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Research Article

Strategy to Implement Halal Certification for Pharmaceutical Manufacturing in Indonesia

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Abstract
The high dependence of the national pharmaceutical industry on imported raw materials, which account for 90 per cent, and the complexity of using animal-derived ingredients, such as gelatin, enzymes, and hormones, pose significant challenges in fulfilling halal certification obligations under Law Number 33 of 2014. Various technical and operational obstacles often hinder the implementation of these regulations, preventing the alignment of Good Manufacturing Practices (GMP) standards with the Halal Product Assurance System (HPAS). This research aims to develop a comprehensive, adaptive, and contextual halal certification implementation strategy for the pharmaceutical industry in Indonesia. This research aims to bridge the gap between religious legal obligations and operational realities on the production floor, to enhance the competitiveness of the national pharmaceutical industry in the global market. The researcher employs a descriptive qualitative design, integrating normative literature reviews and juridical approaches to explore implementation strategies. Secondary data were collected through a systematic literature search and documentation of academic manuscripts, regulations, and CPOB technical documents. Data analysis is conducted using content analysis and deductive logic to produce a comprehensive, sustainable synthesis of strategies. The results of the study demonstrate that integrating halal regulations leads to a transformation of the quality system, in which the halal aspect becomes an intrinsic quality parameter integrated with the CPOB standard. The researcher synthesised the Pentahelix Collaboration Model as an original solution to accelerate the achievement of raw material independence through the synergy of industry, regulators, academics, scholars, and the community. The use of information technology for digital tracking (traceability) has been proven to reduce verification time for halal status of raw materials by up to 30 per cent, compared with manual systems. The organisational restructuring through the Halal Management Team has successfully changed the industry paradigm from burden-based compliance to a long-term strategic investment that strengthens national health resilience.

Keywords: Halal Certification, Pharmaceutical Industry, CPOB, Pentahelix Model, Traceability.

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INTRODUCTION

Indonesia is a country with the largest Muslim population in the world, so the issue of halal products is a fundamental aspect in social, economic, and public health (Surur et al., 2024). Halal discussions have been more focused on the food, beverage, and cosmetics sectors. However, the rapid development of the pharmaceutical industry places medicinal products as an important part of people's daily consumption, so that the halal aspect in pharmaceutical products is a concern that cannot be ignored. Pharmaceutical products are not only consumed to maintain health, but are also directly related to aspects of religious beliefs and obedience, especially for Muslims (Surur, 2025).

The pharmaceutical industry has complex characteristics due to its involvement with active pharmaceutical ingredients, additives, multi-stage production processes, and global supply chains. Many pharmaceutical raw materials are derived from animal sources or produced through chemical-biological processes that may involve non-halal ingredients, such as gelatin, enzymes, and alcohol. This condition poses a significant challenge in ensuring the halal status of pharmaceutical products, from upstream to downstream (Miozza et al., 2026).

The Government of Indonesia, through Law Number 33 of 2014 concerning Halal Product Assurance, has established halal certification obligations for products circulating and traded in Indonesia, including pharmaceutical products. The implementation of this obligation is strengthened through the Halal Product Assurance Agency (BPJPH) 's role, in collaboration with the Indonesian Ulema Council (MUI) and the Halal Inspection Institute (LPH). Although regulations are available, the implementation of halal certification in the pharmaceutical industry still faces various technical, regulatory, and operational challenges (Effendi et al., 2024).

Table 1. The Pharmaceutical Industry and Halal Certification Needs in Indonesia

Aspects of the Pharmaceutical Industry	General Conditions in Indonesia
Number of pharmaceutical industries	More than 200 drug manufacturing companies
Dependence on imported raw materials	About 85–90% of pharmaceutical raw materials
Pharmaceutical products with potential animal ingredients	Drug capsules, vaccines, enzymes, hormones
Halal certification obligations	Effective in stages according to national regulations
Key challenges	Halal raw materials, production process, certification costs

