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Development strategy of nusantara capital city as a global halal hub

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Abstract
This study examined the strategic potential of Nusantara Capital City (IKN) to be developed as a global Halal Hub in support of the Indonesia Emas 2045 vision. A qualitative approach was employed using secondary data derived from government policy documents, the Nusantara Smart City Blueprint, and internationally indexed academic literature. Content analysis and comparative analysis were conducted to identify key themes, supporting factors, and challenges in positioning IKN within the global halal ecosystem. The findings indicated that the success of IKN as a Halal Hub depended on the integration of physical logistics infrastructure, such as multimodal transportation, segregation facilities, and cold chain systems, with smart digital technologies, including Internet of Things sensors, blockchain, and centralized monitoring systems. This integration strengthened transparency, traceability, and halal compliance while enhancing global market trust. The study also revealed the importance of human resource readiness and regulatory harmonization to ensure competitiveness. The proposed conceptual framework contributed to integrating smart city development with halal supply chain governance.

Keywords: Halal Hub, Halal Supply Chain, IKN, Smart Logistics, Traceability.

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1. Introduction

Over the past several decades, the halal industry has experienced significant global growth. This expansion has been driven by the rapid growth of the Muslim population, rising purchasing power, and increasing awareness of the importance of products and services that comply with Sharia principles. According to Azam and Abdullah (2020), the global halal industry is estimated to be worth approximately USD 2.3 trillion annually, making it one of the fastest-growing markets worldwide. The industry is no longer confined to food and food-related products. However, it has expanded to include pharmaceuticals, cosmetics, health products, medical devices, and service sectors such as logistics, marketing, and finance (Azam & Abdullah, 2020). In Indonesia, as the country with the world's largest Muslim population, the halal industry plays a strategic role in the national economy. The Government of Indonesia has recognized this potential and is developing a robust halal ecosystem as part of its national economic development strategy (Utomo et al., 2021).

The development of Ibu Kota Nusantara (IKN) as Indonesia's new capital city presents a strategic opportunity to establish a Halal Hub. Its central location in Indonesia provides convenient access to both domestic and international markets, particularly in Southeast Asia and the Middle East. Furthermore, IKN's vision as a smart and sustainable city aligns with the infrastructure and technological requirements

needed to support a comprehensive halal ecosystem (Ammar et al., 2026). However, despite its considerable potential, several challenges must be addressed, including the need for skilled human resources and the harmonization of regulations between local and national levels. This study aims to identify the potential of IKN as a Halal Hub and to analyze both the supporting and inhibiting factors involved. A review of the literature indicates that no in-depth study has specifically examined the development of IKN as a Halal Hub. Therefore, this research offers novelty by exploring the relevance of IKN's development within the context of the globalization of the halal industry. Abdullah and Azam (2020) highlight that the growth of the halal industry in ASEAN, including Indonesia, demonstrates a significant contribution to both national economies and global trends (Abdullah & Azam, 2020). Additionally, research by Nor et al. (2023) identifies the potential and market opportunities of the halal sector in Malaysia and Indonesia, which may serve as references for the development of IKN as a Halal Hub (Nor et al., 2023).

The importance of developing a Halal Hub in IKN is further supported by global trends indicating increasing demand for halal products across various sectors. According to data compiled by Azam and Abdullah (2020), global Muslim expenditure on food, beverages, and lifestyle products reached USD 4 trillion in 2020 and is projected to continue increasing. Moreover, Muslim travel expenditure amounted to USD 169 billion in the same year and was projected to rise to USD 6.49 trillion by 2034 (Ovsiannykov, 2025). These figures demonstrate the substantial potential for IKN to become an efficient hub for the distribution and trade of halal products. Nevertheless, several challenges must be addressed to realize IKN as a Halal Hub. One of the primary challenges is the shortage of skilled human resources in halal logistics. Research by Effendi (2023) indicates that the readiness of human resources in Indonesia's small and medium enterprise (SME) sector for halal products still requires significant improvement. In addition, harmonizing halal policies with the smart city system envisioned for IKN requires effective cross-sectoral coordination (Effendi, 2023).

