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EL NINO AND ITS IMPACT ON THE PALM OIL INDUSTRY

By

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RESUME

El Nino has the potential to cause economic losses in the palm oil industry, but the amount of these losses depends on the intensity of El Nino. The higher the intensity of El Nino (very strong), the greater the decrease in palm oil productivity and production, leading to a higher increase in global palm oil prices and consequently larger economic losses. The potential losses for the palm oil industry will be even greater if forest and land fires occur.

INTRODUCTION

According to various predictions of world climate experts, the El Nino climate anomaly, where rainfall is below normal, is expected to occur again in 2023/2024. This El Nino event will occur in the world's palm oil center countries, especially in Indonesia and Malaysia which produce around 84 percent of the world's palm oil (PASPI, 2023).

Theoretically, El Nino's entry point affects the palm oil industry starting from the palm oil production process which is basically based on plant biological processes which are influenced, among other things, by environmental conditions such as rainfall and air temperature. El Nino, characterized by decreased rainfall below normal, will affect FFB production which in turn will affect palm oil production (Crude Palm Oil/CPO and Crude Palm Kernel Oil/CPKO). The extent of the impact of El Nino on palm oil production depends on several factors, such as the intensity of El Nino (very strong, strong, moderate, weak), plant age, land quality, and geolocation.

Economically, the prices of palm oil (including the prices of Fresh Fruit Bunches/FFB) are determined by the direct variable (direct effect) of market's supply and demand. The El Nino event is an indirect variable (indirect effect) that affects supply, thereby influencing world palm oil prices. Two important questions in this context are how much El Nino's affects palm oil productivity and how much El Nino event influences palm oil prices.

This article will discuss the impact of El Nino on palm oil productivity and palm oil prices. This article is based on a previous literature survey related to impacts of El Nino events on world palm oil production and prices. In addition, this article will also discuss other potential impacts faced by the palm oil industry due to the El Nino.

THE IMPACT OF EL NINO ON PALM OIL PRODUCTION

The link between climate change and agricultural/food production and food prices has been one of the topics of studies by experts in recent decades (Bandara and Cai, 2014; Wheeler and Von Braun,

2013). Based on ecophysiology, agricultural commodity production is a biological process, requires certain climatic conditions (comfort zone) for optimal production so that if an extreme climate change occurs, it will affect agricultural/food production.

Various studies (Rosenzweig and Parry, 1994; Lesk et al., 2016; Haile et al., 2017) revealed that climate change has an impact on global food production, although the effects vary between countries and types of commodities. The study by Lesk et al., (2016) showed that global cereal production decreased by approximately 8-10 percent due to the drought that occurred in the 1964-2007 period.

The effect of climate change on oil palm plantations has also been revealed by many studies (Rahman et al., 2013; Zainal et al., 2013; Darlan et al., 2016; Kamil and Omar, 2016; Hassan et al., 2018; Khor et al., 2021). As the world's largest producers of palm oil (PASPI, 2023), the decline in palm oil production in Indonesia and Malaysia has also affected the global palm oil production as a whole.

The link between El Nino events and global palm oil productivity and prices in the 2000-2022 period can be seen in Figure 1.

