Critical Indicators for Improving Compliance of Fuel Trading Business Entities in Indonesia

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ABSTRACT

Fuel oil is one of Indonesia's most dominant types of energy, making it essential to have strict oversight and regulation of its supply and distribution. This research aims to identify compliance indicators for fuel trading business entities in the downstream oil and gas sector and develop guidelines to monitor and improve the level of compliance of these entities. The method used in this research is the Analytical Hierarchy Process (AHP). The results showed ten relevant compliance indicators: waste management, resource use, occupational accident rate, safety training, audits and inspections, regulatory violations, social and community contributions, stakeholder satisfaction, operational efficiency, and tax and financial compliance. Of the ten indicators, the highest weight is obtained from regulatory violations at 42%, followed by the work accident rate at 22%. These findings provide a strong basis for monitoring and improving compliance in the oil and gas trading business and supporting better and sustainable energy management in Indonesia.

1. Introduction

In Indonesia's energy use context, fuel oil (BBM) is one of the most dominant types of energy, as seen from the national energy composition 2022, where petroleum accounts for 40.30% of total energy use. This dominance emphasizes the importance of good downstream oil and gas management. Therefore, to ensure effective supervision and regulation of the supply and distribution of Fuel Oil and Natural Gas, a Regulatory Agency was established following Law No. 22 of 2001. This agency regulates downstream business activities, including fuel processing, transportation, storage, and trading. Business entities engaged in the fuel trading sector must obtain a commercial business license from the Minister and periodically report distribution appointments to the Minister through the Director General and the Regulatory Agency. In this case, legal entities in fuel trading businesses have a central role in carrying out fuel trading activities after obtaining a valid license. Given the importance of compliance with applicable regulations, identifying and assessing compliance indicators at business entities in fuel trading is very relevant. Regulatory compliance impacts the company's operational efficiency. It contributes to maintaining the stability of the national energy supply and ensuring sustainable

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governance in the energy sector. As such, this research aims to delve deeper into compliance indicators that can significantly impact Indonesia's energy sector's sustainability and success.

Research on determining compliance indicators for fuel oil business entities using the Analytical Hierarchy Process (AHP) approach is highly relevant to Indonesia's energy resource management and regulatory policy. In several critical aspects of the fuel regulatory context and needs, Indonesia, a country with large energy consumption, requires efficient and effective fuel management and distribution. Compliance of business entities with regulations set by the government is vital to achieving this goal. There is relevant literature covering studies on energy regulation and industry compliance, as noted in previous research [1]. The Analytical Hierarchy Process (AHP) approach developed by Thomas L. Saaty in 1980 is a widely used decision-making method to address complex, multi-criteria problems [2]. Various studies on AHP have been conducted, covering optimal allocation of energy subsidies among socio-economic subsectors in Iran [3], industrial site selection in Isfahan [4], solar power plant development [5], energy system policy decision-making [6], cement industry [7], energy industry [8], thermal performance and hydrodynamics [9], supplier evaluation [10-12], supplier selection [13, 14], green supplier selection [15, 16], material selection [17], ship complementary equipment [18], housing subsidy [19], clothing production [20], technology acquisition [21], selection of the best electrician [22], performance evaluation of shipping companies [23], insurance companies [24], marketing risk [25], educational framework [26], and subjective judgment [27]. These studies demonstrate the success of the AHP approach in providing solutions to various challenges in the energy and industrial sectors, thus providing a strong foundation for this research in determining compliance indicators in Indonesia's fuel oil business sector.

While there are various studies on regulatory compliance in the energy sector, there is currently a lack of research on compliance indicators for fuel business entities. This research gap can be seen in the lack of understanding of indicators that can be used to measure compliance of fuel business entities with applicable regulations, whether from legal, operational, or environmental aspects. Meanwhile, related literature, such as studies on corporate compliance in the energy sector, only provide a general overview and do not discuss the specific context in Indonesia in-depth, especially for companies involved in fuel trading, such as Pertamina [28]. As a state-owned company, Pertamina plays an essential role in fuel distribution in Indonesia and has relevant data and reports that can be used in this analysis. Recent data from Pertamina is expected to strengthen the analysis and conclusions drawn in this study, given that the latest information on Pertamina's policies and reports can be accessed through annual reports or other official publications. Therefore, this research aims to develop a compliance framework for fuel business entities in Indonesia using an AHP approach. The main contribution of this research is to provide a more comprehensive understanding of compliance indicators that can be applied in the context of fuel businesses in Indonesia, as well as to develop recommendations that can improve compliance with existing regulations, ultimately contributing to more sustainable and effective energy management.

