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Determination of the palm based biodiesel policy integration model as a renewable energy commodity

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A B S T R A C T

The increase in economic activity in the industrial sector and the rapid growth of the world population have stimulated an increase in energy demand. In 2004, Indonesia earned the status of a net importer of oil so that it becomes a challenge for the Indonesian government in developing the use of renewable energy to achieve ideal conditions for national energy security. Indonesia has the potential for large amounts of renewable energy sources, one of which is palm-based biodiesel. The mandatory biodiesel policy program was implemented in 2008 with a biodiesel content of 2.5% and gradually until 2019 with a biodiesel content of 30% (B30). The mandatory biodiesel policy is closely related to the achievement of the Sustainable Development Goals (SDGs), and the concept of maintaining the balance of Trilemma Energi. The current energy management and utilization policies in Indonesia continue to increase in line with modern life consumption patterns that require a more environmentally friendly energy variable for energy absorption in Indonesia, especially renewable energy. The purpose of this research is to determine the integration model of palm-based biodiesel policy as a renewable energy commodity to support energy security. This study uses several strategic frameworks by combining a quantitative approach through the perspective of the Balanced Scorecard (BSC) and measuring the technology coefficient using the Technology Contribution Coefficient (TCC), as well as a qualitative approach with the Business Model Canvas (BMC) and the design of the Omnibus Law. Data were collected through Focus Group Discussion (FGD) and Expert Opinion (EO) which were validated by Structural Equation Modeling-Partial Least Square (SEM-PLS) using a sample of 40 respondents from related agencies. The results showed that based on the SEM-PLS validation of 20 BSC perspective variables, two invalid variables were obtained, namely the variable efficiency port service cost and value-added creation which had a P value> 0.05. Meanwhile, Indonesia's TCC score is quite high, namely 0.787, which means that Indonesia is quite aggressive in developing biodiesel and its policies. Based on the results of the FGD expert, it was obtained that the BMC initiates the helicopters to view current biodiesel developments. And 10 regulations have been drafted into a proposed draft Omnibus Law through an action plan.

1. Introduction

One important form of national resilience is economic resilience. National Resilience in the economic field can be seen from the conditions of a country's economic life, where the country must be able to maintain the country's national economic independence. Ayoup et al. (2018) stated that the real form of economic resilience is the ability to maintain healthy and dynamic economic stability, with the ability to be economically independent and competitive. The increase

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in economic activity in the industrial sector and the rapid growth of the world population have stimulated an increase in energy demand. However, the amount of energy supply is increasingly limited, particularly fossil energy which is the world's main energy source (Sanjid et al., 2013). The Indonesian energy sector faces challenges that affect national energy security, including the real condition where since 2004 Indonesia has held the status of a net oil importer. This net importer condition is carried out to meet domestic oil consumption which cannot be fulfilled by domestic oil production. Indonesia has the potential for large amounts of renewable energy sources, including biodiesel to replace diesel which is produced from palm oil (Bell et al., 2011). By increasing the use of oil palm in biodiesel as part of the biological source of biodiesel in the composition of the national energy mix, there will be three strategic objectives achieved, namely: (1) Minimizing foreign exchange outflows due to the use of biodiesel blends, (2) Maintaining fixed palm prices high because there is a substitute for palm oil demand for domestic biodiesel, (3) Increasing the contribution and role of biofuels in the target of the renewable energy mix. These three strategic objectives in aggregate will strengthen the exchange rate and minimize the current account deficit (CAD) and for the long term, renewable energy from palm oil will minimize the predicted threat of net importers of total energy in 2027 (Brown et al., 2013). The government's effort in maximizing foreign exchange inflow and minimizing foreign exchange outflow concerning the revitalization of palm oil commodities is by issuing a policy in the form of mandatory biodiesel blending, hereinafter referred to as mandatory biodiesel (Bieker, 2002). The mandatory biodiesel policy concerning the achievement of the Sustainable Development Goals (SDGs), and to increase energy production and as an effort to increase added value is an integral part of the concept of maintaining the balance of Trilemma Energi which includes energy security, energy equity and the environment sustainability (Cornell, 2009). The purpose of synchronizing the mandatory biodiesel policy with the trilemma concept above is that it requires long-term strategic planning based on the vision and mission, and the goal is to develop a palm-based renewable energy integrated performance measurement system model. A model that can synchronize policies and synergies between sectors is packaged as an integrated policy solution in a performance management framework so that the development of palm oil, especially Crude Palm Oil (CPO), is renewable energy (Goh & Lee, 2010).

The formulation of the problem in this research is how to develop a more synchronized policy integration model to support the implementation of the national oil-based biodiesel performance to increase energy security and the realization of energy independence in Indonesia. The objectives to be achieved in this study are:

a. Developing a more synchronized policy integration model proposal to support the implementation of palm oil-based national biodiesel performance, within a validated Balanced Scorecard (BSC) performance management system.
b. Compiling an overview of the development of a sustainable biodiesel policy through the initiation of the Business Model Canvas (BMC) to support the National Biodiesel Mandatory Program.
c. Drafting the Omnibus Law to support synchronization and synergy in the implementation of the mandatory national biodiesel policy.

The benefits of this research are:

a. To provide input for regulators in developing a policy integration model that supports the implementation of the performance of palm oil-based national biodiesel as a renewable energy commodity.
b. Assisting stakeholders in redesigning a description of the palm-based biodiesel business model which will always change and be sustainable.
c. It is hoped that the synchronization arrangement for the Omnibus Law design is expected to become a reference for regulators in the reconstruction plan for the implementation of the palm-based biodiesel policy in harmony and synergy to optimize the national biodiesel mandatory program.

2. Materials and methods

2.1 National resilience

National resilience is a dynamic condition of a State that has tenacity and resilience and can develop national strength in facing and overcoming all threats, disturbances, obstacles, and challenges that come from within and outside the country, directly or indirectly, which can endanger its integrity, identity, the survival of the nation and state as well as the nation's struggle in maintaining national goals. National resilience is a conception of defense that is universal and aims for the survival of an independent and sovereign Indonesian nation and state based on its strength (Ministry of Defense of the Republic of Indonesia, 2008).

