



received: 17 January 2024
accepted: 30 September 2024

pages: 69-95

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MAPPING THE BARRIER OF HALAL FOOD INDUSTRY PERFORMANCE AND THE POLICY INSIGHT: COMBINATION OF ISM-DEMATEL APPROACH

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ABSTRACT

The study aims to understand interlinkages and the relative importance of barriers to maximising the performance of the halal industry in Indonesia using Integrated Interpretive Structural Modelling (ISM) and the Decision-Making Trial and Evaluation Laboratory (DEMATEL) methodology. This study uses the content validity method to find the relevant or valid barrier, the ISM methodology to examine the interrelationship between the valid barriers, and the DEMATEL methodology to find the cause–effect relationships and revise the ISM digraph. To the best of the authors’ knowledge, this study is the first to investigate the barriers to systematically maximising halal industry performance in Indonesia, elaborating on the relationship between relevant theories and practical issues to identify the barriers. The study’s integrated approach helps corporate and political decision-makers identify essential barriers to development and explore the interdependencies between barriers. This can help decision-makers overcome critical obstacles, use resources more efficiently, and find innovative solutions for the industry’s viability and dynamic development.

KEY WORDS

barriers, halal industry, ISM, DEMATEL

10.2478/emj-2024-0034

INTRODUCTION

In Islam, halal refers to something that is legal (Aziz & Ahmad, 2018; Tieman, 2011). Halal is considered part of religious conformity and a standard

lifestyle choice for Muslims (Golnaz et al., 2010). Halal products have become an important market category worldwide, accounting for 24 % of the world’s Muslim population (Sumarliah, 2021). While halal is commonly associated with Muslims, this does not imply that halal product customers are exclusively Muslim. Consumers of halal products from nations

Susanty, A., Puspitasari, N. B., Mariana, S. D., Fekete-Farkas, M., Gyenge, B., & Nazaruddin, L. O. (2024). Mapping the barrier of halal food industry performance and the policy insight: combination of ISM-DEMATEL approach. *Engineering Management in Production and Services*, 16(4), 69-95. doi: 10.2478/emj-2024-0034

with minority Muslim populations have increased significantly in recent years. For example, Brazil, Australia, and Singapore were among the top ten nations in the halal food industry in terms of the GIEI (Global Islamic Economy Indicator) score in 2017–2018 (Thomson Reuters, 2017). Nevertheless, they are non-Muslim nations (Latif, 2017). The largest market in the halal food sector is meat and poultry, which is surprisingly led by non-Muslim countries. New Zealand and Australia are the global leaders in the export of halal meat. Brazil and Argentina are the world's largest producers of chicken (Nor Ai'han Muiar, 2015). The quality of halal products, also known as Halalan Tollyiban, is why they are not used. The entire production chain is guaranteed to be clean, safe, and high quality (Cruz & Billanes, 2021).

The phrase "halal industry" refers to any economic operation that adheres to Islamic standards (Laldin, 2006). Indonesia's halal industry contributes USD 3.8 billion to its Gross Domestic Product (GDP). Additionally, the halal industry has attracted USD 1 billion in international investment, producing 127,000 employees annually. If re-optimised, the halal industry can raise exports and foreign exchange reserves (Kusumaramdhani & Nusran, 2021). The expected total assets of many halal industrial sectors, including halal food, banking, travel, fashion, medical, entertainment media, and cosmetics, would expand by 31 % by 2023, according to the 2019 State of the Global Islamic Economy Report (DinarStandard, 2019). Consequently, to maximise its economic potential, Indonesia should have started expanding its halal industry.

Despite the positive impact of the halal industry on Indonesia's economy, its potential has yet to be completely realised. This is evident from Indonesia's inability to attain a top spot in all halal industry sectors. According to the State of Global Islamic Economy Report 2022, Indonesia ranks fourth among the top 15 Global Islamic Economic Indicators, behind Malaysia, Saudi Arabia, and the United Arab Emirates. Indonesia ranks second in the classification of halal food producers despite ranking first in the classification of halal food consumers. Indonesia ranks sixth in Islamic Finance, third in modest fashion, and ninth in pharmaceuticals and cosmetics. For Muslim Friendly Travel and Media and Recreation, Indonesia did not rank among the top ten (DinarStandard, 2022).

Therefore, based on the background described above, this research highlights the barrier between the potential to grow a halal industry and the fact that

these opportunities are yet to be maximised. Then, to find the relevant barriers to maximising the performance of the halal industry, this study utilised institutional pressure from the institutional theory of DiMaggio and Powel (1983) and the resource-based view (RBV) (Barney, 1991). This study also used some previous studies on halal industry performance (i.e., Hasan & Pasyah, 2022; Batubara & Harahap, 2022; Salahuddin et al., 2021; Adham et al., 2020; Utomo et al., 2021) and notes from the National Sharia Economic and Finance Committee to find relevant barriers, such as the Indonesian Sharia Economic Masterplan 2019–2024 (Ministry of National Development Planning/National Development Planning Agency, 2018). Related to institutional pressure from institutional theory, organisations in a certain industry operate within an institutionalised environment in which different control mechanisms, such as rules, laws, and policies, impact the behaviour and practices of those organisations (Lawrence & Suddaby, 2006). These control mechanisms comprise three dimensions of pressure (coercive, mimetic, and normative), which are also known as drivers or forces that create isomorphism or homogeneity in organisational strategies, structures, and processes, particularly those within the same industry (Glover et al., 2014). As a result, a lack of control systems may be a barrier to maximising industrial performance. Moreover, according to certain academics, institutional pressure from institutional theories is important in driving halal enterprises (Ab Talib et al., 2016a; Zulfakar et al., 2018). Related to RBV theory, this theory is grounded in resources and capabilities as two drivers of competitive advantage and performance. A resource is considered as the core in the RBV theory because of its main role in providing inputs to the firm's processes and activities (Barney, 1991), whereas capabilities arise as a result of the firm's ability to create value of the process by using and combining resources (Amit & Schoemaker, 1993). RBV theory suggests that a firm contains resources, some of which are called strategic because they are rare, valuable, imperfectly imitable, and substitutable (Ali et al., 2022). Related to the Indonesian Sharia Economic Masterplan 2019–2024, in general, there are several challenges in developing the halal industry in the country, namely, inadequate regulations related to the halal industry, inadequate public literacy and awareness of halal products, and the interlinkage of the halal industry and sharia finance, which still need improvement. The other is the increase in consumption and demand for halal products in the country,

which must be balanced with the amount of production. However, governance and risk management in the halal sector remain inadequate. The use of technology is yet to be optimised in the halal industry. Indonesia's halal standards are yet to be accepted globally (Ministry of National Development Planning/National Development Planning Agency, 2018). Thus, referring to the RBV theory, the lack of a firm's ability in the halal industry to provide relevant input to the firm's processes and activities and create value in the process through using and combining resources could be a barrier to maximising the performance of the industry. More details about the barriers originating from the institutional theory and RBV, as well as relevant previous research, can be found in the literature review subsection.

Some previous studies related to the institutional theory and resource-based view in the halal context (such as Islam et al., 2024; Jaswir et al., 2023; Sumarliah et al., 2023; Nee & Mohamad, 2022; Sumarliah et al., 2022; Tan et al., 2022; Hew et al., 2020; Karbhari et al., 2021; Hewege & Perera, 2020; Iswanto & Koeswinarmo, 2020; Rahman et al., 2020; Bashir et al., 2019; Suharko et al., 2018; Ab Talib et al., 2016a; Ab Talib et al., 2016b). Some previous studies related to the halal industry's performance have directly discussed the barriers to maximising the halal industry's performance (such as Hasan & Pasyah, 2022; Batubara & Harahap, 2022; Salahuddin et al., 2021; Adham et al., 2020; Utomo et al., 2021). Table 1 provides a detailed explanation of the results. However, since these previous studies have not differentiated the barriers (group of barriers that affect others and group of barriers that are affected by others) to maximise halal industry performance, policymakers need to know how both groups of barriers are related to each other. This study aims to answer the following research questions.

RQ1. What are the valid barriers to maximising the performance of Indonesia's halal industry?

RQ2. How are the barriers to maximising the performance of the halal industry in Indonesia interlinked with one another?

RQ3. What is the relative importance of each barrier in maximising the halal industry's performance in Indonesia?

RQ4. What recommendations could be generated from the findings of this research?

A content validity analysis, integrated Interpretive Structural Modelling (ISM), and Decision-Making Trial Evaluation and Laboratory (DEMATEL) approach addresses the above research question. The

identified barriers were initially verified using content validity analysis with subject matter experts (Yusoff, 2019). The importance of each barrier is then determined using DEMATEL once an ISM model of the barriers has been built (Manoharan et al., 2022). This study adds to prior research in two ways, based on the research questions. This study is the first to identify and categorise barriers impacting the performance of the halal industry into two groups: "facilitator (affecting others or a cause)" and "dependent (affected by others or an effect)". Consequently, it helps policymakers identify and place barriers according to the direction and strength of their effect on other barriers. It also helps policymakers identify barriers according to their dependence and driving forces. Second, the report proposes a hierarchy of barriers, providing policymakers with advice on systematically removing them to maximise the halal industry in Indonesia. Additionally, the findings of this study contribute to a better understanding of the Indonesian halal industry.

1. LITERATURE REVIEW

The literature review will consist of an explanation of institutional pressure from the institutional theory of DiMaggio and Powel (1983), previous research on halal that used institutional theory, RBV theory, previous research on halal using RBV theory, and previous research related to the performance of the halal industry. Referring to the systematic literature review result by Islam et al. (2024), Institutional Theory and RBV are the leading theories researchers use to underpin the premises of halal studies, pointing to certifiers and producers' perspectives.

1.1. INSTITUTIONAL PRESSURE FROM THE INSTITUTIONAL THEORY

Halal certification is one of the tools that the government must consider for Indonesia to be competitive in the halal industry (Izzudin & Adinugraha, 2021). On the demand side, halal food certification is an essential component of the halal food industry because it influences customer preferences (Mohayidin & Kamarulzaman, 2014), confidence (Mohamed et al., 2013), purchasing behaviour (Shah Alam & Sayuti, 2011), and willingness to pay (Verbeke et al., 2013). On the supply side of the halal food chain, it is essential to ascertain the factors that motivate

firms to implement halal food certification. Then, referring to Izzudin and Adinugraha (2021) and Jaswir et al. (2023), this underlines the Institutional Theory by DiMaggio and Powell (1983) to determine the factors that motivate firms to engage in halal food certification as a prominent condition to maximise the performance of the halal industry.

