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## RESEARCH ARTICLE

# Sharia Management Decision Support System for Halal Supply Chain Supplier Selection

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**Abstract:** However, the fast growth of the global halal market makes the halal supply chain management more challenging especially on the process of halal supplier selection where there will be operational issues as well as ethical and Sharia compliance considerations. Traditional ways to evaluate suppliers tend to focus on economic performance without halal assurance, ethical and Sharia compliance, traceability, and sustainability perspectives. Hence, the objective of this research paper is to construct a Sharia Management Decision Support System (DSS) for halal supplier selection using Simple Additive Weighting (SAW) method as a Multi-Criteria Decision-Making (MCDM) technique. Ten evaluation criteria included in the model are Halal Certification Compliance, Reputation of Suppliers, Product Quality, Delivery Reliability, Cost Efficiency, Islamic Ethical Compliance, Traceability, Sustainability, Risk Management, and Financial Stability. Computation process includes criterion weighting, normalization of decision matrix, computing of weighted score, and supplier ranking steps. Based on the results, Halal Certification Compliance, Product Quality, and Islamic Ethical Compliance were found to be highly influential criteria in supplier evaluation. Supplier A3 got the highest preference score among other suppliers which means it performs excellently in terms of halal assurance, ethical compliance, and traceability. On theoretical contribution, the study provides insights regarding integration of Sharia Management principles in DSS procurement evaluation frameworks. In terms of methodology, SAW model for halal supplier evaluation was successfully developed. On practical contribution, this study helps improve supplier transparency, procurement accountability, and halal supply chain management. On policy implication, this paper recommends better halal industry regulation, halal assurance system, and sustainable Islamic supply chain management.

**Keywords:** Halal Supply Chain, Decision Support System, Simple Additive Weighting, Sharia Management, Supplier Selection, Multi-Criteria Decision-Making

## 1. Introduction

During the last 10 years, the global halal industry has experienced impressive growth as demand for halal-certified goods and services has accelerated. The once-niche religious market is now a pillar of the international economy (Hanim Yusuf et al., 2016; Nasution & Rossanty, 2018). According to recent global halal market reports, the halal economy encompasses multiple sectors, including food and beverages, pharmaceuticals, cosmetics, logistics, tourism, fashion, and Islamic finance (Oktadiana et al., 2016). Among these sectors, halal food supply chains remain the largest contributor to global halal expenditure due to the continuous growth of Muslim consumers and the increasing preference for ethical, hygienic, and Sharia-compliant products (Ahmed & AKBABA, 2018). The halal market is no longer



limited to Muslim-majority countries, as non-Muslim countries such as Japan, South Korea, Australia, and several European nations have increasingly adopted halal standards to access global Muslim markets (Musaada & Muttaqin, 2025).

The rapid growth of the halal industry has made competition fierce among organizations that work within halal supply chains. Companies now must strive to preserve not only operational efficiencies and high levels of quality but also the halal integrity of their supply chain (Zulfakar et al., 2014). In halal ecosystems, supply chain activities involve procurement, production, warehousing, transportation, distribution, and retailing processes that must all comply with Islamic principles. Any failure to maintain halal integrity at one stage of the supply chain may compromise the halal status of the final product. Consequently, halal supply chain management has become one of the most critical strategic concerns in contemporary Islamic business management (Karia & Deng, 2025).

In spite of the growing importance of halal chains, maintaining the integrity of halal through several suppliers and logistics partners is still a difficult task. The current supply chains are more international and require complex interactions between the manufacturer, distributor, logistic partner, certifier, and supplier of raw materials. These factors make the process of verifying compliance with halal norms difficult, particularly when the suppliers come from diverse backgrounds with varying regulatory and certification requirements. In many cases, organizations face confusion about the origin of the raw materials, manufacturing process, transportation, and storage of the products (Hong et al., 2019).

Non-halal contamination is among the principal threats facing halal ecosystems in the supply chain. This form of contamination could occur due to exposure to non-halal items while the items are being produced, poor separation of the halal products from other products during storage, contamination by dirty transport vehicles, or use of non-certified inputs. Halal products have to be sourced from acceptable resources and should not have any contamination at all stages of their production process. It follows that the maintenance of halal compliance requires the monitoring of the supply chain actors (Susanty et al., 2025).

The supplier selection process represents one of the most important aspects of halal supply chain management, especially because suppliers represent the main source of raw materials, ingredients, packaging materials, and other services. Traditional supply chain management models involve the use of certain factors for selecting suppliers, such as cost, quality, punctuality, and reliability (Harsanto et al., 2024). Nevertheless, halal supply chain management requires a broader range of aspects, which include, among others, compliance with the Sharia law, certification, traceability, ethics, and Islamic values. Therefore, supplier selection in the halal framework represents a far more complicated procedure compared to ordinary procurement procedures (Fernando et al., 2024).

