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Corresponding author:
auliaistna3@gmail.com

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BUILDING A HALAL INNOVATION ECOSYSTEM: A QUALITATIVE MULTIPLE CASE STUDY OF CROSS-SECTOR COLLABORATION IN INDONESIA

Aulia Itsna Karimah[1]
[1]*Universitas Islam Negeri Semarang, Indonesia*

ABSTRACT

Objective: This study examines how cross-sector collaboration shapes the development of the halal innovation ecosystem in Indonesia and proposes a conceptual framework that explains the interactions among stakeholders in fostering sustainable halal innovation.

Research Design & Methods: This study employs a qualitative multiple-case study design based on 36 semi-structured interviews with representatives from government agencies, universities, the halal industry, the Halal Assurance Agency (BPJPH), Halal Certification Bodies (LPH), Islamic financial institutions, industry associations, and micro, small, and medium-sized enterprises (MSMEs). Data were analyzed using thematic analysis and cross-case analysis to identify recurring patterns of collaboration and stakeholder interactions.

Findings: Six interrelated themes emerged: shared vision and strategic alignment, knowledge creation and sharing, technology transfer and innovation adoption, collaborative governance, halal assurance and institutional trust, and innovation outcomes and ecosystem barriers. These findings indicate that, although there is a shared vision to strengthen Indonesia's halal industry, collaboration remains fragmented. Key constraints include weak institutional coordination, limited commercialization of research, inadequate technology adoption, and limited access to innovation financing. Halal assurance also extends beyond regulatory compliance by supporting institutional trust and the legitimacy of the halal innovation ecosystem.

Implications & Recommendations: Strengthening the halal innovation ecosystem requires sustained cross-sector coordination, stronger mechanisms for research commercialization and technology transfer, Sharia-compliant and more accessible innovation financing, and enhanced institutional support for halal assurance, particularly for MSMEs.

Contribution & Value Added: This study proposes a Multi-Stakeholder Halal Innovation Ecosystem framework that contextually expands upon Innovation Ecosystem Theory and the Triple Helix Theory by incorporating halal certification bodies, Islamic financial institutions, industry associations, and MSMEs as integral ecosystem stakeholders. This study also highlights strategic alignment, ecosystem readiness, and halal legitimacy as key dimensions for understanding the dynamics of innovation in the halal industry.

Keywords: Halal Innovation Ecosystem; Triple Helix; Collaborative Governance; Halal Certification; Institutional Trust.

JEL codes: O31, O35, L26.
Article type: research paper

INTRODUCTION

The halal industry has evolved from merely a means of fulfilling the religious needs of Muslims to one of the global economic sectors that plays a strategic role in driving economic growth, international trade, and cross-industry innovation. The scope of the halal industry is no longer limited to food and beverage products but now encompasses the pharmaceutical, cosmetics, logistics, tourism, fashion, media, and Islamic financial services sectors. This expansion is driven by the growing global Muslim population, shifting consumer preferences toward products that are safe, high-quality, sustainable, and ethically produced, as well as the strengthening commitment of various countries to making the halal economy a key source of future economic growt (Noviyanti & Hakim, 2025). This development indicates that the concept of "halal" has undergone a transformation from merely an attribute of Sharia compliance to a source of competitive advantage capable of creating added value for businesses and enhancing a country's competitiveness in the global economy (Syakirunn'iam et al., 2025).

The 2024/2025 State of the Global Islamic Economy (SGIE) Report shows that Muslim consumer spending in the Islamic economy continues to grow and is projected to exceed USD 3 trillion in the coming years. This growth not only reflects rising demand for halal products and services but also indicates increasingly fierce competition

among countries in building innovative, integrated, and sustainable halal ecosystems (Noviyanti & Hakim, 2025). Countries such as Malaysia, the United Arab Emirates, Saudi Arabia, Turkey, and Indonesia are no longer focusing solely on strengthening regulations or increasing the number of halal certifications; rather, they are beginning to develop strategies that integrate research, innovation, digitalization, investment, and collaboration among governments, universities, industry, and halal certification bodies. This paradigm shift indicates that the success of the halal industry in the era of a knowledge-based economy is increasingly determined by the ability of various actors to build an innovation ecosystem capable of accelerating knowledge creation, technology transfer, the commercialization of innovations, and the sustainable strengthening of market confidence (Adner, 2017; Jacobides et al., 2018; Sulaiman et al., 2025).

Indonesia occupies a highly strategic position in the development of the global halal industry, supported by the world's largest Muslim population, abundant natural resources, and a continuously growing domestic market. In recent years, the Indonesian government has demonstrated an increasingly strong commitment through the implementation of Law No. 33 of 2014 on Halal Product Assurance, the strengthening of the role of the Halal Product Assurance Agency (BPJPH), the development of halal industrial zones, and the implementation of the Indonesian Sharia Economy Master Plan, which positions the halal industry as one of the main pillars of national economic transformation. These efforts are beginning to yield positive results. The State of the Global Islamic Economy Report 2024/2025 ranks Indonesia as one of the top-performing countries in the development of the Islamic economy, particularly in the halal food and modest fashion sectors, reflecting Indonesia's increasing competitiveness at the global level (Noviyanti & Hakim, 2025).

These achievements have not yet been fully accompanied by the formation of a robust halal innovation ecosystem. Various reports and research findings indicate that the development of the halal industry in Indonesia still faces challenges in the areas of commercializing research outcomes, technology adoption, strengthening innovation capacity, and the effectiveness of collaboration among stakeholders (Ardana & Sugiarti, 2026; Hidayah & Solihah, 2025). Higher education institutions have produced a wide range of research on halal products, food technology, halal assurance systems, and Sharia-compliant business models. However, most of these research findings have not yet been transformed into innovations that can be utilized by the industry. On the other hand, business operators particularly micro, small, and medium-sized enterprises (MSMEs) still face limitations in accessing technology, obtaining innovation support, and accelerating the commercialization of halal products. This situation indicates that the primary challenge in developing Indonesia's halal industry no longer lies in the availability of regulations or the size of the market potential, but rather in the ability to build collaborations that can integrate knowledge, technology, policy, and industry needs into a sustainable innovation ecosystem (Etzkowitz & Zhou, 2017; Rachman & Sangare, 2023).

These various challenges indicate that the development of the halal industry can no longer be viewed as the responsibility of a single institution, but rather as the result of interactions among various interdependent actors in creating, developing, and implementing innovations (Syakirunn'iam et al., 2025). This perspective aligns with Innovation Ecosystem Theory, which views innovation as a collaborative process involving knowledge exchange, resource integration, institutional coordination, and the creation of shared value among various stakeholders (Adner, 2017). Within an innovation ecosystem, the success of an innovation is determined not only by the capacity of individual organizations but also by the quality of relationships, trust, and collaboration mechanisms that enable knowledge to be developed into solutions that provide both economic and social benefits (Jacobides et al., 2018). Therefore, the ecosystem approach is increasingly used to explain how innovation can develop sustainably through cross-sectoral synergy.

One of the most widely used frameworks for explaining collaboration in innovation ecosystems is the Triple Helix Theory, which emphasizes the importance of synergy among universities, industry, and government in generating knowledge, accelerating technology transfer, and promoting innovation-driven development (Etzkowitz & Leydesdorff, 2000; Etzkowitz & Zhou, 2017). The characteristics of the halal industry indicate that such collaboration is not yet fully adequate. Unlike the industrial sector in general, halal innovation is influenced not only by technological, market, and policy aspects, but also by compliance with Sharia principles, halal assurance systems, certification mechanisms, and institutional legitimacy all of which form the basis for consumer trust (Wahab & Mahdiya, 2026). In this context, halal assurance institutions, such as BPJPH and halal inspection agencies, do not merely function as regulators or certification bodies but also serve as facilitators that ensure the credibility of halal innovation throughout the value chain. These conditions indicate that both the Innovation Ecosystem and Triple Helix approaches still require conceptual development to adequately explain the unique dynamics of collaboration within the halal industry, particularly in developing countries such as Indonesia (Khan et al., 2022; Syakirunn'iam et al., 2025).

The growth of the halal industry has spurred various studies examining innovation from diverse perspectives, ranging from consumer behavior, halal marketing strategies, the digitization of certification, blockchain technology, supply chain traceability, to sharia financial governance (Ali et al., 2021; Khan et al., 2022; Syakirunn'iam et al., 2025).Other studies have also shown that digital transformation and strengthened governance can improve the efficiency of the halal certification process and enhance the industry's competitiveness in the global market (Alkadash et al., 2026; Haleem et al., 2020). Nevertheless, most of these studies still focus on improving

the performance of individual components of the halal industry in isolation such as technology, regulation, marketing, or certification systems. In other words, previous research has largely addressed what needs to be developed within the halal industry, but relatively few studies have examined how various actors can establish collaborative mechanisms that foster sustainable innovation.

From a theoretical perspective, most research still adopts either Innovation Ecosystem Theory or Triple Helix Theory as a framework to explain the relationship between universities, industry, and government. Both theories have made significant contributions to understanding the processes of knowledge creation, technology transfer, and cross-sectoral innovation (Adner, 2017; Etzkowitz & Zhou, 2017). Its application in the context of the halal industry still has several limitations. First, most studies have not integrated the role of halal certification bodies as actors that influence the legitimacy, trust, and success of innovation. Second, previous studies have predominantly used quantitative approaches or conceptual analyses, and thus have not been able to capture the dynamics of relationships, negotiation processes, and patterns of collaboration among stakeholders that emerge in practice. Consequently, there remains an empirical and methodological gap regarding how the halal innovation ecosystem is built, maintained, and developed through cross-sectoral interactions in the context of a developing country such as Indonesia. These gaps form a crucial foundation for this study to deeply explore the collaborative mechanisms that shape the Halal Innovation Ecosystem through a qualitative multiple-case study approach.

