streams, thematic clusters, and evolving areas of scholarly interest. The findings contribute to the literature by providing a comprehensive overview of how digital transformation, governance mechanisms, compliance frameworks, and technological innovations are reshaping Islamic finance and halal governance research. Furthermore, the study offers valuable insights for researchers, policymakers, regulators, certification authorities, and industry practitioners seeking to strengthen transparency, accountability, and compliance within Islamic economic ecosystems.

The present study was conducted with three primary objectives. (1) To examine the intellectual structure of research on Islamic finance compliance, blockchain technology, and halal governance by identifying influential publications and their thematic relationships through bibliographic coupling analysis. (2) To explore the conceptual landscape of the field by identifying dominant and emerging research themes using keyword co-

occurrence analysis. (3) To provide a comprehensive understanding of how digital technologies, governance mechanisms, and compliance frameworks are shaping transparency, accountability, and future research directions within Islamic economic ecosystems.

This study advances existing reviews by integrating bibliographic coupling and keyword co-occurrence analysis to examine the convergence of Islamic finance, digital technologies, and halal governance, culminating in a conceptual framework linking digital technologies, governance mechanisms, compliance effectiveness, and organizational outcomes.

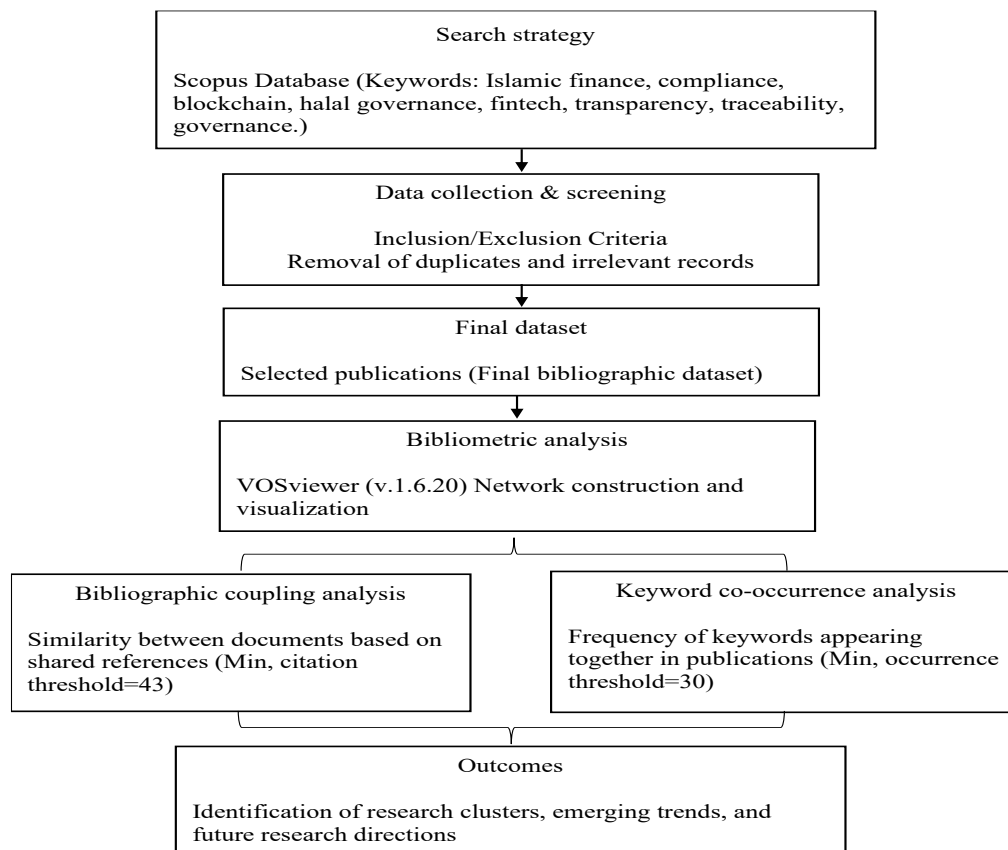


Fig 1. Flowchart of bibliometric process. Source: Authors' own creation/work

METHODOLOGY

Research Design

This study adopts a bibliometric review approach to investigate the intellectual structure and emerging research trends in Islamic finance compliance, blockchain technology, and halal governance. Bibliometric analysis provides a systematic and quantitative method for examining scientific literature, enabling researchers to identify influential publications, thematic developments, and knowledge structures within a specific research domain (Hammad et al., 2025). Scopus was selected as the bibliographic database due to its extensive coverage of peer-reviewed literature, standardized bibliographic metadata, comprehensive citation information, and compatibility with bibliometric analysis. Compared with conventional narrative reviews, bibliometric techniques offer greater objectivity by utilizing citation-based and keyword-based relationships to map scholarly developments and research trajectories.