Previous studies have examined various aspects of halal logistics and supply chain management. For instance, recent research emphasizes the role of digital technologies, such as blockchain and IoT, in enhancing transparency and traceability within halal supply chains (Harsanto et al., 2024; Mahsun & Waeno, 2025). Other studies focus on the implementation of halal logistics practices at the firm level, highlighting the importance of end-to-end process control, from procurement to distribution, in ensuring halal compliance (Khoirunnisa et al., 2024). Meanwhile, research on halal clusters and ecosystems underscores the importance of integrating infrastructure, governance, and market systems to support the growth of the halal industry (Puspita, 2023).

However, despite the growing body of literature, existing studies remain fragmented. Most research focuses either on halal supply chain practices, digital technology adoption, or sector-specific analysis, without integrating these elements into a comprehensive smart city framework. In particular, there is limited research on how halal logistics systems can be embedded in smart city development to create a globally

competitive Halal Hub. Furthermore, most studies do not specifically address the strategic positioning of newly developed cities, such as Ibu Kota Nusantara (IKN), within the global halal ecosystem. Therefore, this study addresses this gap by developing a conceptual framework that integrates halal logistics, smart infrastructure, and digital technologies within the context of IKN as a future global Halal Hub. This research contributes by providing a holistic perspective that connects halal assurance systems with smart city development, offering both theoretical and practical implications for policymakers and industry stakeholders.

To address these challenges, this study recommends several strategic measures, including strengthening halal infrastructure, investing in technology and human resources, and harmonizing policies and regulations. Strengthening halal infrastructure may involve establishing halal certification facilities and developing halal warehouses to support the segregation of halal and non-halal products. Investment in technology and human capital includes developing training programs for workers in the halal logistics sector and adopting digital technologies such as the Internet of Things (IoT) and blockchain to enhance transparency in halal supply chains. Policy and regulatory harmonization can be achieved through cross-sectoral collaboration among central and local governments and halal certification bodies. This study not only provides theoretical insights but also offers practical guidance for policymakers and investors in developing IKN as an innovative, sustainable, and environmentally friendly Halal Hub. It is expected to contribute to the literature on integrating smart cities with halal ecosystems and to serve as a foundation for further research on the development of the halal industry in Indonesia and globally.

2. Research Method

This study employs a qualitative approach to explore the potential of Ibu Kota Nusantara (IKN) as a halal center, or Halal Hub, within the framework of Indonesia Emas 2045 (Golden Indonesia 2045). A qualitative approach was selected because it enables an in-depth understanding of socio-economic phenomena and public policy issues related to the development of the halal ecosystem. In line with Fadli (2021), qualitative methods allow researchers to examine phenomena holistically, contextually, and meaningfully, rather than focusing solely on quantitative variable relationships (Fadli, 2021).

The research data are derived from secondary sources, including official government documents, particularly the *Nusantara Smart City Blueprint* published by the Nusantara Capital Authority (2023), as well as relevant academic literature on the halal industry, smart logistics, and smart city development (Otorita Ibu Kota Nusantara, 2023). In addition, a comparative study examined the development of Halal Hubs in Malaysia and Brunei Darussalam using international, peer-reviewed scientific publications (Nor et al., 2023; Rahim & Sulaiman, 2023). These two countries were selected because they are widely recognized for successfully integrating halal ecosystems into their national development strategies and for positioning themselves as global players in the halal industry. The literature selection process followed several systematic stages. First, relevant articles were identified using predefined keywords

such as "Halal Hub," "smart logistics," "halal supply chain," and "smart city development" across selected academic databases.

Second, the identified articles were screened based on their titles and abstracts to ensure relevance to the research objectives. Third, a full-text review was conducted to evaluate the suitability of each article in terms of its conceptual contribution and empirical relevance. Finally, only articles that met the inclusion criteria were selected and used as references in this study. The research data are derived from secondary sources, including official government documents, particularly the Nusantara Smart City Blueprint published by the Nusantara Capital Authority (2023), as well as relevant academic literature on the halal industry, smart logistics, and smart city development. The academic literature was collected from reputable databases, including Scopus-indexed journals, Google Scholar, and national indexing platforms such as SINTA and GARUDA, to ensure the inclusion of high-quality and relevant studies. After the data were compiled, analysis was conducted using content analysis techniques (Rahayu et al., 2025). Content analysis was chosen to identify themes, patterns, and interrelationships among concepts that support the development of a Halal Hub in IKN.

