

## SHORT COMMUNICATION

# HAS INDONESIA BEEN UNABLE TO COMPETE IN THE WORLD BIODIESEL TRADE DURING THE IMPLEMENTATION OF THE BIODIESEL BLENDING MANDATE?

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### ABSTRACT

To meet the domestic demand for biodiesel, because the application of the biodiesel blending mandate is very aggressive and even exceeds that of all countries in the world, it is suspected that Indonesia, which is involved in export trade, has lost its export competitiveness when compared to other leading biodiesel exporting countries in the world. The purpose of this study is to determine whether biodiesel can survive or lose its competitiveness with the application of the biodiesel blending mandate in that country which is the highest when compared to all other biodiesel producing and exporting countries. By using the analysis method of export market share and comparative advantage, research was conducted to determine whether Indonesian biodiesel has export competitiveness or not when compared to other leading biodiesel exporting countries. The results show that the average market share of Indonesia's biodiesel exports is still higher when compared to that of the majority of biodiesel exporting countries and including biodiesel exporting countries that have a comparative advantage even when the biodiesel blending mandate is enforced every year compared to the majority of the world's leading biodiesel exporting countries that have a comparative disadvantage.

*Keywords:* comparative advantage, competitiveness, energy policy, market share, Palm biodiesel.

### 1 INTRODUCTION

The bioenergy potential of different countries' and regions' agriculture is widely covered in scientific works in recent years. One of the goals of a country developing these energy sources is because they are more competitive than fossil energy sources [1]. Biodiesel is superior to fossil energy sources because it produces less CO<sub>2</sub>; as Lopes *et al.* [2] stated, economic decarbonization is necessary towards sustainability. Michelsen and Madlener [3] also added that the application of biodiesel as a biofuel is seen as important as one of the pillars towards a more sustainable energy system for a country. The development and utilization of clean energy sources are carried out by many countries in the world due to international concerns about the adverse impact of fossil fuel consumption on the global climate and environment [4].

As a result, energy policies are designed to reduce greenhouse gas emissions and dependence on oil imports [5] and should focus on developing sustainable energy sources [6]. One of the energy policies is the biodiesel blending mandate. The biodiesel blending mandate is applied in various biodiesel producing countries in the world; it is the mandatory use of biodiesel mixed with fossil diesel for energy production, including energy for transportation and electricity, which produce the largest global carbon emissions [7]. Countries that implement biofuel mandates can generally reduce greenhouse gas emissions [8]. The blending mandate supports the acceleration of the realization of renewable energy programs [9]. Palm oil production is optimized to support Indonesia's ambitious mandate for 30% biofuel blending by 2025 [10].

Related to export competitiveness, policies to achieve it are understood as those increasing the ability to sell in the global market [11]. Export competitiveness means increasing the ability to overcome obstacles and challenges in marketing in the global market. It is important to measure export competitiveness so that policy makers and business actors in general know whether their exports are competitive and how competitive they are. In addition, competitiveness is also useful for knowing whether trade, industry, and other domestic policies encourage or hinder exports [12].

Several studies have shown the relationship between energy policy and exports [13, 14]. The existence of a mandate to blend Indonesian biodiesel, which is quite aggressive, may affect Indonesia's biodiesel exports abroad and it is very likely that the effect will be negative. The existence of a biodiesel blending mandate may reduce export competitiveness. Export competitiveness, especially for Indonesian biodiesel, may be surpassed or left behind by other biodiesel exporting countries, which, by either marketing biodiesel without adopting the biodiesel blending mandate or applying the mandate but at still below Indonesia's level, may be able to outperform Indonesia's biodiesel export competitiveness. An increase in the blending level imposed by the mandate will lead to an increase in domestic demand for biodiesel. The existence of domestic demand for biodiesel may interfere with biodiesel exports to foreign countries.

The purpose of this study was to determine the position of Indonesia's biodiesel export competitiveness among other biodiesel exporting countries during the biodiesel blending mandate period in Indonesia. This study can show the competitive position of Indonesia's biodiesel exports among all countries involved in the world biodiesel export trade.

## 2 THEORY

### 2.1 Market share

Market share means the share of actual sales, either in quantity sold or in volume, for a product in a given period and geographic area. This is a reliable proxy to determine market power [15]. Market share also indicates success in a trade [16]. Therefore, market share can be used to show how strong a country's competitiveness is in trade competition with other competitors.