Data Collection and Screening

The bibliographic dataset was obtained from the Scopus database, which is recognized as one of the largest and most comprehensive indexing platforms for peer-reviewed scientific literature. Scopus was selected because of its extensive coverage of journals across business, finance, management, information systems, and social sciences, making it particularly suitable for studies involving Islamic finance, governance, and digital

technologies. A structured search strategy was developed using keywords associated with Islamic finance compliance, halal governance, blockchain technology, fintech, transparency, certification, traceability, and related governance mechanisms. The retrieved publications were screened to ensure relevance to the research objectives. Duplicate records and documents lacking complete bibliographic information were excluded. The final dataset was exported in CSV format for subsequent bibliometric analysis. A systematic search and data collection procedure was employed, encompassing a clearly defined search strategy, document selection criteria, data extraction process, and bibliometric analytical procedures to ensure methodological transparency and reproducibility.

Bibliometric Analysis Tool

The analysis was conducted using VOSviewer (version 1.6.20), a widely used software application for constructing and visualizing bibliometric networks (Hammad, Rahamaddulla, Sorooshian, et al., 2025). VOSviewer facilitates the identification of relationships among publications, authors, citations, and keywords through network visualization and clustering techniques. The software was selected due to its capability to generate graphical representations of knowledge structures and to calculate network indicators such as occurrence frequency and total link strength (TLS), which assist in understanding the strength of relationships among research elements. The citation and keyword occurrence thresholds were established to generate focused and interpretable bibliometric networks, ensuring that the analysis captured publications and keywords with sufficient relevance and connectivity within the research domain.

Bibliographic Coupling Analysis

Bibliographic coupling analysis was employed to explore the intellectual foundations of the research field. This technique measures the degree of similarity between publications based on the references they share (Hammad et al., 2025). Documents that cite common references are considered conceptually related and are therefore grouped into thematic clusters. To ensure the inclusion of influential studies, a minimum citation threshold of 43 was applied during the analysis. The resulting bibliographic coupling network enabled the identification of major research streams and provided insights into the evolution of scholarly contributions related to compliance systems, governance frameworks, transparency mechanisms, and digital transformation within Islamic finance and halal ecosystems.

Keyword Co-occurrence Analysis

To examine the conceptual structure of the literature, keyword co-occurrence analysis was performed using author keywords extracted from the selected publications. This method identifies research themes by measuring the frequency with which keywords appear together within the same documents (Fahima et al., 2025; Hammad, et al., 2025). Keywords exhibiting strong co-occurrence relationships are grouped into clusters representing interconnected research topics. A minimum occurrence threshold of 30 was established for keyword selection. The resulting network visualization provided insights into dominant research themes, emerging topics, and evolving scholarly interests within the field. Furthermore, the analysis facilitated the identification of conceptual linkages among blockchain technology, halal governance, Islamic finance compliance, fintech innovation, transparency, and risk management.

Research Framework

The methodological procedure consisted of four sequential stages. First, relevant publications were retrieved from the Scopus database using predefined search terms. Second, the collected records were screened and refined according to the study objectives. Third, the finalized dataset was imported into VOSviewer for network construction and visualization. Finally, bibliographic coupling and keyword co-occurrence analyses were performed to identify influential publications, thematic clusters, and emerging research trends. The overall framework provides a comprehensive understanding of the intellectual and conceptual evolution of research on Islamic finance compliance, blockchain, and halal governance.

Tab 1. Top 10 documents in bibliographic coupling analysis

Rank	Publications	Scope	Citations	TLS
1	Ali & Suleiman (2018)	The multifaceted dimensions of food integrity within the halal supply chain	114	89
2	Tan et al. (2017)	The influence of external supply chain integration on halal food integrity	89	80
3	Rahman & Razimi (2023)	Halal Biotechnology Products: Supply Chain Compliance and Integrity Risks	10	70
4	Roy & Srivastava (2022)	The Safety–Quality Perspective on Food Chain Integrity: Implications for Consumer-Centred Food Chain Governance	24	45
5	Randeree (2019)	Challenges within Halal Food Ecosystems: Evidence from the United Arab Emirates	51	37
6	Ling & Wahab (2020)	Food Supply Chain Integrity: Beyond Food Safety and Quality	58	36
7	Azmi et al. (2020)	Types of Risks in Halal Food Supply Chains: A Literature Review	10	30
8	Handayani et al. (2022)	Ensuring Halal Food Supply Chain Integrity through Halal Suppliers: A Bibliometric Review	63	28
9	Tieman et al. (2019)	Blockchain Technology for Enhancing Halal Integrity: Perspectives of Halal Certification Bodies	40	22
10	Alrobaish et al. (2022)	Assessment of food integrity culture in food businesses through method triangulation.	17	15