The complexity of assessing the halal suppliers becomes even more challenging when considering the need to incorporate the tenets of Islamic business ethics in the process of making management decisions. Islamic business ethics emphasize fairness, integrity, transparency, accountability, honesty, and social responsibility in all business operations. It is expected that the suppliers should not only provide high-quality products but do so in an ethically correct manner according to the principles of Sharia. Such actions as deception, fraud, gambling (gharar), exploitation, and unethical procurement are not acceptable under Islamic business practices (Noor et al., 2024; Siregar et al., 2025).

To solve such problems, many businesses now need tools for decision making that are systematic and intelligent enough to consider several criteria at once. One good solution to support complex managerial decision making is provided by Decision Support Systems (DSS) (Gunasekaran, 1999), which are becoming more popular especially when solving supplier selection problems, where there are usually several alternatives and several criteria used for their evaluation. With the help of DSS, it becomes easier to analyze the performance of suppliers using both qualitative and quantitative criteria.

Among the common methods used in evaluating suppliers through decision support systems (DSSs) is the Simple Additive Weighting (SAW) (Angelina et al., 2019; Haswan, 2017). SAW is an MCDM technique whereby alternatives are evaluated using aggregated criteria, whose weights depend on the relative importance of those criteria. This approach is considered powerful because of its simplicity, ease of interpretation, and ability to provide alternative rankings systematically. As far as supplier selection is concerned, SAW enables organizations to give weights to various criteria that include halal certification, quality of products, delivery reliability, traceability, cost efficiency, sustainability, and ethics. Once the weightings have been determined, individual suppliers are rated against those criteria to come up with a preference score. It can be observed from the above that SAW is easy to use (Pranolo & Widayastuti, 2014; Saputri et al., 2023).

Several strengths can be observed in using the Simple Additive Weighting (SAW) model for managing halal suppliers. First, it facilitates an objective assessment of suppliers through the conversion of qualitative analysis into quantitative measures. Second, SAW increases decision-making clarity since the allocation of weights and rankings can be easily traced and monitored. Third, it permits the incorporation of Sharia considerations in purchasing decisions. Finally, SAW improves managerial efficiency because it reduces subjective bias during supplier evaluations. The abovementioned benefits are highly relevant for halal companies that need efficiency and religious conformity.

Conventional approaches for the selection of suppliers rely heavily on personal judgments, intuitions, or single factor assessment techniques based on price factors. The conventional methods for selecting suppliers are ineffective in halal supply chains because they do not address the multi-dimensional nature of the concept. The conventional purchasing systems might overlook important factors, such as the authenticity of halal certification, traceability process, ethics of the suppliers, and avoidance of contaminations.

In response to the inadequacies of the conventional approach to selecting suppliers, there is an increased inclination towards MCDM based DSS models in halal management studies. MCDM (Afshari et al., 2010; Madić et al., 2017; Suganthi et al., 2015) models enable organizations to make supplier selection decisions by analyzing multiple criteria and considering their relative weights simultaneously. Compared to traditional decision-making models, DSS and MCDM models provide greater accuracy, flexibility, and consistency. The application of such models is particularly relevant in the context of halal ecosystems as the supplier selection process considers not only economic aspects but also moral and ethical factors.

The other notable aspect in halal supply chain management is the implementation of halal assurance systems. The halal assurance system refers to a management system put in place for the purpose of ensuring continual compliance with halal requirements in all operations. This includes certification management, traceability systems, verification of suppliers, auditing, training of employees, and risk management. Halal assurance systems require collaboration between all stakeholders in the supply chain process, especially the suppliers, as any failure at their end will directly impact the halal requirements downstream (Mahashofia et al., 2025; Sucipto et al., 2026).

The transparency of supply chain has become a major priority in halal logistics and procurement processes. There are increased expectations for transparency in regard to the source of products, ingredients used, manufacturing processes, and modes of transportation. Halal supply chains characterized by greater levels of transparency contribute to increasing consumer confidence and ensuring corporate accountability. There has been increased deployment of advanced technologies, which include digital traceability systems, blockchain technology, IoT, and DSS solutions for improving levels of transparency and monitoring in halal supply chains (Febriandika et al., 2025; Hanifasari et al., 2024).

Though there has been considerable exploration about the use of decision support systems (DSS) and MCDM in supplier selection research, there still remain some key areas which

need more exploration. The first limitation that can be cited is that a lot of the research has focused on supplier selection from a general point of view without considering Shariah-based concepts. The second important point of weakness relates to the neglect of the aspect of Islamic ethics when conducting supplier selection analysis. A third area that needs further research is the application of SAW methods in halal supply chains.