To enhance the validity and reliability of the research findings, data source triangulation was applied by comparing information from policy documents, academic articles, and halal industry reports. Discussions with peer researchers were conducted as part of a peer debriefing process to ensure that data interpretation remained unbiased and consistent with the research context. Furthermore, the researcher emphasized awareness of potential personal bias and maintained objectivity by focusing on verified empirical data. This study has limitations, particularly the absence of primary data such as stakeholder interviews or field surveys within the IKN area, given that the city is still under development. Therefore, the findings are exploratory and primarily focus on developing a conceptual framework and strategic guidelines that may be further tested through empirical research.

3. Results and Discussion

3.1. Results

The research findings indicate that Ibu Kota Nusantara (IKN) has significant potential to become a globally competitive Halal Hub. This potential can be analyzed through three principal dimensions: the readiness of logistics infrastructure, the inclusiveness of the business ecosystem, and the opportunities and challenges associated with its implementation.

Logistics Infrastructure Potential

IKN is designed as a smart city with integrated multimodal infrastructure, including land, sea, and air transportation networks. This logistics system is strengthened through the implementation of Smart Logistics and an Intelligent Transportation System (ITS), which enable real-time monitoring and management of goods distribution (Ding et al., 2021; Song et al., 2020). These technologies are highly relevant for ensuring the segregation of halal and non-halal products, enhancing transportation efficiency, and maintaining product quality through transparent

traceability mechanisms. Furthermore, the planned provision of electric vehicle infrastructure, such as Public Electric Vehicle Charging Stations (SPKLU) and Public Electric Vehicle Battery Swapping Stations (SPBKLU), adds strategic value to IKN. While integrating electric vehicle (EV) infrastructure supports environmentally sustainable logistics, several concerns must be considered in the context of halal supply chains. One potential issue is the risk of cross-contamination if EV-based transportation systems are not properly segregated between halal and non-halal goods.

Additionally, the current EV logistics ecosystem may still face limitations in infrastructure standardization, operational protocols, and halal compliance monitoring. To address these concerns, it is essential to implement strict segregation procedures, dedicated halal transport units, and real-time monitoring systems supported by IoT technologies. With appropriate governance and technological integration, EV-based logistics can not only support green transportation goals but also enhance the integrity and traceability of halal distribution systems.

The logistics infrastructure in IKN plays a critical role in ensuring halal product assurance throughout the supply chain. This includes the development of dedicated halal logistics facilities that support strict segregation between halal and non-halal products at every stage, including storage, transportation, and distribution. Segregation facilities, such as specialized halal warehouses and separate handling systems, are essential to prevent cross-contamination and maintain product integrity. In addition, cold chain infrastructure is required to preserve the quality and safety of halal products, particularly in sectors such as food, pharmaceuticals, and cosmetics (Zailani et al., 2010). The integration of temperature-controlled storage and transportation systems ensures that products remain compliant not only with halal standards but also with global quality and safety requirements (Ali et al., 2021).

Furthermore, the implementation of smart logistics technologies enhances halal assurance through traceability and real-time monitoring. Technologies such as IoT sensors enable continuous tracking of product conditions, including temperature, location, and handling processes, while blockchain systems can provide immutable records of the entire supply chain. These technologies strengthen transparency and allow regulators, producers, and consumers to verify halal compliance at every stage. The combination of physical infrastructure and digital monitoring systems establishes a comprehensive halal logistics ecosystem that supports product integrity, enhances trust, and aligns with international halal standards. The presence of this infrastructure supports environmentally friendly halal distribution while positioning IKN within the global transition toward green logistics (Un-Noor et al., 2017).

Inclusive Business Ecosystem

IKN is also designed to establish a business ecosystem that supports global integration. This ecosystem includes economic incentives, simplified licensing procedures, and technology-based services that facilitate investment. The presence of an Integrated Command and Control Center (ICCC) enables real-time monitoring of halal supply chains, ensuring that international standards such as ISO 22000 and ISO

28000 are consistently implemented (Yaacob et al., 2024a). Through this mechanism, the competitiveness of Indonesian halal products can be strengthened in international markets while simultaneously enhancing investor confidence in IKN as a global halal operations hub. From a market perspective, standardization enhances consumer trust by assuring that products meet recognized halal criteria, regardless of their origin or distribution channel (Zailani et al., 2017a). This is particularly important in global trade, where differences in national halal standards can create barriers to market entry. Harmonized standards facilitate cross-border transactions and reduce uncertainty for international buyers and investors (Anshori et al., 2025).