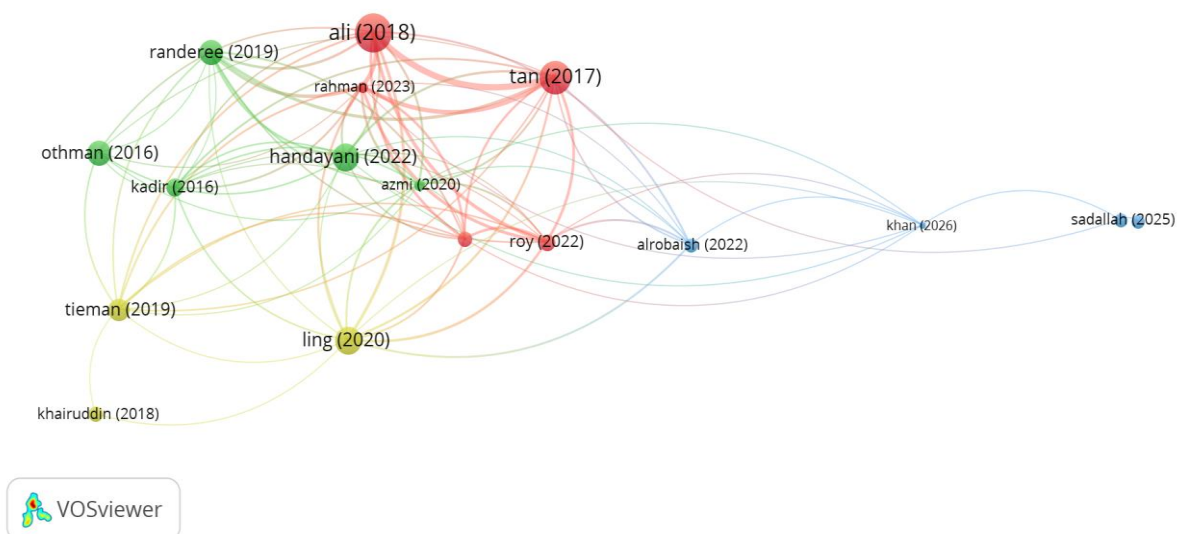


Fig 2. Bibliographic coupling of Industry 5.0 and artificial intelligence. Source: Authors' own creation/work

Cluster 1 (Red): Halal Supply Chain Integrity, Integration, and Biotechnology Compliance

The control of multiple dimensions of food integrity within halal food supply chains (FSC) is necessary, such as the raw material, the food production process, the service operation, and the consumer-related component; monitoring and governance are key aspects of food integrity to prevent breakdowns between the various steps of the chain (Ali & Suleiman, 2018). The external integration, enabled by the halal assurance systems, is seen to improve compliance with halal standards, to increase collaboration between the different actors in the supply chain, and to increase the operational outcomes, such as product quality and operational cost efficiency; customer integration represents one of the most important linkages between the assurance practices and outcomes (Tan et al., 2017). The process of producing halal products involves a complete alignment of the supply chain, from the farm to the fork, where the products need to be produced under the guidance of Shariah principles, a structured halal supply chain management, and a continuous compliance mechanism to ensure product integrity in technologically advanced production environments and to guard against new integrity threats (Rahman & Razimi, 2023). The integrity of halal production using biotechnology also relies on the uniformity of halal production principles from the initial production stage to the final stage, with integrated production chain governance and risk management to guarantee the integrity, authenticity, and compliance of products through their entire production cycle (Roy & Srivastava, 2022).

Cluster 2 (Green): Halal Supply Chain Governance, Integration Challenges, and Organizational Compliance