2. Methods

This research uses the Analytical Hierarchy Process (AHP) method to determine the choice of compliance indicators for fuel trading business entities in the downstream oil and gas sector. AHP was chosen because it provides a more structured, objective, and quantitative approach compared to the methods used in previous studies [2, 3, 22, 29-32].

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This approach allows for a systematic and comprehensive evaluation of the various relevant indicators and preferences, thus ensuring that the selected compliance indicators truly fit this study's specific objectives and context. Thus, the AHP method strengthens the basis for effective decision-making in industry practice.

3.1 Data Collection Procedure

Data collection in this study was conducted through focus group discussions (FGDs) involving five experts from downstream oil and gas regulatory agencies in Indonesia. The FGDs aimed to determine the importance of each compliance indicator used in the study. The experts provided input on the importance of each compliance indicator based on their experience and knowledge in the downstream oil and gas sector. In addition, the research also used case studies of several companies engaged in fuel trading in Indonesia, involving four expert respondents who specifically assessed the compliance indicators that had been determined.

3.2 Data Analysis Procedure

The data obtained from the FGDs and expert assessments were then analyzed using the AHP method. The first step in the AHP analysis is to develop a hierarchical structure of compliance indicators consisting of criteria and sub-criteria relevant to this study, as shown in Figure 1. This structure includes the ten critical indicators of compliance identified earlier: waste management, resource use, occupational accident rates, safety training, audits and inspections, regulatory violations, social and community contributions, stakeholder satisfaction, operational efficiency, and tax and financial compliance.

Once the hierarchical structure is developed, the next step is to conduct pairwise comparisons to assess the relative weight of each compliance indicator. Experts were asked to compare each indicator in terms of its importance relative to others, based on an AHP scale that measures the degree of preference of one indicator over another. The results of this comparison were then processed to derive the priority weight of each indicator, reflecting its importance in the context of fuel trading business compliance. At this stage, each criterion is compared against each other in pairs to determine its relative importance. This assessment uses a Saaty scale that ranges from 1 to 9, where 1 indicates that both elements are equally important. In contrast, 9 indicates that one of the elements is much more important than the other. The pairwise comparison matrix will look like in Equation (1). Here, $a_{ij}$is the comparison between criteria i and j.

$$A = \begin{bmatrix} 1 & a_{12} & a_{13} \\ \frac{1}{a_{12}} & 1 & a_{22} \\ \frac{1}{a_{13}} & \frac{1}{a_{23}} & 1 \end{bmatrix} \quad (1)$$

After completing the pairwise comparison matrix, the next step is calculating each criterion's priority weight. This weight can be calculated by summing the value of each matrix column and then dividing each matrix element by the number of columns to get the relative average of each criterion. This step is formulated in Equation (2). Where $w_i$is the priority weight of the criteria $i$and n is the number of criteria.

$$w_i = \frac{1}{n} \sum_{j=1}^{n} \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} \quad (2)$$

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After the priority weights are obtained, the last step in data analysis is to conduct a consistency test to ensure that the experts' assessments are consistent. The consistency level is measured by calculating the consistency ratio (CR). If the CR value is below 0.1, then the assessment is considered consistent; conversely, if it exceeds 0.1, then a reassessment of some pairwise comparisons is required. In this study, the results of the CR calculation show that the assessments provided by the experts have met the expected consistency standards, so they can be used as the basis for determining the most relevant compliance indicators.

Through this approach, AHP facilitates a more objective analysis and enables stakeholder involvement in decision-making. The final results of the AHP analysis are used as a basis for making recommendations for improving compliance in the fuel trading sector, considering the weight of the most influential indicators in the success of regulatory compliance.