Referring to Scopus Databases, this study found 14 articles with the keywords “Institutional Theory” and “Halal” in the abstract. Seven out of 14 articles tried to explain how institutional theory is used in the context of halal certification (Jaswir et al., 2023; Hewege & Perera, 2020; Iswanto & Koeswinarmo, 2020; Bashir, 2019; Suharko et al., 2018; Ab Talib et al., 2016a; Ab Talib et al., 2016b), while others discussed institutional theory as one of the underpinning theories in halal or halal logistic research (Islam et al., 2024; Nee & Mohamad 2022; Rahman et al., 2020), institutional theory in Shariah Governance of Islamic Banks (Karbhari et al., 2021), and institutional theory in blockchain technology adoption (Sumarlia et al., 2023; Sumarlia et al., 2022; Tan et al., 2022; Hew et al., 2020). The summaries of the 14 articles can be seen in Table 1.

According to DiMaggio and Powell (1983), Institutional Theory explains that firm strategies and actions are responses to pressure from the external environment. Meyer and Rowan (1977) and Suchman (1995) hypothesised that a firm's endeavours are influenced by its desire to acquire business legitimacy and market recognition. Mariotti et al. (2014) explained that Institutional Theory “depicts firms as passive participants that respond to external pressures and expectations”. In the context of the halal food market, this suggests that external factors, such as government regulations, industry standards, and consumer demand, prompt firms' pursuits of halal food certification. Fischer (2015, 2016) showed that the halal food industry is profoundly institutionalised and that firms' operations are compliant with set government regulations.

DiMaggio and Powell (1983) classified Institutional Theory as having three isomorphic mechanisms: coercive, normative, and mimetic isomorphism. These three isomorphic processes further elucidate external environmental pressures (government rules, industry norms, and consumer expectations).

- **Coercive Isomorphism.** In the case of coercive isomorphism, DiMaggio and Powell (1983) point out that firms are pressured directly or indirectly

by government organisations. This view is supported by Arpanutud et al. (2009). In short, according to DiMaggio and Powell (1983) and Arpanutud et al. (2009), governmental factors are significantly related to certification and standards implementation in Coercive Isomorphism. This finding suggests that regulatory commitment and the need to operate a legitimate operation, either directly or indirectly, coerced firms to implement halal food certification. Therefore, in the context of barrier factors, the absence of these factors inhibits firms from implementing halal food certification.

- **Normative Isomorphism.** According to Mariotti et al. (2014), normative isomorphism is linked to a firm's reputation and image. Mariotti et al. (2014) also emphasised the importance of conforming to industry norms, which may substantially impact a company's image and reputation. Furthermore, because Muslims are known to be sensitive consumers (Rezai et al., 2012) and eating halal food is the norm (Abdur Razzaque & Chaudry, 2013), food firms that serve Muslim markets must ensure that their products are halal, as studies have shown that halal certification portrays a firm's image and reputation. Therefore, in the context of barrier factors, the lack of consumer demand for halal certifications will prevent firms from implementing halal food certification because the absence of a halal certificate does not cause the firm to lose its image and reputation.
- **Mimetic Isomorphism.** As defined by DiMaggio and Powell (1983), Mimetic Isomorphism is the duplication of a firm's business activities from other businesses. Furthermore, according to DiMaggio and Powell (1983), the mimetic approach is favoured owing to limited knowledge since it creates a sense of comfort in developing firm objectives or strategies. In this circumstance, only the effective or best practices are duplicated. Previous studies (Fikru, 2014a; 2014b; Mariotti et al., 2014; Arpanutud et al., 2009) discovered that enterprises are driven to use certification to achieve the same success as viral firms and thus begin the mimetic approach. Based on this point of view, in the context of barrier factors, the absence of successful enterprises owing to their use of halal certification discourages or even prohibits new firms from using it.

1.2. RBV THEORY

RBV theorists believe that a firm's valuable, uncommon, and unique resources and talent determine its competitive advantage (Barney, 1991). Research recognises that tangible and intangible resources are significant because each may give a business a distinct competitive advantage (Barney, 1991; Karia & Wong, 2013). Physical, information technology, knowledge, managerial competence, and organisational and relational resources (Karia & Wong, 2013).

Referring to Scopus Databases, six articles were found using the keywords "Resource-Based View", "Resource Based View", and "Halal" in the abstract. Among these articles, Islam et al. (2024) and Nee and Mohamad (2022) conducted systematic literature reviews on the use of RBV theory in halal research. Islam et al. (2024) found 32 of 320 articles dealing with halal studies on standards, certification, policy-makers and producers, and halal supply chains. Only seven out of 32 articles consulted the RBV (approximately 21 %). Nee and Mohammad (2022) found that the RBV is a theory that has been applied in various aspects of research in halal logistics and supply chains. Then, in conceptual and empirical research, Ali et al. (2022) used RBV to derive supply chain integration, which has significant effects on the dimensions of the Halal Food Supply Chain Integrity; Azhar and Tu (2021) used RBV to find several factors for the successful implementation of sustainable halal food supply chain management; Uthamaputhran et al. (2019) used RBV as a theoretical lens to make a conceptual focus on halal SMEs' resources to support the process of internationalisation; and Ab Talib et al. (2016b) used RBV to find a conceptual model of the relationship between Halal Certification and logistics performance. The summaries of the six articles can be seen in Table 1.

According to Barney (1991) and Dube et al. (2016), certification is a resource that a firm may use to seek profit from the standpoint of RBV theory. In this context, halal food certification, whether in a license, logo, or seal, is a certified identity for a firm whose food items are derived from, produced, and distributed under Islamic standards values (Riaz & Chaudry, 2004). Halal certification has evolved into a new marketing strategy that captures customer attention (Yunos et al., 2014). This strategy allows a firm to operate in a highly competitive business climate and has the potential to generate billions of ruptures. Furthermore, according to RBV theory, the

internal condition of halal food firms, customers, and supplier connections are strategic resources that impact halal food supply chain integrity as a valuable and rare skill that affects food quality performance (Ali et al., 2022). Therefore, in the context of barrier factors, the absence of a competitive business environment, as well as the support from internal firms, customers, and supplier relationships, will inhibit firms from getting or implementing halal certification as their resource, which, in turn, does not maximise the performance of the halal industry in Indonesia.

1.3. RESEARCH RELATED TO THE HALAL INDUSTRY

This research, which identified articles published in Scopus databases (Scopus, n.d.) using the "advanced search" tool with the keyword "halal industry" in the title, found 38 articles. However, upon reading these articles, a significant gap in the literature became apparent. While not entirely on point, five articles were found to be potentially supportive of the research's objectives and could aid in identifying the barriers to maximising the performance of the halal industry: Hasan and Pasyah (2022), Batubara and Harahap (2022), Salahuddin et al. (2021), Adham et al. (2020), and Utomo et al. (2021). The object of their research, methods, variables, and findings are shown in Table 1.

1.4. RESEARCH GAP

Table 1 reveals a significant research gap in the existing literature related to the halal industry. None of the previous studies on institutional and resource-based theories directly addressed the industry performance or its barriers. Understanding these factors is crucial for the growth and optimisation of the halal industry. This gap not only highlights the need for further research but also underscores the potential impact of addressing these issues. Furthermore, none of the previous studies related to the halal industry, which are listed in Table 1, identified barriers to maximising the performance of the halal industry. The review of the existing literature reveals several vital limitations that suggest a critical research gap:

1. Limited focus on comprehensive industry performance. Most studies (Hasan & Pasyah, 2022; Batubara & Harahap, 2022; Salahuddin et al., 2021; Adham et al., 2020; Utomo et al., 2021) do not address the overall performance of the halal industry. This

Tab. 1. Summary of previous studies related to institutional theory and resource-based view in the context of halal research and halal industry performance

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Institutional Theory					
Jaswir et al., 2023	Identify the factor that could motivate the food industry to take part in the standardisation process and analyse which motive is the most influential. This study also examines the relationship between the motive and the implementation itself	Food and beverage small and medium-sized enterprises, Malaysia	Exploratory Factor Analysis and Covariance-based Structural Equation Modelling	- From the institutional theory: three motives — coercive isomorphism, mimetic isomorphism, and normative isomorphism - Implementation of MS 1500: the perception through implementation; core activities in implementation, and limitation of implementation	The most influential motive is coercive or pressure from the outside of the organisation, either from governmental mandates or political influence. Then, there is a significant relationship between the motive behind the implementation of MS1500 and the implementation itself
Hewege & Perera, 2020	Identify the role of certification bodies and the influence of religious-cultural institutions over a country's supply chains in the context of halal certification	N/A	Qualitative content analysis method involving subjective interpretation of the content of text data through a systematic classification process of coding and identifying themes	- From the institutional theory and Gramsci's theory of Hegemony: religious beliefs, cultural rituals, and diverse social institutions - Halal supply chain	Four research propositions followed by a theoretical framework describing the influence of religious beliefs, cultural rituals, and diverse social institutions on halal supply chains
Iswanto & Koeswirmo, 2020	Identify the relationship between organisations based on the interpretation of each party related to the Halal Product Guarantee policy and its consequences	Halal industry, Indonesia	Interview with several informants, purposively selected based on their competence in organisations related to halal product policies Document studies and literature studies	From the institutional theory: interpretation, power relation, and regulation liminality	The interpretations of each organisational actor towards the new halal certification policy in Indonesia are driven by different institutional reasons/logics, resulting in contradictions, even conflicts related to the relationship between organisations implementing the policy
Bashir et al., 2019	Identify the degree to which halal consumers with higher institutional pressures are more expected to purchase halal food products	Halal consumers, South Africa	Structural equation modelling (SEM)	- Attitude - From institutional theory: coercive pressures, normative pressures, mimetic pressures - Purchasing intention - Buying behaviour	All institutional factors have a direct effect on halal consumer intentions and an indirect effect on buying behaviour