Furthermore, within an inclusive ecosystem, halal standardization supports the integration of multiple stakeholders, including producers, logistics providers, certification bodies, and regulators. By aligning these actors under a unified set of rules and verification processes, the system minimizes information asymmetry and strengthens accountability across the supply chain (Hew et al., 2020a; Yaacob et al., 2024b). In the context of IKN, robust halal standardization is essential not only for ensuring compliance but also for positioning the city as a globally competitive Halal Hub that is transparent, reliable, and accessible to diverse economic actors.

Opportunities and Challenges

Geographically, IKN's location at the center of the Indonesian archipelago provides a strategic advantage for access to both domestic and international markets, particularly Southeast Asia and the Middle East. The environmentally friendly infrastructure design aligns with global trends in sustainable city development and modern Halal Hubs (Chen et al., 2022; Zhang et al., 2025). However, several challenges must be anticipated. First, the limited availability of skilled human resources in halal logistics represents a significant constraint. Effendi (2023) emphasizes that workforce readiness in Indonesia’s halal small and medium enterprise (SME) sector remains relatively low and requires capacity-building programs (Effendi, 2023). Second, regulatory harmonization between national halal policies and IKN’s smart city system necessitates effective cross-sectoral coordination (Ismail, 2023). Without such harmonization, halal policies risk becoming misaligned with urban governance frameworks, potentially resulting in inefficiencies and reduced investment attractiveness.

From a halal perspective, the development of IKN as a Halal Hub must be understood not merely as the establishment of an advanced logistics system, but as the creation of a comprehensive halal assurance ecosystem. This involves ensuring that all logistics processes, from sourcing, handling, and storage to transportation and distribution, strictly comply with halal requirements and are protected against contamination. The halal aspect is particularly reflected in the implementation of segregation systems, certified halal handling procedures, and continuous compliance monitoring across the supply chain. In addition, the integration of traceability technologies enables verification of halal status at every stage, allowing stakeholders to track product history and ensure adherence to halal standards (Yaacob et al., 2024b; Zailani et al., 2017b).

Furthermore, halal governance plays a critical role in strengthening this system. The involvement of certification bodies, regulatory institutions, and halal auditors ensures that logistics operations are not only efficient but also aligned with Sharia principles. Without such governance mechanisms, advanced logistics infrastructure alone would not be sufficient to guarantee halal integrity. Therefore, the success of IKN as a Halal Hub depends on its ability to integrate logistics efficiency with a robust halal assurance system, where compliance, transparency, and trust become the central pillars of the ecosystem.

Integration of Physical Halal Logistics Flow and Digital Traceability Architecture

To further substantiate these findings, a visualization is required to illustrate how the physical flow of halal logistics is interconnected with digital data architecture within the smart city ecosystem. The findings demonstrate that the success of IKN as a Halal Hub does not solely depend on the provision of physical infrastructure, such as multimodal distribution routes, cold chain facilities, and port access, but also on the integration of technologies, including the Internet of Things (IoT), blockchain, and centralized monitoring systems through the Integrated Command and Control Center (ICCC). This integration creates a halal distribution system that is both efficient and transparent, capable of meeting global demand for traceable, verifiably halal products. To clarify the relationship between these two dimensions, a figure illustrates the integration of the physical halal logistics flow with the traceability data architecture in IKN.