The gaps are addressed through the proposition of a Sharia Management Decision Support System for the selection of halal suppliers using the Simple Additive Weighting approach. The proposed system considers operational criteria, ethical criteria, halal assurance criteria, and sustainability criteria in a single supplier assessment model. Unlike the traditional supplier selection process, the proposed model emphasizes transparency, consistency, Shariah compliance, and decision-making accountability. The uniqueness of the research lies in incorporating Islamic business ethics, halal assurance processes, transparent supply chains, and sustainable halal logistics using a SAW DSS approach.

In terms of theoretical contribution, this paper adds to the existing body of literature on DSS and MCDM application in Shariah compliance and halal supply chain studies. From the methodology aspect, it contributes to developing a reproducible computational model for assessing suppliers' compliance to halal criteria through weighted multi-criteria analysis. In practice, this system will provide organizations with an effective tool for selecting halal-compliant suppliers, thereby avoiding any possible contamination issues in procurement practices.

The suggested model is based on several steps, which include criteria identification, criteria weighing, normalization of suppliers' data, calculation of preference ratings through the use of the Simple Additive Weighting (SAW) technique, and determination of the final ranking of suppliers. The suggested model takes into account halal certification, traceability capacity, delivery dependability, cost effectiveness, supplier reputation, sustainability level, and Islamic ethics compliance.

The current paper addresses the following research questions:

- (1). What are the most influential factors involved in halal supplier selection within Sharia-compliant supply chains?
- (2). How can the Simple Additive Weighting (SAW) technique be used for facilitating the process of halal suppliers' evaluation and ranking?
- (3). How effective is the application of the decision support system in increasing the transparency of the process of halal supplier selection?
- (4). What are the effects of integrating Sharia compliance and sustainability aspects on the results of supplier evaluation?

## 2. Literature Review

### 2.1 *Sharia Management Theory*

Sharia Management refers to the manner in which organizations manage and govern themselves based on the teachings of Islam, as found in the Quran, Hadith, Ijma, and Qiyas. Unlike traditional management systems that concentrate on profit and efficiency, Sharia Management places more importance on the combination of ethics, spirituality, society, and economics when making decisions. The ultimate aim of Sharia Management is not only to make profits but rather to seek *falah* (success) through righteous means (Aziwantoro, 2024; Syefa, 2025).

In the context of Islamic management philosophy, there are a few essential principles that govern the operations within an organization such as *adl*, *sidq*, *amanah*, *tabligh*, *hisab*, and *maslahah*. The application of these principles holds a lot of significance when it comes to managing procurement and suppliers because the suppliers have an impact on the integrity and ethics behind the products/services offered to customers. In the case of halal industries,

there is no scope for managing procurement in a way where money becomes the only concern of the suppliers.

Concepts such as halalan tayyiban emphasize the role of Shariah Management in the governance of supply chains. Halalan tayyiban means that all items should be not just halal (lawful), but also tayyib (hygienic, safe, beneficial, and moral). Therefore, corporations should make sure that their suppliers comply with halal regulations, guarantee product safety, avoid engaging in immoral activities, and facilitate sustainable business environments. As such, evaluating suppliers becomes a managerial task that requires structured tools for addressing economic, ethical, and religious issues.

However, in spite of the rising number of organizations adopting Sharia Management in the Islamic financial institutions and halal industries, many still rely on traditional methods of selecting suppliers, which do not take into account Islamic ethics sufficiently enough. At present, the traditional approach to purchasing involves prioritizing the cost-effectiveness of the supply process rather than ensuring its halal nature and adherence to ethical considerations.

## *2.2 Halal Supply Chain Management*

HSCM stands for Halal Supply Chain Management and refers to the process of organizing all the functions of procuring, producing, storing, transporting, distributing, and selling in accordance with Islamic principles. HSCM's primary goal is ensuring that halal products remain intact throughout the whole chain of operations. Unlike traditional supply chains, the halal supply chain requires constant supervision to avoid contamination or tampering with the product (Islam et al., 2024; Maharani et al., 2023).

Globalization of halal markets has increased the complexities associated with halal supply chains. Halal products are normally handled by more than one supplier, logistic providers from different countries, and manufacturing and distribution systems that operate under various regulations. This makes the task of maintaining halal integrity during the entire process extremely difficult. Supplier management therefore becomes one of the most important areas in halal supply chain management.

According to various studies (Ellahi et al., 2025; Mabkhot, 2023; Sadeli & Rosyidi, 2025), the major risks arising from suppliers play a significant role in causing halal failure. This is due to things like sourcing of raw materials from unaccredited suppliers, ambiguity in tracking of ingredients, improper mode of transportation and handling of materials, among others. Therefore, for proper functioning of halal supply chain, there is need for an evaluation process to check performance and behavior of suppliers.