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Suharko et al., 2018	Identify the institutional conformance of the Halal Certification Organisation (HCO) to the development of the halal tourism industry (HTI)	Halal tourism industry, Indonesia and Thailand	Qualitative case study approach-set of interviews has been conducted with some key informants in Majelis Ulama Indonesia (MUI) and Central Islamic Committee of Thailand (CICOT)	From the institutional theory: three motives — coercive pressures, normative pressures, mimetic pressures for understanding the dynamic of halal tourism sectors	Adapting to the rapid development of halal tourism industry, the two HCOs provided a halal certificate for Muslim consumers' protection, increased export of goods to a number of Muslim countries and provided halal tourism services to augment the competitiveness of respective halal tourism destination
Ab Talib et al., 2016b	Identify the theoretical background of halal food certificate implementation	N/A	Literature review	From the institutional theory: coercive (dependence — regulatory pressure), normative (demand — customer pressure), mimetic (uncertain — competitive factor)	Three propositions — the relationship between coercive, normative, and mimetic on halal food certification
Rahman et al., 2020	Identify the central institutional theory that can be used as a primary reference for future scholars as underpinning theory	N/A	Literature review	From the institutional theory: behaviour, perception, etc.	General review by focusing on the concept of institutions, the characteristics of institutions, and the three key elements discussed in institutional theory
Sumarlia et al., 2023	Identify the intent to adopt a blockchain-facilitated halal traceability (BFHT) scheme in Indonesian firms' halal food supply chain (SC)	Halal food enterprise, Indonesia	Partial least squares structural equation modelling (PLS-SEM)	- From the institutional theory: institutional force — prescriptive, imitative, coercive - Halal-focused approach: procuring materials, manufacturing activities, staffing, warehousing and shipping - Perceived attractiveness: compatibility, complexity, comparative advantages, perceived attractiveness - Adoption intent	The intent to adopt the blockchain-facilitated halal traceability (BFHT) is considerably affected by perceived attractiveness, as perceived attractiveness is considerably affected by institutional forces, which are significantly influenced by halal-focused attitude. Firms that follow a completely halal-focused attitude show higher awareness regarding institutional forces that motivate them to adopt a BFHT

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Sumarliah et al., 2022	Identify the participation intent in the blockchain-halal fashion traceability (BHFT) system via a joint framework that includes diffusion of innovation theory, institutional theory, and halal-oriented approach	Halal fashion producers, Indonesia	Partial least squares structural equation modelling (PLS-SEM)	- Institutional theory: institutional pressure- normative, mimetic, coercive - Halal-oriented approach: sourcing, manufacturing, staffing, storing and shipping - Diffusion of innovation theory: perceived desirability-compatibility, complexity, relative advantage - Participation intention	The halal-oriented approach is significant in helping halal fashion manufacturing companies value the institutional pressures that support them in blockchain-empowered halal fashion traceability
Tan et al., 2022	Identify the current traceability challenges for the food supply chain in Malaysia to comply with halal requirements. We position these challenges in the context of institutional theory	Food supply chain, Malaysia	Case study- interview with three companies	- Based on institutional theory (coercive, mimetic and normative pressures) and agency theory (agency problem and risk sharing): - Lack of Global Halal Certification system, inaccurate and unauthentic data of halal products, poor regulation of raw materials for halal products, and ineffectiveness of existing traceability system	The technology with smart contract is proposed with inputs from three Blockchain software providers with the aim to create a conceptual framework that integrates both halal processes and technologies to improve traceability of Halal food supply chain from farm to fork
Hew et al., 2020	Identify the intention to participate in a blockchain-based halal traceability system through a united model that consists of a halal orientation strategy, institutional theory, and diffusion of innovation theory	Halal food and beverage manufacturers, Malaysia	Partial least squares structural equation modelling (PLS-SEM)	- From the institutional theory: institutional pressure — normative, mimetic, coercive - halal orientation strategy: materials, production process, staffing, storage and transportation - Perceived desirability: complexity, relative advantage, compatibility - Intention to participate	First, the halal orientation strategy will be more perceptive towards the institutional pressures that demand them to participate in a traceability system. Second, the manufacturers would evaluate the technological characteristics of the system and subsequently develop their perceived desirability. Third, the manufacturers with favourable perceived desirability shall decide to participate in the system

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Karbhari et al., 2021	Identify the relevance of applying institutional theory in Shariah governance of Islamic banks	Islamic Banks	Literature review	Institutional theory: coercive-to attain legitimacy, mimetic-to eliminate uncertainty and normative- mainly from professionalisation	Institutional theory to best serve the development of operational strategies and structures of Islamic banks, including the role, function and power of the various stakeholders, including regulators and those involved in the Shariah governance process of Islamic banks
RBV					
Islam et al., 2024	Identify the underlying Islamic principles to the business theories for producers and policymakers and explain halal marketing by value creation approach for halal stakeholders concerned with halal certification and its implementation	N/A	Literature review	Best Worst Method (BWM), Gravity Theory, Decision Tree (DT), Theory of Constraints, Classical Secularisation Theory, and Game Theory, fuzzy decision-making trial and evaluation laboratory (DEMATEL), stakeholder theory (ST), Grounded Theory, Theory of Religion, Pareto analysis, Critical Success Factors (CSFs), Resource-based view (RBV) and institutional theory (IT)	Only seven studies consulted the resource-based view (RBV), a strategy theory and the institutional theory (IT) connected to halal. This study further underpinned qualitative Quranic verses to add to the current body of RBV and IT, resulting in halal sustainable competitive advantage and halal certification institutionalisation
Nee & Mohamad, 2022	Identify Scopus database halal logistics and halal supply chain academic literature from 2007 to 2020	N/A	Literature review	Theory used in research about halal logistics and halal supply chain	Diffusion of Innovation (DOI), Resource-Based View (RBV), Technology–Organisation–Environment (TOE), Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Institutional Theory, Agency Theory and Adaptive Saturation Theory (AST) are the theories that have been applied in various aspects of research in HL and HSC

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Ab Talib et al., 2016a	Identify a theoretical model for the relationship between halal certification and logistics performance	N/A	Literature review	• Institutional theory: coercive isomorphism-regulation and policies enforced onto firms prior to operation; firms are pressured to secure certification as a means of gaining business legitimacy • RBV: halal is both tangible and intangible resources • Logistics performance: quality, time, cost, and flexibility	The conceptual model: halal certification, could positively influence logistics performance; governmental factors act as the moderator between the halal certification-logistics performance relationship or could directly influence logistics performance
Halal Industry					
Hasan & Pasyah, 2022	Identify the challenges of the Indonesian halal industry in the digital economy era	Halal food and beverage industry, Indonesia	Normative legal research	• Opportunities for the halal product industry in the digital economy era; • The challenges of the Halal Industry in the era of the digital economy; • Legal assurance of halal industry in the digital economy era; • Elements and system of law enforcement and protection of rights (non-legal factors, including culture, the law or regulation itself, the mentality of the officers who enforce the law, the facilities expected to support the implementation of the law, and the legal culture/legal awareness); facility factors used by law enforcement	Halal product industry in Indonesia in the era of the digital economy and efforts to guarantee legal certainty for the halal industry is currently still not implemented optimally

AUTHOR	PURPOSE OF RESEARCH	OBJECT OF RESEARCH	METHOD	VARIABLES	FINDING
Batubara & Harahap, 2022	Identify the strategies for halal industry development implemented by business actors in Indonesia and provide Indonesian Muslims' responses and Sharia compliance to the halal context in their lives	Halal industry, Indonesia	Analytical Network Process	- Internal problem: internal industry-relatively new in Indonesia, marketing, and human resources - External problem: infrastructure, legal standards, and government support - Strategy: halal area development, government policy support, coaching and training, assistance, research and collaboration, and constructing halal concerns through local wisdom	The strategies used to develop halal industry are not appropriate due to internal factors such as lack of standardisation, branding, and limited human resources, and external ones which are the absence of a roadmap for halal industry and less supports from the government. Improving effective government policies and training human resources are among the strategies that might be applied
Salahuddin et al., 2021	Identify a glance over five decades of Malaysian experience in nurturing and commodifying the halal industry	Halal industry, Malaysia	Literature review	- Halal logistics (market outlook, constraints, needs), halal marketing and sales (market outlook, constraints, needs) - Halal operation (market outlook, constraints, needs),	Cost of realignment to policies, risk of asymmetric information, and certification fraud are among the major barriers that hinder starting an operation in a halal setting
Adham et al., 2020	Identify the Muslim-minority context of Taiwan and utilise the Viable System Model (VSM) as the framework to diagnose the current state of Taiwan's halal industry	Halal industry, Taiwan	Viable System Model	- Implementation - Coordination - System monitoring - Intelligence - Policymaking	An absence of a halal industry development policy. This situation then explains why Taiwan lacks formal policymaking and intelligence as well as control and coordination functions
Utomo et al., 2021	Identify and explore the role of Islamic financing in supporting halal industry development in Indonesia	Islamic financing, Indonesia	Partial least square (PLS)	- Islamic financial literacy - Religiosity - Subjective norms, - Attitude - Awareness - Intention	Literacy on Islamic finance, attitude and awareness strongly affect business owners' intention to use Islamic financial products. It was also found that subjective norms significantly influence literacy, attitude, and awareness. However, religiosity does not significantly affect attitude toward Islamic financial products

indicates a gap in research that looks at the broader factors influencing the performance of the halal industry.

2. Absence of a barrier identification framework. None of the existing studies focus on identifying the barriers that prevent the halal industry from maximising its potential. The failure to identify these barriers systematically limits the field's understanding of the factors that inhibit the industry's growth and performance optimisation.

3. Lack of advanced methodologies. As mentioned in the provided research excerpt, none of the prior works utilised integrated ISM-DEMATEL methodologies, which are well-suited for understanding complex relationships among barriers. ISM (Interpretive Structural Modelling) helps create a structured model to identify the relationships among barriers. At the same time, DEMATEL (Decision Making Trial and Evaluation Laboratory) quantifies and visualises each barrier's causal relationships and influence. The absence of these methodologies in the field is a notable research gap.