This study is based on the premise that the development of the halal industry in the era of a knowledge-based economy requires an approach capable of integrating the functions of knowledge creation, innovation development, governance, and halal certification into a single sustainable collaborative system. This study aims to explore how universities, industry, the government, and halal certification bodies establish collaborative mechanisms to shape the Halal Innovation Ecosystem in Indonesia through a qualitative multiple-case study approach. Unlike previous studies, which tended to examine each actor or aspect of the halal industry separately, this study develops a Halal Innovation Ecosystem Framework that explains the relationships among stakeholders, knowledge-sharing mechanisms, co-innovation processes, and the role of halal certification bodies in strengthening the legitimacy and competitiveness of the halal industry. Thus, this study is expected to make three major contributions. First, from a theoretical perspective, this study expands the application of Innovation Ecosystem Theory and Triple Helix Theory by integrating the dimensions of halal governance and halal certification as integral parts of the innovation process. Second, from a practical perspective, the research findings are expected to serve as a reference for universities, industry players, the BPJPH, halal certification bodies, and other stakeholders in strengthening collaboration, accelerating the commercialization of research outcomes, and enhancing the halal industry's innovation capacity. Third, from a policy perspective, the resulting conceptual framework is expected to support the formulation of a more integrated, adaptive, and competitive national halal ecosystem development strategy, thereby strengthening Indonesia's position as one of the world's halal industry hubs.

LITERATURE REVIEW

Innovation Ecosystem Theory

The concept of the Innovation Ecosystem emerged as a response to the limitations of traditional innovation approaches, which positioned organizations as the primary actors in generating innovation. In an increasingly complex business environment, innovation is no longer viewed as the result of a single company's individual activities, but rather as the outcome of interactions among various interdependent actors in creating value and capturing shared benefits (Adner, 2017). This perspective emphasizes that the success of innovation is determined not only by an organization's internal capabilities but also by the quality of relationships among stakeholders (Cunha et al., 2016), institutional coordination, knowledge exchange, and the ability to build sustainable collaborations. The evolution of the Innovation Ecosystem concept reflects a shift from a linear innovation paradigm toward a systemic approach (Costa & Matias, 2020). In conventional innovation models, the innovation process is viewed as a sequence of activities beginning with research, development, production, and culminating in commercialization. In contrast, the Innovation Ecosystem views this process as occurring dynamically through simultaneous interactions among various organizations possessing different resources, competencies, and interests. Innovation depends on the ability of each actor to build complementary relationships, share resources, and manage interdependence within an ecosystem (Adner & Kapoor, 2010; Granstrand & Holgersson, 2020; Jacobides et al., 2018).

The innovation ecosystem concept is not limited to the technology sector but is also used to explain innovation dynamics in sectors such as healthcare, education, energy, manufacturing, and the creative industries. Various studies show that effective innovation ecosystems can accelerate knowledge transfer, enhance innovation capacity, strengthen organizational competitiveness, and foster the emergence of new business models through cross-sector collaboration. Thus, the primary focus of the Innovation Ecosystem lies not only on innovation as an output but also on how relationships among stakeholders are managed to create collective learning processes and sustainable innovation. Although it has become one of the dominant perspectives in innovation studies, the application of the Innovation Ecosystem framework is still dominated by research in technology and manufacturing based sectors. Most studies focus on the relationships between companies, suppliers, customers, and business

partners in creating economic value. As a result, institutional dimensions, social legitimacy, and compliance with certain norms have received relatively little attention. This situation is particularly important in the context of the halal industry, as the success of innovation is determined not only by technological efficiency or market strength, but also by compliance with Sharia principles, the credibility of the halal certification system, and the level of consumer trust. Thus, the application of the Innovation Ecosystem to the halal industry requires a conceptual framework that takes these unique characteristics into account so that it can explain the relationship between innovation, governance, and halal assurance more comprehensively.

Triple Helix Theory

The Triple Helix Theory is one perspective used to explain the development of innovation through collaboration among universities, industry, and government. Developed by Etzkowitz & Leydesdorff (2000) this theory is based on the assumption that the creation of knowledge and innovation is no longer the responsibility of a single institution, but rather the result of dynamic interactions among various actors with complementary roles. Universities serve as knowledge producers, industry as developers and users of innovation, while the government functions to create a regulatory and policy environment that supports the development of innovation (Etzkowitz & Leydesdorff, 2000; Etzkowitz & Zhou, 2017). Unlike conventional approaches to innovation, which have each institution operating independently, the Triple Helix Theory emphasizes the importance of cross-sector collaboration in generating new knowledge, accelerating technology transfer, and fostering knowledge-based economic growth. Through interactive relationships, each actor not only performs its primary function but can also assume roles traditionally held by other actors. For example, universities not only conduct research but can also engage in the commercialization of innovations through business incubators, innovation centers, and industry partnerships. On the other hand, industry is increasingly active in research and development activities, while the government acts as a facilitator that promotes the creation of a conducive innovation environment.

The Triple Helix Theory has been used to explain various forms of collaboration in innovation development, including the development of industrial clusters, technology-based entrepreneurship, and regional economic development (Etzkowitz & Zhou, 2017). This perspective views the quality of the relationship between universities, industry, and government as a key factor in supporting knowledge transfer and the creation of innovation. In the context of the halal industry, the application of the Triple Helix must take into account institutional characteristics not fully addressed by conventional models. The success of innovation depends not only on the relationships among these three actors but also on the existence of institutions with the authority to ensure halal compliance and integrity (Wahab et al., 2026). Halal certification bodies, such as the BPJPH, Halal Inspection Agencies (LPH), and other relevant institutions, play a role in ensuring that the development of products and services remains in accordance with applicable halal regulations. Research by Rachman & Sangare (2023) indicates that the development of a halal ecosystem in Indonesia requires synergy among the government, universities, civil society organizations, and private institutions in the implementation of halal certification programs. This indicates that collaboration in the halal industry involves a broader range of actors than the three main institutions in the Triple Helix model. Therefore, this study uses the Triple Helix as a framework to understand the relationship between universities, industry, and government, while also considering the role of halal certification bodies as key actors within the context of the halal innovation ecosystem.

Halal Innovation Ecosystem

The increasingly complex evolution of the halal industry indicates that innovation can no longer be viewed as a process focused solely on product or technology development. In the context of the halal industry, innovation must integrate economic aspects, Sharia compliance, governance, consumer trust, and sustainability into a mutually supportive system. Therefore, the Halal Innovation Ecosystem perspective is used in this study to explain how various actors collaborate to produce innovations that are not only economically valuable but also meet halal requirements and gain legitimacy from consumers and relevant institutions. Studies on halal industry innovation strategies indicate that strengthening the industry's competitiveness requires the adoption of innovation, cross-sector collaboration, and integrated regulatory support (Syakirunn'iam et al., 2025). Unlike innovation ecosystems in the manufacturing or technology sectors, the halal innovation ecosystem has unique characteristics because the value creation process must take halal requirements into account throughout the halal value chain. This process encompasses product research and development, raw material procurement, production, distribution, certification, and the delivery of products to consumers. Thus, the success of innovation is determined not only by the ability to develop new technologies but also by the ability of all stakeholders to maintain halal integrity, process transparency, and consumer trust in the resulting products (Mohamed et al., 2020; Tieman, 2015). This perspective shows that innovation in the halal industry is a multidimensional process that combines technological, governance, regulatory, and Sharia values.

Various actors make complementary contributions. Universities play a role through research, technological development, and the provision of competent human resources. The industry plays a role in adopting and commercializing innovations to generate added value for the market (Syakirunn'iam et al., 2025). The government creates policies, incentives, and a regulatory environment that support the development of the halal industry.

Meanwhile, halal certification bodies ensure that the processes and products developed comply with Sharia principles and applicable halal standards (Al-Mahmood & Fraser, 2023; Janah & Yazid, 2024). The interaction among these stakeholders forms an interdependent system, meaning that the success of innovation is also determined by the quality of coordination, knowledge exchange, and the trust built among them. The importance of this synergy is also evident in the development of the halal ecosystem in Indonesia, particularly through government collaboration with universities and private institutions in the implementation of halal certification (Rachman & Sangare, 2023). Although research on innovation, supply chains, certification, and the digitalization of the halal industry continues to evolve, the relationship between these various components within a cross-sectoral innovation system still requires further exploration. Some studies focus on specific components, such as supply chain integration and halal integrity (Ali et al., 2021), while others highlight innovation strategies and the competitiveness of the halal industry (Syakirunn'iam et al., 2025). However, how universities, industry, the government, and halal certification bodies build collaborative relationships to generate and develop innovations still requires a deeper understanding. This situation indicates a research gap in explaining the mechanisms of collaboration, knowledge flows, co-innovation processes, and governance that support the development of a halal innovation ecosystem. Therefore, this study views the Halal Innovation Ecosystem as a conceptual framework that explains the integration of various actors, resources, knowledge, and institutional mechanisms in building sustainable halal innovation.

Cross-Sector Collaboration in the Halal Industry

Cross-sector collaboration is increasingly recognized as a key factor in driving innovation in sectors involving multiple stakeholders. Unlike traditional forms of cooperation, which are transactional in nature, cross-sector collaboration emphasizes the process of establishing shared goals, sharing resources, aligning interests, and creating value through sustained interaction among organizations with different backgrounds, functions, and interests (Bryson et al., 2015). In the context of the halal industry, this approach is particularly relevant because the success of developing halal products and services depends not only on the capabilities of a single organization but also on the synergy among educational institutions, the business sector, the government, and halal certification bodies in building an interconnected system. A study by Studi Rachman & Sangare (2023), for example, highlights the importance of government collaboration with universities, civil society organizations, and private institutions in supporting the development of a halal ecosystem in Indonesia. One key aspect of cross-sector collaboration is knowledge sharing. Through the exchange of knowledge, experience, and expertise, each stakeholder can bridge information gaps, accelerate the learning process, and generate solutions that are better adapted to industry needs (Abdillah et al., 2024). In the halal industry, this process encompasses not only the transfer of knowledge regarding technology and product innovation but also the dissemination of understanding about halal standards, halal product assurance systems, and practices for maintaining halal integrity throughout the value chain. Therefore, the quality of knowledge exchange is a key aspect in understanding the effectiveness of cross-sector collaboration.