### 2.2 Comparative advantage

David Ricardo's theory of comparative advantage remains at the heart of international trade theory. Economists still use the theory of comparative advantage today [17]. International trade cannot be separated from competition between countries. Countries that are more efficient than other countries in producing a product or commodity will have a comparative advantage. More efficient use of resources and technology can support this efficiency [18].

## 3 METHODOLOGY

The analysis conducted in this section is based on data from UN Comtrade [19] and ITC [20].

### 3.1 Market share of export analysis

The market share of export analysis is based on the equation proposed by Cooper and Nakanishi [21]:

$$MS = X_{ij}/X_j \quad (1)$$

where  $MS$  is the Indonesia's biodiesel export market share,  $X_{ij}$  is the biodiesel export ( $j$ ) from country  $i$ , and  $X_j$  is the export of biodiesel from all countries in the world market. The export market share is usually expressed as a percent by multiplying by 100.

### 3.2 Normalized revealed comparative advantage analysis

The normalized revealed comparative advantage (NRCA) of commodity  $j$  and country  $i$  ( $NRCA_{ij}$ ) is given by the following equation [22]:

$$NRCA_{ij} = X_{ij}/X - X_i X_j / X^2 \quad (2)$$

where  $X_i$  represents the export of all commodities from country  $i$  and  $X$  the total exports of all commodities from all countries in the world.  $NRCA_{ij} > 0$  indicates that country  $i$  has a comparative advantage of commodity  $j$ . Conversely,  $NRCA_{ij} < 0$  shows that country  $i$  has a comparative disadvantage of commodity  $j$ . The higher the  $NRCA_{ij}$  score, the stronger is a comparative advantage and vice versa.  $NRCA$  is symmetrical because the  $NRCA$  score is between  $-0.25$  and  $+0.25$  with a neutral point at zero.

## 4 RESULTS AND DISCUSSION

Currently, biodiesel is the most widely accepted substitute for diesel. The factors that determine this acceptance are the technical and environmental advantages of biodiesel. Biodiesel is preferred over diesel because of its biodegradability, higher cetane number, lower carbon monoxide, particulate matter, unburnt hydrocarbons, sulfur content, etc. However, biodiesel cannot completely replace diesel. Biodiesel has disadvantages including higher NOx emission, high viscosity, oxidation, and poor fuel atomization [23]. Biofuel policies have an impact on welfare [24]. Marketing of biodiesel exports abroad can generate foreign exchange for a country. In export marketing, Indonesian biodiesel competes with biodiesel from various countries in the world, all made from palm oil, soybeans, rapeseed, and others. The competitiveness of Indonesian biodiesel export among other biodiesel exporting countries is discussed further in the following sections.

### 4.1 Export market share

Referring to Fig. 1, it can be seen that the market share of Indonesia's biodiesel exports tends to decline. In 2012, Indonesian biodiesel reached 14.7% compared to only 5% in 2019. However, Indonesia's average biodiesel export market share is still above the average export market share of leading biodiesel exporting countries from Asia, United States, Europe, as well as the world. Indonesia's average biodiesel export market share reaches 7.1%. The average biodiesel export market share from eight leading biodiesel exporting countries in Asia is 1.3%. The average biodiesel export market share of the four leading biodiesel exporting countries in United States is 4%. The average biodiesel export market share of the 26 leading biodiesel exporting countries in Europe is 2.8%. Meanwhile, the average biodiesel export market share from the 40 leading biodiesel exporting countries in the world is 2.5%. Indonesia's biodiesel export market share is ranked in the top 6 of the 40 leading biodiesel exporting countries in the world.

In Asia, Indonesian biodiesel ranks first out of the eight leading biodiesel exporting countries from Asia. It shows that Indonesia, which is trying to increase its biodiesel blending mandate to 40%, is still able to compete with many biodiesel producing countries in the world. This condition shows that Indonesia has succeeded in meeting the domestic demand for biodiesel and has also succeeded in marketing its biodiesel abroad.