Noted is the literature from halal suppliers organized around the issues of supply chain integration, halal logistics, halal lifestyle, and compliance to halal standards, with literature mapping (bibliometric mapping) that shows from literature that there are roles that are included in the literature and the authors who created it, and the literature that cited it, and the keywords that are used in literature, it is known that the roles of suppliers starting from upstream to downstream are included in achieving halal integration and strengthening knowledge development in halal food supply chain systems (Handayani et al., 2022). The global market of halal foods has been in a phase of rapid growth, especially for Malaysia as a hub for halal food, and is paralleled by regulatory development, the establishment of certification systems and institutional support, while there are still challenges related to consumer awareness, segregation of halal and non-halal products, traceability and compliance with the halal certification and enforcement by stakeholders in the halal supply chain (Kadir et al., 2016). Operational problems arise regarding interoperability, non-unified certification standards, regulatory differences, and differences among stakeholders in the food supply chain, as inconsistencies in the certification systems affect consumer confidence and reveal weak points in governance, compliance, and cross-border halal food supply chain systems (Randeree, 2019). Higher levels of knowledge, assurance practices, and commitment to the institution have been found as factors affecting halal compliance in the food industry, and the differences identified between multinational companies and SMEs showed that human capital, internal governance, adherence to certification, and strategic management are important aspects of maintaining halal integrity and effectiveness of implementation (Othman et al., 2016).

Cluster 3 (Blue): Food Integrity Systems, Digital Traceability, and Sustainability-Driven Organizational Performance

Food integrity culture is defined as a holistic approach that involves human perception, operational performance, technical controls, and managerial control; food integrity is enhanced by employing integrated assessment tools such as climate perception, operational performance indicators, and food fraud vulnerability diagnostics in food organizations (Alrobaish et al., 2022). Despite the ongoing challenges of implementing these technologies in practice at the SME level and limitations in the systems, and the questionable benefits of adopting AI and blockchain, the integration of AI and blockchain in halal supply chains can be expected to benefit the integrity of halal products, with technology playing a role in improving halal integrity performance through building trust, increasing the efficiency of the supply chain, and through data-driven certification processes (Khan et al., 2026). Academic integrity, competence, personal objective orientation, and perceived stress influence academic performance in an AI-supported environment, while the impact of ChatGPT on academic performance interacts with these variables and strengthens the competence-related effects on academic performance and increases the stress level of the users (Sadallah et al., 2025). In the hotel industry, sustainable performance and customer trust

are supported by green organizational practices, such as green human resource management, corporate social responsibility, and eco-friendly corporate image, with environmental responsibility and ecological motivation being associated with better organizational performance, as well as customer satisfaction and trust in the organization (Sun et al., 2023).

Cluster 4 (Yellow): Food Integrity Frameworks, Halal Logistics Compliance, and Supply Chain Transparency

Food integrity is perceived as a multi-dimensional concept that goes beyond food safety and quality assurance to include food defense and involves a range of farm-to-fork supply chain management, traceability, and communication technologies that introduce greater transparency and overcome the shortcomings of existing approaches like HACCP in protecting against intentional and unintentional contamination hazards (Ling & Wahab, 2020). Contamination risks, non-compliance problems, and consumer perceptions are key factors affecting the management of halal supply chains, while blockchain-based systems, efficient segregation of halal logistics, and standardized communication protocols throughout the transport, storage, and documentation processes improve not only the traceability of the chain but also ensure its regulatory compliance and end-to-end halal integrity in global markets (Tieman et al., 2019). The integrity in the storage and logistics aspects of the Halal warehouse system is crucial in order to ensure the prevention of cross-contamination and the continuity of the Halal supply chain, which is important in the context of regulating the compliance of halal warehouses (Khairuddin et al., 2018).

Table.2 Summary of Bibliographic coupling analysis

Cluster & colour.	Cluster label	Num of publications	Representative publications
1 (red)	Halal Supply Chain Integrity, Integration, and Biotechnology Compliance	5	(Ali & Suleiman, 2018), (Tan et al., 2017), (Rahman & Razimi, 2023), (Roy & Srivastava, 2022)
2 (green)	Halal SuppHalal Supply Chain Governance, Integration Challenges, and Organizational Compliance	5	(Handayani et al., 2022) (Kadir et al., 2016), (Randeree, 2019), (Othman et al., 2016)
3 (blue)	Food Integrity Systems, Digital Traceability, and Sustainability-Driven Organizational Performance	4	(Alrobaish et al., 2022), (Khan et al., 2026), (Sadallah et al., 2025),(Sun et al., 2023)
4 (yellow)	Food Integrity Frameworks, Halal Logistics Compliance, and Supply Chain Transparency	3	(Ling & Wahab, 2020), (Tieman et al., 2019), (Khairuddin et al., 2018)

Co-occurrence analysis

Table 3 presented top keywords in this research area from search string and figure 3 illustrates visualized map by VOSviewer.