Halal assurance systems have been widely used in order to improve halal governance within supply chain ecosystems. Such systems usually include halal certification validation, halal supplier audits, traceability systems, training programs, documentation processes, and risk management processes. However, many halal assurance systems still suffer from fragmentation and lack an intelligent decision-making system to select suppliers.

Sustainable halal logistics is another issue emerging in the context of HSCM. Sustainable halal logistics combines environmental issues, social issues, and economic efficiency along with Islamic ethics. It is consistent with the philosophy of Maqasid Sharia that puts the emphasis on the well-being of mankind and environmental concerns. Hence, modern approaches to halal supplier selection incorporate aspects of sustainability such as green logistics and carbon reduction.

## *2.3 Islamic Procurement Principles*

The meaning of Islamic procurement refers to the procedures related to the purchase and sourcing of materials that follow the Shariah. The procurement in the Islamic context operates under the principles of ethics and legality aimed at guaranteeing justice and fairness throughout the procurement process. The procurement should not include any forbidden

elements such as usury, uncertainty, gambling, dishonesty, and other immoral sourcing behaviors.

The following Islamic procurement practices become more relevant when evaluating suppliers:

- (1). Halal Certification: Suppliers must deliver halal-certified goods and services.
- (2). Transparency: The procurement process must be clear and observable.
- (3). Objectivity: The supplier evaluation process must not discriminate.
- (4). Honesty: Suppliers must be honest and accountable.
- (5). Corporate Social Responsibility: Islamic procurement encourages sustainable business environments.

In practice, the application of the above Islamic procurement practices becomes difficult due to the diversity of suppliers, global purchasing operations, and monitoring capabilities. As a result, firms need to adopt decision support systems-based procurement approaches to transform Islamic procurement practices into decision criteria.

#### *2.4 Decision Support Systems in Supplier Selection*

Decision Support System (DSS) is an information system designed using computers for supporting managers who make decisions based on semi-structured or unstructured problems. DSS combines data management systems, models, and interface tools to help decision-makers assess different options systematically and objectively (Eslami et al., 2022; Moro et al., 2014).

The choice of suppliers is a very significant topic in the domain of decision support systems (DSS) since the decision-making process incorporates multiple criteria, competing interests, and also has a great strategic significance. Classical methods used for supplier evaluation are based mostly on managerial intuition and subjective assessment; thus, they are often inconsistent and lack transparency. However, decision support systems address this problem by incorporating both objective and subjective evaluation criteria into the process. In halal supply chains, DSS offer the following benefits:

- (1). Greater transparency in the process of supplier assessment
- (2). Reduced subjectivity during the procurement process
- (3). Incorporation of halal assurance requirements
- (4). Increased traceability and accountability
- (5). Objective ranking of supplier alternatives

Modern DSS models typically employ MCDM techniques, considering that the issue of choosing suppliers involves a wide range of criteria such as price, quality, delivery, halal certification, environmental friendliness, and supplier reputation.

The implementation of smart contracts and distributed ledger technology in financial systems has been investigated across multiple applications, such as cross-border payments, supply chain financing, digital identity verification, and decentralized asset management. These applications illustrate the capacity of blockchain technologies to enhance the efficiency, security, and transparency of financial activities. As financial systems progress towards digital platforms, smart contracts and distributed ledger technologies are anticipated to assume a progressively vital role in defining the future of financial services.

#### *2.5 Simple Additive Weighting (SAW)*

Simple Additive Weighting (SAW) technique is one of the most widely used methods in Decision Support Systems and Multi-Criteria Decision Making for assessing and ranking alternatives according to various criteria (Haswan, 2017; Rusdiyanto et al., 2020).

It is often referred to as the weighted sum technique, since this method involves calculating the weighted sum of normalized values of criteria, which is then taken as the final value for each alternative.

The SAW method works on the principle that:

- (a). Each criterion has a level of importance (weight)
- (b). Each alternative is evaluated against all criteria
- (c). Scores are normalized to make them comparable
- (d). The weighted scores are added together
- (e). The alternative with the highest total score is considered the best option