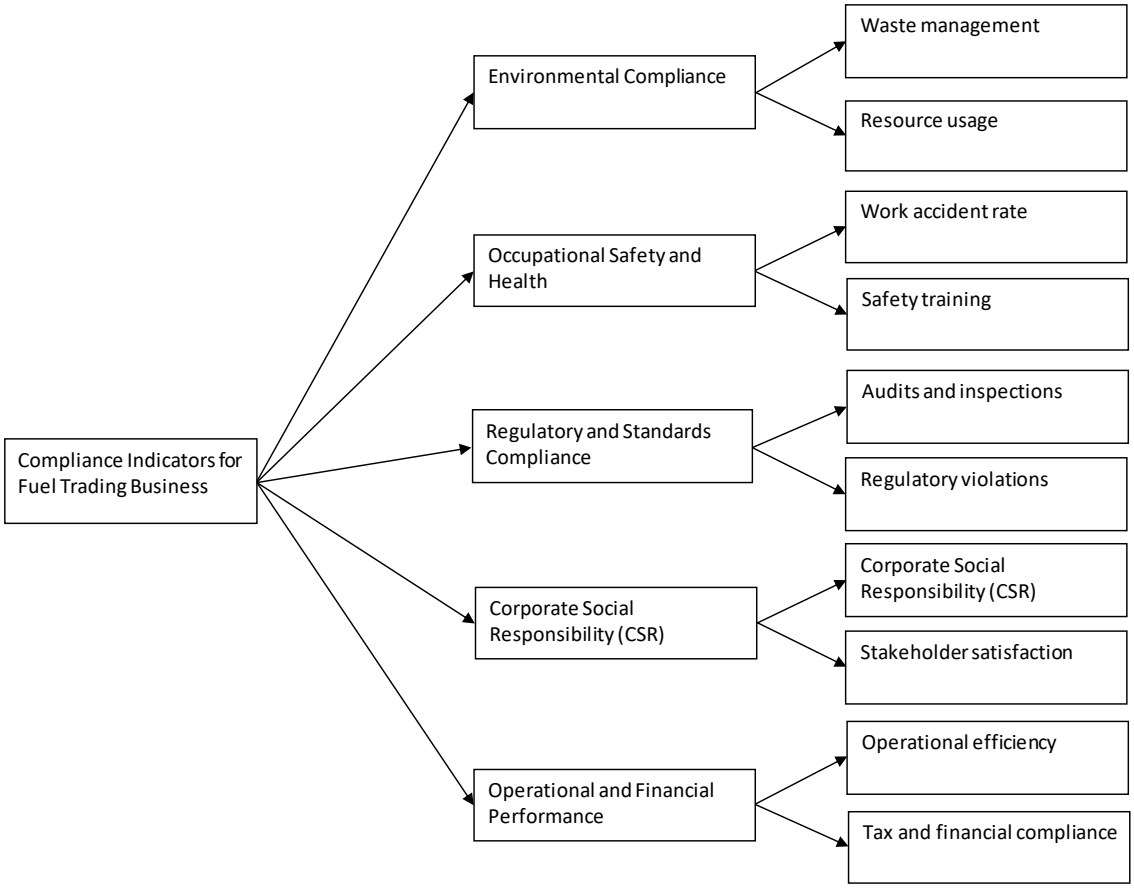

Figure 1. Hierarchical structure

3. Results and Discussion

This study analyzed various aspects of industry management relevant to waste management, resource use, and regulatory compliance, all contributing to the sustainability of industry operations. The weight of each compliance indicator for fuel trading business entities is shown in Figure 2. The consistency value of this assessment, with a score of 0.063, is below 0.1, indicating that the weighting data is consistent. The research findings reveal that regulatory violations are the highest weighted factor in the

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criteria assessment, with a weight of 42%. It shows that companies must follow applicable regulations to prevent sanctions that can harm the business, including revocation of business licenses by regulatory agencies [33].