Table.3 Top 15 keywords in the co-occurrence of keywords analysis

Rank	Keyword	Occurrences	TLS
1	blockchain	15	22

2	smart contracts	6	12
3	halal	7	9
4	artificial intelligence	5	8
5	blockchain technology	7	8
6	traceability	3	7
7	cybersecurity	3	6
8	fintech	3	6
9	secure data sharing	3	6
10	transparency	4	6
11	supply chain	6	6
12	integrity	7	5
13	halal certification	7	4
14	risk management	4	4
15	halal supply chain	3	4

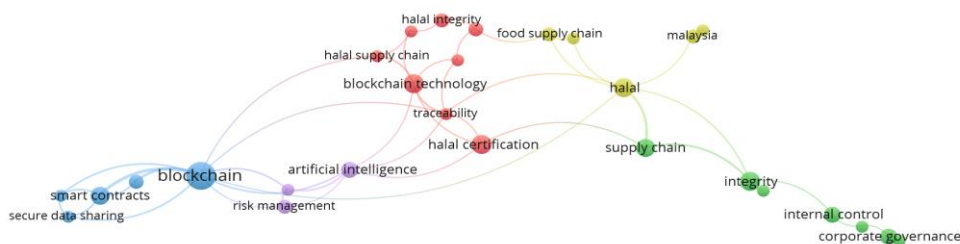


Fig 3. Co-word analysis. Source: Authors' own creation/work

Cluster 1 (Red): Blockchain-enabled smart supply chains for secure, transparent, and compliant digital systems

Combined public-private architectures in blockchain-based healthcare systems decrease the load on the computational mechanisms employed, while enabling secure peer-to-peer communications between the IoT devices and SDN controllers, which facilitates efficient and secure handling of electronic health records with enhanced authorization, compliance, integrity protection, and scalability in existing healthcare infrastructures to ensure safe and effective medical information processing (Goel et al., 2024). The cross-pollination of blockchain

and reinforcement learning facilitates the maintenance of a secure and transparent supply chain with automated smart contract enforcement and a self-adjusting aspect, ensuring compliance without relying on human oversight, while adaptive learning algorithms enhance decision-making, forecast potential risks, and boost logistics efficiency, thereby creating a comprehensive system of supply chain compliance that is real-time, secure, and self-learning (Sarathy et al., 2024). An ERP-based traceability system supports the monitoring of the halal beef supply chain by tracking the product from the upstream to the downstream process, ensuring it meets the halal certification standards through the integration of inventory, procurement, and manufacturing data, and by providing a framework for fast verification, counterfeit prevention, and consumer trust (Hijrah Abd Kadir et al., 2024). The adoption of blockchain and IoT in halal supply chain systems demonstrates that there are countries with advanced implementation such as Malaysia and Indonesia, where transparency and traceability in the halal supply chain are enhanced, and countries with limited adoption, such as the Philippines, where there are gaps in research, policy, and technological integration in the halal product movement systems, suggesting a need for collaboration, innovation, and regulatory frameworks to increase the integrity and efficiency of halal product movement systems (Ilisan et al., 2025).

Cluster 2 (Green): Internal control systems, corporate governance, and sustainability-oriented financial integrity for improving compliance, transparency, and decision-making in organizations

In dairy industries, the integration of logistics processes and green supply chain practices increases data analytics performance by delivering sustainable and eco-friendly logistics and supply chain integration that supports the performance of data analytics, which improves real-time decision-making, resource optimization, regulatory compliance, and operational efficiency in an industrial environment (Ahmad et al., 2025). The internal control processes of financial management in mosques have revealed weaknesses in documentation, cash handling, and compliance with procedures, signifying the need for better systems of financial monitoring and technological support for systematic recording and strengthening accountability, transparency, and financial management of religious organizations (Wan Ali et al., 2025). Earnings management has a positive association with corporate tax avoidance, whereas strong corporate governance elements like board independence and gender diversity weaken this relationship, highlighting the importance of robust internal audit systems and governance mechanisms for maintaining financial integrity and regulatory compliance in Asian non-financial companies (Furqan et al., 2025). The internal control environments show limited direct connection to sustainable development goals within fraud prevention contexts, where effectiveness relies on the compliance culture, accountability, monitoring systems, and institutional commitment to integrity, which highlights the importance of improving governance to better support sustainable development and fraud prevention measures (Puime Guillén et al., 2022).