4. Underuse of institutional and resource-based theories. Although several studies on the halal industry exist, they have not adequately applied the institutional theory (which looks at how institutions, including regulations and cultural norms, influence organisational behaviour) and resource-based theory (which focuses on how organisations use their internal resources to create competitive advantage). The research you are working on emphasises these theories to examine performance barriers, thereby addressing a gap where the application of these theoretical frameworks is limited or underdeveloped.

Connecting considerations to the research gap:

1. Addressing the lack of holistic industry performance studies:

- This research goes beyond the narrow focus on specific elements of the halal industry and aims to provide a holistic assessment of the industry's performance. In doing so, it introduces a fresh perspective that considers the industry as a complex system influenced by various factors. This perspective, missing from the literature, makes it a novel and intriguing study for policymakers and industry stakeholders.
- The connection to the gap is clear: while others may look at subsets or components of the halal

industry, this research addresses the full scope of performance evaluation, making it highly relevant for policymakers and industry stakeholders.

2. Systematic Barrier Identification:

- By identifying the barriers to maximising the performance of the halal industry, this research fills a void left by earlier works. The connection here is that no prior studies systematically addressed these barriers, and by doing so, this research advances the academic conversation and provides practical insights, enlightening the audience about the real-world implications of the research.
- The research expands the scope of analysis to encompass the key barriers that hinder the industry's growth, which had previously been overlooked or inadequately explored.

3. Application of Integrated ISM-DEMATEL:

- The application of the integrated ISM-DEMATEL approach is innovative in this context, providing a methodologically rigorous way to identify and evaluate the relationships among barriers. The connection to the research gap is through the absence of such techniques in previous studies, and this research directly fills that methodological gap, instilling confidence in the audience about the robustness of the research.
- This provides a quantitative and structured approach to addressing complex interdependencies among barriers, allowing the research to offer previously unavailable insights into halal industry studies.

4. Combining Institutional and Resource-Based Theories:

- This research makes a theoretical contribution by integrating institutional and resource-based theories to explain the performance barriers of the halal industry. Earlier studies may have used these theories in isolated contexts, but none have applied them in conjunction to analyse the industry's barriers and performance.
- By focusing on these two theories, the research not only fills a theoretical gap but also provides a framework for future researchers to apply these theories to other industries or contexts.
- Overall, the research gap is well-established regarding the limited application of institutional, resource-based theories and halal industry

research in identifying barriers and underusing advanced methodologies (ISM-DEMATEL).

2. RESEARCH METHODS

2.1. BARRIERS TO MAXIMISING HALAL INDUSTRY PERFORMANCE

Although not directly identifying the barriers to maximising the performance of the halal industry,

the previous study of the institutional theory and resource-based view in the halal context and the previous study of the halal industry provided insight into choosing several barrier factors (Table 1). This study chose 16 factors as barriers to maximising halal industry performance (Table 2).

2.2. CONTENT VALIDATION

Before processing with the Combined ISM-DEMATEL methodology, a content validation pro-

Tab. 2. Summary of barriers to maximising halal industry performance

UNDERPINNING THEORY OR INSIGHT FROM PREVIOUS RESEARCH	BARRIERS	
Three motives from institutional theory (Jaswir et al., 2023; Hewege & Perera, 2020; Iswanto & Koeswinarmo, 2020; Bashir et al., 2019; Ab Talib et al., 2016b Sumarliah et al., 2023; Sumarliah et al., 2022; Hew et al., 2020; Karb-hari et al., 2021)	1	The absence of successful enterprises due to their use of halal certification led to a lack of understanding of Indonesian business actors regarding the importance of halal for their business (B1)
	2	The absence of successful enterprises owing to their use of halal certification has led to a lack of halal awareness among Indonesian business actors (B2)
	3	The absence of successful enterprises due to their use of halal certification led to a lack of understanding among business actors regarding the process of applying for halal certification (B3)
	4	The absence of successful enterprises due to their use of halal certification causes them to pay less attention to the existence of halal supervisors in the company, so the number is minimal (B4)
	5	The lack of education and socialisation related to halal certification leads to a lack of customer demand for halal certification (B5)
Resource based view (Nee & Muhammad, 2022) and internal problem of halal organisation (Batubara & Harahap, 2022)	6	The lack of developed technology for halal leads to the lack of support from information and communication technology regarding traceability issues (B6)
	7	The lack of developed technology for halal leads to limited technology to detect the halal status of the products (B7)
	8	The lack of optimal research for the development of substitution/alternative products from non-halal raw materials or additives (B8)
Halal logistic support (Salahuddin et al., 2021)	9	The lack of support from suppliers within a halal guarantee for certain products (for example, gelatine, which is widely used for consumer products; not many suppliers can supply these products with halal guarantees) (B9)
Challenges of halal industry development-government support (Adham et al., 2020; Batubara & Harahap, 2022)	10	The lack of regulatory commitment led to a lack of control and coordination in support of a viable halal industrial ecosystem from different government agencies (B10)
	11	The lack of regulatory commitment led to the absence of a roadmap for the halal industry, and the regulation was not severe enough to be enforced by the government because it was not supported by the ease and low cost of making a halal certification (B11)
	12	Companies lack optimal halal supervisors because there are no sanctions for the absence of halal supervisors (B12)
Halal logistic support (Salahuddin et al., 2021)	13	The lack of infrastructure to support halal logistic implementation (B13)
	14	The lack of support from halal Logistic Service Provider (LSP) (B14)
Challenges of halal industry development-government support (Adham et al., 2020; Batubara & Harahap, 2022)	15	The lack of the number of halal industrial estates that have been operating (B15)
	16	The lack of regulatory commitment led to the obligation for halal certification for food and beverages being too late (it voluntary before 19 October 2019 and mandatory since 17 October 2024) (B16)

cess was carried out on the barriers found. Content validation is a process that provides guarantees on whether the items represent or depict the relevant concept (Zamanzadeh et al., 2015; Sekaran & Bougie, 2016); therefore, content validation will contribute to the improvement of the items through expert panel suggestions and information on the representativeness and clarity of the items (Polit & Beck, 2006). The steps in conducting the content validation can be described as follows (Yusoff, 2019):

- Step 1. Preparation of the content validation questionnaire. This questionnaire used four Likert scales ranging from not relevant to very relevant (1 = not relevant, 2 = somewhat relevant, 3 = relevant, and 4 = very relevant). A cover letter that would include the study's purpose, the barrier's brief description, and its scoring will be included in the content validity questionnaire to ensure that the review panel of experts ensures clarity, understanding, and meeting expectations with respect to the task being undertaken.
- Step 2. Selection of expert panel and distribution of a content validity questionnaire.
- Step 3. Evaluation of each barrier based on the responses of the expert panel. Each barrier was evaluated using the item-content validity index (I-CVI) and scale level (S-SVI). I-CVI is computed as the number of experts giving a rating of

“relevant” or “very relevant” for each item (barrier) divided by the total number of experts. Values range from 0 to 1, where $I-CVI > 0.79$, the barrier is relevant, between 0.70 and 0.79, the barrier needs revisions; and if the value is below 0.70, the barrier is eliminated. According to Lynn (1986), for six to eight experts, the I-CVI value should be at least 0.83. The S-CVI was calculated using the average CVI (S-CVI/Ave) (Zamanzadeh et al., 2015). The S-CVI/Ave was calculated based on the average I-CVI scores across all barriers. Excellent content validity is indicated by S-CVI/Ave of at least 0.9 (Shi et al., 2012).

2.3. COMBINED ISM-DEMATEL METHODOLOGY

Combined ISM-DEMATEL is a methodology for system analysis that employs matrix and graph theories to examine the interrelationships among various factors within a system. The utilisation of ISM and DEMATEL methodologies can facilitate the assessment of the magnitude and relevance of barriers to the performance of the halal industry and the hierarchical arrangement of barriers (Manoharan et al., 2022). The structural framework of the combined ISM-DEMATEL methodology is illustrated in Fig. 1.

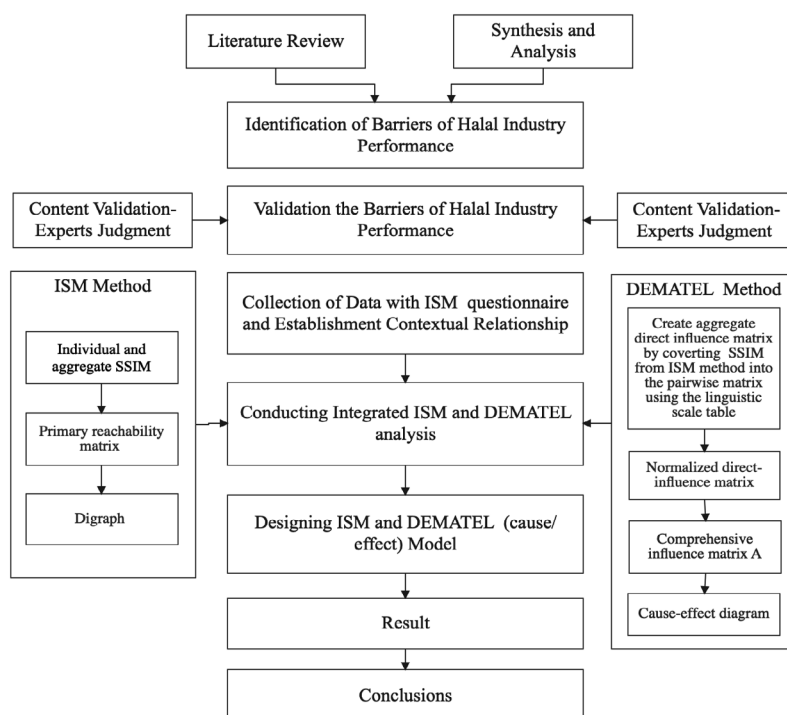


Fig. 1. ISM-DEMATEL integrated framework

Source: elaborated by the authors based on Manoharan et al., 2022.