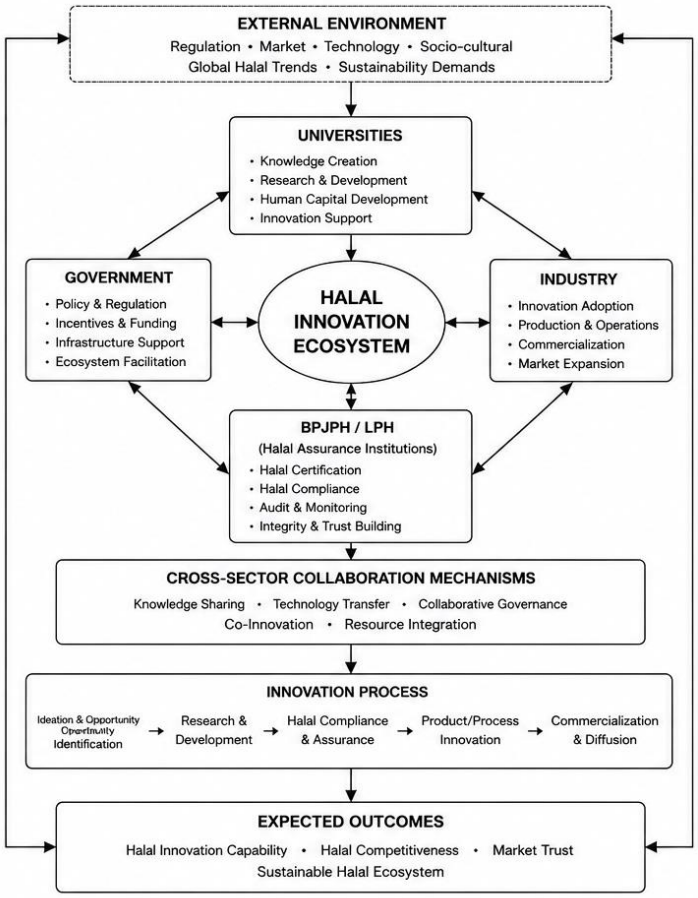
Technology transfer and co-innovation are also key elements in the development of the halal industry. Universities play a role in generating research and innovation, while industry adapts these research findings into value-added products or processes. The government supports this process through policies, incentives, and the development of innovation infrastructure. Meanwhile, halal certification bodies ensure that the innovations developed remain in accordance with Sharia principles and applicable halal standards. Thus, halal innovation is not merely the result of individual research activities but can also emerge through a process of collective learning involving various actors within a collaborative ecosystem (Etzkowitz & Zhou, 2017; Ranga & Etzkowitz, 2013). Building cross-sector collaboration is not a simple process. Differences in organizational goals, institutional cultures, communication barriers, uneven distribution of resources, and low levels of trust among stakeholders can pose obstacles to creating effective collaboration (Bryson et al., 2015). These challenges become even more complex in the halal industry because the innovation process must also take into account Sharia compliance, institutional legitimacy, and consumer trust. Therefore, the success of the Halal Innovation Ecosystem is determined not only by the presence of key actors but also by the quality of collaborative governance which builds trust, aligns interests, and creates sustainable coordination mechanisms among all stakeholders.

Conceptual Framework

Based on a synthesis of Innovation Ecosystem Theory, the Triple Helix Theory, and the literature on the Halal Innovation Ecosystem and cross-sector collaboration, this study posits that the development of the halal industry is the result of dynamic interactions among various stakeholders whose roles, resources, and interests complement one another. In the Indonesian context, universities, industry, the government, and halal certification bodies do not operate independently but rather form a collaborative system that enables shared learning, knowledge exchange, innovation development, and the strengthening of halal governance. Therefore, this study proposes a conceptual framework called the Halal Innovation Ecosystem Framework—a model that explains how cross-sector collaboration shapes a sustainable halal innovation ecosystem. This framework consists of four main components: ecosystem actors, collaboration mechanisms, innovation processes, and outcomes. Ecosystem actors include universities as generators of knowledge and innovation, industry as users and developers of innovation, the government as a policy maker and facilitator, and halal certification bodies as guardians of halal integrity and the legitimacy of the innovation process. These four actors are linked through various collaborative mechanisms, such

as knowledge sharing, technology transfer, collaborative governance, resource integration, and co-innovation. Through these mechanisms, each actor contributes to strengthening innovation capacity, accelerating the commercialization of research results, improving the quality of the halal certification system, and expanding the adoption of innovations by industry players.

Figure 1 Initial Cosnceptual Framework



The interactions among these components subsequently produce various expected outcomes, including an increase in the halal industry's innovation capability, the strengthening of halal product competitiveness, increased consumer confidence in halal integrity, and the formation of an adaptive and sustainable halal ecosystem. Unlike typical Innovation Ecosystem models, which focus on the relationships between universities, industry, and government, the framework developed in this study positions halal certification bodies as strategic actors that influence the legitimacy, credibility, and success of innovation. Thus, this framework not only explains the relationships among stakeholders but also offers a new perspective on the importance of halal governance as an integral part of the innovation process. This conceptual framework serves as the foundation for the data collection and analysis process in this study. Each component of the framework was used as an initial guide to explore how informants interpreted the roles of each actor, built collaborations, addressed various challenges, and developed strategies to strengthen the halal innovation ecosystem in Indonesia. In line with the characteristics of qualitative research, this framework is flexible and can therefore be refined based on empirical findings obtained during the research process. With this approach, this study is expected not only to yield a deeper understanding of the dynamics of cross-sector collaboration but also to develop a conceptual model that can serve as a reference for future research and for the formulation of policies on halal industry development.

METHODS

This study employs a qualitative approach using a multiple case study design to explore how cross-sector collaboration shapes the Halal Innovation Ecosystem in Indonesia. This approach was chosen because the study focuses on gaining an in-depth understanding of the processes, interactions, and experiences of stakeholders in developing halal innovations within real-world contexts. The multiple case study design allows for the contextual exploration of phenomena as well as comparisons across cases to identify patterns and characteristics of collaboration (Yin, 2018). Indonesia was chosen because it has a growing halal industry supported by the Halal Product Guarantee regulations, institutional strengthening through the Halal Product Guarantee Agency (BPJPH),

and policies for the development of the Islamic economy. The unit of analysis for this study is the cross-sectoral collaboration process involving four main groups of actors: universities, halal industry stakeholders, government agencies, and halal product assurance institutions, including the BPJPH and the Halal Inspection Agency (LPH). Case selection and informant selection were conducted using a purposive approach, taking into account their experience, direct involvement, and strategic roles in the development of halal innovations (Patton, 2014). Data were collected primarily through semi-structured interviews, with document analysis serving as a supplementary source. The interview guidelines were developed based on an Initial Conceptual Framework that draws on Innovation Ecosystem Theory and Triple Helix Theory, while allowing informants the flexibility to describe their relevant experiences and collaborative practices. The documents analyzed included Halal Product Guarantee regulations, reports from the BPJPH and KNEKS, the State of the Global Islamic Economy Report, and related scientific publications.

Data collection was conducted in stages until the information obtained was deemed sufficient and no longer contributed substantively to the development of the research theme (Guest et al., 2020). Data credibility was strengthened through source triangulation by comparing interview results from various groups of informants and related documents. Data analysis employed thematic analysis through a process of familiarization with the data, initial coding, theme development, review, and theme definition (Ahmed et al., 2025). The analysis combines a deductive approach based on an initial conceptual framework with an inductive approach to identify new findings from empirical data. Furthermore, within-case and cross-case analyses were conducted to identify patterns of collaboration, similarities, and differences across cases (Yin, 2018). These findings were then used to evaluate and refine the conceptual framework of the Halal Innovation Ecosystem. Research quality was ensured through the principle of trustworthiness encompassing credibility, transferability, dependability, and confirmability supported by source triangulation, member checking, documentation of the research process, and an audit trail (Bowen, 2008). All stages of the research adhered to research ethics, including participant consent, protection of informants' anonymity, and the use of data for academic purposes.

RESULT

Overview of Interview Findings

The analysis was conducted on 36 semi-structured interviews involving informants from the government, universities, industry, BPJPH, Halal Certification Bodies (LPH), Islamic financial institutions, industry associations, and MSME operators. The analysis process utilized thematic analysis through the stages of open coding, axial coding, and theme development until consensus was reached on the main patterns emerging from the data. The analysis yielded six main themes that describe the dynamics of halal innovation ecosystem development in Indonesia, namely: (1) Shared Vision and Strategic Alignment, (2) Knowledge Creation and Sharing, (3) Technology Transfer and Innovation Adoption, (4) Collaborative Governance, (5) Halal Assurance and Institutional Trust, and (6) Innovation Outcomes and Ecosystem Barriers. These six themes are interrelated and demonstrate how various actors interact in building the halal innovation ecosystem through collaboration, knowledge exchange, technology adoption, governance strengthening, and the implementation of halal assurance systems.

Table 1 Overview of Emergent Themes

Theme	Government	Universities	Industry	Halal Institutions	Main Focus
Shared Vision and Strategic Alignment	National policy	Research and innovation	Market competitiveness	Institutional alignment	Common vision but limited strategic alignment
Knowledge Creation and Sharing	Capacity building	Collaborative research	Practical knowledge	Technical guidance	Knowledge exchange remains fragmented
Technology Transfer and Innovation Adoption	Innovation support	Prototype development	Commercialization	Technology validation	Limited innovation adoption
Collaborative Governance	Policy coordination	Research partnership	Cross-sector collaboration	Institutional facilitation	Collaboration remains project-based
Halal Assurance and Institutional Trust	Regulation	Halal research	Consumer confidence	Certification and assurance	Halal assurance strengthens trust
Innovation Outcomes and Ecosystem Barriers	Policy support	Human capital	Innovation investment	Institutional capacity	Funding, coordination, and technology remain major barriers

Source: Authors' analysis based on interview findings.