Cluster 3 (Blue): Blockchain-enabled secure, scalable, and AI-integrated data management systems for healthcare, smart cities, and advanced analytics applications

The comprehensive approach of blockchain-based decentralized data lake architecture, which integrates distributed storage systems, federated learning, homomorphic encryption, and smart contracts for access control, significantly improves the storage of data needed for AI applications, ensuring scalable, privacy-preserving, and secure data management while offering benefits in terms of retrieval efficiency, reduced costs, and wide applicability across sensitive sectors like smart cities, finance, and healthcare (Gundu et al., 2025). Despite its promising potential to enhance data transparency and cross-institutional data exchange, blockchain technology faces significant challenges, including scalability concerns, regulatory differences, and the need to integrate with existing systems and infrastructure. Blockchain applications in clinical data management offer the potential for secure data sharing, managing consent, maintaining auditability, and achieving interoperability among various healthcare systems, but there are still obstacles to overcome, such as scalability concerns, differences in regulatory frameworks, and the need to connect with legacy systems and infrastructure (Chafik et al., 2026). In a smart city context, Blockchain based smart city data systems provide more security, fraud protection, and regulatory compliance in an AI-driven city environment by sharing data in a decentralized, tamper-proof and transparent manner through smart city data systems by citizen sensors and smart contracts, multisignature encryption, consensus mechanisms, while facing scalability and computational overhead challenges in large-scale urban deployments (Shrivastava et al., 2025). A machine learning-based technique, AOA-CNN-XGBoost, is proposed to improve prediction accuracy when analysing students' psychological and behavioural states by

applying data preprocessing and feature selection for multi-level data granularities in student psychological and behavioural analysis, and the performance of this technique is higher than the traditional CNN and optimization technique (Sharma et al., 2024).

Cluster 4 (Yellow): Sustainable halal food supply chain management integrating green economy practices, food integrity systems, and supplier-driven halal compliance frameworks

Sustainable halal food supply chain systems involve managing sustainable production methods on farms, ensuring the integrity of the final product, guaranteeing food safety and product traceability, and introducing green economy practices in the farm-to-fork process, which aims to meet the sustainability goals and to contribute to consumer trust in the growing halal market while maintaining the ethical principles of food production (Salisu et al., 2025). Food integrity culture frameworks are built using a combination of tools related to human perception, operational performance, and technical vulnerability assessment to provide a comprehensive food integrity management system that not only increases food safety but also decreases the risk of food fraud and strengthens the integrity of the food supply chain (Alrobaish et al., 2022). The results of the bibliometric analysis of the literature on halal food supply chain reveal research clusters such as halal logistics, integration in the food supply chain, halal lifestyle, and supplier management, which indicate the evolution of the studies on halal food chains and can indicate insights into how to increase compliance in the supply chain from upstream to downstream and better strengthen implementation of halal standards in international food chains (Handayani et al., 2022).

Cluster 5 (Purple): Sharia fintech regulation, halal supply chain digitalization, and ESG-driven corporate governance for enhancing transparency, compliance, and ethical financial and business systems

Comparing Sharia fintech regulations in Indonesia and Malaysia, Indonesia lacks legal clarity, consumer protection, and enforceability, with only non-binding fatwas from religious authorities to guide financial technology operations, whereas Malaysia has a structured regulatory regime for supervision, compliance, and consumer protection, which underscores the need for comprehensive legislative modification to ensure the proper governance and operational integrity of Sharia compliant financial technology in Indonesia (Fahamsyah et al., 2025). The combination of AI and blockchain in halal food supply chains overcomes the inefficiencies in traditional halal systems, leading to improved traceability, accuracy in certifications, and fraud prevention, while providing empirical evidence of better sustainability, certification speed, and SME performance, as well as identifying adoption obstacles and suggesting an expanded technology–organization–environment framework for halal supply chain transformation (Khan et al., 2025). ESG performance positively improves corporate corruption risk management in GCC non-financial firms, with risk management committees strengthening this relationship by enhancing oversight and governance quality, demonstrating that integrated sustainability practices and governance structures significantly improve ethical conduct, transparency, and corruption control in emerging market organizations (Hussainey & Al-Hajaya, 2026).

Tab 4. Summary of co-word analysis

Cluster & colour	Title	No. of keywords	Representative keywords
1 (red)	Blockchain-enabled smart supply chains for secure, transparent, and compliant digital systems	8	blockchain technology, traceability, halal certification, halal supply chain
2 (green)	Internal control systems, corporate governance, and sustainability-oriented financial integrity for improving compliance, transparency, and decision-making in organizations	7	supply chain, integrity, corporate governance, internal control

3 (blue)	Blockchain-enabled secure, scalable, and AI-integrated data management systems for healthcare, smart cities, and advanced analytics applications	5	Blockchain, smart contracts, cybersecurity, secure data sharing
4 (yellow)	Sustainable halal food supply chain management integrating green economy practices, food integrity systems, and supplier-driven halal compliance frameworks	5	Halal, food supply chain, food integrity
5 (purple)	Sharia fintech regulation, halal supply chain digitalization, and ESG-driven corporate governance for enhancing transparency, compliance, and ethical financial and business systems	3	Fintech, artificial intelligence, risk management