2.3.1. ISM METHODOLOGY

- Step 1. The integrated approach starts with the case study (in this case, the performance of the halal industry) and a literature review to identify the barrier factors to maximise the performance of the halal industry.
- Step 2. An ISM questionnaire is developed to establish a correlation between every pair of barriers identified in the first phase that has undergone the validation process. The ISM questionnaire requested that each expert evaluate the direct correlation between any two barrier factors using the following symbols: V if factor I affects the emergence of factor J; A if factor J affects factor I; X: If both factors affect one another (two-way effect); and O, if no association exists between the two factors. Based on the questionnaire completed by each expert, an individual and aggregate Structural Self-Interaction Matrix (SSIM) was created. In this case, the aggregate SSIM was calculated based on the majority rule in SSIM (Abdullah et al., 2014; Dhochak & Sharma, 2016; Li et al., 2019; Cai & Xia, 2018; Sushil, 2012).
- Step 3. The primary reachability matrix is developed by transforming the aggregate SSIM into a binary matrix of 1 s and 0 s (symbols X and V are replaced by 1 s, and symbols A and O are replaced by 0 s).
- Step 4. The final reachability matrix is created by using the transitivity rule described by Kannan et al. (2008). The transitivity rule states that if “barrier-1” affects “barrier-2,” “barrier-2” affects “barrier-3,” then the resultant is “barrier-1” affects “barrier-3”.
- Step 5. The barriers are partitioned into different levels from the final reachability matrix based on the reachability and antecedent set. The reachability set is the assembly of the barrier that is affected by other barriers and itself, whereas the antecedent set is the assembly of the barrier that affects other barriers and itself (Warfield, 1974; Kumar et al., 2016).
- Step 6. The digraph, hierarchical model, or structural connections between the barriers are developed based on the results of step 5.

2.3.2. DEMATEL METHODOLOGY

- Step 1. Convert SSIM from the ISM method into a pairwise matrix using the linguistic scale table,

which has values ranging from 0 (no influence) to 4 (extremely high influence), with 1 representing low influence, 2 representing medium influence, and 3 representing high influence. This conversion generates an aggregate direct-influence matrix X for the eight experts. The aggregate direct influence matrix $X = [x_{ij}]_{n \times n}$, which consists of 16 factors as barriers, can be seen in Equation 1 (when $i = j$, $x_{ij} = 0$).

$$X = \begin{bmatrix} 0 & x_{12} & \dots & x_{1n} \\ x_{21} & 0 & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \dots & 0 \end{bmatrix} \quad (1)$$

- Step 2. Establish the normalised direct-influence matrix M and after normalisation according to Equation (2). After normalisation, the values of the elements in the matrix M were all between 0 and 1.

$$M = \frac{X}{\max_{1 \leq i \leq n} \sum_{j=1}^n t_{ij}} \quad (2)$$

- Step 3. Establish the comprehensive influence matrix A using (3). “I” denotes the identity matrix. The comprehensive influence matrix A reflects the comprehensive relations among the factors, including direct and indirect relations.

$$A = M(I - M)^{-1} \quad (3)$$

- Step 4. Calculate the influencing degree, influenced degree, centrality and causality. R_i represents the cumulative impact of factor B_i on other factors, which is the summation of all constituent elements in the corresponding row of matrix A . D_i represents the overall impact of external influences on factor B_i . The summation of the column elements of matrix A yields this value: the system's component B_i is “ m_i ”, the sum of R_i and D_i . As shown by the difference between R_i and D_i , “ n_i ” represents B_i 's pure effect on the other components.
- Step 5. Develop a cause–effect diagram. The centrality m of the horizontal axis vector ($R_i + D_i$) — called “prominence” — shows the factors' significance. The “relation” vertical axis ($R_i - D_i$) represents causality n , which divides elements into cause factors ($n > 0$) and effect factors ($n < 0$). Visualising the dataset of (m_i , n_i) creates a cause-effect diagram that illustrates fac-

tor significance and interrelationships (Tseng, 2009).

2.4. RESEARCH RESPONDENTS

A panel of experts representing the halal industry in Indonesia was selected to participate in this study. Because the results of this study were based on experts' opinions, they were essential to this study. According to Dalkey and Helmer (1963), an expert is knowledgeable about a specific field. Adler and Ziglio (1996) emphasised that the selection of experts must be based on four "expertise" requirements: an expert must have (i) expertise in dealing with relevant problems (in this case, the halal industry in Indonesia, and have at least five years of experience in the halal industry); (ii) willingness and capacity to participate; (iii) time to participate; and (iv) a strong ability to communicate.

In this study, the number of experts for data processing using the ISM and DEMATEL methods followed the rules for the number of experts for the content validity method. Rodrigues et al. (2017) stated that the minimum number of experts was two, and the maximum was 20 for the validation process. Therefore, in assessing the barriers' content validity for this research, eight experts were selected based on the mentioned "expertise requirements" criteria as well as after having preliminary discussion and continuous follow-up: (i) a representative from the Halal Product Guarantee Agency; (ii) two representatives from two companies; (iii) the Deputy Director of the LPPOM Indonesian Ulama Council; (iv) two representatives from the Halal Inspection Agency; (v) staff of the National Sharia Economy and Finance Committee; and (vi) the Head of the Halal Industry Empowerment Center. The panel of experts was asked to offer professional views based on subjective judgment for each barrier to the dimensions of the entire construct through filled-out Content Validity and ISM questionnaires. The questionnaires were distributed to a panel of experts using Google Forms. It took nearly two months to select, approach, inform, and receive responses from the panel of experts. Email invitations with a survey link were sent to eight experts as eligible individuals. The remainder was sent if the survey was not initiated after one week of emailing. After three weeks, eight respondents gave positive responses.

3. RESEARCH RESULTS

3.1. RESULT OF THE CONTENT VALIDITY METHOD

The results of the content validation method can be seen in Tables 3 and 4. After excluding barriers B6 (the lack of developed technology for halal leads to the lack of support from information and communication technology regarding traceability issues), B7 (the lack of developed technology for halal leads to limited technology to detect the halal status of the products), and B13 (the lack of infrastructure to support halal logistic implementation), the I-CVI and S-CVI/Ave meet satisfactory levels (above 0.83 and 0.90), and thus, the rest of the barriers achieved a satisfactory level of content validity. Content validity caused the number of barriers to be discussed in subsequent data processing to only 13 factors.

3.2. RESULT OF DATA PROCESSING WITH ISM

In accordance with the framework of the integrated ISM-DEMATEL method, the ISM method was used first, followed by the DEMATEL method. The individual SSIM and pairwise matrix were constructed using the responses eight decision-makers gave in the ISM questionnaire, as explained in the sub-section respondent of the research. In the ISM method, the aggregate SSIM matrix for barriers, as shown in Table 5, was constructed based on the majority rule proposed by Abdullah et al. (2014), Dhochak and Sharma (2016), Li et al. (2019), Cai and Xie (2018), and Sushil (2012).

Then, the SSIM was converted into binary numbers 0 and 1 to get the initial Reachability Matrix, as shown in Table 6. The final reachability matrix was developed from the initial reachability matrix using the transitivity rule (Table 6). The final reachability matrix reflects the driving power and dependence of barriers. Driving power refers to the effectiveness of barriers on others; for each barrier, this score was quantified by summing up the value on the corresponding row in the final reachability matrix. Dependence refers to the extent to which barriers are affected by others. The score was evaluated for each barrier by summing the values in the corresponding column in the final reachability matrix. Subsequently,

Tab. 3. Initial result of the content validation process

BARRIERS	EXPERTS (THE RESULT FROM QUESTIONNAIRE)								EXPERTS (CONVERSION TO BINARY SCALE)								EXPERT IN AGREEMENT	I-CVI
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H		
B1	3	3	4	4	4	3	4	4	1	1	1	1	1	1	1	1	8	1,00
B2	2	3	4	3	4	4	4	4	0	1	1	1	1	1	1	1	7	0,88
B3	2	4	3	3	4	3	4	4	0	1	1	1	1	1	1	1	7	0,88
B4	3	4	4	3	4	4	4	4	1	1	1	1	1	1	1	1	8	1,00
B5	2	3	4	3	4	4	4	4	0	1	1	1	1	1	1	1	7	0,88
B6	2	2	4	2	4	3	4	4	0	0	1	0	1	1	1	1	5	0,63
B7	2	2	2	2	4	4	3	3	0	0	0	0	1	1	1	1	4	0,50
B8	2	3	3	3	4	4	3	4	0	1	1	1	1	1	1	1	7	0,88
B9	3	3	3	3	4	3	2	3	1	1	1	1	1	1	0	1	7	0,88
B10	3	4	4	4	4	3	3	4	1	1	1	1	1	1	1	1	8	1,00
B11	3	4	4	3	4	3	1	3	1	1	1	1	1	1	0	1	7	0,88
B12	3	3	2	3	4	3	3	4	1	1	0	1	1	1	1	1	7	0,88
B13	3	4	3	2	4	2	3	3	1	1	1	0	1	0	1	1	6	0,75
B14	3	4	3	2	4	3	4	4	1	1	1	0	1	1	1	1	7	0,88
B15	3	3	3	1	4	3	4	3	1	1	1	0	1	1	1	1	7	0,88
B16	3	4	4	3	4	4	4	1	1	1	1	1	1	1	1	0	7	0,88
S-CVI/Ave																		0,85
0,63 0,88 0,88 0,69 1,00 0,94 0,88 0,94																		
Average proportion of barriers judged as relevance across the eight experts																		0,85