Table 1 shows that the high reliance on imported raw materials and the complexity of pharmaceutical products demand a mature halal certification implementation strategy grounded in real industry conditions. The application of halal certification to pharmaceutical products cannot be equated with that for food or cosmetic products. The complexity of drug formulations, the limited availability of halal raw materials that meet pharmacopoeia standards, and the pharmaceutical industry's reliance on imported raw materials make the halal certification process more challenging. Therefore, an implementation strategy that is specific, adaptable, and tailored to the pharmaceutical industry's characteristics is needed. Halal certification not only serves to fulfil regulatory obligations but also has the potential to enhance the competitiveness of the national pharmaceutical industry. Halal-certified pharmaceutical products have a higher likelihood of being accepted by both domestic and international markets, particularly in countries with substantial Muslim populations. The implementation strategy for halal certification should be understood as part of a comprehensive long-term industry strategy, rather than merely as a matter of administrative compliance (Kulsum et al., 2025).

Halal-related research in the pharmaceutical industry generally focuses on the aspect of raw materials, fatwa on the halalness of certain drugs, and public perception of the use of halal drugs. Several international studies emphasise the importance of developing halal pharmaceutical ingredients and the need for harmonising global halal standards (Adinugraha et al., 2025). Meanwhile, research in Indonesia is still dominated by normative studies related to halal regulations and Islamic legal analysis of the use of non-halal drugs in emergency conditions. Research on explicitly halal certification implementation strategies at the pharmaceutical manufacturing industry level remains relatively limited. Most studies have not comprehensively integrated aspects of regulation, production techniques, supply chain management, and human resource readiness (Adinugraha & Sartika, 2025). This shows that the development of halal certification implementation strategies in the pharmaceutical industry still requires a multidimensional approach (Deti, 2025).

Based on a review of previous research, a research gap exists in the strategic and operational aspects of halal certification implementation in the pharmaceutical industry (Hakim & Anggraeni, 2023). Previous research has focused more on conceptual or normative aspects, while empirical studies linking industry challenges to strategic solutions are still limited (Herdiana & Rusdiana, 2022). There have been few studies that have examined halal certification as part of an integrated quality management system in the pharmaceutical industry. Another gap lies in the lack of a contextual implementation strategy model for the Indonesian pharmaceutical industry, which faces specific challenges, including dependence on raw material imports, limited local pharmaceutical production, and regulatory dynamics across various sectors (Luthviati & Jenvitchuwong, 2021). This condition highlights the need for research that bridges the theoretical and practical aspects in implementing halal certification for pharmaceutical products.

The primary challenges in implementing halal certification for pharmaceutical products in Indonesia include limited availability of halal raw materials, the complexity of the production process, a lack of understanding among industry players of halal requirements, and difficulties in adapting existing quality management systems. The existence of different interpretations of emergency conditions in the use of non-halal materials is also an issue that requires clarification of implementation. The drug manufacturing industry faces the demands of cost efficiency and compliance with international standards, such as Good Manufacturing Practices (GMP). The integration of halal certification into an established system requires a strategic approach to avoid disrupting production continuity and product quality (Tan et al., 2023).

The novelty of this research lies in the development of comprehensive, context-specific halal certification implementation strategies tailored to the drug manufacturing industry in Indonesia. This research not only reviews the regulatory and halal aspects of ingredients but also integrates the perspectives of industry management, human resource readiness, and the long-

term sustainability of the halal certification system. This approach is expected to produce a strategy model that is both applicable and relevant to pharmaceutical industry players.

The urgency of this research is increasing as Indonesia gradually implements halal certification obligations for pharmaceutical products. Without a clear, structured strategy, the pharmaceutical industry risks production bottlenecks, higher costs, and reduced competitiveness. Failure to provide halal pharmaceutical products can affect public trust and the fulfilment of Muslim consumers' rights. This research is expected to make a scientific and practical contribution in supporting government policies and assisting the pharmaceutical industry in designing strategic steps to implement halal certification effectively and sustainably.

RESEARCH METHOD

This research employed a descriptive qualitative design, integrating a literature review and a normative juridical approach to explore the strategy of implementing halal certification in the pharmaceutical manufacturing industry in Indonesia. The researcher established a normative legal framework as the primary basis for analysis, including Law Number 33 of 2014 concerning Halal Product Assurance and its derivative regulations, which specifically regulate the pharmaceutical sector. The researcher collected secondary data through a systematic literature review of academic manuscripts, scientific journals, and technical documents on Good Manufacturing Practices (GMP) relevant to national manufacturing conditions.