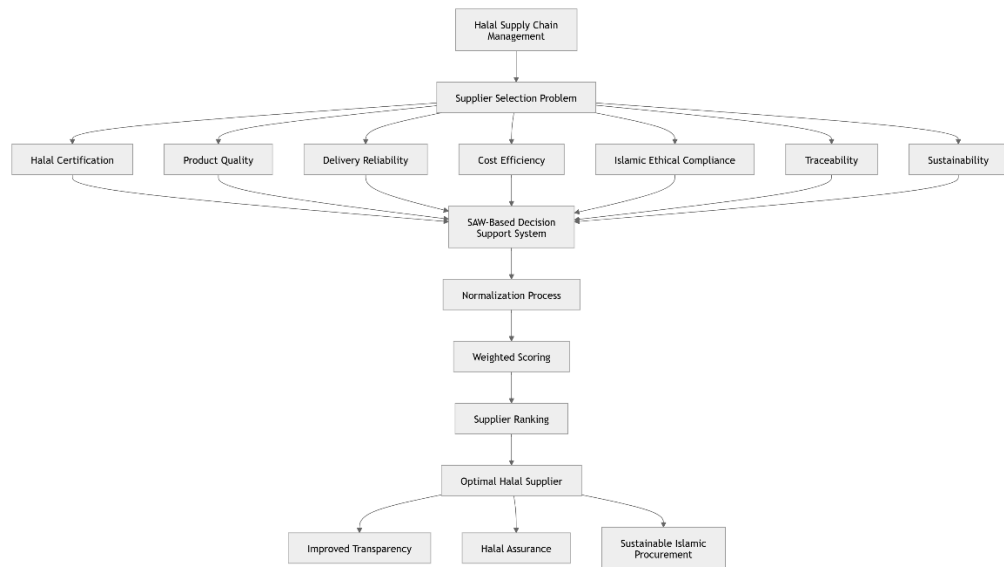


Figure 1. HSCM SAW Process

### 3. Research Method

#### 3.1 Research Design

The research uses a quantitative decision support system (DSS) model for the creation of an effective process of selecting suppliers from the perspective of halal supply chain management. In this context, the use of MCDM models based on the SAW technique is employed for the evaluation of alternative suppliers in relation to operational, halal, ethical, sustainable, and risk-based criteria. The choice of quantitative approach in research is justified by the nature of selection, as it includes quantifiable criteria which should be measured.

This study utilizes an applied decision analytic methodology designed to help procurement managers, the halal industry participants, and organization-level decision-makers find the most suitable halal compliant supplier. This approach stresses replicability, transparency, and consistency in the supplier selection process. Unlike existing procurement systems which rely heavily on intuition or management judgment, this decision-making process is capable of quantifying both qualitative and quantitative characteristics of the supplier.

The research framework involves a combination of Sharia Management and modern DSS techniques. The research work expands the evaluation of suppliers from traditional operational efficiency criteria such as cost, quality, and timeliness to include Islamic ethics, halal certification criteria, and sustainability factors. It represents an important innovation in halal supply chain management because supplier choices have a direct impact on the halal aspect of the entire supply chain.

The computational model consists of the following process flow:

- (1). Selection of evaluation criteria of halal suppliers

- (2). Criteria weights determination
- (3). Supplier alternatives selection
- (4). Formulation of decision matrices
- (5). Criteria normalization
- (6). Calculation of weighted preference scores utilizing SAW approach
- (7). Ranking of suppliers
- (8). Provision of recommendations based on results through DSS

The outlined model of DSS will be beneficial for semi-structured decision-making by procurement management. This framework will allow managers to objectively appraise supplier alternatives in order to minimize subjectivity and inconsistency in decision-making. Application of the SAW technique proves to be particularly justified due to its simplicity and clarity.

According to the Sharia point of view, the research model developed will comply with the requirements of halalan tayyiban, amanah, tabligh, adl, and maslahah. Hence, it can be expected that the use of the DSS model will help increase procurement effectiveness while also strengthening the halal status, ethics, and sustainability in the supply chain.

### 3.2 Criteria Identification

The criteria for evaluating the suppliers were established by reviewing the literature, the halal supply chain standards, the Islamic procurement principles, and previous supplier selection research. The selected criteria include both traditional operation dimensions and Sharia-based halal dimensions. The inclusion of the above criteria is intended to provide a holistic evaluation of the supplier that conforms to the halal supply chain criteria.

The study utilizes ten evaluation criteria:

- (1). Halal certification compliance
- (2). Supplier reputation
- (3). Product quality
- (4). Delivery reliability
- (5). Cost efficiency
- (6). Islamic ethical compliance
- (7). Traceability capability
- (8). Sustainability practices
- (9). Risk management capability
- (10). Financial stability

These criteria are considered highly relevant because halal supply chains require supplier evaluation mechanisms capable of integrating operational performance, halal integrity, ethical responsibility, and sustainability dimensions simultaneously.

**Table 1.** Halal Supplier Selection Criteria and Sharia Justification

Code	Criteria	Definition	Islamic/Sharia Justification
C1	Halal Certification Compliance	Supplier compliance with recognized halal certification standards	Ensures products comply with halal requirements and avoid prohibited elements
C2	Supplier Reputation	Historical performance and organizational credibility	Reflects trustworthiness ( <i>amanah</i> ) and ethical business conduct
C3	Product Quality	Ability to provide consistent product quality	Aligns with <i>ihسان</i> and consumer protection principles
C4	Delivery Reliability	Timeliness and consistency of delivery performance	Supports fairness, operational accountability, and contractual fulfillment
C5	Cost Efficiency	Supplier capability to provide competitive pricing	Encourages efficiency without compromising halal integrity
C6	Islamic Ethical Compliance	Adherence to Islamic ethical business practices	Prevents fraud, deception, exploitation, and unethical sourcing
C7	Traceability	Ability to track materials and supply chain activities	Supports transparency and halal assurance systems