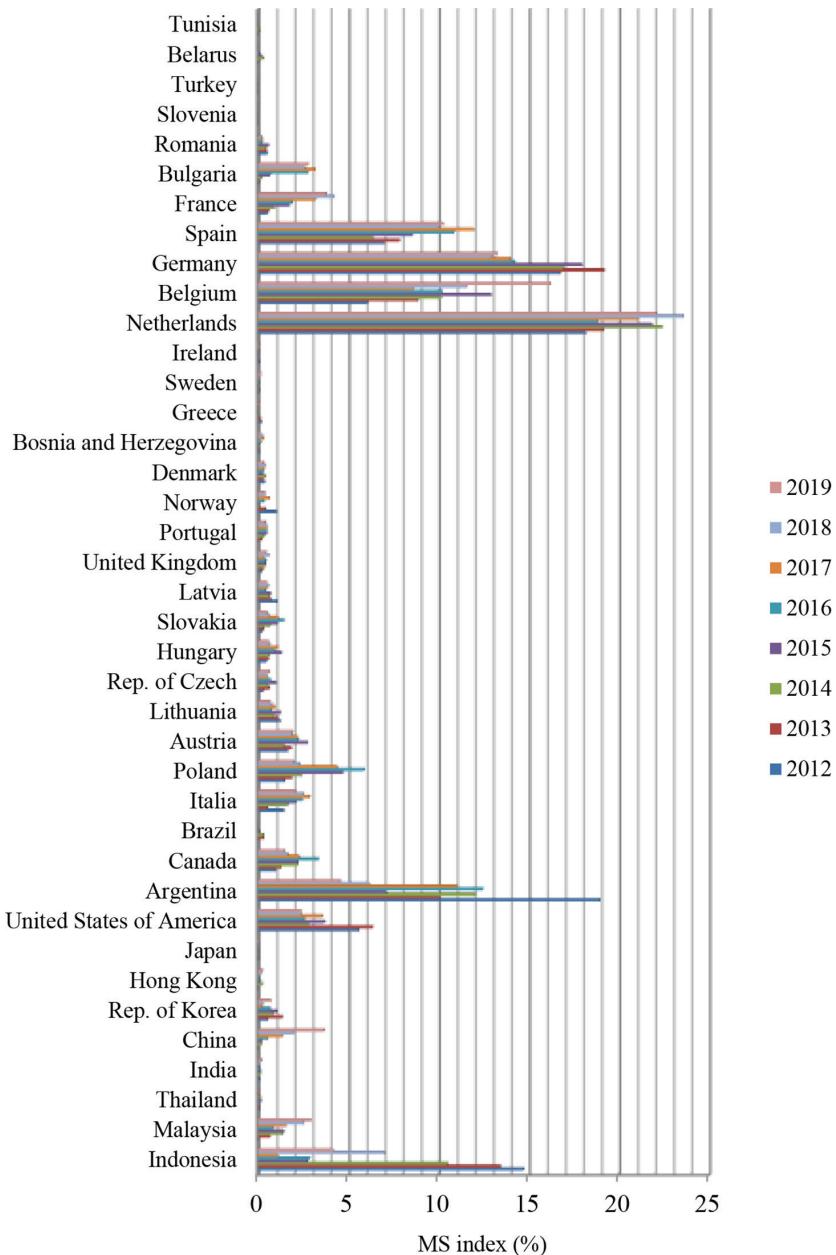


Figure 1: Export market share of the world's leading biodiesel exporting countries (Source of data processed: ITC [16]).

#### 4.2 Comparative advantage

In Fig. 2, to the left of the x = 0 axis, negative NRCA values indicate a condition comparative disadvantage while, to the right, the condition of comparative advantage is indicated. Although there appears to be a decline in comparative advantage, out of 40 biodiesel exporting