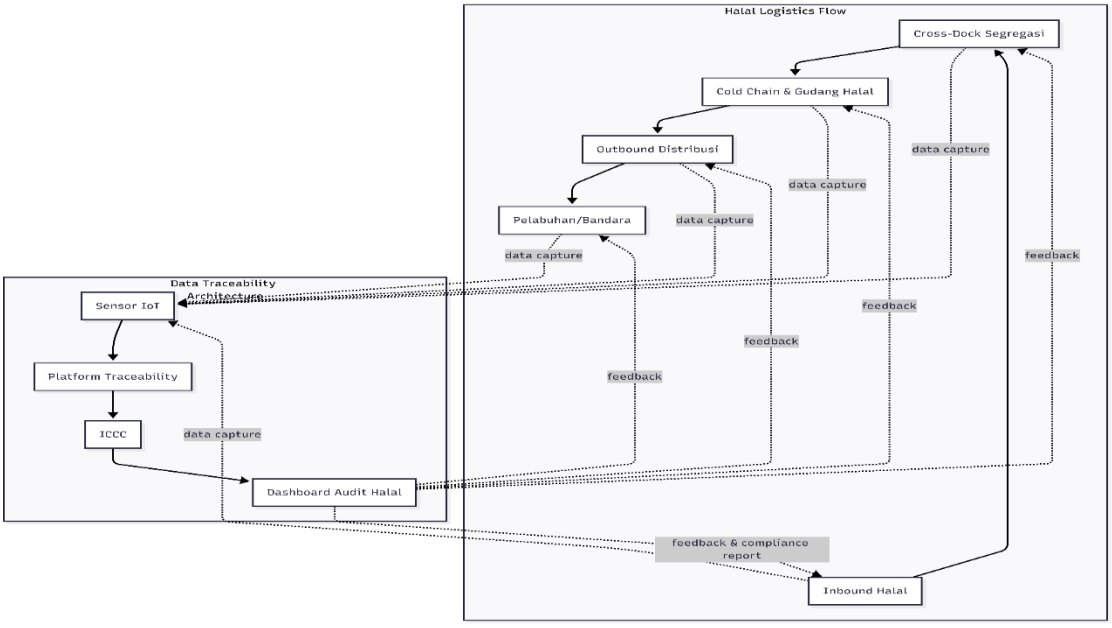

Figure 1. Integration of Physical Halal Logistics Flow with Traceability Data Architecture in IKN

The illustration (Figure 1) demonstrates the integration between the physical halal logistics flow and the traceability data architecture, which constitutes the core finding of this study. At the physical layer, goods move from halal inbound facilities to segregation facilities. They are subsequently distributed through cold chain systems to

outbound logistics points and onward to ports or airports as export gateways. Simultaneously, at the digital layer, each process is recorded through IoT sensors connected to a traceability platform and the ICCC. The collected information is displayed on a halal audit dashboard accessible to regulators, auditors, and investors. A feedback loop mechanism from the dashboard to all supply chain nodes strengthens supervisory functions and enables rapid corrective actions in cases of potential non-compliance with halal standards. This integration demonstrates that IKN's success as a Halal Hub depends not only on logistical efficiency but also on data transparency, product traceability, and the smart city system's capacity to ensure continuous halal compliance. Accordingly, this model reinforces IKN's position as an innovative, inclusive, and sustainable prototype Halal Hub at the global level.

3.2. Discussion

The findings of this study affirm that the development of Ibu Kota Nusantara (IKN) as a Halal Hub holds strong prospects, provided that the integration between physical logistics infrastructure and digital data architecture can be consistently realized. The visualization results demonstrate that the flows of goods and data do not operate independently; rather, they complement one another through mechanisms of data capture and feedback loops. Such integration is aligned with smart logistics theory, which emphasizes the interconnectivity of subsystems to enhance efficiency, transparency, and supply chain sustainability (Ding et al., 2021; Liu et al., 2023; Song et al., 2020). In other words, the success of a Halal Hub in IKN is measured not only by the speed of goods distribution but also by the system’s capacity to ensure comprehensive traceability and halal compliance. Within the broader halal industry literature, this study extends the understanding that modern Halal Hubs must integrate halal assurance principles with technological innovation. Zailani et al (2017) emphasize that traceability is one of the most critical factors in ensuring global consumer trust in halal products. This finding is consistent with the present study’s results, which highlight the role of IoT sensors, blockchain technology, and the Integrated Command and Control Center (ICCC) as key instruments in safeguarding the integrity of the halal supply chain in IKN (Zailani et al., 2017a).