C8	Sustainability	Environmental and social responsibility practices	Aligns with Maqasid Sharia and environmental stewardship
C9	Risk Management	Capability to manage operational and halal-related risks	Prevents contamination and operational disruptions
C10	Financial Stability	Supplier financial capability and long-term viability	Ensures continuity and procurement sustainability

### 3.3 DSS Framework Using SAW Method

#### 3.3.1. Simple Additive Weighting (SAW) Method

Simple Additive Weighting (SAW) is one of the most commonly used techniques in MCDM analysis to evaluate the alternatives using the weighted combination of the criteria. SAW is often referred to as the weighted sum model, because the overall value of each alternative is calculated by adding the weighted criteria scores together. SAW technique was selected for use in this research for various reasons, including:

- (1). Easy computation framework
- (2). Clear ranking procedure
- (3). Easy application in DSS environment
- (4). Ease in managing multiple criteria
- (5). Easy understanding of the technique by management

As regards the selection of halal suppliers, SAW allows procurement managers to evaluate potential suppliers regarding various criteria, including halal requirement, performance, and Islamic ethics.

#### 3.3.2. Decision Alternatives

The supplier alternatives evaluated in this study are represented as:

$$A = \{A_1, A_2, A_3, A_4, A_5\} \tag{1}$$

Where:

- $A_1$  = Supplier Alpha
- $A_2$  = Supplier Beta
- $A_3$  = Supplier Gamma
- $A_4$  = Supplier Delta
- $A_5$  = Supplier Epsilon

These suppliers are evaluated using ten predefined criteria.

#### 3.3.3. Determination of Evaluation Criteria

The decision criteria are represented as:

$$C = \{C_1, C_2, C_3, \dots, C_{10}\} \tag{2}$$

Where:

- $C_1$  = Halal certification compliance
- $C_2$  = Supplier reputation
- $C_3$  = Product quality
- $C_4$  = Delivery reliability
- $C_5$  = Cost efficiency
- $C_6$  = Islamic ethical compliance
- $C_7$  = Traceability
- $C_8$  = Sustainability
- $C_9$  = Risk management
- $C_{10}$  = Financial stability

## 4. Result and Discussion

This part highlights the computation results obtained after implementing a DSS based on SAW for supplier selection. The computation results have been obtained after conducting an extensive process of evaluation including the weighing of criteria, normalization, scoring, and ranking of suppliers. These results provide a thorough analysis of the performance of suppliers based on criteria including Sharia compliance, capability, sustainability, and halal assurance.

The DSS successfully transformed multi-dimensional information on supplier assessments into numerical rankings, thus enabling an objective comparison among the supplier options. The results of this study indicate that the SAW approach can be utilized in procurement decisions in halal supply chains by considering Islamic ethics and operational efficiency together.

### 4.1 Criteria Weight Results

The first stage of DSS computation involved analyzing the importance of each criterion for evaluating the suppliers. The weights were determined by expert opinion and factors that align with procurement in accordance with Sharia principles. Factors related to halal credibility and Islamic morality were accorded more importance because maintaining halal assurance is considered the primary goal in halal supply chain management.

The findings demonstrate that ensemble learning techniques, specifically the Random Forest and Gradient Boosting models, yield the greatest predictive accuracy. These models exhibit robust proficiency in identifying nonlinear interactions among variables and managing high-dimensional financial datasets.

**Table 2.** Machine Learning Model Performance

Code	Criteria	Weight	Percentage (%)	Priority Rank
C1	Halal Certification Compliance	0.18	18%	1
C2	Supplier Reputation	0.08	8%	7
C3	Product Quality	0.15	15%	2
C4	Delivery Reliability	0.10	10%	4
C5	Cost Efficiency	0.07	7%	8
C6	Islamic Ethical Compliance	0.14	14%	3
C7	Traceability	0.10	10%	5
C8	Sustainability	0.06	6%	10
C9	Risk Management	0.07	7%	9
C10	Financial Stability	0.05	5%	11

The results reveal that Halal Certification Compliance (C1) is the most important criterion, having a weight of 0.18. This clearly shows that halal guarantee is still the most important factor when evaluating a halal supplier. In addition to C1, the importance of Product Quality (C3) and Islamic Ethical Compliance (C6) have been recognized due to the significance of product quality and Islamic business ethics in Sharia-based purchasing operations.

Cost Efficiency (C5) has comparatively a low weight compared to other factors. It can be interpreted that organizations operating in the halal network give more emphasis on the integrity of halal than cost efficiency. Such outcomes are aligned with the principles of Sharia Management, including accountability and trustworthiness.