2.2 Energy security

According to DEN (Indonesian National Energy Council, 2015), Energy security is a condition that guarantees the availability of energy, people's access to energy at affordable prices in the long term while still paying attention to environmental protection. Menegaki (2020) explains that energy security is the ability of the economy to ensure the

availability of a sustainable and timely supply of energy resources with energy prices at a level that will not affect economic performance.

2.3 Development of Indonesian palm oil

In the Indonesian economic system, oil palm commodity has a bright prospect as a source of foreign exchange that can create broad job opportunities to improve the welfare of the Indonesian people, according to Presidential Regulation No. 24 of 2015 palm oil is a strategic plantation commodity that can be used for various products such as food, oleochemicals, and bioenergy. The use of palm oil for bioenergy includes biodiesel, biogas, pellets, bio briquettes, methane gas, and biomass power plants (Hidayatno et al., 2015). The area of oil palm plantations in Indonesia has experienced very rapid growth, the increase in the area of oil palm was in the position of 15.75% in 2017, but decreased in 2016 around 0.53% (Khairunisa & Novianti, 2017). In 2015-2019, oil palm plantation areas were spread across 26 provinces, and the largest was in Riau province, namely 2.71 million hectares or around 18.89% of the total area of oil palm plantations in Indonesia in 2018. Meanwhile, the development of oil production palm oil (CPO) from 2015-2019 has increased wherein in 2018 it reached 42.88 million tons or an increase of around 22.72% can be seen in Fig. 1. Development of Area and Production of Indonesian Palm Oil 2015-2019 by the Central Statistics Agency (BPS, 2019).

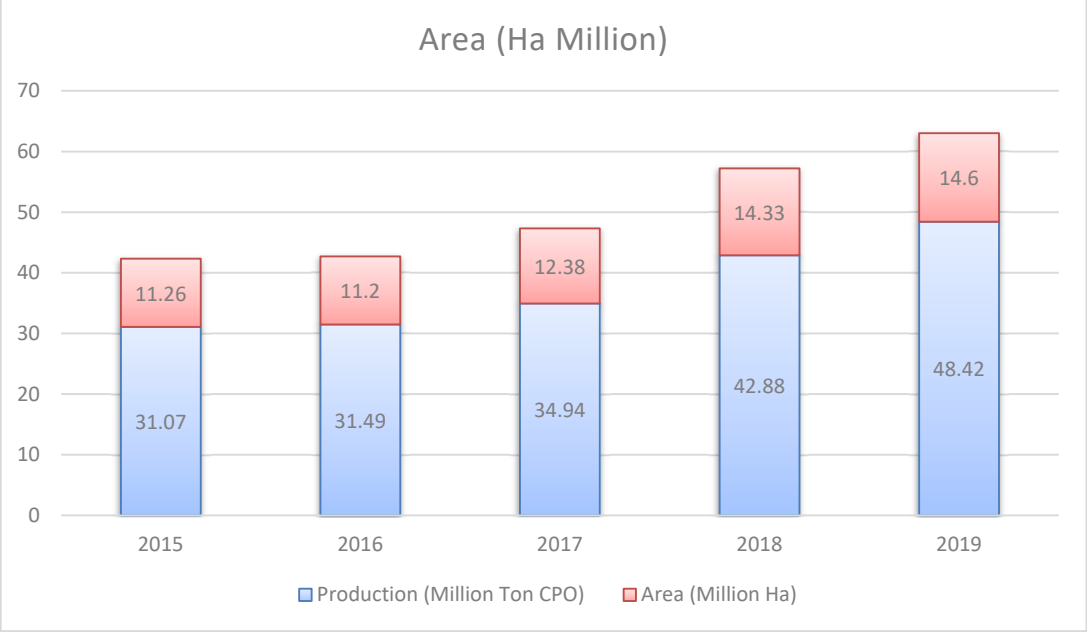


Fig. 1. Development of Indonesian Palm Oil Area and Production 2015-2019 (BPS, 2019)

2.4 Biodisel mandatory policy

Public policy is a decision taken by the government on certain public issues, and the sustainability of these decisions or actions has an impact on the public (Goh & Lee, 2010). Public policy is a collection of actions and directions from the government. Public policy analysis must be able to provide policy advice that leads to institutional strengthening (Dunn, 2015). Based on the 2014-2019 Medium-Term National Development Plan (RJPM) (Bappenas, 2014), the government has taken a policy of accelerating the mandatory (mandatory) gradual substitution of fossil diesel energy with biodiesel, known as the mandatory biodiesel policy (Rocha, 2014). The objectives of the Biodiesel Mandatory Program include:

a. Supporting national energy security (De Souza et al., 2010)
b. Reducing consumption and imports of fossil fuels (Dincer & Martinez, 2019, Knothe et al., 2015).
c. Increase the added value of the economy by developing industry-based biofuels at local/domestic resources (Davidson, 2005).
d. Supporting domestic economic growth (Sugiyono, 2016).
e. Reducing greenhouse gas emissions and improving environmental quality (File M., 2015).

SDGs 2030 for the sustainability of the Biodiesel Mandatory

The United Nations (UN) has set 17 (seventeen) Sustainable Development Goals (SDGs) with 169 (one hundred and sixty-nine) achievements until 2030 (Hache, 2018). It can be seen in Fig. 3 that there are 17 (seventeen) Sustainable Development Goals (SDGs) 2030. The SDGs 2030 goal is to set targets that can be universally applicable and can be measured by balancing three dimensions of sustainable development (Lim and Lee, 2012), namely economic, social, and the environment

or 3-P (profit, people, planet). Indonesia has aligned the SDGs with Nawacita as a national development vision, which is formulated in the 2015-2019 Mid-Term Development Plan policies, strategies, and programs and further translated into the Annual Government Work Plan.