Although all groups of informants held relatively consistent views on the importance of cross-sector collaboration, there were differences in emphasis depending on their respective institutional roles. Informants from the government placed greater emphasis on policy, coordination, and regulatory strengthening. Universities emphasized knowledge creation, collaborative research, and the commercialization of innovations. Industry players

focus on commercialization, competitiveness, and market needs, while the BPJPH, LPH, and halal certification bodies view the halal assurance system as the foundation of product trust and integrity. On the other hand, Islamic financial institutions and MSME stakeholders place greater emphasis on financing challenges, resource capacity, and technology adoption. These varying perspectives provide a comprehensive picture of the factors that both support and hinder the development of the halal innovation ecosystem in Indonesia.

Theme 1: Shared Vision and Strategic Alignment

The results of the interview analysis show that stakeholders share a relatively similar perception of Indonesia's potential to become one of the global hubs for the halal industry. However, this shared vision has not yet been fully reflected in the alignment of strategies and institutional priorities. The government tends to view the development of the halal industry as part of the national economic development agenda, which requires regulatory support and cross-sectoral coordination. Higher education institutions are more focused on strengthening research, fostering innovation, and enhancing human resource capacity, while industry players emphasize product development, competitiveness, and expanding market access. These differing orientations are reflected in a statement by a ministry official who emphasized that the challenges in developing the halal industry are no longer limited to available potential, but rather to the ability of all stakeholders to align their development efforts: "Indonesia possesses immense potential, both in terms of its Muslim population and natural resources. The challenge is no longer about potential, but rather how all stakeholders can move toward the same goal" (G2). A similar perspective was expressed by a BPJPH official, who noted that the shared national vision has not yet been fully reflected in interagency coordination of implementation: "The national vision is clear, but implementation on the ground is still carried out on a sectoral basis. Each institution has its own targets, so coordination is not yet optimal" (G6). Both statements highlight a discrepancy between the shared understanding of the goals for halal industry development and the implementation of strategies at the institutional level.

A coordination gap was also found in the relationship between universities and industry, particularly regarding the prioritization and direction of research outcomes. Academic informants noted that research and innovation activities are not always based on the industry's actual needs, while industry stakeholders prioritize solutions that can be directly applied in production processes and product development. This difference in orientation indicates that the alignment between the research agenda and market needs is not yet fully coordinated. Overall, 31 out of 36 informants identified a gap between the vision for halal industry development at the national level and the implementation of collaboration at the operational level. The most frequently cited issues include differences in institutional priorities, limited coordination in program implementation, and the lack of optimal alignment between research agendas and industry needs. These findings indicate that although a shared vision has served as a starting point for cross-sector collaboration, its translation into joint strategies and programs has not yet been consistently implemented.

Theme 2: Knowledge Creation and Sharing

The results of the interview analysis show that knowledge exchange has become one of the key activities in building cross-sector collaboration within the halal innovation ecosystem. These activities take place through various forms of interaction, including collaborative research, seminars, training, coordination forums, halal certification mentoring, and business incubation programs. However, the intensity of these activities has not yet been fully accompanied by sustained knowledge integration among institutions. Higher education institutions tend to focus on knowledge development through research and scientific publications, whereas industry players place greater emphasis on the need for technical knowledge that can be directly applied in production processes and product development. This difference in orientation is reflected in a statement by a professor who noted that, "We have many research collaborations with industry and the government. However, not all research results can be translated into innovations ready for adoption" (U1). This statement indicates that the existence of research collaborations does not always lead to continuity in the utilization of knowledge. A similar situation was also observed in inter-institutional information-sharing forums. The director of a halal research center explained that a number of collaborative forums remain focused on the exchange of information and have not been consistently followed up with the development or implementation of joint programs. Thus, the knowledge exchange activities that have taken place have not yet fully established an integrated collaborative process between knowledge producers and knowledge users.

The limitations of knowledge integration are also evident in the suboptimal alignment between research findings, industry needs, and information regarding halal innovations developed by various institutions. From the industry's perspective, one informant emphasized that, "We need a more practical transfer of knowledge. Scientific publications are important, but we need implementation guidelines" (I5). This statement highlights the industry's need for knowledge that is not merely conceptual but can also be translated into operational solutions. Informants from industry associations and halal institutions also identified limitations in access to cross-institutional information, particularly regarding research findings, technological needs, and innovations with potential for joint development. As a result, the information available at each institution cannot yet be fully utilized as a basis for identifying new collaboration opportunities. Overall, 29 out of 36 informants identified limited information integration as one of the

main barriers in the process of knowledge creation and sharing. The most frequently cited barriers relate to the suboptimal dissemination of research findings, limited follow-up on knowledge-sharing forums, and the gap between academic outputs and the practical needs of industry. These findings indicate that the process of knowledge creation and exchange has been taking place through various cross-sectoral activities, but the connectivity and continuity of its utilization remain uneven.

Theme 3: Technology Transfer and Innovation Adoption

The results of the interview analysis indicate that technology transfer and the adoption of innovations still face obstacles during the transition from research and development to industrial application. Collaboration between universities, the government, and industry stakeholders has yielded various research initiatives and halal technology development. However, some research outcomes remain at the prototype stage and have not progressed to validation or commercialization. This situation was primarily highlighted by informants from universities, who pointed out the lack of sustained support once research projects end. A professor in the field of food technology stated, "We have successfully produced various halal product prototypes, but once the research project is completed, the development process usually stops" (U2). This statement illustrates a disconnect between innovation development activities and the stage of their utilization. From an industry perspective, the director of a halal pharmaceutical company emphasized that research-derived technologies must undergo a validation process to ensure their suitability, safety, and feasibility before being implemented on a production scale. Meanwhile, a BRIN representative noted that some of the innovations developed are still at an intermediate Technology Readiness Level (TRL), thus requiring funding support, further testing, and partnerships with industry to reach the commercialization stage. The disparity in needs between technology developers and industry users indicates that the technology transfer process has not yet proceeded consistently from the research stage through to implementation.

Barriers to innovation adoption were also found at the business operator level, particularly among MSMEs, which face resource constraints in accessing and implementing new technologies. MSME informants identified investment costs, limited production facilities, and technical capabilities as issues affecting their decisions to adopt innovations. These conditions differ from the needs of larger-scale industries, which tend to prioritize the availability of proven technologies and readiness for implementation in production processes. Overall, 33 out of 36 informants identified three main barriers to technology transfer and innovation adoption: limited funding for commercialization, suboptimal technological readiness, and weak partnerships between research institutions and industry. These three barriers arise at different stages, ranging from technology development and validation to financing and implementation by businesses. The interview findings also show that the sustainability of innovation is not only related to the success of producing prototypes or new technologies, but also to the ability to bring these development results to the stages of validation, commercialization, and adoption in business activities.

Theme 4: Collaborative Governance

The results of the interview analysis show that collaborative governance has been realized through various forms of cooperation involving the government, universities, industry, BPJPH, Halal Certification Bodies (LPH), and other supporting organizations. These forms of collaboration include joint research, halal certification assistance, training, and inter-agency coordination forums. Although various initiatives are underway, informants noted that their implementation tends to remain piecemeal and dependent on specific programs or projects. The government has placed greater emphasis on the need for coordination among ministries and agencies, while universities and industry have stressed the importance of clearly defining roles and responsibilities in carrying out joint activities. A BPJPH official explained that, "Inter-agency coordination has improved compared to a few years ago, but a permanent coordination mechanism is still needed" (G6). This statement indicates that improved communication and coordination have not yet been fully accompanied by institutional mechanisms that ensure the sustainability of the collaboration. A similar point was raised by a representative from an LPH, who noted that collaboration with universities and industry is still largely confined to specific activities and has not yet evolved into a consistently sustained partnership model. The forms of collaboration that have been established still vary in terms of continuity, coordination, and the involvement of each institution.

Issues regarding collaborative governance are also reflected in the lack of clarity regarding which party is responsible for initiating, coordinating, and ensuring the sustainability of cross-sectoral programs. From an industry perspective, one informant stated, "We are often confused about who the main driving force is in cross-sectoral collaboration" (I6). This statement indicates a lack of clarity regarding leadership and the division of responsibilities in the implementation of collaboration. In addition, informants from various stakeholder groups highlighted the need for policy integration, more structured communication channels, and program coordination involving relevant institutions. Overall, 30 out of 36 informants proposed a more integrated coordination mechanism involving the government, universities, industry, BPJPH, LPH, industry associations, and Islamic financial institutions. These proposals include strengthening inter-institutional coordination, clarifying the roles and responsibilities of each actor, and aligning programs so that collaborative activities are not limited to specific projects. These findings show that the primary needs in collaborative governance are not limited to increasing the number of partnerships, but

also include clarity in coordination structures and the continuity of cooperation among actors within the halal innovation ecosystem.

Theme 5: Halal Assurance and Institutional Trust

The results of the interview analysis show that halal assurance plays a crucial role in the implementation and development of the halal innovation ecosystem, particularly in ensuring compliance with halal requirements and maintaining the integrity of products and production processes. Informants from the government and halal assurance institutions placed greater emphasis on regulatory compliance, consistent oversight, and the protection of halal integrity throughout the supply chain. Meanwhile, industry players view halal assurance as part of a strategy to build consumer trust while also meeting market access requirements. A halal auditor explained that, "Certification is not just an administrative document. What is more important is ensuring halal integrity throughout the supply chain" (H1). This statement underscores the informants' focus on the application of halal principles, which is not limited to the product certification process but also encompasses consistent compliance with halal requirements across supply chain activities. The industry's perspective is reflected in the statement of a director at a halal cosmetics company, who noted that, "Export markets require strong halal assurance. Certification has become a competitive advantage" (I3). Both statements reflect different yet complementary emphases: halal certification bodies focus on maintaining integrity and compliance, while the industry views certification as a key aspect of building product credibility and expanding market opportunities. Thus, halal assurance is a shared concern for regulatory bodies, inspection agencies, and business operators, even though each has different orientations and responsibilities.