### 4.2 Supplier Performance Scores

In the supplier evaluation analysis process, normalized values were used through the application of the SAW normalization technique. Each of the suppliers was rated using all ten criteria. The normalized data was subsequently multiplied with the weight value associated with each criterion.

**Table 3.** Weighted Supplier Performance Scores



Supplier	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Total Score
A1	0.176	0.077	0.147	0.093	0.064	0.137	0.098	0.055	0.067	0.040	0.954
A2	0.166	0.080	0.150	0.091	0.067	0.131	0.093	0.056	0.064	0.042	0.940
A3	0.180	0.073	0.142	0.100	0.062	0.140	0.100	0.060	0.070	0.043	0.970
A4	0.172	0.078	0.145	0.096	0.065	0.133	0.096	0.058	0.066	0.042	0.951
A5	0.164	0.074	0.143	0.089	0.068	0.129	0.092	0.055	0.063	0.041	0.918

According to the computational results, Supplier A3 achieved the best overall performance result, measured as 0.970. The supplier showed high performance regarding halal compliance, delivery performance, Islamic ethics compliance, traceability performance, and risk management. These aspects combined contributed to Supplier A3's superiority in terms of ranking position.

Supplier A1 and Supplier A4 also showed high overall performance with respect to the aspects of product quality and supplier reputation. However, slight disparities concerning ethical compliance and traceability performance negatively affected their preference scores compared with Supplier A3.

Supplier A5 achieved the worst score due to poor performance in aspects of halal compliance, delivery performance, and traceability performance. While Supplier A5 demonstrated competitive performance in terms of cost efficiency, the lower weight attached to economic criteria affected its ranking score negatively.

#### 4.3 Supplier Ranking

The final ranking results generated by the SAW model are presented in Table 4.

**Table 4.** Supplier Ranking

Rank	Supplier	Final Score	Performance Category
1	A3	0.970	Excellent
2	A1	0.954	Excellent
3	A4	0.951	Very Good
4	A2	0.940	Very Good
5	A5	0.918	Good

Supplier A3 was determined to be the best halal supplier alternative by the Decision Support System (DSS). Supplier A3 performed satisfactorily for most of the critical criteria, especially regarding halal certification, Islamic ethics conformity, and traceability. The above information shows that Supplier A3 has what it takes to govern the halal supply chain in a sustainable manner.

From the final SAW scorecard, Supplier A3 emerged as the best halal supplier. This was due to the supplier's excellent performance in various aspects, which include:

- (a). High compliance score on halal certification
- (b). Strict observance of Islamic ethics
- (c). Excellent traceability
- (d). Efficient delivery
- (e). Strong risk management ability

Moreover, the supplier showed stable operational performance in sustainability and financial stability dimensions. These results show that Supplier A3 can provide sustainable halal supply chain support without the threat of halal contamination.

In terms of Shariah Management, Supplier A3 is congruent with the following concepts of halalan tayyiban, amanah, tabligh, and ethical procurement management, see figure 2 for detail radar chart analysis, heatmap analysis and Comparison analysis.