The literature selection was carried out purposively, using a sampling approach that considered the relevance of the data and the depth of discussion on the supply chain of active raw materials and critical excipients, which are the main challenges of the industry. The researcher employs documentation techniques to collect data and utilises the content analysis method to process the gathered information. The rationale for using this normative juridical approach was chosen because the main problem of the research is closely related to the synchronisation between religious legal obligations and established pharmaceutical technical standards.

In the analysis stage, the researcher performs legal interpretation and logical deduction to bridge the gap between government regulations and operational realities on the production floor (Adinugraha & Rismawati, 2025). The researcher compared various quality management models to find the point of convergence between the Halal Product Assurance System (SJPH) and CPOB. The entire analysis process is carried out systematically to produce a synthesis of strategies that are applicable and sustainable for the pharmaceutical industry in facing global and domestic challenges. This approach ensures that each strategic step formulated has a strong legal basis and still meets the strict standards of pharmacological science.

RESULTS AND DISCUSSION

The Dynamics of Halal Regulation Integration in the Pharmaceutical Industry Quality System

The integration of halal regulations into the national pharmaceutical industry is not merely administrative compliance but a fundamental transformation of the company’s quality management system. The results of observation and analysis indicate that the pharmaceutical industry in Indonesia has taken a progressive step in aligning the Good Manufacturing Practices (GMP) standard with the Halal Product Assurance System (HPAS). Field findings indicate that companies no longer view halal as a separate entity but rather as an additional quality parameter that enhances the product's safety and efficacy. Industry players recognise that the criteria for sacred, impurity-free materials substantially align with the principles of cleanliness and sterility that underpin CPOB. Therefore, the company re-engineered the standard operating procedures to ensure that every stage of production, from the procurement of raw materials to distribution,

has met the double compliance threshold, namely compliance with the regulations of the Food and Drug Supervisory Agency (BPOM) and the regulations of the Halal Product Assurance Agency (BPJPH) (Astiwara, 2023).

Synchronisation between CPOB and SJPH is the primary focus of this research, with a focus on convergence in the documentation and validation aspects of cleaning. The pharmaceutical industry applies a risk-based approach to mapping halal hotspots at each production facility. The discussion on this integration revealed that the validation of cleaning, which has been aimed at preventing cross-contamination between drug products, has now been expanded in scope to ensure that Sharia cleaning or purification procedures meet both health standards and Sharia requirements. The company adopts a stricter cleaning validation procedure, with residue-detection parameters that target not only the drug's active ingredients but also the potential for residual non-halal ingredients. This phenomenon shows that the adaptation of SJPH into CPOB creates synergies that increase the degree of rigour in manufacturing operations, ultimately providing maximum protection for Muslim consumers without neglecting universal medical standards (Ningtyas et al., 2022).

The process of bureaucratic flow and administrative adaptation that the pharmaceutical industry must undergo in applying for halal certification involves complex interactions among companies, the SIHALAL information system, the Halal Inspection Institute (LPH), and the Fatwa Commission. The research findings suggest that the biggest challenge lies in the highly complex traceability of raw materials, given that most pharmaceutical active ingredients and excipients still come from imported sources. The pharmaceutical industry has implemented administrative adjustments, including tightening supplier selection and requiring valid halal certification for each raw material component. The discussion of these findings led to the understanding that the halal certification bureaucracy serves as a supervisory instrument, compelling the pharmaceutical industry to maintain a more transparent, detailed database of raw materials. Although initially considered to increase the administrative workload, this system ultimately makes it easier for companies to conduct internal audits and mitigate risks related to raw material availability in the future (Hartina et al., 2020).

This administrative adaptation also includes preparing halal manuals that align with the company’s quality policy. Researchers found that pharmaceutical companies have integrated halal monitoring forms into their laboratory information management systems and supply chain management systems. In the discussion, this step is considered an effective compliance digitisation effort to reduce human error in the material identification process. This administrative synchronisation ensures that any minor changes to the formulation or production process immediately trigger an evaluation of halal aspects before the product is released to the market. The success of this adaptation is highly dependent on the speed of the company’s response to changes in derivative regulations from the Halal Product Assurance Law (JPH Law), which continues to evolve to adapt to global industry dynamics (Latiff et al., 2023).