Tab. 4. Final result of the content validation process

BARRIERS	EXPERTS (THE RESULT FROM QUESTIONNAIRE)								EXPERTS (CONVERSION TO BINARY SCALE)								EXPERT IN AGREEMENT	I-CVI
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H		
B1	3	3	4	4	4	3	4	4	1	1	1	1	1	1	1	1	8	1,00
B2	2	3	4	3	4	4	4	4	0	1	1	1	1	1	1	1	7	0,88
B3	2	4	3	3	4	3	4	4	0	1	1	1	1	1	1	1	7	0,88
B4	3	4	4	3	4	4	4	4	1	1	1	1	1	1	1	1	8	1,00
B5	2	3	4	3	4	4	4	4	0	1	1	1	1	1	1	1	7	0,88
B8	2	3	3	3	4	4	3	4	0	1	1	1	1	1	1	1	7	0,88
B9	3	3	3	3	4	3	2	3	1	1	1	1	1	1	0	1	7	0,88
B10	3	4	4	4	4	3	3	4	1	1	1	1	1	1	1	1	8	1,00
B11	3	4	4	3	4	3	1	3	1	1	1	1	1	1	0	1	7	0,88
B12	3	3	2	3	4	3	3	4	1	1	0	1	1	1	1	1	7	0,88
B14	3	4	3	2	4	3	4	4	1	1	1	0	1	1	1	1	7	0,88
B15	3	3	3	1	4	3	4	3	1	1	1	0	1	1	1	1	7	0,88
B16	3	4	4	3	4	4	4	1	1	1	1	1	1	1	1	0	7	0,88
S-CVI/Ave																		0,90
0,69 1,00 0,92 0,85 1,00 1,00 0,85 0,92																		
Average proportion of barriers judged as relevance across the eight experts																		0,90

based on the final reachability matrix (Table 7), the reachability, antecedent, and intersection sets were identified for each barrier. The barrier for which the reachability and intersection sets are the same is given as the top-level barrier in the ISM hierarchy. This would not help achieve any other barrier above their level. After the top-level barrier was identified, it was discarded from the remaining barriers. This iteration

is continued until the levels of each barrier are obtained. In this study, the thirteen barriers, along with their reachability set, antecedent set, intersection set, and levels, are presented in Table 8. The level identification process, or partitioning of these barriers, was completed in eight iterations. The identified levels aid in building the digraph and the final model of the ISM (Mathiyazhagan et al., 2013), as shown in

Tab. 5. Aggregate SSIM based on the majority rule

	16j	15j	14j	12j	11j	10j	9j	8j	5j	4j	3j	2j	1j
	B16	B15	B14	B12	B11	B10	B9	B8	B5	B4	B3	B2	B1
1i	V	V	V	V	A	A	A	V	A	V	X	X	
2i	A	V	V	V	A	A	A	V	A	V	V		
3i	A	V	V	V	A	A	V	V	A	V			
4i	V	O	O	X	A	A	O	O	A				
5i	V	V	V	V	V	A	V	V					
8i	A	O	O	O	A	A	X						
9i	X	O	X	O	A	A							
10i	V	V	V	X	X								
11i	V	V	V	V									
12i	X	O	O										
14i	A	X											
15i	O												
16i													

Tab. 6. Initial reachability matrix

		1j	2j	3j	4j	5j	8j	9j	10j	11j	12j	14j	15j	16j
		B1	B2	B3	B4	B5	B8	B9	B10	B11	B12	B14	B15	B16
1i	B1	1	1	1	1	0	1	0	0	0	1	1	1	1
2i	B2	1	1	1	1	0	1	0	0	0	1	1	1	0
3i	B3	1	0	1	1	0	1	1	0	0	1	1	1	0
4i	B4	0	0	0	1	0	0	0	0	0	1	0	0	1
5i	B5	1	1	1	1	1	1	1	0	1	1	1	1	1
8i	B8	0	0	0	0	0	1	1	0	0	0	0	0	0
9i	B9	1	1	0	0	0	1	1	0	0	0	1	0	1
10i	B10	1	1	1	1	1	1	1	1	1	1	1	1	1
11i	B11	1	1	1	1	0	1	1	1	1	1	1	1	1
12i	B12	0	0	0	1	0	0	0	1	0	1	0	0	1
14i	B14	0	0	0	0	0	0	1	0	0	0	1	1	0
15i	B15	0	0	0	0	0	0	0	0	0	0	1	1	0
16i	B16	0	1	1	0	0	1	1	0	0	1	1	0	1

Tab. 7. Final reachability matrix

		1j	2j	3j	4j	5j	8j	9j	10j	11j	12j	14j	15j	16j	DRIVING POWER
		B1	B2	B3	B4	B5	B8	B9	B10	B11	B12	B14	B15	B16	
1i	B1	1	1	1	1	0	1	1*	0	0	1	1	1	1	10
2i	B2	1	1	1	1	0	1	1*	0	0	1	1	1	1*	10
3i	B3	1	0	1	1	0	1	1	0	0	1	1	1	1*	9
4i	B4	0	0	0	1	0	0	0	0	0	1	0	0	1	3
5i	B5	1	1	1	1	1	1	1	0	1	1	1	1	1	12
8i	B8	0	0	0	0	0	1	1*	0	0	0	1*	0	1*	4
9i	B9	1	1	0	0	0	1	1	0	0	0	1	1*	1	7
10i	B10	1	1	1	1	1	1	1	1	1	1	1	1	1	13
11i	B11	1	1	1	1	0	1	1	1	1	1	1	1	1	12
12i	B12	0	0	0	1	0	0	0	1	0	1	0	0	1	4
14i	B14	0	0	0	0	0	0	1	0	0	0	1	1	0	3
15i	B15	0	0	0	0	0	0	0	0	0	0	1	1	0	2
16i	B16	0	1	1	0	0	1	1	0	0	1	1	0	1	7
Dependence		7	7	7	8	2	9	10	3	3	9	11	9	11	

Tab. 8. Level partition

No	Reachability Set	Antecedent Set	Intersection Set	Level
12	4j,10j,12j,16j	1i,2i,3i,4i,5i,10i,11i,12i,16i	4ij,10ij,12ij,16ij	I
14	9j,14j,15j	1i,2i,3i,5i,8i,9i,10i,11i,14i,15i,16i	9ij,14ij,15ij	
15	14j,15j	1i,2i,3i,5i,9i,10i,11i,14i,15i	14ij,15ij	
8	8j,9j,16j	1i,2i,3i,5i,8i,9i,10i,11i,16i	8ij,9ij,16ij	II
9	1j,2j,8j,9j,16j	1i,2i,3i,5i,8i,9i,10i,11i,16i	1ij,2ij,8ij,9ij,16ij	
16	2j,3j,8j,9j,16j	1i,2i,3i,4i,5i,8i,9i,10i,11i,16i	2ij,3ij,8ij,9ij,16ij	
4	4j	1i,2i,3i,4i,5i,10i,11i	4ij	III
1	1j,2j,3j	1i,2i,3i,5i,10i,11i	1ij,2ij,3ij	IV
3	1j,3j	1i,2i,3i,5i,10i,11i	1ij,3ij	
2	2j	2i,5i,10i,11i	2ij	V
11	10j,11j	5i,10i,11i	10ij,11ij	VI
5	5j	5i,10i	5ij	VII
10	10j	10i	10ij	VIII

Tab. 9. Aggregate direct-relations matrix

		1j	2j	3j	4j	5j	8j	9j	10j	11j	12j	14j	15j	16j
		B1	B2	B3	B4	B5	B8	B9	B10	B11	B12	B14	B15	B16
1i	B1	0	2	2	3	1	3	1	1	1	3	3	3	3
2i	B2	2	0	3	3	1	3	1	1	1	3	3	3	1
3i	B3	2	1	0	3	1	3	3	1	1	3	3	3	1
4i	B4	1	1	1	0	1	0	0	1	1	2	0	0	3
5i	B5	3	3	3	3	0	3	3	1	3	3	3	3	3
8i	B8	1	1	1	0	1	0	2	1	1	0	0	0	2
9i	B9	3	3	1	0	1	2	0	1	1	0	2	0	2
10i	B10	3	3	3	3	3	3	3	0	2	2	3	3	3
11i	B11	3	3	3	3	1	3	3	2	0	3	3	3	3
12i	B12	1	1	1	2	1	0	0	2	1	0	0	0	2
14i	B14	1	1	1	0	1	0	2	1	1	0	0	2	1
15i	B15	1	1	1	0	1	0	0	1	1	0	2	0	0
16i	B16	1	3	3	1	1	2	2	1	1	2	3	0	0

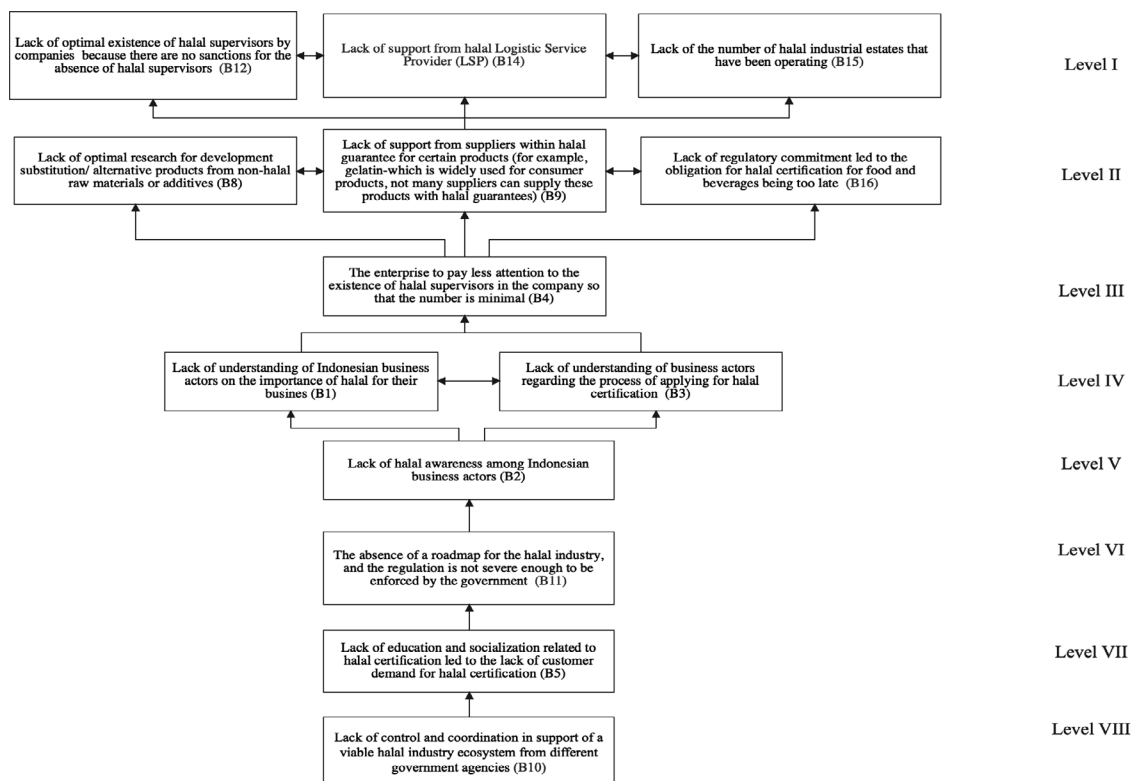


Fig. 2. ISM model of the halal industry barriers

Tab. 10. Normalised direct relationship matrix "M"

