

# Marketing Risk Management of Palm Oil Based Biodiesel Agroindustry

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**Abstract**—Biodiesel is fuel generates from vegetable oils that have properties similar to diesel oil. The advantages of biodiesel compared to diesel is an environmentally friendly fuel because it produces much lower emissions (sulfur free, low smoke number) in accordance with global issues, higher cetane number (> 57) so that the combustion efficiency is better than diesel, lubrication properties of the piston engine; biodegradable, a renewable energy because it is made from natural materials, and improve the independence of fuel supply because it can be produced locally. The purpose of this research is to design the risk management decision support system for agro-industry development biodiesel of oil palm-based. Determination of objectives and risk management strategies using the used to obtain an alternative value in the aspect of marketing. This research resulted in a decision support system that is useful to help decision makers in addressing the risk of agro-bio-diesel. Risk management model is designed in a decision support system (DSS), can be used by industrial users and investors in the field of biodiesel. DSS software development using Microsoft Visual Basic Version 6.0 consists of three main components namely database management system, knowledge base management system and model base management system. Model base management system consists of risk marketing analysis.

**Keywords**— Risk management; Biodiesel agroindustry; palm oil; marketing; Analytical Hierarchy Process (AHP)

## I. INTRODUCTION

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The availability of energy derived from petroleum is increasingly limited. These conditions lead to an increase in fuel prices due to petroleum crude oil production can not meet domestic market demand is increasing rapidly due to the growth of population and industry. Indonesia, which originally was a net-exporter in the field of fuel oil since 2000 has been a net importer of fuel. In the period January - July 2006 Indonesian oil production only reached 1.29 million barrels/day, while the fuel consumption reached about 1.3 million barrels / day so there is a deficit of 0.27 million barrels of fuel that must be met through imports. To meet the deficit is 0.27 million barrels, with world oil prices at U.S. \$ 70/barrel, then Indonesia should provide a daily budget of around U.S. \$ 18.9/day [1].

Indonesia's dependence on fossil fuels is huge . Based on data DESDM [2] 52.5 % of oil dominates the energy consumption in Indonesia, while the use of natural gas by

19 %, coal 21.5 %, water 3.7 %, 3 % and geothermal renewable energy is only about 2 % of total energy use. Dependence on oil led to Indonesia easily swayed by the soaring world oil prices to break the above U.S. \$ 75 / barrel . The oil shortages led to a crisis in a variety of fields . Indonesia's oil reserves are currently at 9 billion barrels, while it is every year Indonesia produced 500 million barrels , this meaning that if it continues to be consumed and can not find new oil reserves , estimated Indonesia's oil reserves will be depleted within the next eighteen years [2]. To solve the problem , then it is time for Indonesia to reduce dependence on fossil fuels by developing alternative energy sources from renewable vegetable resources . To anticipate the problem of fuel is unstable , then it is time for Indonesia to reduce dependence on fossil fuels by developing alternative renewable energy sources. Bioenergy development is expected to substitute fuel needs in Indonesia.

The purpose of this study was to design the risk management decision support system of agro-industry marketing of palm oil-based biodiesel. Biodiesel is a fuel from vegetable oils that have properties resembling diesel. The advantages of biodiesel compared to diesel is an environmentally friendly fuel because it produces much better emissions (sulfur free, low smoke number) in accordance with global issues, higher cetane number (> 57) so that the combustion efficiency is better than the diesel oil,

have the lubrication properties of the piston engine; biodegradable (able to decompose), is a renewable energy because it is made from renewable natural materials, and increase the independence of the fuel supply as it can be produced locally [3].

Trifino [4] states that biodiesel can be used easily as it can be mixed with any composition with petroleum diesel, has physical properties similar to diesel fuel that can be applied directly to the diesel engines are almost without modification, can be degraded easily (biodegradable), 10 times the non-toxic compared to petroleum diesel, has a cetane number better than regular petroleum diesel, biodiesel exhaust is not black, it contains no sulfur and aromatic compounds. One source of vegetable oil that can be used to produce biodiesel is palm oil.

Daryanto [3] states that biodiesel derived from palm oil, is now a new hope to answer most of the energy needs in Indonesia. In addition to environmentally friendly, palm oil biodiesel can also be updated, while Indonesia is the largest palm oil producer in the world today. Palm oil is the highest oil producing plants in the world that is equal to 6 tons of oil per hectare per year, with production reaching 55 tons of dry biomass per hectare /year.