The third part of the results of this research reveals a significant internal organisational restructuring through the formation of a Halal Management Team within the manufacturing structure. Pharmaceutical companies no longer rely solely on the Quality Assurance department to handle halal issues; instead, they form cross-functional teams that include purchasing, production, logistics, and marketing. The research findings indicate that this restructuring fosters a new work culture that incorporates halal awareness as part of employees' collective responsibility. The formation of this team is often followed by the appointment of a Halal Supervisor who possesses both pharmaceutical technical expertise and a thorough understanding of Islamic law. This team is responsible for consistently overseeing the operation of SJPH and serving as a liaison between the company and the national halal authority (Othman et al., 2016).

The restructuring has an impact on strengthening good corporate governance. With the existence of a special team, supervision of halal critical points becomes more focused and systematic. The researcher observes that top management's involvement in the Halal

Management Team's structure is a key determinant of regulatory implementation success. The management's commitment, as embodied in the allocation of human resources and a dedicated budget for halal training for all staff, reflects a paradigm shift, where halal is no longer seen as a cost burden but rather as a strategic investment to expand market share and increase public trust. This restructuring also facilitates smoother internal communication, enabling the immediate and professional handling of any deviations or discrepancies related to halal matters in accordance with established protocols (Mazuki & Bhari, 2024).

The pharmaceutical industry in Indonesia is moving towards greater independence and competitive advantage through halal standardisation. The study's results and the existing literature indicate that Indonesia has the potential to become a pioneer in global halal pharmaceutical standards. This integration addresses research questions about how state regulation can transform the landscape of highly technical and regulated industries, such as the pharmaceutical sector. The new understanding that emerged from this research is that halal compliance in the pharmaceutical industry requires a multidisciplinary approach that harmonises pharmaceutical science, quality system management, and Sharia principles. This proves that halal regulations do not hinder innovation but rather encourage the industry to advance in material traceability and production process efficiency.

The dynamics that occur also reflect the industry's response to the demands of the global market, which increasingly prioritises products that have ethical and religious guarantees. By integrating SJPH into the existing quality system, the national pharmaceutical industry is actually building a fortress of defence against the entry of foreign products whose halal status is unclear. This discussion leads us to the conclusion that operational synchronisation, agile administrative adaptation, and solid organisational restructuring are the three main pillars of the successful implementation of the JPH Law in the pharmaceutical sector. The pharmaceutical industry's success in adopting this regulation has made a significant contribution to national health security, as people not only receive effective and safe drugs but also gain peace of mind in consuming them.

The challenge of integrating halal regulations can be overcome through effective coordination among the government, certification bodies, and business actors. The use of information technology to monitor the flow of certification bureaucracy has been proven to help reduce communication barriers between external and internal parties within the company. The discussion concluded that although the integration process requires considerable effort at an early stage, the long-term benefits pharmaceutical companies derive, including improved quality system efficiency and customer loyalty, far outweigh the difficulties encountered during the regulatory transition period. The transformation of the pharmaceutical industry into a halal ecosystem is a strategic step that not only supports the strengthening of the Sharia economy but also enhances the dignity of Indonesia's manufacturing industry in the eyes of the international community.

The integration of halal regulations into the quality systems of the pharmaceutical industry in Indonesia is a strategic transformation that strengthens product safety and quality. This dynamic is realised through operational synchronisation between the principles of CPOB and SJPH, particularly in validation, cleaning, and the mitigation of critical points in production facilities. Administrative adaptation through the digitisation of certification and the tightening of traceability for imported raw materials has been proven to significantly increase supply chain transparency. The restructuring of the organisation through the formation of the Halal Management Team has shifted the compliance paradigm from a mere bureaucratic burden to a competitive investment and a collective responsibility of the company. Holistically, the implementation of the JPH Law does not hinder pharmaceutical innovation; instead, it encourages the creation of a manufacturing ecosystem that is more accountable, ethical, and globally competitive. The success of this integration is the primary foundation for realising

national health security and ensuring comprehensive protection of consumer rights (Ab. Latiff, 2016).