Fig. 2. Sustainable Development Goals (SDGs) 2030

2.5 Trilemma Energy

The mandatory biodiesel policy to achieve the Sustainable Development Goals (SDGs) is an integral part of the concept of maintaining the balance of Trilemma energy (Gunningham, 2013), namely:

a. Energy Security is the effective management of domestic primary energy supply and external resources, reliable energy infrastructure, and the ability to supply energy to meet current and future needs.

b. Energy Equity that can provide energy access at affordable prices for all residents in the country.

c. Environmental sustainability, which includes the achievement of efficient energy supply and utilization, development of energy supplies from renewable energy and other low-carbon energy sources.

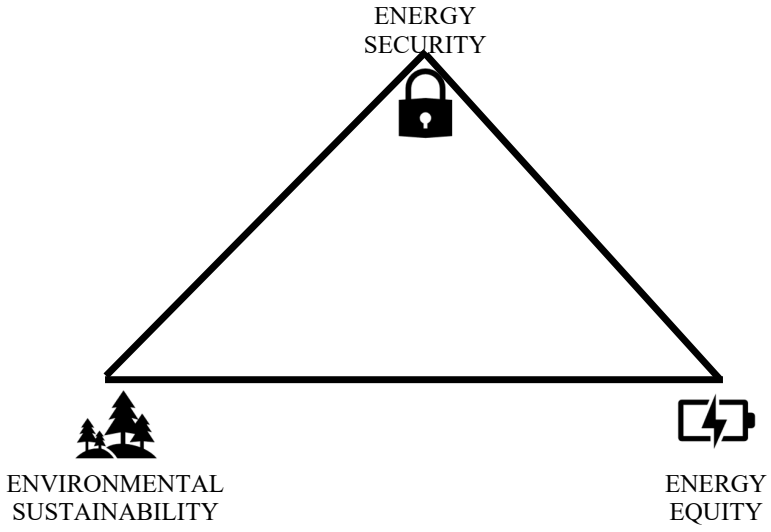


Fig. 3. Trilemma Energy (Gunningham, 2013)

2.6. Research method

The type of research in this study is to use the development of a multisectoral performance synchronization model based on the Balanced Scorecard (BSC) framework, by combining qualitative methods with quantitative methods. The quantitative method uses model validation with Structural Equation-Modeling Partial Least Square (SEM-PLS) and Technology Contribution Coefficient (TCC). While the qualitative method relates to the use of Expert Opinion (EO), Focus Group Discussion (FGD), and brainstorming with regulators and biodiesel policy operators. The sample taken in this study must reflect the nature/opinion of the population. This study used 40 respondents from the Academic, Business and Government (ABG) component whose validity was guaranteed, such as experts (representing academics), large oil palm associations and entrepreneurs (representing Business), and relevant ministerial regulators (representing the Government). The research sample obtained through FGDs involved respondents representing relevant department / institutional stakeholders consisting of the Coordinating Ministry for the Economy team, the Ministry of Agriculture team, the Ministry of Finance team, the Ministry of Industry team, the Ministry of Trade team, the Ministry of Energy and Mineral Resources team, the Ministry of BUMN team, the Ministry team. Research and Technology and BPPT, the Ministry of Transportation team, the

Coordinating Ministry for Maritime Affairs team, the Regional Government team represented by Regional Government Bureaucrats / Regional Work Units, representative teams from biodiesel entrepreneurs, and representatives of biodiesel distribution operators as well as several respondents who have used biodiesel. The data used in this study consisted of primary data and secondary data. Primary data used in this study were obtained through FGD by distributing questionnaires with a Likert scale of 1-5 which represented respondents' opinions on the questionnaire (Osterwalder and Pigneur, 2010). Questionnaires were distributed to related departments/institutions according to the predetermined target research respondents. Meanwhile, secondary data used in this study is data released officially by the Central Statistics Agency (BPS), the coordinating ministry, research institutes, and others. This research hypothesis testing was carried out using the Structural Equation Model (SEM) approach based on Partial Least Square (PLS). SEM is a multivariate analysis technique that combines factor analysis and regression analysis (correlation) to examine the relationship between variables in a model, both between indicators and their constructs (variables), or relationships between constructs (Morisawa, 2002). Meanwhile, PLS is an alternative approach that shifts from a covariance-based SEM approach to variant-based (Marcoulides & Chin, 2013).

Research Location Description

Coordinating Ministry for the Economy

This ministry was chosen as the object of research because the regulatory changes made can convince investors to invest in biodiesel by keeping market trends positive so that the supply of biodiesel can develop. The Coordinating Ministry for Economic Affairs following Presidential Regulation Number 8 of 2015 has the task of organizing coordination, synchronization, and control of Ministry affairs in the administration of government in the economic sector (Nagi et al., 2008). Based on the status of concession, oil palm plantations in Indonesia consist of Smallholder Plantations, Private Large Plantations, and State Large Plantations. It can be analyzed that the development of oil palm land area for smallholder plantations and large private plantations has developed quite rapidly, while the development of the land area for oil palm plantations of the state has not developed significantly. Smallholder plantations are the second-largest oil palm plantations in Indonesia (Marlinah, 2017).

Ministry of Agriculture

The Ministry of Agriculture was chosen as the object of research because it is responsible for strengthening the oil palm farmer organizations and inviting all oil palm farmers to join the organization to make oil palm marketing easier. This ministry can also provide training or extension on the quality of oil palm to farmers and their human resources so that they can improve the quality of oil palm. Improving the quality of oil palm can increase the added value of oil palm so that it is more profitable. Besides, good quality can reduce the residual yield of oil palm production by utilizing high-quality oil palm (Morgenthau & Thompson, 2010).

Ministry of Finance

The Ministry of Finance was chosen as the object of research because it has the authority to regulate incentives. The regulations given to biodiesel can keep the price of biodiesel at bay so that people can continue to use biodiesel. This can make people interested in using biodiesel and slowly move from the previous fuel, namely diesel. The community also participates in government programs in implementing biodiesel policies. The Ministry of Finance of the Republic of Indonesia is in charge of financial affairs and state assets (Putra & Sanusi, 2019).