Compared with international practices, IKN's development strategy shows both similarities and distinctions with Malaysia and the United Arab Emirates. Malaysia, through the Halal Industry Development Corporation (HDC), emphasizes internationally recognized halal certification and strong government incentive support. This approach has positioned Malaysia as a global reference point in halal certification, although certain logistical capacity challenges remain (Nor et al., 2023). Meanwhile, Brunei Darussalam integrates halal development with a global city vision based on trade, tourism, and Islamic finance. Dubai has successfully positioned itself as an international halal hub by integrating regulation, modern logistics, and a Sharia-compliant business ecosystem (Rahim & Sulaiman, 2023). In this regard, IKN is a synthesis of these two approaches. Indonesia has the world's largest Muslim population, which supports a substantial domestic market, alongside a global ambition reflected in the development of a new smart capital city. This dual advantage enables

IKN to combine Malaysia's strengths in halal certification with the UAE's smart logistics integration and Islamic investment ecosystem. However, the findings also indicate that limitations in skilled human resources and insufficient regulatory harmonization remain serious challenges that must be addressed promptly (Effendi, 2023; Ismail, 2023).

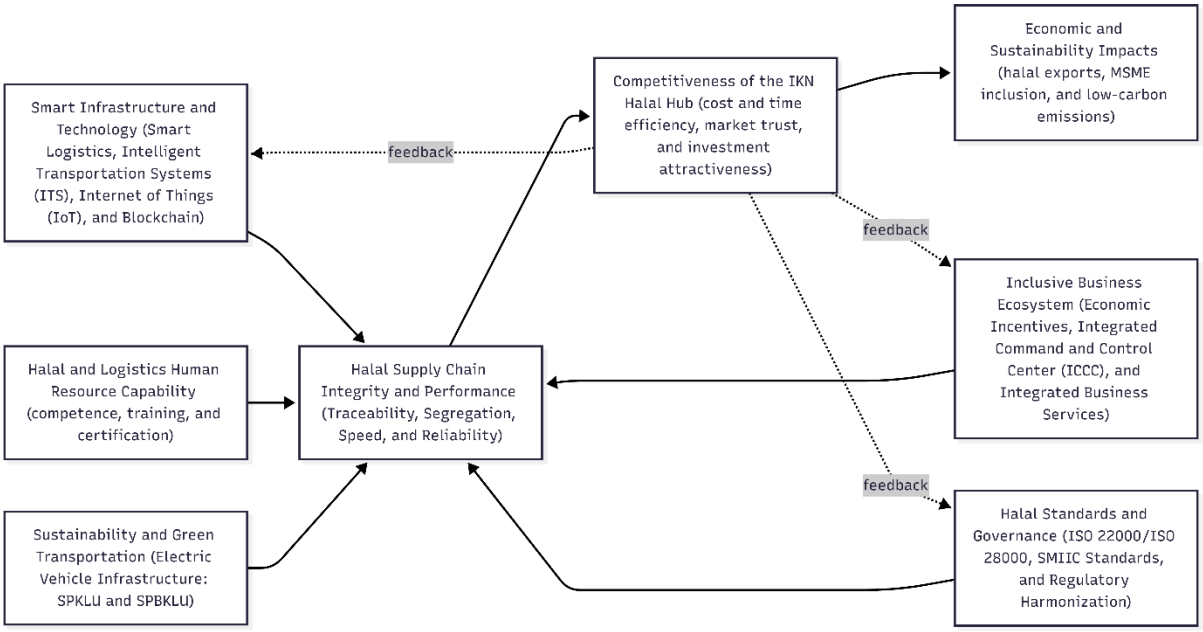

Figure 2. Conceptual Model for the Development of IKN as a Global Halal Hub

Figure 2 illustrates that the integrity and performance of the halal supply chain constitute the core of Halal Hub development in IKN. This integrity encompasses four primary dimensions: traceability, segregation, speed, and reliability, which serve as benchmarks for ensuring halal compliance while maintaining distribution efficiency. At the input level, three fundamental factors influence supply chain integrity. First, smart infrastructure and technology, including smart logistics systems, Intelligent Transportation Systems (ITS), Internet of Things (IoT), and blockchain technology. These technologies function as the backbone for ensuring end-to-end traceability and real-time halal compliance monitoring (Ding et al., 2021; Guerrero-Ibáñez et al., 2018; Hew et al., 2020b)—second, halal and logistics human resource capability, encompassing technical competence, training, and certification. Skilled human capital is a prerequisite for ensuring that halal logistics systems operate in accordance with international standards (Khaliqi & Pane, 2021; Yaacob et al., 2024a). Third, sustainability and green transportation, realized through electric vehicle infrastructure such as SPKLU and SPBKLU. The adoption of low-emission transportation supports green logistics targets while enhancing global investment attractiveness (Sanguesa et al., 2021; Sankar et al., 2023). Furthermore, supply chain integrity is closely linked to an inclusive business ecosystem comprising economic incentives, the ICCC as a centralized data control hub, and integrated business services. This ecosystem fosters connectivity among stakeholders, including regulators, business actors, and investors, thereby creating a conducive environment for the growth of the halal industry (Hendrickson et al., 2015; Un-Noor et al., 2017).