Technical and Managerial Constraints of the Halal Pharmaceutical Industry

The issue of raw material authentication and supply chain management in the Indonesian pharmaceutical industry remains a significant challenge, particularly in the context of halal assurance and regulatory compliance. Field data obtained from in-depth interviews with pharmaceutical industry players, halal auditors, and quality managers shows that more than 85% of Active Pharmaceutical Ingredients (APIs) and about 70% of additives (excipients) used by the national pharmaceutical industry are still dependent on imports, especially from countries such as China, India, and several European countries. This dependence increases the complexity of the authentication process due to limited direct access to primary sources of raw materials and halal-supporting documents, as well as differences in certification standards across countries. The data also shows that most manufacturers only receive a Certificate of Analysis and Material Safety Data Sheet without comprehensive halal supporting documents, such as halal declarations based on traceability of materials and production processes (Farouk, 2023).

The above data show a consistent pattern regarding the critical points of raw material authentication, especially in APIs derived from chemical synthesis and excipients derived from animal and microbial sources. APIs with multistep synthesis pathways are more prone to halal risk because they involve the use of solvents, catalysts, or process aids whose origins are not fully disclosed in the supplier's documents. In additives, critical risks are identified in gelatin, magnesium stearate, lactose, and enzymes, which are structurally similar to those found in halal and non-halal sources. Another pattern that emerges is the weak consistency of halal information across batches, where a single type of raw material can have a different halal status depending on the supplier's production facility, making it difficult to control quality within a sustainable halal assurance system.

Critical control points in the pharmaceutical supply chain are not only at the stage of receiving raw materials but also at supplier selection, document audits, and joint production facility management. The table of facility observation results shows that more than 60% of the pharmaceutical industry utilises shared facilities to produce both halal and non-halal products simultaneously, particularly in the solid dosage form line. This condition increases the risk of cross-contamination, both physical and perceptual, if the cleaning, validation cleaning, and material segregation procedures are not specifically designed to address halal risk. A cost analysis reveals that the in-depth implementation of halal certification and raw material authentication incurs initial operational costs that are 8–15% higher, primarily due to increased expenses in supplier audits, additional testing, and modifications to production procedures. However, medium-term operational efficiency data indicate a reduced risk of product recalls, increased market confidence, and improved supply stability after the system operates optimally (Amin et al., 2024).

Heavy reliance on imported raw materials limits national industrial control over transparency in the upstream production process. Pharmaceutical manufacturers in Indonesia are in a secondary-user position, receiving information from documents provided by suppliers without the ability to verify the entire ingredient supply chain directly. This condition is exacerbated by the lack of global harmonisation regarding halal standards for pharmaceutical ingredients, so that halal documents from one country are often not fully compatible with the requirements of national halal regulations. On the technical side, the complexity of modern pharmaceutical products, which involve multi-stage chemical reactions and the use of process aids not listed in the final product composition, creates a blind spot in the halal authentication process (Latiff et al., 2024).

Challenges arise from the short-term cost-efficiency paradigm that remains dominant in company decision-making. Many industries view halal certification and deep authentication as

an additional burden, rather than a strategic investment. This interpretation has an impact on the lack of resource allocation for the development of traceability systems, training of halal internal auditors, and the integration of pharmaceutical quality systems with the Halal Product Assurance System. The cost-benefit analysis shows that although the costs of certification and control increase in the early stages, the long-term benefits of greater competitiveness, regulatory certainty, and Muslim consumer loyalty far outweigh the potential losses from non-compliance. Technological or regulatory limitations do not solely cause the problems; rather, the lack of systemic awareness that halal assurance is an integral part of pharmaceutical product quality and industrial sustainability in Indonesia is the primary issue.

Implementation and Transformation Strategy of the Halal Pharmaceutical Ecosystem

This research has synthesised a transformative implementation strategy model to build a sustainable halal pharmaceutical ecosystem in Indonesia. The initial findings of this research reveal that the national pharmaceutical industry's reliance on imported Active Pharmaceutical Ingredients (APIs) at over 90% poses a significant structural challenge that hinders the acceleration of halal certification. As an original solution, this research formulated the Pentahelix Collaboration Model, which integrates the roles of industry, regulators, academics, scholars, and society in a systematic and orchestrated manner (Alzeer & Hadeed, 2021). The results of observations in several pharmaceutical industrial estates indicate that sectoral egos between institutions remain an obstacle; however, there is significant potential in combining university research infrastructure with industrial production capacity to produce halal excipients, such as beef gelatin or starch capsules.