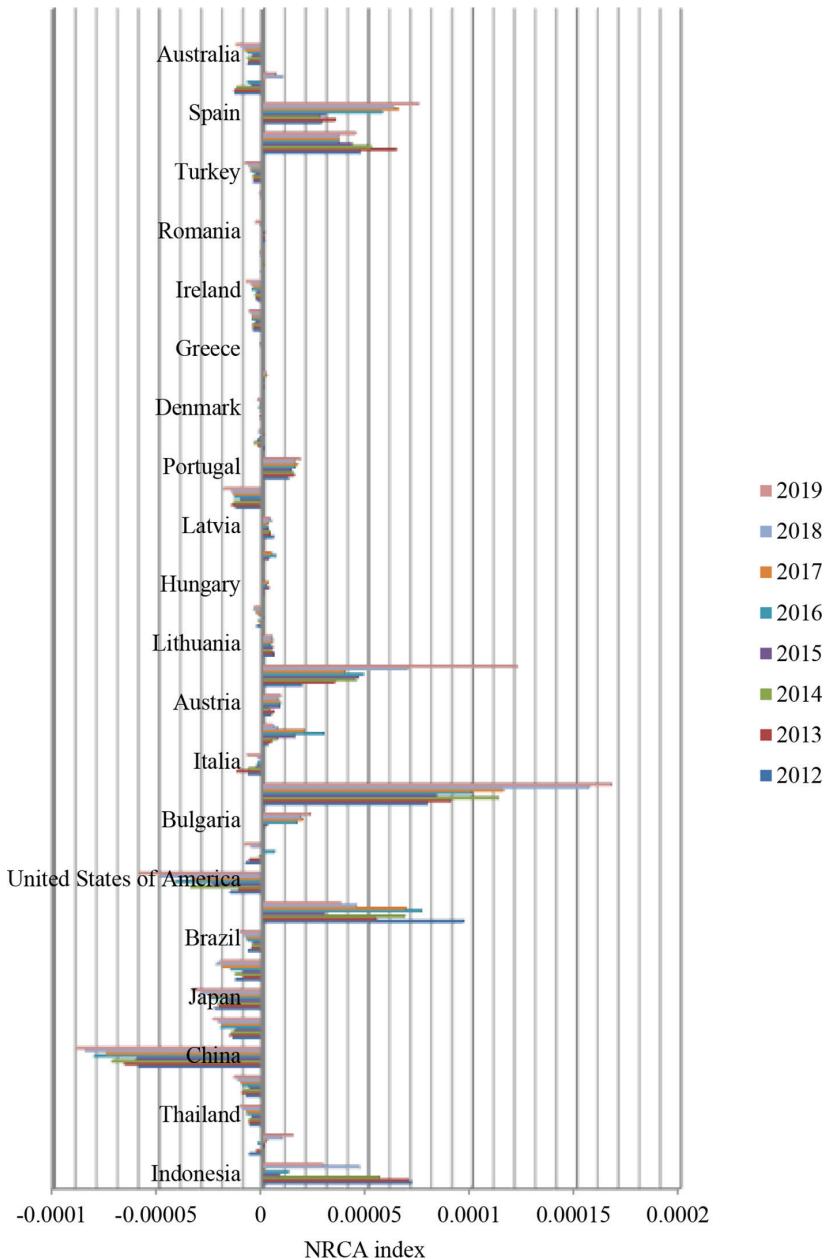


Figure 2: Comparative advantage of the world's leading biodiesel exporting countries (Source of data processed: ITC [16]).

countries, only 16 countries have shown comparative advantage, including Indonesia. Concerning biodiesel, Indonesia is even one of the countries that shows a prominent comparative advantage. The comparative advantage of Indonesia's biodiesel is ranked in the top 6 in the world out of 40 leading biodiesel exporting countries in the world. In Asia, Indonesian biodiesel ranks first out of eight leading biodiesel exporting countries in Asia.

The average comparative advantage of Indonesian biodiesel is stronger than the average comparative advantage of all biodiesel exporting countries in the world, even from 16 biodiesel exporting countries that have comparative advantages. Comparative advantage of Indonesia's biodiesel is 9 times stronger than the average comparative advantage of all biodiesel exporting countries in the world and 1.4 times of the 16 biodiesel exporting countries, which have comparative advantages. Indonesia's biodiesel also has a comparative advantage in the annual biodiesel blending mandate from 2012 to 2019. Thus, it can be said that Indonesia seems to be able to produce biodiesel more efficiently than the majority of the world's leading biodiesel exporting countries.

## 5 CONCLUSIONS

In our opinion, the application of a country's higher biodiesel blending mandate may be very likely to cause that country to lose the competition with other biodiesel exporters in the world. However, it is not the case with Indonesia, which markets biodiesel in the international market and at the same time has to fulfill the blending mandate, even the most aggressive of all countries in the world, which is 30% biodiesel blend. Although Indonesia implements a biodiesel blending mandate in its country, it still has a larger export market share compared to the average export market share of the 40 leading biodiesel exporting countries in the world. Indonesian biodiesel ranks 6th out of the market share of 40 biodiesel exporting countries in the world. In addition, Indonesian biodiesel is one of 16 countries out of 40 countries in the world which, based on the average value, has a comparative advantage and in fact, every year the biodiesel blending mandate runs in that country. Indonesian biodiesel is also ranked 6th in the comparative advantage of the 40 leading biodiesel exporting countries in the world.

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