Ministry of Industry

The choice of the Ministry of Industry as the object of research is because it has always been active in coordinating the planning and evaluation of the implementation of the mandatory B30 which is coordinated by the Coordinating Ministry for Economic Affairs from 2018 to the present. The Ministry of Industry has provided facilities for several biodiesel factory investment factories to obtain a tax allowance since 2007. In general, the tax allowance is given after being approved trilaterally by the Ministry of Finance, the Investment Coordinating Board (BKPM), and the Ministry of Industry as the proposing agency. Some of the incentives that have been prepared include a tax holiday which is regulated by Minister of Finance Regulation 150/2018 and Regulation of the Head of BKPM No. 1 the year 2019 With coordination between stakeholders, the provision of these facilities can be carried out properly and is useful to support the competitiveness of the national biodiesel industry (Putrasari et al., 2016).

Ministry of Trade

This agency was chosen as the object of research because its authority can facilitate the biodiesel industry. One of them is coordinating distribution issues with PT ASDP Ferry Indonesia, PT Pelindo, and PT Pertamina. This synergy can accelerate the biodiesel distribution process. With the good division of tasks and coordination, there is no overlap in the distribution process. The Ministry of Trade is in charge of trade affairs, which has to organize trade affairs in the government to assist the President in carrying out the government of the country. The Ministry of Trade regulates the supply and distribution of raw materials and the distribution of supporting components (Todaro & Smith, 2006).

Ministry of Energy and Mineral Resources in the Renewable Energy Sector

The Ministry of Energy and Mineral Resources in the Energy Sector (ESDM) is certainly needed as an object of research because it is under this ministry that the biodiesel industry develops. Indonesia is working to build national energy resilience and independence by increasing the use of biodiesel. The Ministry of Energy and Mineral Resources encourages the BBN Mandatory Program through the Minister of Energy and Mineral Resources Regulation No. 32 of 2008 concerning the Provision, Utilization and Trading Procedure of Biofuels as Other Fuels as last amended by the Minister of Energy and Mineral Resources Regulation No. 12 of 2015 (Tarmidi, 1992).

Ministry of State-Owned Enterprises

The Ministry of BUMN was chosen as the object of research because the regulations made regarding the obligation to use fatty acid methyl esters greatly affect the amount of biodiesel use. The use of biodiesel can be carried out by state-owned companies through regulations from this ministry. This is also a means of supporting the biodiesel program. Biodiesel can be used in industrial machines and vehicles used in state-owned companies (Yusuf et al., 2016).

Ministry of Research, Technology and Higher Education of the Republic of Indonesia in the field of Strengthening Innovation

The Ministry of Research, Technology, and Higher Education can issue regulations related to the research or development of biodiesel applications as a generator of future energy innovations. The Ministry of Research and Technology continues to strive to encourage the development of energy technology, one of which is biodiesel. The Ministry of Research and Technology is in charge of conducting research and development to support all biodiesel program activities. The mandatory biodiesel program is included in the national energy mix policy, so there needs to be the involvement of all stakeholders so that biodiesel can be produced on a large scale, it is necessary to study, develop and improve the technology that can be applied by the industry to be able to produce biofuels more economically and efficiently. Due to this, the Ministry of Research and Technology was chosen as the object of research (Kennedy & Ahmad, 2007).

Ministry of Transportation

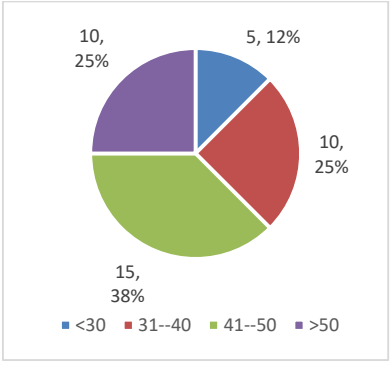
The Ministry of Transportation can issue regulations that require non-Public Service Obligation vehicles to use biodiesel so that the demand for biodiesel increases and the public will start to switch to using biodiesel (Koh et al., 2009). Due to this, this agency was chosen as the object of research.

Coordinating Ministry for Maritime Affairs

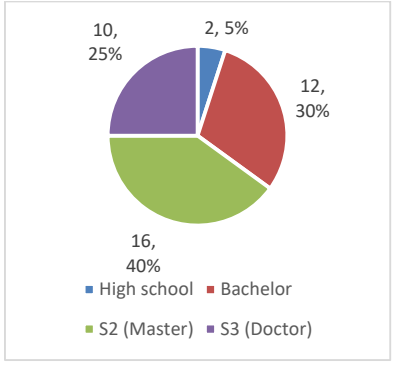
This agency has an impact in regulating the supervision of land processing, especially oil palm, and improving the tourism sector to improve the current account deficit. Due to this, this agency was chosen as the object of research. The Coordinating Ministry for Maritime Affairs is in charge of coordinating, synchronizing, and controlling ministerial affairs in the administration of government in the maritime and investment sector. The Coordinating Ministry for Maritime Affairs and Investment is subordinate to and responsible to the President.

3. Results and discussion

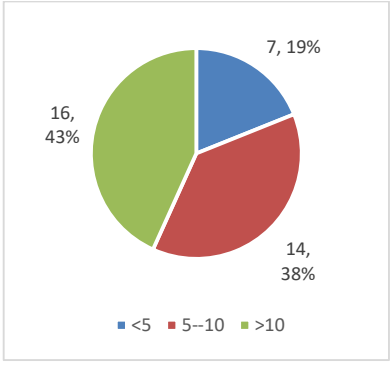
This research studies the development of biodiesel related to existing policies in Indonesia. This research is important considering that the Indonesian government is currently starting to move towards developing towards the B-50 in early 2021 after launching the B-20 in 2018 and the B-30 in 2019 successfully being developed in 2018. The policies made by the government have begun to direct in the effort to use biofuels which refers to the use of biodiesel from palm oil (Zhou & Thomson, 2009). The study begins with a preliminary interview with stakeholders who understand the development of biodiesel. After the interview was carried out, it was continued with data collection in the field. Then proceed with an FGD to discuss biodiesel policy. Data collection was carried out by sending questionnaires to respondents to be filled in and returned to the researcher. Respondents in this study consisted of policymakers in related ministries and palm oil users and farmers.