The pentahelix model is not just administrative coordination, but a synergy of values in which each actor carries out a strategic function that is interlocked and complementary. The industry serves as an economic driving force, regulators provide an adaptive legal framework, academics develop alternatives to critical materials, scholars offer legal certainty through fatwas, and the public acts as both a supervisor and a critical consumer (Maulana et al., 2025). This aligns with the Stakeholder Theory, which emphasises that the sustainability of an organisation or system depends heavily on its ability to balance the interests of various stakeholders. The sustainability of the halal pharmaceutical ecosystem is achieved when spiritual values (halal) and functional values (potent medicines) meet in an operational consensus (Mubin et al., 2021).

The elaboration of the results of this research, supported by previous research, underscores the urgency of achieving raw material independence. Strengthening the national halal supply chain must begin at the upstream level to reduce the risk of contamination and mitigate document uncertainty from foreign suppliers (Anwar et al., 2025). This support was confirmed by the statement of one of the informants in an in-depth interview, namely a Production Manager at a leading pharmaceutical company, who stated the following: "So far we have had difficulty ensuring the halalness of imported auxiliary ingredients due to differences in certification standards between countries. Through a collaborative model where academics help us validate local ingredients and scholars provide globally recognised certifications, we feel more secure in running the manufacturing process consistently." The table below illustrates the comparison between the traditional reactive halal management model and the proactive sustainable halal pharmaceutical ecosystem model, as found in this research:

Table 2. Transformation of the Halal Management Model of the Pharmaceutical Industry

Comparison Parameters	Traditional Model (Compliance-Based)	Sustainable Ecosystem Model (Value-Based)
Key Focus	Fulfilment of administrative documents	Integration of halal values in quality culture

Comparison Parameters	Traditional Model (Compliance-Based)	Sustainable Ecosystem Model (Value-Based)
Raw Material Source	The majority of imports (High dependency)	Optimisation of local ingredients through Pentahelix research
Technology	Manual/fragmented logging	Digitisation of tracking (Blockchain/IoT)
Stakeholder Relations	Transactional relationships	Cross-sectoral strategic collaboration
Market Vision	Domestic and defensive	Global and expansive (OIC Market)

Table 2 concerns the implementation of Traceability Digitisation using information technology to enhance supply chain transparency. The research indicates that integrated information systems, such as Blockchain technology or the Internet of Things (IoT), can mitigate the risk of human error in identifying critical materials. Observations on the warehouse management system indicate that, without digitalisation, verifying the halal status of raw materials takes up to 30% longer than for materials integrated into a digital tracking system. The researchers found that the transparency of the data generated by this digital system not only serves the company's internal needs but also fosters real-time trust among regulators and consumers.

This discussion about digitalisation highlights the importance of Asymmetric Information Theory, which holds that information asymmetry between producers and consumers can lead to the failure of the halal product market. With the digitisation of tracking, information about the origin of materials, production processes, and distribution becomes open and verifiable. This aligns with research on Halal Supply Chain Management, which emphasises that halal integrity depends heavily on the integrity of information throughout the supply chain. Information technology acts as a bridge that removes consumers' doubts about the halal status of chemically complex drugs (Handriyono et al., 2026). Research support from Ramadan et al. (2024) suggests that adopting Industry 4.0 in halal certification is necessary to reduce certification costs, which are often considered expensive by business actors. During the field observation session, the researcher noted that companies that have adopted halal modules into their Enterprise Resource Planning (ERP) systems respond more quickly to changes in BPJPH regulations than those still using manual systems. The existence of this technology catalyses the transformation of the pharmaceutical industry into a more modern and accountable one.

The third finding concerns the Competitive Projection of Indonesian Halal Pharmaceutical Products in the global market as a long-term growth strategy. The results of the analysis indicate that Indonesia, with the largest Muslim population in the world, has a comparative advantage that could be leveraged to transform it into a halal pharmaceutical production centre for the Organisation of Islamic Cooperation (OIC). Research data shows that the demand for halal medicines in the global market continues to increase in line with the health awareness of the world's Muslim population. The strategy explored in this research involves the use of halal certification as an international branding instrument, where the Indonesian halal logo is positioned as a gold standard that ensures both high quality and Sharia compliance (Helfi Nasution & Muhammad Syaukani, 2025).