At the business implementation level, particularly among MSMEs, meeting halal assurance requirements still faces a number of obstacles. MSME informants highlighted the complexity of certification procedures, limited understanding of technical and administrative requirements, and the need for guidance during the process of meeting halal standards. Several informants also expressed hopes for procedures that are easier to understand, more accessible digital services, and guidance tailored to their business capacity. These conditions indicate differing experiences in accessing the halal assurance system between companies with more established institutional capacity and MSMEs that still require support in meeting certification requirements. Overall, 34 out of 36 respondents stated that halal assurance plays a crucial role in building trust, strengthening product competitiveness, and supporting the sustainability of the halal industry. The aspects most frequently emphasized include consistency in the application of halal standards, the credibility of the certification process, consumer trust, and ease of access for business operators. These findings indicate that attention to halal assurance is not only related to fulfilling certification obligations but also encompasses efforts to maintain halal integrity and ensure that halal assurance mechanisms are accessible to businesses of all sizes.

Theme 6: Innovation Outcomes and Ecosystem Barriers

The results of the interview analysis show that the development of the halal innovation ecosystem in Indonesia has yielded a number of advances, as reflected in increased inter-institutional collaboration, the growth of halal research activities, the expansion of certification implementation, and increased awareness among business actors regarding the importance of innovation. Nevertheless, these various initiatives have not yet been fully connected within an integrated system. Informants identified funding constraints, weak inter-institutional coordination, disparities in human resource capacity, regulatory complexity, and low technology adoption particularly among MSMEs as ongoing barriers. From a financing perspective, a director of an Islamic bank explained that, "Financing for halal innovation is still considered high-risk, so it requires more flexible financing schemes" (F1). This statement illustrates the challenges faced by innovators in securing financing support that aligns with the characteristics of halal technology and product development. Meanwhile, a representative of a halal industry association highlighted the issue of connectivity among ecosystem components, stating that, "Indonesia actually has all the components of the ecosystem. The challenge is how all these components can function as a single, interconnected system" (A1). Both statements indicate that, although various actors and supporting resources are available, their utilization still faces obstacles, both in terms of access to financing and coordination among stakeholders.

Based on the categorization of issues raised by the informants, limited funding was the most frequently identified obstacle, cited by 32 of the 36 informants. The next most common barrier was weak inter-agency coordination, cited by 31 informants; limited human resource capacity, cited by 28 informants; regulatory complexity, cited by 27 informants; and low technology adoption among MSMEs, cited by 25 informants. This pattern of findings indicates that barriers to ecosystem development arise across several interrelated aspects. Funding constraints are primarily related to the sustainability of research and the commercialization of innovations, while human resource constraints affect entrepreneurs' ability to understand and apply new technologies. At the same time, weak inter-institutional coordination and regulatory complexity also affect program implementation and the involvement of various actors in innovation activities. Low technology adoption among MSMEs also indicates that progress in innovation development has not been felt equally by all groups of business actors. Overall, these findings show that the development of the halal innovation ecosystem has led to progress at the institutional level

and in collaborative activities, but still faces challenges in integrating resources, financial support, business capacity, and cross-sector coordination.

DISCUSSION

Reinterpreting Innovation Ecosystems in the Context of the Indonesian Halal Industry

Research findings indicate that the development of halal innovation ecosystems cannot be adequately explained solely by the presence of various organizations operating within the same industry. Rather, it depends on how interdependent actors coordinate their activities, align institutional priorities, exchange knowledge, and mobilize complementary resources to develop and implement innovations. Through these six themes, this study identifies recurring discrepancies between the availability of ecosystem components and the effective integration among them. Although Indonesia has a diverse range of actors including government agencies, universities, industry, halal certification bodies, Islamic financial institutions, industry associations, and micro, small, and medium-sized enterprises (MSMEs) their presence does not automatically guarantee the formation of a functioning innovation ecosystem. This finding aligns with Adner (2017) conceptualization of an ecosystem as an alignment structure in which various partners must coordinate their positions and activities to realize a shared value proposition. These findings also support the view of Granstrand & Holgersson (2020) that an innovation ecosystem consists of an ever-evolving configuration of actors, activities, institutions, and relationships. The findings of this study add an important contextual dimension: in the halal industry, ecosystem alignment must accommodate not only innovation and commercial objectives, but also institutional requirements related to halal compliance and product integrity.

A key insight from this study is that a shared vision and strategic alignment are two interrelated yet distinct conditions. Informants generally acknowledged Indonesia's potential to become a major player in the global halal industry; however, this shared aspiration is not consistently translated into coordinated institutional priorities and joint implementation. This discrepancy broadens the perspective on ecosystem alignment by demonstrating that agreement on broad development goals does not necessarily signify alignment in the activities required to achieve them. As explained by Adner (2017), Participation in the ecosystem and ecosystem alignment are not the same thing: stakeholders may support the same value proposition but still have different expectations, responsibilities, and priorities. In Indonesia's halal industry, government agencies emphasize policy implementation and interagency coordination; universities prioritize research and human resource development; while businesses focus on product development, market access, and operational viability (Wahid et al., 2026).These differences are not inherently contradictory; rather, they become obstacles when stakeholders lack mechanisms to translate their respective priorities into complementary activities. Therefore, these findings suggest that strategic alignment is not merely a prerequisite for a halal innovation ecosystem, but rather an ongoing coordination process that links institutional goals with collaborative innovation activities.

The relationship between knowledge creation, knowledge sharing, and technology transfer provides a second dimension to the innovation ecosystem perspective. The findings reveal that knowledge-generating activities such as collaborative research, training, seminars, and institutional forums already exist. However, the knowledge generated through these activities does not consistently evolve into validated technologies, commercial applications, or solutions adopted by businesses. This discrepancy is significant because knowledge exchange alone does not guarantee innovation at the ecosystem level. De Moortel & Crispeels (2026) explain that interorganizational collaboration contributes to innovation ecosystems through the processes of knowledge creation and value creation that operate at the organizational, interorganizational, and ecosystem levels. The challenges identified in this study relate to these inter-level relationships: knowledge generated by universities must be translated into solutions that address industry needs, while companies must have the capacity and resources to adopt those solutions (Dashti et al., 2024). Barriers identified in technology transfer include limited commercialization funding, inadequate technology validation, and weak research-industry partnerships, thereby indicating a gap between knowledge production and its mobilization across the ecosystem. The concept of ecosystem readiness can be used to describe this condition, which refers to the collective capacity of ecosystem actors to provide the coordination, financing, validation, institutional support, and adoption capabilities necessary to move innovation from the research stage to practical implementation. This concept complements, rather than replaces, technology readiness, as technically mature innovations may still fail to reach the market if the surrounding institutional and commercial frameworks are inadequate.

These findings indicate that the value created by the halal innovation ecosystem extends beyond conventional economic outcomes. Innovation, productivity, market access, and competitiveness remain important, but these are accompanied by the need to maintain halal integrity, institutional legitimacy, and public trust (Khairulazmi et al., 2025). This distinction is highly relevant because halal innovation is not evaluated solely based on technological novelty or commercial potential (Raimi et al., 2023). Its acceptance also depends on whether the relevant products, processes, and supply chain activities comply with halal requirements. Research on halal supply chain integrity has also emphasized the importance of integrating organizational, supplier, and customer processes to maintain halal integrity and improve business performance (Rajendran et al., 2024). Halal supply chain resilience

differs from that of conventional supply chains by emphasizing the preservation of halal integrity amid ever-changing conditions (Harwati et al., 2025; Saima et al., 2024). These studies reinforce the relevance of halal certification as a value dimension of the ecosystem specific to this sector. Therefore, this study conceptualizes halal ecosystem value as a combination of economic value creation and the maintenance of halal legitimacy. The latter is reflected in the credibility of assurance mechanisms, the consistency of halal compliance, and the trust that stakeholders place in the institutions responsible for maintaining halal integrity.

These findings indicate that the distinctive contribution of this study is not to replace existing innovation ecosystem theories, but rather to provide a contextual elaboration for an industry in which innovation and halal legitimacy are institutionally interdependent. The proposed Halal Innovation Ecosystem refers to an analytical framework in which cross-sector collaboration, knowledge mobilization, technology adoption, institutional governance, and halal assurance collectively support the development of innovations that are economically viable and compliant with halal sharia. This conceptualization emphasizes three interrelated conditions: strategic alignment among interdependent actors; the ecosystem's readiness to transform knowledge into applied innovation; and halal legitimacy as an integral dimension of value creation. These three conditions serve as the conceptual foundation for examining why the conventional configuration among universities, industry, and government requires further elaboration in Indonesia's halal industry. The research findings are summarized in Table 2, which shows that the key concepts in Innovation Ecosystem Theory remain relevant for explaining the dynamics of Indonesia's halal industry but require reinterpretation in line with the characteristics of the halal ecosystem. Based on a synthesis of empirical findings and the literature, this study identifies three key conceptual developments: the importance of strategic alignment to address fragmentation among actors; ecosystem readiness as a prerequisite for effective technology transfer; and halal legitimacy as a value dimension that distinguishes the halal innovation ecosystem from innovation ecosystems in general. This study identifies three key developments. First, a shared vision must be supported by strategic alignment to foster effective collaboration. Second, the success of technology transfer is influenced by ecosystem readiness, not merely technology readiness. Third, value creation within the halal ecosystem encompasses not only economic value but also halal legitimacy and institutional trust as sources of competitive advantage. Based on these findings, this study proposes the concept of a Halal Innovation Ecosystem—an innovation system that integrates cross-sector collaboration, institutional governance, and a halal assurance system to create innovations that are both competitive and Sharia-compliant. This conceptual framework serves as the basis for discussing the expansion of the Triple Helix model into a Multi-Actor Halal Innovation Ecosystem in the following section.