Age



Education



Years of experience

Strategic Objective Synchronization

The formulation of this Strategic Goal includes 4 pillars of the Balanced Scorecard perspective, namely Learning and Growth, Internal Business Process, Customer and Social, and Prosperity. The four pillars of the BSC have Key Performance Indicators that are derived from the vision, mission, and strategic objectives. The alignment of strategic objectives in this research needs to be done as a first step in the data management and analysis stage.

The formulation of the strategic objectives of the vision and mission mapping results:
a. Increase the value of Gross Domestic Product (GDP) to maintain the sustainability of the state budget.
b. Reduction of transportation rates for cost-saving vehicle operations.
c. Increased value of fuel use efficiency.
d. Minimizing carbon emissions and the acidity of rainwater.
e. The mandatory application of biodiesel.
f. Increase in farmer productivity.
g. Increased productivity of idle land resources.
h. Conduct research on biodiesel development.
i. Increase the efficiency of biodiesel technology with the availability of technological infrastructure.
j. Creating competent human resources in biodiesel development.
k. There is appropriate information dissemination regarding biodiesel.
l. Increasing the guarantee of supply and demand for biodiesel with clear systems and mechanisms.
m. Increasing the performance of national biodiesel in terms of quantity, quality, price, can replace fossil energy.
n. Creating a positive image of Indonesia in participating in keeping the world's air clean.
o. Increased competitive advantage to produce effective biodiesel levels.

Table 1
National Key Performance Index

No	Perspective National	Code	Strategic Objective	Key Performance Indicator (KPI)	Code
1	Prosperity	**P_1**	Sustainable Revenue APBN (State Budgeting) and Foreign Exchange	Import value of fossil energy	P_11
				GDP value	P_12
2	Customer and Social	**CS_1**	Increase Cost Efficiency of Fuel Consumption	Increase in the efficiency of use per kilometer	CS_11
		CS_2	Reduce Air Pollution and GHG emissions	Value of GHG emissions wasted into the air	CS_21
		CS_3	Efficiency Port Service Cost	Increase in logistic cost saving	CS_31
		CS_4	Create Direct and Indirect Jobs	Increase in the workforce in rural areas for biodiesel	CS_41
		CS_5	Energy Security and Balance	Increased use of biodiesel fuel	CS_51
3	Internal Business Process	**IBP_1**	Sustainable Palm Farming & Value-Added Agriculture	Increase in prices received by farmers	IBP_11
				Farmer welfare level	IBP_12
		IBP_2	Participation of non-corporate oil palm farmers	The total contribution of non-corporate farmers	IBP_21
		IBP_3	Increase Productivity Resouces	Utilization of idle land	IBP_31
				Profit per hectare of land	IBP_32
		IBP_4	Operating and Process Excellences	Mastery of biodiesel technology	IBP_41
				Yield [yield] per input unit	IBP_42
		IBP_5	Low Production Cost	The efficiency of the cost of goods sold for biodiesel	IBP_51
		IBP_6	Market Share of Bioenergy Increase	Increase in biodiesel market share index	IBP_61
4	Learning and Growth	**LG_1**	Increase Technology Infrastructure	Production process efficiency	LG_11
				Availability of energy technology and infrastructure	LG_12
		LG_2	Increase Human Resources Quality	The number of results of HR researchers	LG_21
		LG_3		The existence of a personnel certifying agency	LG_22
				Dissemination of policies related to biodiesel	LG_32
		LG_4	Integrated Organization	Clarity of institutional system	LG_41
				Clear mechanisms for incentives and energy taxes	LG_42
				Continuity of community development	LG_43
				Policy alignment	LG_44

Compilation of the Balanced Scorecard

From the strategic map model, the formulation and validity of the strategic mapping model are carried out from the perspective of the base scorecard and internal business process as well as the following perspectives (Kaplan and Norton, 1996). The validity of the base scorecard perspective will be tested by the results of discussions with stakeholders, while other perspectives after the base scorecard will be tested for the validity of the model using the technology contribution coefficient. In the improved model, the base scorecard is expanded to 12 ministries/agencies currently relevant to biodiesel development (Klapper et al., 1999).

Formulation of KPI Initiation and Validation by SEM

As previously explained, within the Balanced Scorecard framework, the vision, mission, and strategic objectives that have been formulated will be derived into Key Performance Indicators (KPIs) which will later be used to measure the performance achievement of the ongoing biofuel development process. KPIs are grouped based on 4 generic perspective pillars, namely the financial perspective or prosperity, the customer and social perspective, the internal business process perspective, and the learning and growth perspective. The following is an initiation KPI designed to measure performance achievement.

Table 2
International Key Performance Index

No	Perspective International	Code	Strategic Objective	Key Performance Indicator (KPI)	Code
1	Prosperity	**P_2**	Emission Incentives	Air pollution level Community support	P_21 P_22
2	Customer and Social	**CS_6**	Increase Contribution on SDGs Energy	Comparison of air quality with fossil energy use Comparison of air quality with biodiesel use	CS_61 CS_62
3	Internal Business Process	**IBP_7**	Increase Bioenergy Competitive	Biodiesel content in the fossil energy mixture The selling price of biodiesel	IBP_71 IBP_72
4	Learning and Growth	**LG_5**	Value Added Creation	Comparison of biodiesel performance Increasing the value of technology contributions	LG_51 LG_52

Model Testing

Validity test

This validity test is tested on variables that contain more than 1 indicator. Besides, the loading between indicators must also be considered where the loading value of other constructs is lower than that of the construct. In Table 3, the validity test for model 1 is presented.

Tabel 3
Combined Loadings Model 1

Indicator	Variable	Outer Loadings
IBP11	IBP1	0.931
IBP12		0.921
IBP31	IBP3	0.934
IBP32		0.924
IBP41	IBP4	0.914
IBP42		0.911
LG11	LG1	0.817
LG12		0.891
LG21	LG2	0.917
LG22		0.856
LG31	LG3	0.941
LG32		0.937
LG41	LG4	0.874
LG42		0.965
LG43		0.935
LG44		0.792
P11	P1	0.970
P12		0.960

Table 3 shows that the IBP indicator items IBP11, IBP12, IBP31, IBP32, IBP41, IBP42 have a value of more than 0.50 which means that the six items have good convergent validity. On the indicators, LG items LG11, LG12, LG21, LG22, LG31, LG32, LG41, LG42, LG43, LG44 have a value of more than 0.50 which means that the ten items have good convergent validity.