System development of palm oil -based biodiesel agro-industry as well as other agro-industry relationships between elements that are relatively complex, there is a mutual dependence and contains the potential for significant risk in its management. The successful development of the agro-industry sector of palm oil -based biodiesel one of which is dependent upon the production of palm oil as a raw material provider. System of palm oil -based biodiesel production has risks such as the weather or climate dependence, the presence of pest attacks, competition price of palm oil as biodiesel feedstock with its designation as a food oil, and the world financial crisis. These circumstances need to be considered because it affects the availability of raw materials in terms of quantity, quality and continuity [5].

In the development of agro-industry, spearheading the marketing success of a business, therefore it is very important to consider the risk of marketing to ensure the performance and sustainability of the business as well. According to Johnson, Thurow, and Vietor [6] stated that variables that influence the risk of marketing include customer satisfaction, competitive conditions and distribution systems. The aim of this research was to find engineering decision support system (DSS) agro-industry strategy to overcome the risk of palm-based biodiesel which can improve the effectiveness of risk management. This study used a systems approach to the output of a conceptual model to overcome the risk of biodiesel palm oil -based agro-industry.

## II. METHODS

### A. Framework

This study uses a systemic framework, with a focus on the design of decision support systems (DSS) for the development of agro-industry risk management palm oil -based biodiesel. Marketing aspect is studied. Primary energy supply in the country is still dominated by fossil fuels. With the amount of oil consumption is greater than

production, plus yet inadequate domestic refinery capacity, Indonesia has to import oil to meet domestic needs. In 2007 Indonesia was importing oil by 35% of oil consumption in the country. Indonesia has the potential of renewable energy sources (biodiesel) are very large to be developed as an alternative energy source fossil fuels whose production has declined. This requires a comprehensive risk management research using a systems approach because there are a number of issues are complex, dynamic and probabilistic. Research framework is presented in Figure 1.

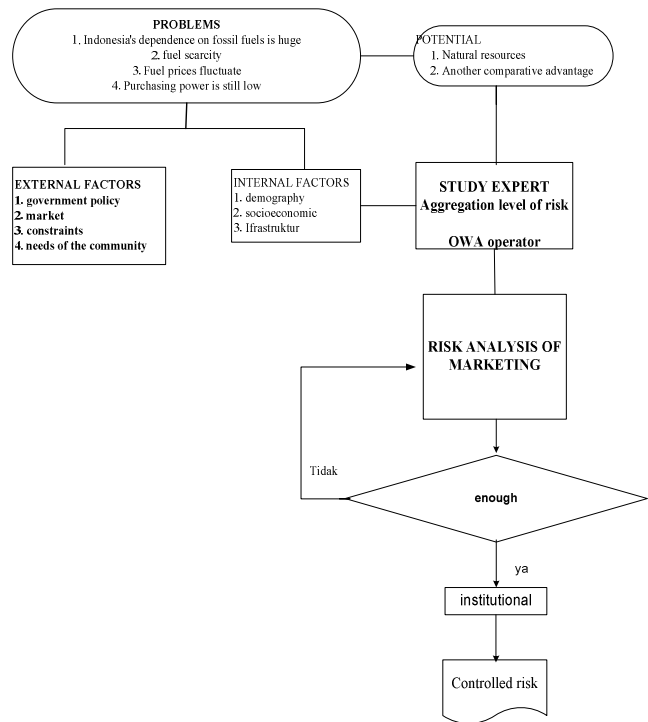


Fig. 1 The risk management framework of marketing research of palm oil-based biodiesel agro-industry

### B. Research Methods

This study uses a systems approach to the output of a conceptual model of risk management agro-industry biodiesel. In particular, this model is constructed by soft system methodology, Analytical Hierarchy Process (AHP). This method uses knowledge as a tool of analysis and interpretation.

### C. Data Collection Method and Knowledge Acquisition

Data was collected by conducting interviews, observations, and review of the literature. The design of the survey are: formulation of the data needs of the AHP. Then the formula was verified to a group of experts. Furthermore, structured questionnaire to be filled by experts in order to formulate a knowledge acquisition.