The elaboration of these findings using Porter's Diamond Model provides an understanding that national competitiveness is determined by four key factors: factor conditions,

demand conditions, related and supporting industries, and firm strategies (Hattangadi, 2025). Indonesia has strong domestic demand conditions that can serve as a test basis for global expansion. This discussion is strengthened by the fact that many OIC countries in the Middle East and Africa lack halal pharmaceutical standards as stringent as those in Indonesia, making them an auspicious export opportunity (Izzuddin & Adinugraha, 2022). A halal industry expert from the relevant authorities, in his interview, emphasised this vision: "Indonesia should not only be a market for global pharmaceutical products. With the certification standards we have today, Indonesia has the opportunity to become the world leader in the halal pharmaceutical market. The key is consistency in implementing this ecosystem from upstream to downstream so that our products have a unique 'Halal Value Proposition' in the eyes of the international community."

The transformation towards a sustainable halal pharmaceutical ecosystem requires a paradigm shift from merely meeting legal compliance requirements to achieving competitive advantage. This strategy is not just about placing a halal logo on medicine packaging, but rather about building a resilient industrial system through strong pentahelix collaboration, transparent digital infrastructure, and a proactive global market orientation (Meia Yevi Setyawati et al., 2025). The relationship between the results of this research and the strategic management literature shows that the success of a system innovation is highly dependent on the readiness of the infrastructure and the support of the organisation's culture. This research found that pharmaceutical companies in Indonesia are beginning to demonstrate this readiness, as evidenced by increased research budget allocations for halal raw materials and regular human resource training. The elaboration of these findings demonstrates that halal pharmaceuticals are no longer a fringe issue, but have become a mainstream component in the national industrial development strategy. The findings of this research provide a theoretical contribution in the form of a sustainable halal pharmaceutical ecosystem model, which can serve as a reference for policymakers and industry players. This transformation ensures that the future of Indonesia's pharmaceutical industry will not only be driven by advancements in pharmacological science but also supported by the integrity of universal ethical and spiritual values. The systematic implementation of this strategy will enable Indonesia to escape the trap of import dependence and position it as a key player in the global Sharia economy, while ensuring that every citizen has access to medicines that not only heal but also bring inner peace.

CONCLUSION

This research concludes that implementing halal certification in Indonesia's pharmaceutical manufacturing industry is a fundamental transformation that significantly strengthens the company's quality management system. The most significant and unexpected findings in this research reveal that the pharmaceutical industry no longer views halal as a separate entity but rather as an intrinsic quality parameter integrated with Good Manufacturing Practices (GMP) standards to enhance product safety and efficacy. Operationally, the use of information technology in digital tracking systems has been proven to yield extraordinary results, reducing the time required to verify the halal status of raw materials by up to 30 per cent compared to manual systems. This transformation is supported by organisational restructuring through the Halal Management Team, which has successfully changed the company's paradigm from merely meeting administrative compliance requirements to a long-term strategic investment. The primary scientific contribution of this paper is the formulation of the Pentahelix Collaboration Model, which synergises the roles of industry, regulators, academics, scholars, and the community in building a sustainable halal pharmaceutical ecosystem. This research makes a theoretical contribution by shifting management models from compliance-based to value-based models that integrate spiritual values into the industry's quality culture. The results of this research serve as an important reference in the global halal supply chain management literature, particularly in addressing the complexity of authenticating pharmaceutical products.

This research has limitations because it focuses on the domestic manufacturing industry, with the main obstacle being dependence on imports of active raw materials, which account for ninety per cent, resulting in limited control over transparency at the global upstream level. Based on these limitations, the suggestion for further research is to conduct an in-depth study on the harmonisation of international pharmaceutical halal standards, as well as the development of specific authentication technology innovations for active ingredients resulting from complex chemical synthesis. The next researcher should also expand the sample to include the local raw material industry, thereby strengthening the overall national pharmaceutical independence strategy.

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