Reliability Test

A variable is said to meet the reliability test if it has a composite reliability value and Cronbach alpha greater than 0.7. The following is the composite reliability and Cronbach alpha value for each variable which is presented in Table 4. Table 4 shows that the composite reliability and Cronbach's Alpha values of all research variables have a value of more than 0.70 so it can be concluded that the indicators IBP1, IBP3, IBP4, LG1, LG2, LG3, LG4, and P have high reliability.

Tabel 4
Composite Reliability dan Cronbach Alpha Model 1

Indicator	Composite reliability	Cronbach's alpha
IBP1	0.923	0.834
IBP3	0.926	0.841
IBP4	0.908	0.798
LG1	0.844	0.637
LG2	0.881	0.734
LG3	0.937	0.866
LG4	0.939	0.913
P	0.964	0.926

Structural Model Evaluation

The following are the final results of model 1 in the study:

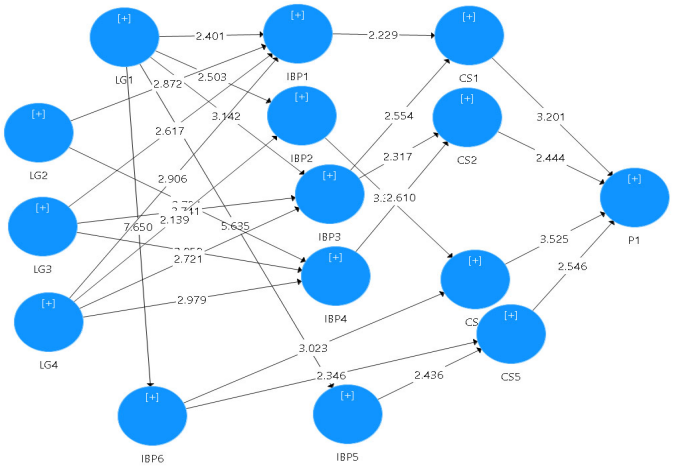


Fig. 4. Final Results of Model 1 Testing

The test results in this study are presented in Table 8 as follows:

Table 5
Hypothesis Testing Model 1

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CS1 → P1	0.417	0.428	0.130	3.201	0.003
CS2 → P1	-0.352	-0.381	0.144	2.444	0.019
CS4 → P1	0.486	0.439	0.138	3.525	0.001
CS5 → P1	0.301	0.331	0.118	2.546	0.015
IBP1 → CS1	0.417	0.415	0.187	2.229	0.031
IBP2 → CS4	0.447	0.472	0.133	3.363	0.002
IBP3 → CS1	0.421	0.424	0.165	2.554	0.015
IBP3 → CS2	0.378	0.311	0.163	2.317	0.026
IBP4 → CS2	0.435	0.507	0.167	2.610	0.013
IBP5 → CS5	0.374	0.359	0.154	2.436	0.019
IBP6 → CS4	-0.403	-0.431	0.133	3.023	0.004
IBP6 → CS5	0.394	0.401	0.168	2.346	0.024
LG1 → IBP1	0.321	0.294	0.134	2.401	0.021
LG1 → IBP2	0.404	0.381	0.162	2.503	0.016
LG1 → IBP3	0.333	0.300	0.106	3.142	0.003
LG1 → IBP5	0.600	0.596	0.106	5.635	0.000
LG1 → IBP6	0.574	0.601	0.075	7.650	0.000
LG2 → IBP1	0.263	0.260	0.092	2.872	0.006
LG2 → IBP4	0.373	0.366	0.100	3.724	0.001
LG3 → IBP1	0.279	0.283	0.106	2.617	0.012
LG3 → IBP3	0.503	0.503	0.134	3.741	0.001
LG3 → IBP4	0.382	0.372	0.125	3.052	0.004
LG4 → IBP1	0.296	0.318	0.102	2.906	0.006
LG4 → IBP2	0.335	0.372	0.156	2.139	0.039
LG4 → IBP3	0.208	0.239	0.076	2.721	0.010
LG4 → IBP4	0.315	0.346	0.106	2.979	0.005

The following is the final result of Model 2 which is presented in Fig. 5.

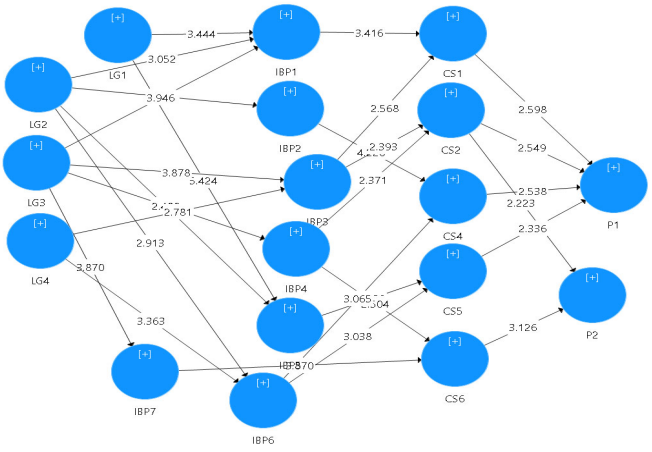


Fig. 5. Final Results of Model 2 Testing

The test results in this study are as follows:

Table 6
Hypothesis Test Model 2

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CS1 → P1	0.3758	0.3789	0.1446	2.5983	0.0131
CS2 → P1	-0.4016	-0.4010	0.1576	2.5486	0.0148
CS2 → P2	0.3552	0.3190	0.1598	2.2234	0.0319
CS4 → P1	0.4978	0.4751	0.1961	2.5384	0.0151
CS5 → P1	0.3572	0.3406	0.1529	2.3359	0.0246
CS6 → P2	0.4464	0.5167	0.1428	3.1262	0.0033
IBP1 → CS1	0.4799	0.4856	0.1405	3.4165	0.0015
IBP2 → CS4	0.4467	0.4694	0.1058	4.2203	0.0001
IBP3 → CS1	0.4042	0.3806	0.1574	2.5680	0.0141
IBP3 → CS2	0.3207	0.2986	0.1340	2.3934	0.0215
IBP4 → CS2	0.3222	0.3680	0.1359	2.3715	0.0226
IBP4 → CS6	0.3023	0.2971	0.1207	2.5038	0.0165
IBP5 → CS5	0.3745	0.4386	0.1536	2.4384	0.0193
IBP6 → CS4	-0.4031	-0.3801	0.1315	3.0651	0.0039
IBP6 → CS5	0.3944	0.3167	0.1298	3.0383	0.0042
IBP7 → CS6	0.4287	0.4514	0.1108	3.8701	0.0004
LG1 → IBP1	0.4281	0.4413	0.1243	3.4436	0.0014
LG1 → IBP5	0.4395	0.4715	0.0810	5.4237	0.0000
LG2 → IBP1	0.2890	0.2575	0.0947	3.0515	0.0040
LG2 → IBP2	0.5055	0.5399	0.1146	4.4107	0.0001
LG2 → IBP5	0.2995	0.2912	0.1072	2.7929	0.0080
LG2 → IBP6	0.3567	0.3375	0.1224	2.9131	0.0058
LG3 → IBP1	0.3663	0.3787	0.0928	3.9458	0.0003
LG3 → IBP3	0.3964	0.4240	0.1022	3.8777	0.0004
LG3 → IBP4	0.3598	0.3671	0.1451	2.4804	0.0174
LG3 → IBP7	0.4390	0.4667	0.1134	3.8696	0.0004
LG4 → IBP3	0.3748	0.3363	0.1347	2.7813	0.0082
LG4 → IBP6	0.4099	0.3976	0.1219	3.3633	0.0017

Based on the results of Models 1 and 2, the integration of palm-based biodiesel policy as a renewable energy commodity in this study, then based on brainstorming with regulators and operators of biodiesel policy through FGD in this study, a proposed Omnibus Law design was made to support synchronization and synergy in the implementation of mandatory policies. national biodiesel. The drafting of the proposed Omnibus Law Bill carried out in this study was based on the linkages of 12 existing institutions from the perspective of the base scorecard in the BSC of this study which consisted of 10 ministries and 2 governments. The proposed Omnibus Law Bill in this study takes a sample of ten regulations, namely Law no. 30 of 2007, Permentan No. 18 of 2016, Presidential Decree No. 61 of 2015, Regulation of the Minister of Industry No. 111/M-IND/PER/10/2009, Minister of Energy and Mineral Resources Decree No. 227K/10/ MEM/2019, Minister of Energy and Mineral Resources Regulation No. 41 of 2018, Minister of Energy and Mineral Resources Regulation No. 12 of 2015, Minister of EMR Decree No. 227K/10/MEM/2019, Government Regulation No. 57 of 2016 and Law No. 30 of 2007.

The ten regulations will be compiled into a proposed omnibus law draft through an action plan which is presented in Table 7 below:

Table 7
Draft Omnibus Law Material from Sectoral Regulations / Regulations To Support Biodiesel

No.	Institutions	Law / Regulations	Constraints / Barriers	Proposed to Overcome Constraints / Barriers
1.	Coordinating Ministry for Economic Affairs and Investment	Law No. 30 of 2007	The distribution of Biodiesel Fuel Business Entities is uneven. And there is a negative campaign from the export destination country	Amendments to the Law Convince investors to invest in biodiesel by keeping positive market trends so that the supply of bio-diesel can develop.
2	Ministry of Agriculture	Minister of Agriculture Regulation No. 18/2016	With the implementation of B30, the supply of raw materials must be maintained while the productivity of farmers, quality of results, and product development is still not optimal. The human resource capacity of business actors in adopting technology is still very limited, mainly due to weak institutional planters.	Strengthening oil palm farmer organizations and inviting all oil palm farmers to join the organization to make oil palm marketing easier. Providing training or counseling on the quality of oil palm to farmers and their human resources so that they can improve the quality of oil palm.
3	Ministry of Finance	Presidential Regulation Number 61 of 2015	The difference in the price of biodiesel and diesel fuel due to increased levels of biodiesel can make users reluctant to use biodiesel	Providing incentives for biodiesel so that the price remains the same as the previous biodiesel so that people can continue to use biodiesel
4	Ministry of Industry	Regulation of the Minister of Industry No 111/ M-IND/PER/ 10/2009	There are still limited infrastructure and funding sources, access to regional autonomy, land conflicts, and pressures on environmental issues.	Providing tax incentives (exemption from imports of machinery and goods and materials). Improvement of infrastructure with port facilities/services. Providing land-use certificates so that there are no land conflicts and environmental issues
5	Ministry of Trade	ESDM ministerial decree No. 227K / 10 / MEM / 2019	Infrastructure and distribution and storage facilities are still less than optimal, resulting in decreased biodiesel quality and the duration of the distribution process	It requires commitment and coordination with institutions related to distribution issues, for example, PT ASDP Ferry Indonesia, PT Pelindo, and PT Pertamina
6	Ministry of Energy and Mineral Resources in the Renewable Energy Sector	ESDM Minister Regulation No. 41 of 2018	The distribution of Biodiesel Fuel Business Entities is uneven. So it requires a stimulus to increase it. Besides, it is necessary to increase field implementers in carrying out handling and storing;	Downstream sector regulator and easy verification of financing. And provide training to field implementers because it is still new.
7	Ministry of State-Owned Enterprises (PT Pertamina)	Regulation of the Minister of Energy and Mineral Resources No. 12 of 2015	The mandatory use of FAME can reduce the Company's competitiveness, for several reasons: 1. Machinery from the industry that uses FAME has not been specifically designed to use biodiesel, which causes the engine to become corrosive / reduce its lifetime so that consumers turn to competitors. 2. For remote depot locations and small volumes, there are problems with the procurement and mixing system (prices become expensive).	Amendments to the Presidential Regulation which mandates the use of Biodiesel for the Industrial sector which only applies in conditions when the FAME price is lower than pure diesel. And only valid in areas with large enough buyers, so that the price of FAME / Biodiesel can be more economical.
8	Ministry of Research, Technology and Higher Education of the Republic of Indonesia in the Field of Innovation	Minister of Energy and Mineral Resources Decree No. 227K / 10 / MEM / 2019	The application of biodiesel is only for motor vehicles and small and medium industries. It still can't be used as fuel for power plants. Biodiesel B30 is still wasteful.	Regulations related to the development of biodiesel application as a generator and the development of biodiesel B30 which is economical and not wasteful.
9	Ministry of Transportation	Presidential Decree No. 61 of 2015	Biodiesel is only used for PSO (Public Service Obligation) vehicles such as trains and buses. Others are not	The regulation requires non-PSO vehicles to use biodiesel so that the demand for biodiesel will increase and people will start to switch to using biodiesel.
10	Coordinating Ministry for Maritime Affairs	Government Regulation No. 57 of 2016	Much of the use of peatland for oil palm is carried out without supervision. A lot of lands is burned for planting oil palm. Provision of raw materials and land management	Regulations that regulate the supervision of land processing, especially palm oil, and improve the tourism sector to improve CAD (Current Account Deficit) reduce exchange rates rupiah.
11	Governor	Law No. 30 of 2007	The distribution of Biodiesel Fuel Business Entities is not evenly distributed and the need for socialization at the provincial level as well as facilities and infrastructure to support the biodiesel program is still lacking	Supporting regulations on land use for the potential biodiesel industry but still fulfills the element of protecting the environment. And making access to facilities and infrastructure such as roads etc. at the provincial level.
12	Regent / Mayor	Law No. 30 of 2007	The distribution of Biodiesel Fuel Business Entities is not evenly distributed and the need for socialization at the district level as well as facilities and infrastructure to support the biodiesel program is still lacking	Supporting regulations on land use for the potential biodiesel industry but still fulfills the element of protecting the environment. And making access to facilities and infrastructure such as roads etc. at the district level.