### D. Methods Data Processing and Interpretation

The data obtained from the literature or field surveys processed in accordance with the design methods used. Data processing methods used in this study include: systems analysis, namely the early stages with three activities:

analysis of the needs of individual actors and stakeholders in the agro-industry and institutional management systems, as well as the problem formulation and identification systems. Furthermore, designing the system, namely the stages of designing decision support models, consisting of components of the database management system, the model and the knowledge base, the dialogue is done by the user (user interface) to improve the effectiveness of risk management based agroindustri.biodiesel palm. Designing was proceeded with the system implementation, namely codefication models, data and programming language dialogues into the risk management models to establish agro-industry marketing of palm oil -based biodiesel based computer. Further data processing activity is model validation, further applications of the model output DSS

#### *E. Designing Modeling*

Risk management models designed using an expert system (rule-base) by taking into account the results of the AHP analysis. The management models of risk management models encourage agro-industry biodiesel palm-based generation.

#### *F. Stages of Research*

This study consists of five main stages, namely 1) literature review, 2) field studies and surveys of experts, 3) problem formulation and identification systems, 4) analysis system that includes identification of needs 5) the formulation of a conceptual modeling strategy to overcome the risk of palm oil-based biodiesel agro-industry.

### III. RESULTS AND DISCUSSION

#### *A. Influenced Factors*

Determination of the value of the risk of agro-industry marketing aspects of palm oil-based biodiesel based on the results of the aggregation value of risk factors that influence it. Factors that influence the risk of such marketing include customer satisfaction, competitive position, distribution conditions, government policies and the increase in raw material prices. The results of calculations indicate that the level of risk aggregation risk marketing aspects of palm oil-based biodiesel agro-industry is very high.

Government policy factors have a very high risk value, customer satisfaction has a high risk value, competitive position worth the risk factors being, the value of the distribution is a high risk condition and factor increase in the price of raw materials have a high risk value. Thus factor high enough role in the marketing risk value is the policy of the government. Government policy on energy development is very much needed. This is associated with the national energy policy objectives is to realize the security of energy supply in the country. The main policy is 1) to provide energy to seek assurance of supply, production optimization and conservation; 2) utilization of the energy utilization efficiency and diversification efforts; 3) towards the economical pricing by taking into account the people who can not afford and 4) Protecting the environment. Furthermore, he declared that the policy is supporting the development of energy infrastructure, government

partnerships with bussiness, community development and research and development.

#### *B. Marketing risk*

Marketing is one of the aspects that influence the successful development of agro-industries. This is caused by the presence of two important roles that marketing (1) Provide information about market demand needs to be translated into products and supporting components for customer satisfaction, and (2) determine the company's financial performance. The results of the marketing analysis showed that the antecedents of customer satisfaction, the conditions of distribution and increased raw material prices high risk. At the risk factors being competitive position. While government policy is very necessary with a very high risk value. In order to minimize the risks involved in the marketing of biodiesel, taken the highest risk factor is government policy, made a further risk management to address the marketing risk. To that end, the model was developed using AHP with the five levels of focus, factors, actors, goals and alternatives need to be considered.

In the agro-industry marketing biodiesel, the highest risk was a government policy. Factors that influence government policy of AHP analysis results in a row is market demand (0.33), the availability of quality raw materials (0.26), the price of raw materials (0.17), biodiesel quality standards (0.13), and infrastructure (0.08). The high market demand weighting factors can increase the excitement of the investors in the agro-industry business this palm-based biodiesel. Rahayu (2006) stated that the absorption of supply CPO for biodiesel feedstock can be improved again, but still requires subsidies that competitive selling price. If 20 percent of palm oil at a price of four thousand dollars per liter and 80 percent petroleum diesel / diesel (one thousand seven hundred dollars / liter) will be obtained by the sales price of two thousand one hundred and sixty dollars per liter. Volume absorbed CPO could reach 4.6 million tons by the subsidy reaches four hundred and sixty dollars per liter (27 percent) in order to keep the selling price at the rate of one thousand seven hundred dollars per liter, or about IRD 1.9 trillion. In this condition, of course, investors await the government's policy in the form of direct subsidies to develop the biodiesel industry in the country. In terms of the budget seems not too difficult if some of the fuel subsidy is estimated to reach IRD 66 trillion can be allocated for this program. The choice of the development of the biodiesel industry is expected to reduce dependence on imported fuel products. Natural resources are abundant palm oil in Indonesia and the availability of technology and human processes can be expected industrial production of biodiesel fuel can replace the position. Actor in marketing has an important role is the local government (0.33), the next actor in a row is a research institute / college (0:20), Consumer (0.19), the Biodiesel Company (0:14) and Financial Institutions (0:12) If the major factors associated with the marketing of risk management, where government policy is desirable, then cooperation in policies between central and local government will result in a good decision in order to attract investors interested to invest without any worries. There is a relationship between the goal of increasing the competitiveness of the risk treatment processes with the aim

of improving the local economy on marketing risk management . This shows how important the products produced for local financial support , for the purpose other than that the product can meet the quality and value of the products in accordance with consumer tastes so smooth product marketing mix marketing program that effectively and efficiently so that the resulting quality products supported programs good marketing to increase customer satisfaction.