		1j	2j	3j	4j	5j	8j	9j	10j	11j	12j	14j	15j	16j
		B1	B2	B3	B4	B5	B8	B9	B10	B11	B12	B14	B15	B16
1i	B1	0.000	0.059	0.059	0.088	0.029	0.088	0.029	0.029	0.029	0.088	0.088	0.088	0.088
2i	B2	0.059	0.000	0.088	0.088	0.029	0.088	0.029	0.029	0.029	0.088	0.088	0.088	0.029
3i	B3	0.059	0.029	0.000	0.088	0.029	0.088	0.088	0.029	0.029	0.088	0.088	0.088	0.029
4i	B4	0.029	0.029	0.029	0.000	0.029	0.000	0.000	0.029	0.029	0.059	0.000	0.000	0.088
5i	B5	0.088	0.088	0.088	0.088	0.000	0.088	0.088	0.029	0.088	0.088	0.088	0.088	0.088
8i	B8	0.029	0.029	0.029	0.000	0.029	0.000	0.059	0.029	0.029	0.000	0.000	0.000	0.059
9i	B9	0.088	0.088	0.029	0.000	0.029	0.059	0.000	0.029	0.029	0.000	0.059	0.000	0.059
10i	B10	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.000	0.059	0.059	0.088	0.088	0.088
11i	B11	0.088	0.088	0.088	0.088	0.029	0.088	0.088	0.059	0.000	0.088	0.088	0.088	0.088
12i	B12	0.029	0.029	0.029	0.059	0.029	0.000	0.000	0.059	0.029	0.000	0.000	0.000	0.059
14i	B14	0.029	0.029	0.029	0.000	0.029	0.000	0.059	0.029	0.029	0.000	0.000	0.059	0.029
15i	B15	0.029	0.029	0.029	0.000	0.029	0.000	0.000	0.029	0.029	0.000	0.059	0.000	0.000
16i	B16	0.029	0.088	0.088	0.029	0.029	0.059	0.059	0.029	0.029	0.059	0.088	0.000	0.000

Tab. 11. Comprehensive influence matrix "A"

		1j	2j	3j	4j	5j	8j	9j	10j	11j	12j	14j	15j	16j	Total
		B1	B2	B3	B4	B5	B8	B9	B10	B11	B12	B14	B15	B16	
1i	B1	0.075	0.136	0.138	0.155	0.08	0.156	0.098	0.082	0.083	0.157	0.17	0.151	0.167	1.648
2i	B2	0.128	0.075	0.159	0.154	0.079	0.154	0.096	0.081	0.081	0.155	0.166	0.151	0.111	1.587
3i	B3	0.129	0.105	0.074	0.149	0.078	0.152	0.148	0.08	0.08	0.149	0.164	0.146	0.111	1.565
4i	B4	0.069	0.074	0.076	0.044	0.056	0.044	0.039	0.057	0.057	0.102	0.05	0.037	0.13	0.834
5i	B5	0.19	0.196	0.197	0.186	0.07	0.191	0.181	0.103	0.157	0.189	0.208	0.181	0.201	2.251
8i	B8	0.07	0.073	0.072	0.039	0.054	0.045	0.095	0.054	0.056	0.04	0.05	0.036	0.099	0.782
9i	B9	0.141	0.145	0.093	0.058	0.066	0.12	0.056	0.066	0.068	0.059	0.127	0.058	0.118	1.174
10i	B10	0.194	0.2	0.201	0.188	0.155	0.196	0.186	0.074	0.134	0.164	0.213	0.185	0.204	2.293
11i	B11	0.185	0.191	0.192	0.181	0.098	0.186	0.177	0.126	0.071	0.183	0.202	0.176	0.196	2.165
12i	B12	0.071	0.075	0.077	0.102	0.058	0.046	0.041	0.085	0.059	0.047	0.052	0.041	0.106	0.859
14i	B14	0.071	0.072	0.071	0.038	0.055	0.043	0.094	0.054	0.056	0.038	0.051	0.095	0.07	0.808
15i	B15	0.06	0.06	0.062	0.032	0.049	0.033	0.032	0.049	0.051	0.032	0.095	0.035	0.033	0.621
16i	B16	0.096	0.151	0.153	0.093	0.072	0.125	0.12	0.073	0.074	0.121	0.16	0.064	0.071	1.374
Total		1.479	1.553	1.564	1.418	0.969	1.491	1.361	0.983	1.025	1.436	1.706	1.357	1.618	

Tab. 12. Total relation Matrix, R+D, and R-D for the barriers

BARRIERS	D	R	D+R	D-R	RANK (D-R)	RANK (D+R)	CAUSE / EFFECT
B1	1.648	1.479	3.126	0.169	4	6	Cause
B2	1.587	1.553	3.14	0.034	5	4	Cause
B3	1.565	1.564	3.129	0.001	6	5	Cause
B4	0.834	1.418	2.252	-0.584	10	12	Effect
B5	2.251	0.969	3.221	1.282	2	2	Cause
B8	0.782	1.491	2.273	-0.708	11	11	Effect
B9	1.174	1.361	2.535	-0.188	7	8	Effect
B10	2.293	0.983	3.277	1.310	1	1	Cause
B11	2.165	1.025	3.190	1.139	3	3	Cause
B12	0.859	1.436	2.295	-0.576	9	10	Effect
B14	0.808	1.706	2.514	-0.898	13	9	Effect
B15	0.621	1.357	1.978	-0.736	12	13	Effect
B16	1.374	1.618	2.992	-0.245	8	7	Effect

Fig. 2. The relationship between barriers i and j is indicated by an arrow pointing from i to j.

As described previously, the DEMATEL method was applied to SSIM in this study by transforming the matrix into a pairwise matrix using a linguistic scale (Equation 1). The aggregate direct-relation matrix (matrix X) is presented in Table 9. The normalised direct relationship matrix "M" was formed using Equation (2), which is presented in Table 10. Table 11 shows

the comprehensive influence matrix "A". In matrix "A", the sum of individual rows and the sum of individual columns are considered to calculate the (R+D) and (R-D), which are used to plot the digraph, and it also determines the cause and effect relationship of each barrier. The values of (R+D) and (R-D) are also highlighted in Table 12. Figs. 3 and 4 show the causal relationship diagram for the barriers and the revised digraph model for barriers in the halal industry.