FINDINGS AND DISCUSSION

This study examined the intellectual and conceptual structure of research on Islamic finance compliance, blockchain technology, and halal governance through bibliographic coupling and keyword co-occurrence analyses. The findings reveal a rapidly evolving interdisciplinary research field characterized by the convergence of digital technologies, governance mechanisms, compliance frameworks, and sustainability-oriented practices. The bibliographic coupling analysis identified four major thematic clusters. The first cluster focuses on halal supply chain integrity, integration, and biotechnology compliance, highlighting the importance of end-to-end governance mechanisms to ensure halal authenticity and product integrity. The second cluster emphasizes halal supply chain governance and organizational compliance, addressing challenges associated with certification systems, regulatory harmonization, stakeholder collaboration, and institutional capabilities. The third cluster centers on food integrity systems, digital traceability, and sustainability-driven organizational performance, demonstrating the increasing role of artificial intelligence, blockchain technology, and sustainability practices in strengthening transparency and consumer trust. The fourth cluster highlights food integrity frameworks, halal logistics compliance, and supply chain transparency, emphasizing traceability systems and risk management approaches that support compliance across global halal markets. These cross-jurisdictional variations suggest that technology-enabled governance models should be contextually adapted rather than uniformly applied, particularly where regulatory requirements and Sharia governance practices differ across Islamic finance markets.

The keyword co-occurrence analysis further revealed the conceptual foundations of the field. Blockchain emerged as the most influential keyword, followed by halal certification, blockchain technology, smart contracts, artificial intelligence, transparency, supply chain, fintech, cybersecurity, and risk management. These findings indicate that contemporary research is increasingly exploring how digital technologies can enhance compliance monitoring, automate certification processes, improve transparency, strengthen governance structures, and support ethical business practices within Islamic economic ecosystems. Overall, the results demonstrate a significant shift from traditional compliance mechanisms toward technology-enabled governance systems. The integration of blockchain, artificial intelligence, fintech innovations, and digital traceability tools is reshaping how Islamic finance institutions and halal supply chains manage compliance, accountability, and stakeholder trust (Arief et al., 2026). Furthermore, sustainability considerations and ESG-related governance practices are becoming increasingly important components of future research directions. The implementation of emerging technologies in Islamic finance is influenced by scalability, interoperability, cybersecurity, legacy system integration, regulatory fragmentation, and technological capabilities, requiring their strategic alignment with established Sharia governance and compliance frameworks.

Theoretical Implications

This study contributes to the literature in several important ways.

First, it provides a comprehensive mapping of the intellectual structure of research at the intersection of Islamic finance compliance, blockchain technology, and halal governance. By identifying major thematic clusters, the

study extends existing knowledge regarding the evolution of compliance-related research within Islamic economic systems. Second, the findings support the growing theoretical argument that technological innovation functions as a governance-enabling mechanism rather than merely an operational tool. The prominence of blockchain, smart contracts, artificial intelligence, and traceability systems suggests that digital technologies increasingly serve as instruments for enhancing transparency, reducing information asymmetry, and strengthening institutional trust (Nawaz et al., 2025).

Third, the study contributes to governance and compliance theories by demonstrating the interconnected relationship between regulatory compliance, organizational governance, technology adoption, and sustainability performance. The emergence of ESG-related themes indicates that compliance is evolving beyond legal obligations toward broader concepts of ethical governance and sustainable value creation. Finally, the conceptual relationships identified through keyword analysis provide a foundation for future theory development concerning digital transformation in Islamic finance and halal ecosystems. Future scholars may utilize these findings to develop integrated frameworks that combine technological, governance, and sustainability perspectives.

Managerial Implications

The findings provide several practical implications for managers, policymakers, regulators, certification authorities, and industry practitioners. For Islamic financial institutions, blockchain-enabled systems have the potential to enhance transparency, reduce operational risks, enhance auditability, and facilitate real-time compliance monitoring. Financial managers should consider integrating digital technologies into governance and risk management frameworks to strengthen stakeholder confidence and operational efficiency (AlSalih, 2025; Badawi, 2026; Teknologi et al., 2025). For halal certification bodies and supply chain managers, digital traceability systems offer opportunities to improve product authentication, certification verification, and supply chain visibility.