The main object of policy in terms of marketing support in anticipation of failure is an increase in the regional economy ( 0.41 ) , which was followed by an increase in income of farmers ( 0.36 ) and an increase in productivity results ( 0:22 ) . Increased regional economy is necessary to note , this was due to an increase in the regional economy will affect business activities in the area . Increased regional economy will be able to sustain other business activities so that the local economy will increase . Increasing farmers' income is a goal in the development of agro-industry , by increasing the income of farmers will be able to increase the productivity results . This increase will affect the level of the spirit to strive for the community as well as investors . Productivity will be affected by many factors such as oil palm cultivation from land preparation , seeds preparation , tillage , fertilization , irrigation , pest and disease control , and harvesting and post- harvest. Pardamean [6] stated that the level of productivity of Indonesian palm plants varies according to the type of ownership . In general, the level of productivity of smallholder plantations the lowest among the country estates and private estates . It is estimated , productivity of smallholder plantations only reached an average of 2.5 tonnes of CPO / ha and the 0:33 tonnes of palm kernel oil ( PKO ) / ha . This is due to the lack of maintenance of the plantation . Meanwhile , the state has the highest productivity plantations , which produces an average of 4.82 tons of CPO per hectare and 0.91 tonnes per hectare PKO . While the average private estates produce tons of CPO / hectare 3:48 and 0:57 PKO tons per hectare . Handling is lacking for the growth and development of oil crops will affect the productivity of the results , so it will affect the increased performance and increased productivity productivity. With the increase in productivity results , both from the increased productivity of palm oil and biodiesel itself , will be able to increase the income of farmers . High-income farmers , farmers will add excitement to continue to pursue the growth and development of plants

Based on the above objectives , the main alternatif to watch to prevent the failure of the agro-industry subsidies biodiesel is biodiesel ( 0.62 ) . Government policies are needed to facilitate the activities of aa business activities . The government's role in improving the provision of subsidies for the development of biodiesel as where subsidies on fossil fuels is very helpful to diesel biodiesel agro-industry development efforts . The second alternative is also worth noting is maintaining market segment (0.24). Kotler [8] states , in maintaining a market segment that has been dominated bonds need to be developed and stronger loyalty with customers . Fidelity bond will grow stronger when companies pay attention to customer satisfaction . Additionally , in an effort to increase sales volume and profit required number of strategies that can attract new customer.

The third alternative is to develop a marketing mix (0:13) . Program marketing mix effectively and efficiently is very necessary , so that good quality products are produced with good marketing program supported will be able to increase customer satisfaction . Mc Carthy and Parreaut [9] states that the integrated marketing mix that will support an increase in the combination of the elements of the marketing mix and form a proper marketing strategy . This is achieved by projecting likely outcomes of various combinations of elements of the marketing mix . The results of the AHP analysis of government policy marketing risks are presented in Figure 2 .