Table 2 Reinterpretasi Innovation Ecosystem Theory dalam Konteks Industri Halal Indonesia

The Concept of an Innovation Ecosystem	Previous Literature	Research Findings	Research Contributions
Shared Vision	A shared vision forms the foundation for collaboration within an innovation ecosystem (Adner, 2017; Granstrand & Holgersson, 2020).	All actors share the same vision of Indonesia as a global hub for the halal industry, but implementation remains sector-specific.	A shared vision alone is insufficient to create an innovation ecosystem without strategic alignment among institutions.
Actor Interdependence	Actors are interdependent in creating value propositions (Adner, 2017).	The government, universities, industry, BPJPH, LPH, sharia financial institutions, associations, and MSMEs are interdependent at every stage of halal innovation.	The halal ecosystem exhibits a higher degree of interdependence because it involves both regulatory and religious actors.
Knowledge Sharing	Knowledge exchange enhances collective innovation (Granstrand & Holgersson, 2020).	A significant amount of knowledge has been generated, but it remains scattered across individual institutions, resulting in suboptimal utilization.	A National Halal Innovation Knowledge Platform is needed to integrate knowledge across sectors.
Technology Transfer	Technology transfer serves as the bridge between research and the market (Sari et al., 2026).	Commercialization is still hampered by limitations in funding, coordination, and industry readiness.	The success of technology transfer is influenced by ecosystem readiness, not just technology readiness.
Ecosystem Value	Ecosystem value is generally measured through innovation and competitiveness (Adner, 2017).	The value of the halal ecosystem encompasses innovation, competitiveness, halal integrity, and public trust.	Adding the dimension of halal legitimacy as a source of value creation within the innovation ecosystem.

Source: Researchers' analysis based on interview data and a review of the literature.

Beyond the Triple Helix: Toward a Multi-Actor Halal Innovation Ecosystem

The Triple Helix model provides a relevant starting point for understanding innovation in Indonesia's halal industry because it explains the interactions among universities, industry, and government in knowledge production, technology development, and innovation policy (Etzkowitz & Zhou, 2017; Marlina et al., 2026). The findings of this study confirm the ongoing relevance of these three institutional domains. Universities contribute research and technological knowledge; industry identifies market needs and translates innovations into commercial applications; while government agencies set policies and facilitate the broader institutional environment. However, empirical findings indicate that these three domains alone do not fully represent the institutional configuration involved in halal innovation. The development and implementation of halal products also depend on institutions responsible for halal product certification, inspections and audits, Sharia-compliant financing, industry representation, and adoption at the business level (Ismail et al., 2025). These findings suggest that the analytical boundaries of the halal innovation ecosystem need to be expanded beyond the conventional relationships between universities, industry, and government, without disregarding the explanatory value of the Triple Helix model.

The need for this expansion should not be interpreted as evidence that the Triple Helix model is theoretically inadequate. Cai & Lattu (2022) demonstrate that the Triple Helix and Quadruple Helix models can serve as complementary analytical approaches, and that the choice between them should depend on the empirical context and research objectives. This study adopts a context-sensitive approach. Rather than proposing another helix model simply by adding more institutional categories, this study identifies multi-actor configurations based on the specific functions performed by various stakeholders in the halal innovation process. In these configurations, the government, universities, and industry remain the primary domains for innovation generation, while halal certification bodies, Islamic financial institutions, industry associations, and MSMEs perform complementary functions that influence the development, validation, financing, adoption, and legitimization of innovations. This distinction is important because the number of actors involved, in and of itself, does not guarantee the existence of an integrated ecosystem. Their relevance is determined by their interdependence and by whether their activities are necessary for the shared value proposition of halal innovation to be realized (Adner, 2017; Jacobides et al., 2018).

One of the most important features of this system is the role of halal certification bodies. In the Indonesian context, the Halal Assurance Agency (BPJPH) and the Halal Certification Bodies (LPH) perform distinct yet interrelated functions within the halal product assurance system. The BPJPH is responsible for managing the halal product assurance system and carrying out functions mandated by law, while the LPH conducts halal inspections and testing. Therefore, these institutions should not be treated as interchangeable certification bodies. The functions of each institution contribute to the institutional framework within which halal products and processes are assessed and recognized. Research findings indicate that halal assurance is not merely an additional regulatory activity carried out after innovation is complete. Rather, halal requirements influence product development, raw material selection, production processes, and supply chain management. This means that institutions involved in halal assurance can influence innovation decisions from the early stages, particularly when companies are developing products or technologies that must comply with halal requirements. Research on the development of the halal ecosystem in Indonesia has also highlighted the importance of collaboration between the BPJPH and private institutions including universities and industry-related organizations in facilitating halal certification (Rachman & Sangare, 2023). This study expands on that discussion by situating halal certification bodies within a broader innovation process, rather than examining them solely in relation to the implementation of certification.

Islamic financial institutions constitute another key group of actors in the proposed framework. The study's findings identify financing constraints as a major barrier to the commercialization and adoption of halal innovations. These constraints are particularly relevant when research outcomes require additional investment for validation, scaling up production, acquiring equipment, or entering the market. In this context, Islamic financial institutions are not merely sources of external capital; their financing decisions can influence whether innovations can progress beyond the research and prototyping stages (Sholeh et al., 2026). Therefore, their involvement relates to the link between knowledge production and commercial implementation. This interpretation aligns with broader findings that ecosystem development depends on the coordination of complementary resources and activities, rather than on the isolated capacities of individual organizations (De Moortel & Crispeels, 2026). The current findings do not prove that Sharia finance has become an effective mechanism for financing innovation across the entire ecosystem. Rather, these findings identify its potential strategic role as well as financing gaps that still need to be addressed.

Industry associations and SMEs also play a crucial role in this multi-stakeholder framework. Associations can facilitate communication between businesses and government agencies, convey industry needs, and support the dissemination of information regarding halal standards and innovation opportunities (Rahman, 2024). Meanwhile, SMEs should not be viewed merely as passive recipients of technology developed by universities or large corporations (Maulana, 2024). Their operational experience, product development activities, and responses to consumer demand can provide practical knowledge that forms the basis for setting innovation priorities. However, the findings also indicate that SMEs face constraints in terms of financing, technical capabilities, regulatory understanding, and technology adoption. These constraints can limit their participation in innovation activities, even

when relevant technologies and institutional support are available. Ardiantono et al. (2024) in their study on Indonesian MSMEs, also identified costs, technology, policies, and operational requirements as significant barriers to the implementation of halal supply chains. This evidence supports the need to position MSMEs as both potential contributors to and beneficiaries of the halal innovation ecosystem, while acknowledging the disparities in capabilities that affect their participation.

Therefore, this proposed Multi-Stakeholder Halal Innovation Ecosystem must be understood as a functionally differentiated configuration, not merely an expansion of the number of helices. Its analytical contribution lies in explaining how innovation-generating actors interact with institutions that provide halal certification, financing, coordination, and market-oriented knowledge. These actors are connected through interdependent activities: universities generate knowledge and develop technology; industry and SMEs identify needs, test, adopt, and commercialize innovations; government agencies set policies and facilitate coordination; the BPJPH and LPH carry out their respective functions within the halal certification system; Islamic financial institutions support investment; and industry associations facilitate communication and collective engagement. This configuration is not always hierarchical, and these findings do not imply that any single actor must control the entire ecosystem. Its effectiveness depends on clear institutional responsibilities and the coordination of complementary contributions. Thus, the proposed framework expands the application of the Triple Helix analytical framework by incorporating regulatory, assurance, financial, and intermediary functions that are highly relevant to halal innovation.

Collaborative Governance and Institutional Trust as Enablers of Halal Innovation

The findings indicate that the effectiveness of a halal innovation ecosystem involving multiple stakeholders depends not only on the presence of relevant stakeholders but also on governance arrangements that link their activities. Although the stakeholders identified in this study have participated in collaborative research, halal certification assistance, training, and coordination forums, these initiatives remain somewhat fragmented and dependent on specific programs or projects. This pattern suggests that collaboration has developed at the level of individual activities but has not yet been fully institutionalized as a sustainable coordination framework. This discrepancy aligns with the argument by Ansell & Gash (2008) that collaborative governance requires more than mere participation by various stakeholders; it involves an organized process in which public institutions and non-state actors engage in collective decision-making and pursue shared goals. In Indonesia's halal industry, the existence of joint activities is therefore a crucial foundation, but this does not necessarily indicate that a stable collaborative governance regime has been established (Akram, 2026).

These findings can also be interpreted through the "Collaborative Governance Regime" framework developed by Emerson & Nabatchi (2015), particularly its emphasis on principled engagement, shared motivation, and the capacity for collective action. These six themes indicate that shared motivation has developed to a certain extent, as stakeholders recognize the importance of strengthening Indonesia's halal industry. Principled engagement is reflected in the existence of research partnerships, institutional forums, certification assistance, and other forms of interaction. However, the capacity for collective action remains hampered by unclear role division, fragmented information, limited collaborative funding, and the absence of permanent coordination mechanisms (Bodin, 2017). These conditions help explain why a shared vision does not always lead to coordinated implementation. Therefore, the primary governance challenge identified in this study is not a lack of willingness to collaborate, but rather the limited institutional capacity to sustain cross-organizational collaboration (Lægreid & Rykkja, 2022). This interpretation aligns with recent research emphasizing that the governance architecture of innovation ecosystems shapes how complementary actors coordinate activities and respond to uncertainty (Clough, 2026).

The findings also indicate that trust in institutions and halal assurance is closely linked to the governance of halal innovation. In this study, halal assurance was recognized by government agencies, halal auditors, and business operators as a means of maintaining product compliance and integrity, while industry informants also linked certification to consumer trust and market access. This indicates that halal assurance serves both a regulatory function and a function related to trust. From an institutional perspective, legitimacy is shaped by rules, norms, and shared understandings that determine whether an organization's activities are considered appropriate and credible (Hewege & Perera, 2020). In the halal industry, these dimensions are reflected in the regulatory requirements governing halal products, the professional practices of inspection and assurance bodies, and the expectations of business operators and consumers regarding halal integrity (Ali et al., 2017). Consequently, halal assurance provides an institutional framework through which the credibility of products and production processes can be evaluated.