The adoption of blockchain-based certification systems can reduce fraud risks and improve consumer trust in halal products. Regulators and policymakers can utilize the findings to develop harmonized standards and regulatory frameworks that facilitate interoperability across different jurisdictions. Improved regulatory coordination may address existing challenges associated with certification inconsistencies and cross-border compliance issues. For business organizations, the integration of ESG principles, sustainability initiatives, and digital governance mechanisms can contribute to enhanced organizational performance, improved reputation, and stronger stakeholder relationships. Managers should therefore view compliance as a strategic capability that supports long-term competitiveness and sustainable growth. Financial institutions should strengthen digital capabilities and integrate technological systems with Sharia compliance processes, while regulators, Sharia authorities, and halal certification bodies should establish coherent governance standards, digital traceability protocols, and transparent verification mechanisms.

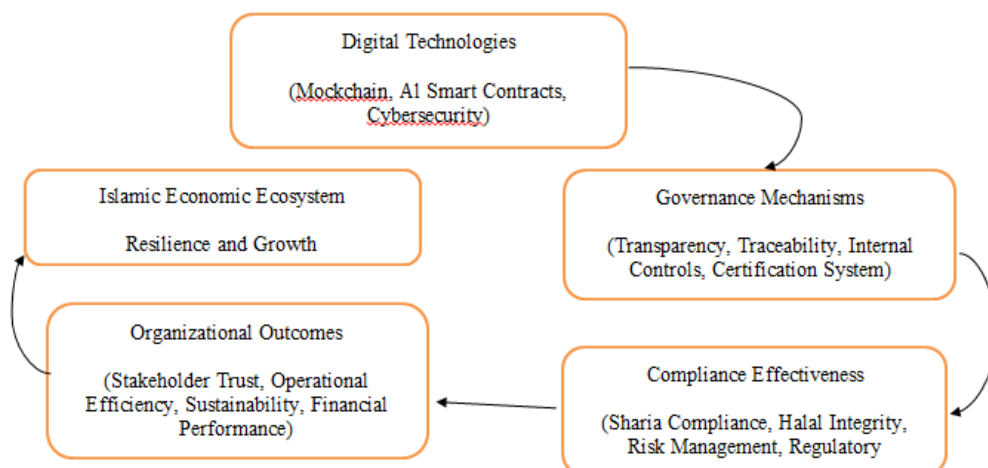


Figure 4: Conceptual framework of the study

Limitations and Future Research

This study is subject to several limitations that provide opportunities for future research. First, the analysis relied exclusively on the Scopus database, which may limit the coverage of relevant publications indexed elsewhere. Future studies could conduct cross-database validation using Web of Science or other complementary bibliographic databases (Hammad et al., 2025). Second, the citation and keyword occurrence thresholds applied to construct interpretable bibliometric networks may have reduced the representation of recent publications with limited citation accumulation. Future research could therefore examine alternative threshold levels or conduct longitudinal analyses to capture the evolution of emerging research themes.

Furthermore, comparative studies across countries and regions could provide deeper insights into how differences in regulatory environments, digital infrastructure, and Sharia governance systems influence technology-enabled governance (Hammad et al., 2026). Future studies could also employ complementary bibliometric techniques, such as co-citation and thematic evolution analyses, to examine the development of the field from different perspectives. Finally, empirical research is encouraged to investigate regulatory harmonization, technological interoperability, institutional readiness, Sharia governance integration, and stakeholder acceptance of blockchain- and AI-enabled governance mechanisms within Islamic finance and halal ecosystems.

CONCLUSION

This study explored the intellectual and conceptual development of research related to Islamic finance compliance, blockchain technology, and halal governance through bibliometric analysis. Using bibliographic coupling and keyword co-occurrence analyses, the study identified the major research streams, influential publications, and emerging themes shaping this interdisciplinary field. The findings reveal that blockchain technology, halal certification systems, digital traceability mechanisms, artificial intelligence, and governance frameworks constitute the primary pillars of contemporary research. The growing integration of these technologies demonstrates a transition toward more transparent, accountable, and efficient compliance systems within Islamic finance and halal industries.

The study also highlights the increasing importance of sustainability and ESG-oriented governance practices, suggesting that future research will continue to explore the relationship between digital transformation, ethical governance, and organizational performance. By providing a comprehensive overview of the knowledge structure within this domain, the study offers valuable insights for researchers, policymakers, regulators, and industry practitioners seeking to strengthen compliance and governance mechanisms in Islamic economic ecosystems. Future studies may expand the analysis by incorporating multiple databases, longitudinal investigations, and advanced bibliometric techniques such as co-citation analysis and thematic evolution analysis to further enhance understanding of emerging research trends.

Use of AI Tools Declaration

AI-assisted tools were used solely to support language refinement and manuscript preparation. All bibliometric analyses, interpretation of findings, and scholarly conclusions were independently reviewed and verified by the authors.

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