Waste management is an activity that includes waste reduction, storage, collection, transportation, utilization, treatment, and disposal. Waste management is essential in industrial sustainability as it affects operational efficiency and environmental impact [34, 35]. Despite having positive attitudes towards green products, consumers are often not entirely willing to purchase them, indicating a gap between environmental awareness and purchasing behavior [36]. Thus, industries need to focus on good waste management and improve consumer education and understanding of the added value of green products.

Meanwhile, the use of natural resources must be balanced with environmental functions in order to achieve sustainability. Following the Law governing the environment, development policies, plans, and programs must be based on the obligation to preserve the environment and achieve sustainable development goals [37]. The government and local governments must conduct a strategic environmental assessment (KLHS) for policy formulation. The findings emphasize that any development plans that exceed the environment's carrying capacity must be revised, and businesses that exceed the environment's carrying capacity must be stopped. Thus, it is essential for companies to not only follow environmental regulations but also integrate sustainable development principles into their operations.

Furthermore, the findings show that the accident rate has the second highest weight in the AHP analysis, with a value of 22%. It shows the importance of implementing Occupational Safety and Health (OHS) in operational activities [38]. Workplace accidents not only risk the safety of workers but also affect operational costs and the company reputation. For this reason, companies need to improve the implementation of OHS procedures, including comprehensive safety training, to minimize the risk of accidents in the workplace. Safety training is crucial in improving workers' ability to understand work procedures and the risks around them. Based on previous research, practical safety training can significantly reduce the rate of workplace accidents [39]. In addition, training can also increase workers' awareness of the importance of preventing accidents and occupational diseases. Therefore, continuous and preventive training programs need to be developed by companies.

Meanwhile, audits and inspections are essential in maintaining regulatory compliance and ensuring that business operations are conducted according to established procedures. Based on reference [40], systematic and independent audits can identify deficiencies in compliance. At the same time, inspections conducted by authorized authorities can provide an official review of documents, facilities, and other resources related to pilot activities. In this case, audits and inspections serve as both supervisory tools and a means of performance improvement through proactive identification and addressing issues.

As mentioned earlier, regulatory violations are the most critical factor and have the highest weight in this study. It is due to the significant potential risks if the company does not comply with applicable regulations. Violations that threaten state security or have the potential to harm the state will be subject to direct sanctions, including revocation of business licenses [33]. This finding emphasizes the importance of regulatory compliance to maintain the sustainability of company operations. Furthermore, corporate social responsibility (CSR) is a concept that requires companies to take responsibility for the social and environmental problems they cause. Previous research shows that CSR can be used for physical aid, healthcare, community development, and scholarships [41]. However, there is a tension between a company's profit goals and the desire to improve

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society. The motivation for profit can sometimes hinder the implementation of sustainable social programs [42].

Meanwhile, stakeholder satisfaction is essential to organizations' long-term growth and success [43]. This study found that companies that maintain good stakeholder relationships can improve performance. However, active leadership from top management and full support from the organization's supervisory body are necessary to ensure this strategy works. Operational cost efficiency is one of the critical factors in the business world. As previously found, control over costs directly related to operations can contribute significantly to business success [44]. Therefore, companies must ensure an effective cost management strategy to reduce unnecessary expenses and achieve maximum results with minimum costs.

In addition, the findings of this study also highlight the importance of tax and financial compliance for the sustainability of company operations. Businesses that distribute and trade fuel or natural gas are required to pay contributions to regulatory agencies in accordance with applicable regulations [45, 46]. Compliance with these obligations will maintain business integrity and prevent companies from potential sanctions that could disrupt operations.