In addition, halal standards and governance frameworks, such as ISO 22000, ISO 28000, and SMIIC standards, ensure that each element of the supply chain aligns with

global benchmarks and minimizes the risk of cross-sector regulatory disharmony (Issaoui et al., 2020). The interaction among these factors determines the competitiveness of the IKN Halal Hub, measured by cost and time efficiency in distribution, enhanced market trust, and ease of investment access. At the macro level, this competitiveness generates broader economic and sustainability impacts, including increased halal exports, SME inclusion in global supply chains, and contributions to carbon emission reduction. The policy implications derived from these findings can be categorized into three key dimensions. First, the government should strengthen halal infrastructure by developing segregation facilities, cold chain systems, and dedicated halal logistics terminals, supported by IoT and blockchain technologies. Second, investment in halal human capital development is essential, including training programs, professional certification, and the integration of halal logistics curricula within higher education institutions. Third, regulatory harmonization is required between national halal policies, international standards (such as SMIIC and ISO), and IKN's smart city governance framework. Such harmonization will prevent policy overlap while simultaneously reinforcing global investment attractiveness.

The development of IKN as a Halal Hub must also align with Indonesia's existing halal regulatory framework. The implementation of Law No. 33 of 2014 on Halal Product Assurance (Undang-Undang Jaminan Produk Halal) establishes a mandatory halal certification system for products circulating in the Indonesian market. This regulation is further supported by Government Regulation No. 39 of 2021, which provides detailed guidelines for the implementation of halal certification, including institutional roles, certification procedures, and compliance mechanisms. These regulatory frameworks play a crucial role in ensuring that halal assurance is not only a voluntary practice but a legally enforced requirement across the supply chain. In the context of IKN, the integration of halal logistics systems must therefore be aligned with national standards set by the Halal Product Assurance Organizing Agency (BPJPH) and related institutions. This alignment ensures consistency between technological innovation, logistics infrastructure, and Sharia compliance, thereby strengthening both domestic credibility and international competitiveness of the halal ecosystem.

5. Conclusion

This study affirms that Ibu Kota Nusantara (IKN) possesses strategic potential to be developed as a global Halal Hub in support of the Indonesia Emas 2045 vision. The findings indicate that the success of IKN depends not only on the development of physical logistics infrastructure, such as multimodal distribution routes, segregation facilities, and cold chain systems, but also on the integration of smart technologies, including IoT sensors, blockchain, and centralized monitoring systems within the Integrated Command and Control Center (ICCC). The integration of physical and digital flows enhances transparency, traceability, and halal compliance, thereby strengthening global market trust in Indonesian halal products. The study further demonstrates that IKN's development strategy has the potential to represent a synthesis of two established international models, namely Malaysia and the United Arab Emirates. From Malaysia, IKN may leverage strengths in halal certification and

regulatory support, while from the UAE, it may integrate a Sharia-based business ecosystem with modern infrastructure. Nevertheless, the findings also highlight key challenges that must be addressed, particularly the limited availability of skilled halal human resources and the need for cross-sector regulatory harmonization to ensure IKN's global competitiveness.

From an academic perspective, this research contributes to the literature by expanding the discourse on integrating halal supply chains into smart city development in the context of constructing a new capital city. From a practical standpoint, it provides strategic recommendations for government institutions, the private sector, educational institutions, and international organizations in developing an innovative, inclusive, and sustainable halal ecosystem. The primary limitation of this study is its reliance on secondary data rather than primary field data, which limits the findings to an exploratory nature. Accordingly, future research should employ empirical methods, such as surveys and stakeholder interviews, to test the effectiveness of the proposed conceptual framework. Further studies may also broaden the scope to examine socio-cultural dimensions and the local economic impacts of developing IKN as a Halal Hub.

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