4. Conclusion

Based on the results of qualitative data processing using EO, FGD, and brainstorming with regulators and biodiesel policy operators. Meanwhile, quantitatively the variables used in the research model of synchronization of multisectoral

performance based on the BSC framework were validated using SEM-PLS and measured econometrically using the TCC. From the results of data processing and discussion of the research model, the following conclusions can be drawn:

a. This research has resulted in determining the integration model of palm-based biodiesel policy as a renewable energy commodity. From each perspective, the balanced scorecard has been validated on each variable KPI. The validation of the National BSC was carried out for 5 rounds of testing using SEM resulting in 1 invalid variable from the customer and social perspective, namely the efficiency of the port service cost has a P value> 0.05. This suggests that the variable efficiency port service cost does not have a significant effect on consumable parts of the model in this study. So that the use of biodiesel has not been efficient to minimize port logistics transport rates as an effort to save vehicle operational costs because the use of biodiesel in vehicles requires an increase in maintenance costs as well. Meanwhile, the National BSC validation that has been combined with the International BCS is carried out 3 times of testing and results in 1 invalid variable, namely the value-added creation variable from the perspective of learning and growth having a P value> 0.05. This suggests that the critical success factor that is owned must be protected, meaning that every existing technology always has protection like the catalyst for B100 which cannot possibly be sold freely internationally. Another quantitative validation in this study was also carried out by looking at the TCC value or technology contribution coefficient compiled from the results of interviews through questionnaires given to respondents. Overall, the TCC result is quite high, namely 0.787. The state of the art or benchmark in this research is Thailand because Thailand has many advantages over Indonesia in developing biofuels, one of which is biodiesel. Besides, the selection of the country is also based on geographical conditions that are relatively close to Indonesia, which has many characteristics of natural resources in common with Indonesia. The comparison results show that technology components that have a high level of importance should have a high degree of sophistication intensity as well, to provide a good final TCC score. In this TCC research, the highest intensity or level of importance is owned by the or aware component, this is because currently the government and organizations related to biodiesel are being aggressive in biodiesel development including by conducting policy alignment. Meanwhile, the lowest intensity or level of interest is in the infoware component, this is because the socialization of biodiesel policy, especially to the general public, has not been optimal.

b. Qualitatively, the results of this study can be represented through the preparation of a flexible initiation BMC so that improvements can be made following the development of biodiesel and its policies. In the business model, the canvas is divided into nine block elements, namely key partners, key activities, key resources, value proportions, customer relationships, channels, customer segments, cost structure, and revenue streams. BMC initiation in this study was compiled based on FGD and brainstorming with regulators and operators as well as secondary data. The results of the initiation of BMC can be used as a helicopter view or a picture for the government and business actors as a picture of the business that is used as input in production and policy making regarding the mandatory development of biodiesel.

5. Future work

This research has been able to reveal important findings in the context of implementing the performance of palm oil-based national biodiesel to increase energy security and the realization of energy independence in Indonesia. Further work related to the findings of this study can be presented as follows:

a. For the Government of Indonesia

The findings of this study can be used as suggestions and input for stakeholders and agencies related to the formulation of strategies and policies to increase national energy resilience and independence. The demand for environmentally friendly energy through the use of biofuels is the dream of the Indonesian and international people that must be realized together. Given that the direction of biodiesel policy in Indonesia has been increasingly aggressive in recent times, information related to policy alignment based on interviews through group discussion forums from various agencies ranging from government, education, and farmers is poured into research models so that forming the analysis in this study can help the government in improving or review existing regulations or policies. By creating policies that are aligned and more comprehensive to accelerate the mandatory program in developing biofuels, it will be one of the commitments of the Indonesian government to put forward the concept of sustainability following the Sustainable Development Goals (SDGs), namely reducing the use of fossil fuels that are not environmentally friendly, reduce dependence on imported oil, and improve the welfare of farmers.

b. For Further Researchers

The existence of difficult conditions during the COVID-19 pandemic as well as the risk of competition for biodiesel raw materials as a result of producers' responses to fluctuating world CPO prices. This has not been discussed in this study and can be used as input for further research.

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