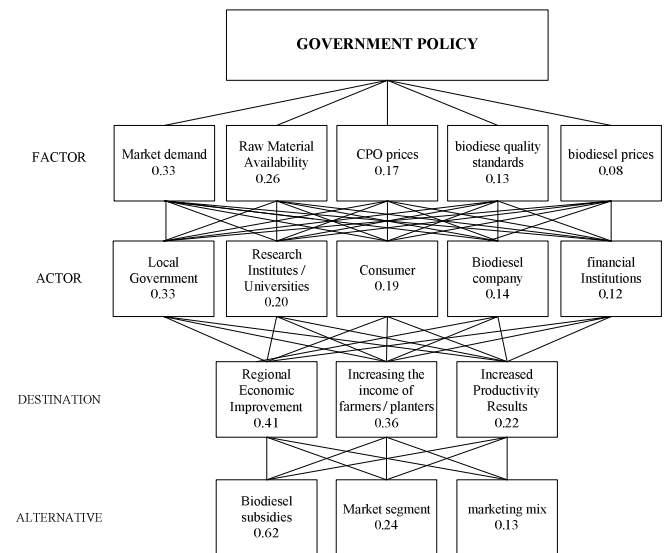


Fig 2. The results of the AHP analysis of government policy risk marketing

#### IV. CONCLUSIONS

Engineering decision support system (DSS) agro-industry strategy to overcome the risk of palm-based biodiesel can improve the effectiveness of risk management. This study uses a systems approach to the output of a conceptual model to overcome the risk of biodiesel palm oil -based agro-industry. In particular, this model is constructed by soft system methodology , particularly using Analytical Hirarchy Process (AHP). This method uses knowledge as a tool of analysis and interpretation , produces Biodiesel marketing DSS software is useful for marketing analysis and risk management. Each risk analysis model using fuzzy non-numeric method of Multiple Criteria Decision Making Multi Person. At the risk of agro-industry of biodiesel marketing, occurred at the highest risk elements of government policy. Factors that influence government policy of AHP analysis results in a row is market demand (0.33), the availability of quality raw materials ( 0.26), the price of raw materials (0:17), biodiesel quality standards (0:13), and infrastructure (0:08).

The high market demand weighting factors can increase the excitement of the investors in the agro-industry business this palm-based biodiesel . Government policy factors contribute to the risk of marketing is very high compared to the antecedents of customer satisfaction , distribution conditions , and the increase in raw material prices which

have a high risk factor while being competitive position at risk . In the context of institutional management , agro-industry company acts as a key biodiesel agro-industry development. In addition agroindustri companies, labor is also a key institution in the management of risk . Capitalization issues and borrowing facilities is an important thing that is needed , because the development of the biodiesel industry requires substantial funds to produce biodiesel production is expected. Conceptual model of a holding company can overcome the institutional development of the marketing agro-industry biodiesel risks palm oil –based.

The development of agro-industrial risk management models need to pay attention to these biodiesel feedstock diversification opportunities based on palm taking into account the dynamic conditions of purchasing power and consumer knowledge of the product.

In the development of agro-industry development on palm oil based biodiesel, the required improvement of the institutional relationship between SMEs oil palm farmers with financial institutions.

Conceptual model of the holding company and institutional development to address the risk of agro-industrial marketing of palm oil-based biodiesel.

## CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest

## REFERENCES

- [1] Syah A, Andi N. 2006. *Mengenal Lebih Dekat Biodiesel Jarak Pagar Bahan Bakar Alternatif Yang Ramah Lingkungan*. Jakarta: PT. Agromedia Pustaka
- [2] DESDM- Departemen Energi dan Sumber Daya Mineral. 2006. *Upaya Tindak Lanjut Peraturan Presiden No. 4/2006 Tentang Kebijakan Energi Nasional*. Jakarta : Pusat Data dan Informasi – DESDM.
- [3] Daryanto. 2006. *Prospek Penggunaan Sawit Sebagai Bahan Baku Biodiesel*. Biodiesel Energi Alternatif yang Atraktif. Di dalam: *Prosiding Seminar Prospek Biodiesel di Indonesia*: Serpong, 12 Agustus 2004. Jakarta: Kementrian Riset dan Teknologi, Republik Indonesia.
- [4] Tryfino. 2006. *Potensi dan Prospek Industri Kelapa Sawit : Analisis Riset Bisnis dan Ekonomi pada Bank BUMN di Jakarta*, economic review no. 206. Jakarta
- [5] Sastrosayono.2006. *Budidaya Kelapa Sawit*. Jakarta: Agromedia Pustaka.
- [6] Johnson A, Thurow AP, Vietor D. 1998. Dairy Manure Management: An Application of Probabilistik Risk Assessment. *J. Environ. Qual* 27 : 481-487
- [7] Pardamean M. 2008. *Panduan Lengkap Pengelolaan Kebun dan Pabrik Kelapa Sawit*. Jakarta: Agromedia Pustaka
- [8] Kotler P. 2002. *Manajemen Pemasaran: Analisis, Perencanaan, Implementasi dan Kontrol*. Jakarta: Prenhallindo.
- [9] Mc Carthy, Perreaut WD. 1993. *Dasar Pemasaran*. Jakarta: Erlangga.