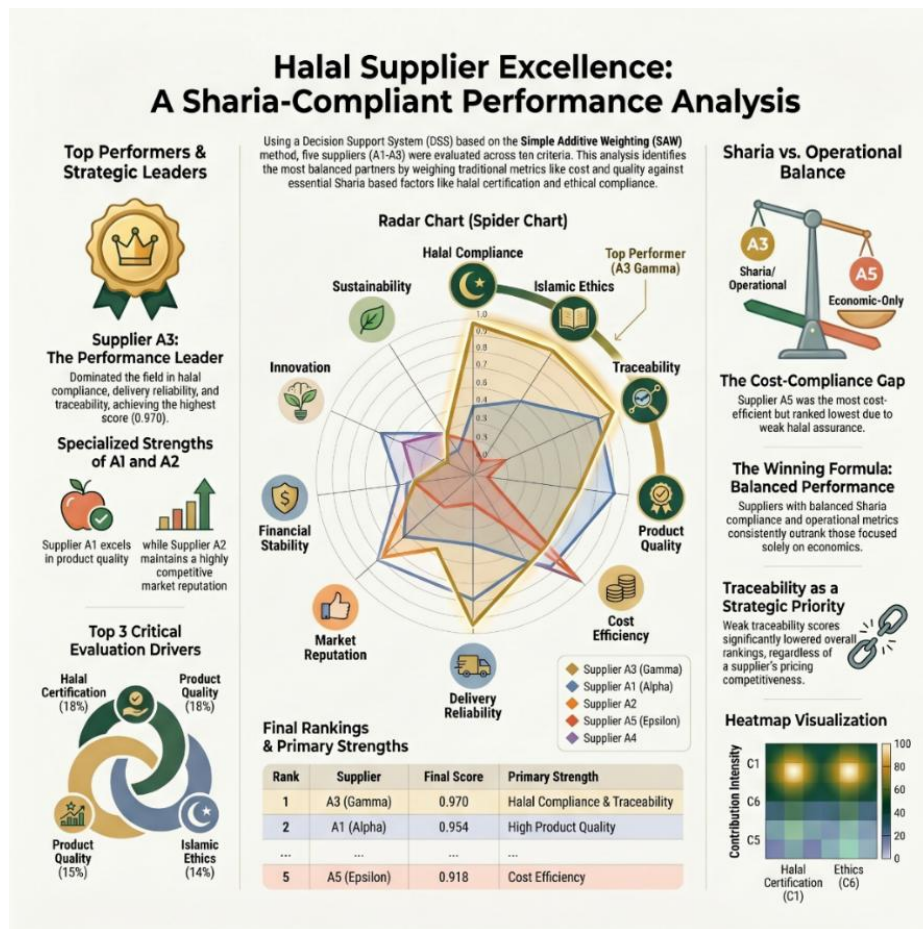


Figure 2. Halal Supplier Excellence Performance

## 5. Conclusion

The paper introduces the concept of a Sharia Management Decision Support System (DSS) that uses the Simple Additive Weighting (SAW) technique to choose halal suppliers. This research addresses the growing challenge of halal sourcing through the consideration of various aspects, including operational measures, halal standards, ethical norms based on Islam, sustainability factors, and risk management strategies, into a single computational decision-making model. The results suggest that the process of halal supplier selection involves evaluating several aspects beyond conventional cost-focused procurement strategies.

The major findings revealed that halal-related factors have significant impacts on the supplier ranking decisions. The leading factors include Halal Certification Compliance, which is followed by Product Quality and Islamic Ethical Compliance. It shows that companies dealing in halal products pay attention to halal, ethics, and consumer satisfaction rather than economics. The DSS calculations found out that Supplier A3 was the most efficient supplier among others because of high ratings in halal certification compliance, traceability ability, delivery assurance, Islamic ethical compliance, and risk management. In addition, it is clear from the findings that suppliers whose performances are balanced in both operational and Sharia compliance aspects receive better ratings than financially efficient companies.

The proposed study methodologically contributes to the body of knowledge by developing an empirical, repeatable SAW-based decision support system (DSS) model designed specifically for halal supplier selection. In the model, both qualitative and quantitative factors related to suppliers are translated into numerically measurable scales using the processes of normalization and weight aggregation. The use of the SAW technique ensures the advantages of simplicity, understandability, interpretability, and operational feasibility in computation. Moreover, the present research also makes a novel contribution to the existing body of

knowledge by incorporating the concepts of Islamic procurement practices, halal assurance systems, and sustainability within the DSS model formulation framework.

Theoretically, the research adds to the scope and practicality of the Sharia Management theory in a computational context. The paper shows that aspects of Islamic business ethics, halal governance, and sustainable procurement can be quantitatively converted into decision criteria for implementation in a decision support system (DSS) model. Besides, integrating the concepts of halal assurance, traceability, sustainability, and Islamic business ethics makes an important contribution to the existing literature on halal supply chain management and Sharia-based procurement systems.

In terms of practice, the paper suggests a clear and objective tool for assessing halal suppliers to organizations. The DSS framework helps procurement officers decrease subjectivity, increase supplier performance monitoring and assurance, and reduce contamination risk along the supply chain. Furthermore, the suggested decision support model facilitates procurement officer accountability due to the fact that all assessment steps, weights of criteria, and ranking of suppliers can be audited systematically.

From the policymaking point of view, the research promotes better frameworks for halal governance for industries, certifying agencies, and regulators. Integration of a DSS into a halal procurement system will lead to increased supply chain transparency, improvement in halal compliance monitoring, and higher consumer trust in halal-certified products. Policymakers can use a similar approach to implement a standardized system of evaluating halal suppliers based on the criteria associated with sustainable Islamic economic growth.

To sum up, the research concludes that the adoption of a DSS approach to decision making, coupled with the use of the SAW method, greatly improves halal supply chain governance, supplier transparency, and decision making based on Sharia principles. Therefore, the proposed DSS framework provides a useful combination of operational effectiveness and Islamic ethics.

Further studies should build on this work and utilize advanced technologies such as artificial intelligence (AI), fuzzy logic, blockchain, Internet of Things (IoT), and explainable AI (XAI). In particular, subsequent research might include large datasets of suppliers, dynamic weights of criteria, and hybrid MCDM techniques such as AHP-SAW, Fuzzy TOPSIS, or BWM-SAW. Also, empirical testing using actual data from industrial halal supply chains would be valuable.

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