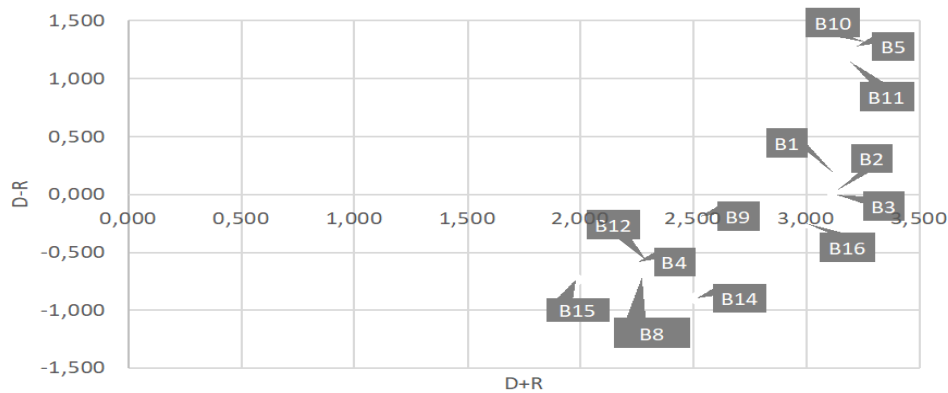


Fig. 3. Causal relationship diagram

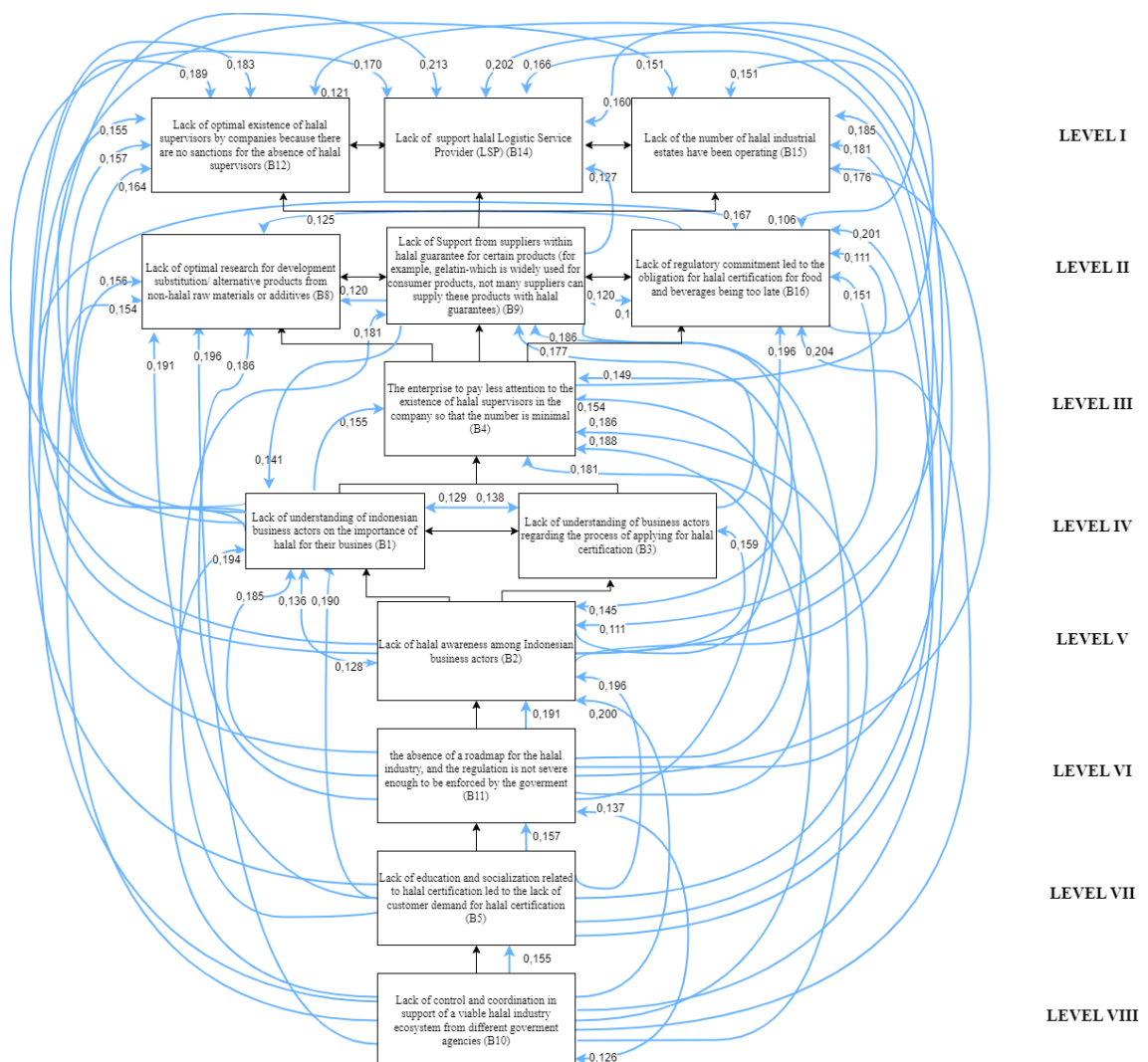


Fig. 4. Revised digraph model according to the result from DEMATEL

4. DISCUSSION

The integrated ISM-DEMATEL method is utilised in this study to identify the main barriers to optimising the halal industry in Indonesia and capture the cause–effect relationships between them based on the expert panel's opinions. The suggested ISM model aids in recognising the significance of barriers, visualising the structure of complex causal relationships using matrices or digraphs and identifying interdependence among the barriers. This study provides significant insights into the barriers that are important to both industry and academia.

Figure 2 and Table 7 indicate that “the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies” (B10) is the most influential barrier with the highest driving power and weak dependence power, and since it is a barrier that hinders the maximisation of the halal industry, policymaking requires more focus to reduce the problems and bring more benefits. In fact, coordination is an important aspect in the implementation of the Law of Halal Product Guarantee because it involves many agencies, such as the Ministry of Industry, the Ministry of Trade, the Ministry of Health, the Indonesian Ulema Council, and other Islamic mass organisations (Hasan & Pasyah, 2022). This coordination is also required because the government must implement law enforcement and consumer rights protection for the certification and labelling of halal products via three (three) surveillance systems: preventive supervision, uniqueness, and incidental. A preventive surveillance system for halal food items, including registration, was implemented. This unique surveillance system is intended to actively monitor halal food, medication, and cosmetics, which can significantly influence health, social, and economic aspects. When indicators of a specific case of halal certification or halal labelling are discovered in the field, this method encourages law enforcement to tackle it with appropriate actions depending on the uniqueness of the committed infractions. An incidental surveillance system is a procedure for unannounced inspections conducted by law enforcement on halal food security and safety. Then, the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies caused several things, including “the lack of education and socialisation”, “the absence of a roadmap for halal integrity”, the lack of optimal existence of halal supervisors by enterprise”, “the lack

of support from halal Logistic Service Providers (LSP)”, and “the lack of the number of halal industrial estates that have been operating”.

Barriers with a high degree of importance and a high net effect are considered critical for maximising the performance of the halal industry. The (+) score represents the relative importance of each barrier. Therefore, factors with higher scores of (+) may have the highest priority in the ranking of barriers. Based on Table 12, the barrier “the lack of regulatory commitment led to the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies” (B10) is ranked first based on the degree of importance, followed by “the lack of education and socialisation related to halal certification that led to the lack of customer demand for halal certification” (B5) and “the lack of regulatory commitment led to the absence of a roadmap for the halal industry, and the regulation is not severe enough to be enforced by the government because it is not supported by the ease and low cost of making a halal certification” (B11). This finding is consistent with the results of the ISM digraph.

Fig. 3 shows the causal relationship diagram, which provides information on the most significant barriers to maximising the halal industry and their level of influence. The feedback collected from the eight experts was displayed in the form of a visual impact map to classify the drivers and barriers into cause-and-effect groups. Fig. 3 presents that the barriers “the lack of regulatory commitment led to the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies” (B10), “the lack of education and socialisation related to halal certification led to the lack of customer demand for halal certification” (B5), “the lack of regulatory commitment led to the absence of a roadmap for the halal industry” (B11), “the lack of understanding of Indonesian business actors on the importance of halal for their business” (B1), “the lack of halal awareness among Indonesian business actors” (B2), and “the lack of understanding of business actors regarding the process of applying for halal certification” (B3) are the causal factors; whereas the barriers “pay less attention to the existence of halal supervisors in the company so that the number is minimal” (B4), “the lack of optimal research for development substitution/alternative products from non-halal raw materials or additives” (B8), “the lack of support from suppliers within halal guarantee for certain products” (B9), “the lack of optimal existence of halal supervisors by companies” (B12), “the lack of

support from halal LSP” (B14), “the lack of the number of halal industrial estates that have been operating” (B15), and “the obligation for halal certification for food and beverages being too late” (B16) belong to the effect group. Fig. 4 shows the revised digraph model for the barriers in the Halal Industry. This figure depicts the relationship between barriers and the magnitude of the value of the relationship between these barriers.

In this study, barriers were divided into causal/influential/driving and affected/dependent groups. From the standpoint of the ISM Model (digraph), the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies (B10) is the most influential barrier, with a high degree of importance, and belongs to the cause factor. This barrier requires immediate attention and needs to be eliminated, and policymaking in the halal sector has to keep its priority. Control and coordination could be essential to handle the three priorities in ranking barriers from the standpoint DEMATEL, namely, “the lack of education and socialisation related to halal certification led to the lack of customer demand for halal certification” (B5), “the lack of understanding of business actors regarding the process of applying for halal certification” (B3), and “the lack of halal awareness among Indonesian business actors” (B2).

This study provides some theoretical contributions in the field of the halal industry, such as:

- Proposes a framework (which is based on the integrated ISM-DEMATEL method) to identify and rank barriers to maximising the performance of the halal industry in Indonesia that could be implemented for identifying and ranking the halal industry barriers in other countries.
- Identifies and raises awareness of critical barriers, the driving and dependence powers of the barriers, and dominant barriers to maximising the performance of the halal industry in Indonesia.
- Proposes guidelines to managers or decision-makers of the halal industry to maximise those industries by discovering the most significant barriers that impact each other.

This study has practical implications for the halal industry. Even though Indonesia is one of the countries with the most significant number of Muslims, in several aspects, its performance is still not optimal or lagging compared to other Muslim-majority countries. Some barriers may cause an inability to achieve optimal conditions. Since this study applied the ISM

and DEMATEL with the help of the expert panel's opinions, it can provide insights into multiple policy-making to determine the relationship between the barriers and focus on the critical barriers to obtain more benefits, increase performance, and increase the efficiency of resource allocation. Moreover, after analysing the barriers, the given framework model is better and effectively selects a programme related to the critical barrier. Then, in line with the most influential barrier, the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies, the government must update the coordination process, standard codes, and procedures and adhere to their implementation. Coordination among government agencies to support the halal industry can enhance the number of halal certifications and generate a rigorous roadmap for the halal industry. Indeed, through a clear roadmap agreed upon by all policymakers, a clear division of tasks and indicators of achievement can be identified. Thus, improving halal performance is not an issue with unclear authority or overlapping powers but with well-divided portions of responsibility. Then, in line with the next level of priority barriers (the lack of education and socialisation related to halal certification that led to the lack of customer demand for halal certification, and the lack of regulatory commitment led to the absence of a roadmap for the halal industry, and the regulation is not severe enough to be enforced by the government), one of the important programs that should be well-measured attainment on the roadmap is halal literacy for the community and enterprise, including the procedure to obtain the halal certificate, the importance of the community to provide factual support for the halalness of a product, and the kind of sanctions for enterprises who do not make an actual declaration of the halalness of their products procedure to get halal certificates. The programme's success was monitored using a periodic survey.

CONCLUSIONS

A descriptive picture was drawn regarding the barriers to maximising halal industry performance. An extensive literature survey identifies various barriers related to halal industry performance. Referring to the institutional theory and RBV in the context of halal research and previous research related to the halal industry, this study succeeded in identifying 16 barriers. After the validation process, only 13 barriers

were considered relevant and used in the subsequent data processing. Then, a structural model and cause–effect diagram were developed for 13 barriers using the integrated ISM-DEMATEL methodology) to determine the critical barriers. The barrier “the lack of control and coordination in support of a viable halal industry ecosystem from different government agencies” is the most influential barrier with the highest driving power and weak dependence power. These barriers should be the focus to be resolved to handle the next level of caused barriers (“the lack of education and socialisation related to halal certification that led to the lack of customer demand for halal certification” and “the lack of regulatory commitment led to the absence of a roadmap for the halal industry, and the regulation is not severe enough to be enforced by the government”).

This study has several limitations. It depended on the expert panel's opinions to validate and identify the relationship between barriers. There may be different barriers for other halal-industry regions. The judgment bias in understanding the barrier is also a concern because the panel experts depended on the given data and had to decide in this context. However, this barrier relationship does not always provide definite results. This limitation inhibits the generalisability of the outcomes. In the future, the relationship between barriers can be tested with the fuzzy ISM, fuzzy DEMATEL, rough ISM, or rough DEMATEL approaches, as a fuzzy and rough approach may offer insights into the significance of barriers and the performance ratings of alternatives concerning barriers. In addition, there is no international comparison of the barriers to the halal industry, which could be an opportunity for future research. Moreover, the relationship between barriers from this study could be used to test the model generated by the integrated ISM-DEMATEL methodology by applying the Structural Equation Modelling (SEM) technique.

ACKNOWLEDGEMENTS

Thank you to the Rector and Head of the Institution of Research and Community Services at Diponegoro University for funding this research through the "Scientific International Publication" grant, fiscal year 2023 (No.569-172/UN7.D2/PP/IV/2023).

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