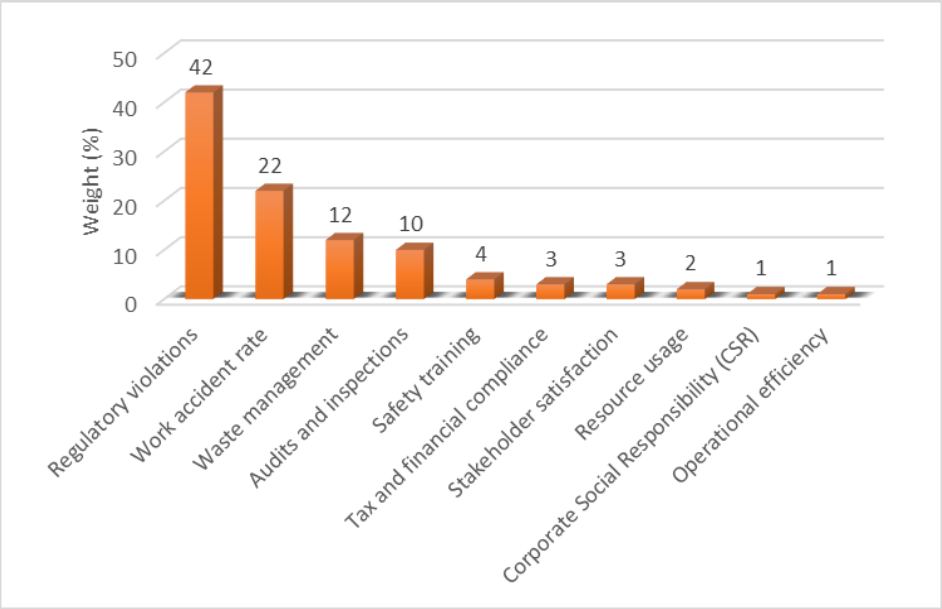

Figure 2. The weighting of each compliance indicator for fuel trading business entities

This research contributes significantly to the industrial management literature by highlighting the importance of regulatory compliance, waste management, and accident reduction in maintaining operational sustainability. The finding that regulatory violations have the highest weight reinforces the view that compliance is critical in industries that want to maintain their business licenses [33]. Previous research also shows the importance of complying with regulations to maintain a company's reputation and operational performance [38]. This discussion reinforces the understanding that implementing sustainability policies is related to environmental issues and includes social and economic dimensions, such as stakeholder satisfaction and operational cost efficiency. From a practical perspective, this study provides recommendations for companies to improve regulatory compliance and conduct regular safety audits and training to improve operational efficiency and reduce the risk of accidents.

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4. Conclusion

This research identified ten compliance indicators relevant to fuel trading entities in the downstream oil and gas business activities sector. The ten indicators include waste management, resource use, occupational accident rates, safety training, audits and inspections, regulatory violations, social and community contributions, stakeholder satisfaction, operational efficiency, and tax and financial compliance. From the analysis conducted, it was found that regulatory violations had the highest weight of 42%, indicating that compliance with regulations is critical in ensuring smooth operations and minimizing risks in the oil and gas business. In addition, the accident rate had the second highest weight of 22%, emphasizing the importance of safety aspects in this industry. This finding confirms the importance of risk management in downstream oil and gas operations. Regulatory compliance and occupational safety are two key aspects that should be the focus of efforts to improve corporate compliance. The indicator weights generated in this study can be used as a reference in monitoring and improving the level of compliance of business entities in this sector regarding regulations and operational safety.

While this study provides important insights into compliance indicators in the oil and gas industry, some limitations should be noted. First, this study focuses only on the downstream sector of the oil and gas industry, so generalization of the results to other sectors in the energy industry needs to be done with caution. Secondly, the approach used, the Analytic Hierarchy Process (AHP), provides results based on subjective perceptions and judgments from experts. Although AHP has proven to be an effective method for multi-criteria analysis, this limitation may affect the objectivity of the results. Another limitation lies in the coverage area and data used. This study did not consider local factors and differences in regulations across countries, which may affect compliance rates and indicator weights.

Future research is expected to expand the scope of the study by covering other sectors in the energy industry or even other industries with similar characteristics in terms of regulation and operational risk. In addition, it is recommended that broader and more diverse data, both in terms of geography and economic sector, be used to enrich the understanding of relevant compliance indicators. Using other more objective quantitative approaches may also provide an additional dimension in assessing these indicators, making the results more representative. Future research could also explore how external factors, such as technological developments or policy changes, affect compliance and risk in the oil and gas sector and provide innovative solutions to improve compliance.

Declarations

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