Trust in the institution should not be equated with consumer trust or viewed as an automatic result of certification. Research findings indicate that trust in halal products depends on the credibility of the assurance process, the consistency of compliance, and the institution's ability to fulfill its respective responsibilities. This distinction is important because the mere presence of a certificate does not indicate that all parties along the supply chain have consistently maintained halal integrity. Rajendran et al. (2024) Demonstrate that supply chain integration and Islamic human resources are linked to the integrity of the halal supply chain as well as the

performance of MSMEs. Harwati et al. (2025) also emphasize that the resilience of the halal supply chain requires maintaining halal integrity amid ever-changing conditions. These studies support the interpretation that halal assurance must be understood as a system of ongoing compliance and coordination, rather than merely a one-time administrative outcome. In this study, the difficulties faced by MSMEs in understanding certification procedures and meeting technical requirements further demonstrate that the effectiveness of assurance arrangements also depends on institutional accessibility and the availability of appropriate assistance.

Therefore, the relationship between collaborative governance and institutional trust can be understood as a mutually reinforcing one. Collaborative governance provides a process through which stakeholders coordinate responsibilities, exchange information, and organize joint activities. Institutional trust, supported by credible halal assurance arrangements, fosters confidence in the rules and procedures governing these activities. If institutional responsibilities are unclear or assurance processes are difficult to access, coordination may become less effective and stakeholder trust may weaken. Conversely, transparent responsibilities, consistent procedures, and easily accessible assurance mechanisms can strengthen the conditions for sustainable collaboration. Recent research on halal certification in Indonesia also highlights the role of collaboration among regulatory, religious, and business stakeholders in fostering institutional trust and broader socioeconomic relationships (Mansur et al., 2025). This study expands on that perspective by linking trust in assurance to broader processes namely, knowledge exchange, technology transfer, financing, and the adoption of innovation.

The findings further indicate that collaborative governance and institutional trust go hand in hand with the resources and capabilities required for innovation. Funding constraints, disparities in human resource capabilities, regulatory complexity, and limited technology adoption are not isolated issues; they affect stakeholders' ability to participate in joint innovation activities. For example, funding constraints can prevent university-developed prototypes from advancing to the commercial production stage, while inadequate technical capacity can limit the ability of SMEs to adopt validated technologies. Weak coordination can further reduce the effectiveness of available support by preventing institutions from aligning their programs and resources. These patterns are consistent with the findings of Ardiantono et al. (2024), which identifies technology costs and supportive policy requirements as key barriers to the implementation of halal supply chains among Indonesian MSMEs. These patterns are also consistent with the argument by Harwati et al. (2025) that the resilience of halal supply chains depends on stakeholders' ability to maintain halal integrity while responding to operational challenges. Therefore, governance arrangements must address not only the coordination of actors but also the disparities in resources and capabilities that shape their actual participation in the ecosystem.

Table 3 A Theoretical Synthesis of a Multi-Stakeholder Halal Innovation Ecosystem

Analytical dimension	Empirical pattern	Theoretical interpretation and contribution
Strategic alignment	Stakeholders share broad development aspirations, but institutional priorities and implementation remain partly fragmented.	Ecosystem participation must be translated into strategic alignment of roles, activities, and priorities.
Knowledge mobilization	Research, training, and information exchange occur, but knowledge is not consistently translated into industrial applications.	Ecosystem readiness complements technology readiness by emphasizing coordination, financing, validation, and adoption capabilities.
Multi-actor interdependence	Government, universities, industry, halal assurance institutions, financial institutions, associations, and MSMEs perform complementary functions.	The Triple Helix remains a foundational model but requires contextual elaboration to capture the institutional configuration of halal innovation.
Technology transfer and adoption	Commercialization and adoption are constrained by funding, technology validation, and uneven business capabilities.	Innovation outcomes depend on the coordination of complementary resources and capabilities across organizational boundaries.
Collaborative governance	Collaboration exists but remains partly project-based, with unclear responsibilities and limited permanent coordination.	Sustainable ecosystem development requires institutionalized coordination and capacity for joint action.
Halal assurance and institutional trust	Halal assurance supports compliance, product integrity, and confidence, while access and implementation remain challenging for some businesses.	Halal legitimacy and institutional trust constitute sector-specific foundations of value creation in the halal innovation ecosystem.

Authors' synthesis based on interview findings and relevant literature.

Overall, this study conceptualizes collaborative governance and institutional trust as complementary supporting mechanisms within the Multi-Stakeholder Halal Innovation Ecosystem. Collaborative governance connects actors through coordination, role clarification, information exchange, and joint action, while institutional trust supported by credible and accessible halal certification strengthens confidence in the rules and processes governing innovation. These mechanisms interact with knowledge creation, technology transfer, financing, and adoption capacity to shape innovation outcomes. This interpretation contributes by positioning halal certification not merely as a compliance requirement or market signal, but as an institutional foundation that supports the credibility and sustainability of cross-sector innovation. This does not imply the existence of a statistically tested

mediating relationship; rather, it is an explanatory mechanism derived from qualitative evidence. The resulting framework highlights that a sustainable halal innovation ecosystem requires the simultaneous development of stakeholder alignment, collaborative governance, institutional trust, and the capabilities needed to translate knowledge into innovations that comply with halal principles.

CONCLUSION

This study examines how cross-sector collaboration shapes the development of the halal innovation ecosystem in Indonesia through a qualitative multiple-case study involving 36 informants. The findings reveal six interrelated dimensions: shared vision and strategic alignment, knowledge creation and sharing, technology transfer and innovation adoption, collaborative governance, halal assurance and institutional trust, as well as innovation outcomes and ecosystem barriers. Although Indonesia has established a broad institutional foundation for halal innovation, collaboration remains fragmented particularly in transforming research into market-ready innovations, coordinating institutional activities, and expanding access to financing and technology for MSMEs. This study proposes a Multi-Stakeholder Halal Innovation Ecosystem framework that extends the application of the Innovation Ecosystem and Triple Helix perspectives to the halal context in Indonesia. It highlights the roles of certification bodies, Islamic financial institutions, industry associations, and SMEs alongside the government, universities, and industry. The findings of this study further establish halal certification and institutional trust as crucial foundations for linking innovation activities to market legitimacy and competitiveness. In practical terms, strengthening this ecosystem requires more sustainable cross-sector coordination, stronger mechanisms for research commercialization, affordable innovation financing, and better institutional support for MSMEs. This study has limitations due to its focus on Indonesia and its qualitative design; therefore, the proposed framework should be understood as an analytical contribution rooted in a specific context, rather than as a universally validated model. Future research could examine its application in various national contexts and empirically evaluate the relationships among the identified dimensions.

REFERENCES

Abdillah, A., Widianingsih, I., Buchari, R. A., & Nurasa, H. (2024). The knowledge-creating company: How Japanese companies create the dynamics of innovation. Learning: Research and Practice, 10(1), 121–123. https://doi.org/10.1080/23735082.2023.2272611

Adner, R. (2017). Ecosystem as Structure: An Actionable Construct for Strategy. Journal of Management, 43(1), 39–58. https://doi.org/10.1177/0149206316678451

Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. Strategic Management Journal, 31(3), 306–333. https://doi.org/10.1002/smj.821

Ahmed, S. K., Mohammed, R. A., Nashwan, A. J., Ibrahim, R. H., Abdalla, A. Q., M. Ameen, B. M., & Khdhir, R. M. (2025). Using thematic analysis in qualitative research. Journal of Medicine, Surgery, and Public Health, 6, 100198. https://doi.org/10.1016/j.glmedi.2025.100198

Akram, H. W. (2026). Rethinking Halal Logistics and Supply Chain Management: An Integrated Conceptual Framework for Governance, Coordination, and Sustainable Development. Logistics, 10(9), 216. https://doi.org/10.3390/logistics10090216

Al-Mahmood, O. A., & Fraser, A. M. (2023). Perceived challenges in implementing halal standards by halal certifying bodies in the United States. PLOS ONE, 18(8), e0290774. https://doi.org/10.1371/journal.pone.0290774

Ali, M. H., Chung, L., Kumar, A., Zailani, S., & Tan, K. H. (2021). A sustainable Blockchain framework for the halal food supply chain: Lessons from Malaysia. Technological Forecasting and Social Change, 170, 120870. https://doi.org/10.1016/j.techfore.2021.120870

Ali, M. H., Tan, K. H., & Ismail, M. D. (2017). A supply chain integrity framework for halal food. British Food Journal, 119(1), 20–38. https://doi.org/10.1108/BFJ-07-2016-0345

Alkadash, T. M., Bashar, A., & Khan, I. (2026). Charting the evolution of Islamic marketing scholarship: a multi-method analysis of the Journal of Islamic Marketing. Journal of Islamic Marketing, 17(8), 2605–2630. https://doi.org/10.1108/JIMA-07-2025-0459

Ansell, C., & Gash, A. (2008). Collaborative Governance in Theory and Practice. Journal of Public Administration Research and Theory, 18(4), 543–571. https://doi.org/10.1093/jopart/mum032

Ardana, Y., & Sugiarti, D. (2026). Indonesia's halal industry: Opportunities, challenges, and strategic directions. International Journal of Halal Industry, 2(1), 77–89. https://doi.org/10.20885/IJHI.vol2.iss1.art5

Ardiantono, D. S., Ardyansyah, G. D., Sugihartanto, M. F., Al Mustofa, M. U., & Lisdiantini, N. (2024). Mapping the barrier and strategic solutions of halal supply chain implementation in small and medium enterprises. Journal of Islamic Marketing, 15(7), 1673–1705. https://doi.org/10.1108/JIMA-08-2022-0229

Bodin, Ö. (2017). Collaborative environmental governance: Achieving collective action in social-ecological systems. Science, 357(6352). https://doi.org/10.1126/science.aan1114

Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: a research note. Qualitative Research, 8(1), 137–152. https://doi.org/10.1177/1468794107085301

Bryson, J. M., Crosby, B. C., & Stone, M. M. (2015). Designing and Implementing Cross‐Sector Collaborations: Needed and Challenging. Public Administration Review, 75(5), 647–663. https://doi.org/10.1111/puar.12432
Cai, Y., & Lattu, A. (2022). Triple Helix or Quadruple Helix: Which Model of Innovation to Choose for Empirical Studies? Minerva, 60(2), 257–280. https://doi.org/10.1007/s11024-021-09453-6
Clough, D. R. (2026). Governance Structures and Coordination Trade-offs: A Discriminating Alignment Theory of Innovation Ecosystem Architectures. Strategy Science, 11(3), 351–374. https://doi.org/10.1287/stsc.2024.0303
Costa, J., & Matias, J. C. O. (2020). Open Innovation 4.0 as an Enhancer of Sustainable Innovation Ecosystems. Sustainability, 12(19), 8112. https://doi.org/10.3390/su12198112
Cunha, J. A. C. DA, Souza, L. J. DE, Macau, F. R., & Alssabak, N. A. M. (2016). Innovation in A Religious Environment: Establishing An Inter-Organizational Network Oriented To The Islamic Market. RAM. Revista de Administração Mackenzie, 17(2), 122–155. https://doi.org/10.1590/1678-69712016/administracao.v17n2p122-155
Dashti, L. A. H. F., Jackson, T., West, A., & Jackson, L. (2024). Enhancing halal food traceability: a model for rebuilding trust and integrity in Muslim countries. Journal of Islamic Marketing, 15(12), 3382–3408. https://doi.org/10.1108/JIMA-06-2023-0167
De Moortel, K., & Crispeels, T. (2026). Blurring boundaries: knowledge dynamics in organizations, collaborations, and innovation ecosystems. The Journal of Technology Transfer, 51(3), 1266–1288. https://doi.org/10.1007/s10961-024-10168-5
Emerson, K., & Nabatchi, T. (2015). Collaborative governance regimes. Georgetown. Georgetown University Press, Public management and change series.
Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. Research Policy, 29(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4
Etzkowitz, H., & Zhou, C. (2017). The triple helix: University--industry--government innovation and entrepreneurship. Routledge.
Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. Technovation, 90–91, 102098. https://doi.org/10.1016/j.technovation.2019.102098
Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. PLOS ONE, 15(5), e0232076. https://doi.org/10.1371/journal.pone.0232076
Haleem, A., Khan, M. I., Khan, S., & Jami, A. R. (2020). Research status in Halal: a review and bibliometric analysis. Modern Supply Chain Research and Applications, 2(1), 23–41. https://doi.org/10.1108/MSCRA-06-2019-0014
Harwati, Asih, A. M. S., & Sopha, B. M. (2025). Resilience in halal supply chain: from definition to framework. Journal of Islamic Marketing, 16(8), 2187–2223. https://doi.org/10.1108/JIMA-02-2024-0067
Hewege, C., & Perera, C. (2020). The Impact of Religio-Cultural Institutional Hegemony on Sri Lankan (halal) Supply Chains: Theorising the Interplay between the Certification Body, Social Institutions and the Government. Journal of Muslim Minority Affairs, 40(3), 351–370. https://doi.org/10.1080/13602004.2020.1813987
Hidayah, N., & Solihah, U. (2025). Challenges and Opportunities in the Indonesian Halal Industry. In Exploring the Halal Industry and Its Business Ecosystem Prospects (pp. 75–96). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-8618-7.ch004
Ismail, I., Tarigan, A. A., Soemitra, A., & Nawawi, Z. M. (2025). Strengthening the global competitiveness of halal culinary SMEs in North Sumatra through a Maqasid of Shariah-based approach. Journal of Islamic Economics Lariba, 11(1), 381–406. https://doi.org/10.20885/jielariba.vol11.iss1.art15
Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. Strategic Management Journal, 39(8), 2255–2276. https://doi.org/10.1002/smj.2904
Janah, N. N., & Yazid, M. (2024). The Role of Halal Certification Bodies in Ensuring Consumer Confidence: A Multi-Site Study in Indonesia. Al Ahkam, 20(2), 218–235. https://doi.org/10.37035/ajh.v20i2.11374
Khairulazmi, M. K., Shaharudin, M. R., Zainoddin, A. I., & Khan, M. S. (2025). Halal manufacturers as orchestrators in halal logistics: implications for organizational performance in Malaysia. Management & Sustainability: An Arab Review, 1–20. https://doi.org/10.1108/MSAR-09-2024-0147
Khan, M. I., Haleem, A., & Khan, S. (2022). Examining the link between Halal supply chain management and sustainability. International Journal of Productivity and Performance Management, 71(7), 2793–2819. https://doi.org/10.1108/IJPPM-07-2019-0354
Lægreid, P., & Rykkja, L. H. (2022). Accountability and inter-organizational collaboration within the state. Public Management Review, 24(5), 683–703. https://doi.org/10.1080/14719037.2021.1963822
Mansur, Yasid, A., & Faqih, R. (2025). Building Bonds Through Certification: Collaborative Governance and Social-Economic Outcomes in Indonesia's Halal Ecosystem. ASEAN Journal of Halal Study, 2(2), 1–9. https://doi.org/10.26740/ajhs.v2i2.50310
Marlina, L., Juliana, J., Ismail, S., & Dewi, S. V. (2026). Halal industry development strategy: a bibliometric analysis. Journal of Islamic Marketing, 17(1), 324–348. https://doi.org/10.1108/JIMA-12-2024-0591
Maulana, I. (2024). The Position of MSME in the Discourse of Platform Capitalism (pp. 67–90). https://doi.org/10.1007/978-981-97-0029-5_5

Mohamed, Y. H., Abdul Rahim, A. R., & Ma'aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia. Journal of Islamic Marketing, 12(9), 1734–1750. https://doi.org/10.1108/JIMA-12-2018-0240

Noviyanti, R., & Hakim, R. (2025). Halal Industry Growth: Economic Opportunities And Challenges In Global Markets. Jurnal Ilmu Ekonomi Dan Bisnis Islam, 7(1), 18–42. https://doi.org/10.24239/jiebi.v7i1.353.18-42

Patton, M. Q. (2014). Qualitative research \& evaluation methods: Integrating theory and practice. Sage publications.

Rachman, A., & Sangare, B. (2023). Synergy and Collaboration Between Government and Private Institutions In Building Halal Ecosystems In Indonesia. Jurnal Ilmiah Islam Futura, 23(2), 303. https://doi.org/10.22373/jiif.v23i2.17507

Rahman, M. M. (2024). Halal Industry 4.0 and Knowledge Management (pp. 221–246). https://doi.org/10.4018/979-8-3693-3980-0.ch010

Raimi, L., Adekunle, S. M., & Muhammad, S. S. (2023). Contemporary Discourse of Halal and Islamic Entrepreneurship. Springer.

Rajendran, S. D., Kamarulzaman, N. H., & Abd Rahman, A. (2024). The mediating role of halal supply chain integrity in enhancing performance for halal herbal-based food SMEs. Journal of Islamic Marketing, 15(12), 3621–3648. https://doi.org/10.1108/JIMA-03-2022-0090

Ranga, M., & Etzkowitz, H. (2013). Triple Helix Systems: An Analytical Framework for Innovation Policy and Practice in the Knowledge Society. Industry and Higher Education, 27(4), 237–262. https://doi.org/10.5367/ihe.2013.0165

Saima, S. U., Firdaus, R. B. R., & Sarjiyanto. (2024). Challenges and ways forward for the Malaysian SMEs in the Halal food industry: a systematic review. Potravinarstvo Slovak Journal of Food Sciences, 18, 223–238. https://doi.org/10.5219/1937

Sari, P. R. K., Ratnasari, R. T., & Osman, I. (2026). Integration of Islamic principles and digital technologies for sustainable halal supply chain management: a conceptual framework. Journal of Islamic Accounting and Business Research, 1–19. https://doi.org/10.1108/JIABR-06-2025-0367

Sholeh, M., Karunia, A. N., Pratista, A. R. H., & Nurseto, T. (2026). Does Islamic finance enhance innovation capacity among Indonesian MSMEs? Evidence from a Multivariate Probit Approach. Journal of Islamic Economics Lariba, 12(2). https://doi.org/10.20885/jielariba.vol12.iss2.art17

Sulaiman, N. S., Talib, M. S. A., & Hashim, N. (2025). Promoting Employment Opportunities Through a Halal Technopreneur Ecosystem for Graduates. In Implementing Halal Principles and Regulations in Business Governance (pp. 159–198). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3373-3917-7.ch007

Syakirunn'iam, L., Sain, Z. H., & Lawal, U. S. (2025). Innovation strategies and competitiveness of the multisectoral halal industry in the digital era and ASEAN economic integration. International Journal of Halal Industry, 1(2), 181–203. https://doi.org/10.20885/IJHI.vol1.iss2.art5

Tieman, M. (2015). Halal clusters. Journal of Islamic Marketing, 6(1), 2–21. https://doi.org/10.1108/JIMA-05-2014-0034

Wahab, A., Kuswanjono, A., & Mahdiya, I. (2026). Halal Industry and Islamic Epistemology: Implications for Policy, Ethics, and Global Practices. Journal of Islamic Economic Laws, 9(01), 144–169. https://doi.org/10.23917/jisel.v9i01.13268

Wahab, A., & Mahdiya, I. (2026). Reconceptualizing halal industry governance in the digital economy: A maqasid al-Sharia based legal framework. Journal of Islamic Law on Digital Economy and Business, 152–167. https://doi.org/10.20885/JILDEB.vol1.iss2.art4

Wahid, S. H., Bashori, Y. A., & Umami, K. (2026). Implementation of self-declare policy in halal certification in Indonesia: challenges, policy model, and integration of maqāṣid al-sharīʿa. Journal of Islamic Marketing, 1–35. https://doi.org/10.1108/JIMA-11-2024-0557

Yin, R. K. (2018). Case study research and applications (Vol. 6). Sage Thousand Oaks, CA.