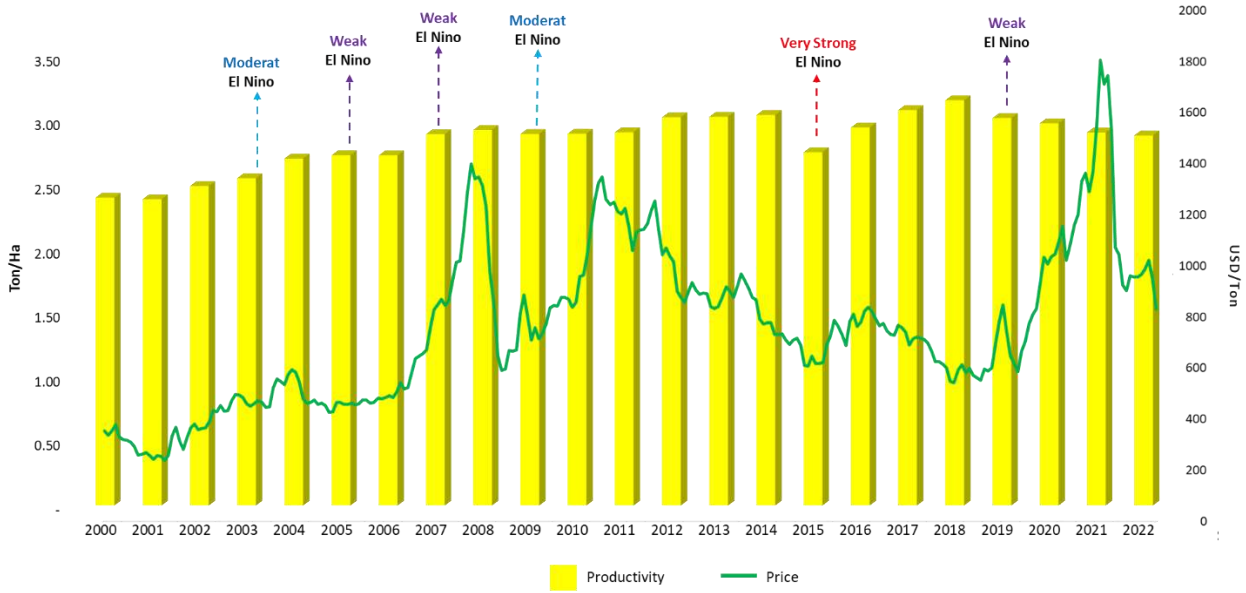

Figure 1. Impact of El Nino on Prices and Global Palm Oil Productivity in 2000-2022 (Source: USDA, Mundi Index, data processed by PASPI, 2023)

During the 2000-2022, El Nino have occurred 6 times with varying intensities (Khor et al., 2021). El Nino events with weak intensity (weak El Nino) occurred in 2005/2006, 2007/2008 and 2018/2019. Meanwhile, El Nino events with moderate intensity occurred in 2003/2004 and 2009/2010 and with very strong intensity occurred in 2015/2016. The link between El Nino and the dynamics of palm oil productivity during the 2000-2022 period, which has the most contrast, is the very strong El Nino in 2015/2016.

The impact of El Nino events on palm oil production did not occur immediately, but was seen 12-24 months later after the onset of drought (Rahman et al., 2013). In general, the impact of El Nino on palm oil production depends on a combination of several factors, namely El Nino intensity, geolocation, plant age, land condition/quality, and the quality of Good Agriculture Practices (GAP).

Through his study, Azlan et al., (2016) revealed that in the event of a very strong El Nino, there was an 11-16 percent decrease in FFB productivity and an 8-14 percent decrease in CPO production. Darlan et al.'s study (2016) also revealed that the 2015 El Nino t with a very strong intensity in Indonesia had an impact on the productivity of Indonesia's oil palm plantations, which decreased with a variation of 6-60 percent. The highest decline in palm oil productivity occurred in the Lampung region and the lowest productivity decline occurred in the Bengkulu and West Sumatra regions. Similar findings were also reported in previous studies such as those by Siregar et al. (1995); Siregar

et al. (1998); Darmosarkoro (2001); Pangaribuan et al. (2001); Corley and Tinker (2003); Rizal and Tsan (2007); and Bakoume et al. (2013).

The susceptibility of oil palm plants to drought stress varies depending on plant age (Pradiko et al., 2016; Siregar et al., 1998). The order of susceptibility to drought stress is as follows: old, mature, and immature. Older palm trees are the most susceptible to drought stress and have a longer recovery period, and vice versa. Recovery in immature oil palm plants is relatively faster than older plants (Harahap and Latif, 1998).

Studies on the impact of climate change on Malaysia's palm oil production also showed that palm oil productivity (including FFB) decreases with every El Nino. The higher the intensity of El Nino, the greater the decrease in palm oil productivity (Rahman et al., 2012, 2013; Kamil and Omar, 2016; Azlan et al., 2016; Hassan et al., 2018; Khor et al., 2021).

IMPACT ON PRICES AND ECONOMIC LOSSES

The analysis of the impact of El Nino on the increase of commodity prices has been extensively studied (Keppenne, 1995; Letson and McCullough, 2001; Brunner, 2002; Ubilava, 2012, 2017a,b; Ubilava and Holt, 2013; Peri, 2017; Oktarina et al. al., 2021). These studies revealed that: (1) El Nino affect the increase in future prices of nearly all food commodities; (2) El Nino does not always affect the increase in commodity spot prices; (3) the magnitude of the price increase varies among commodities, and (4) the relationship between El Nino and commodity prices is generally non-linear.

The decline in palm oil productivity every El Nino occured in Indonesia and Malaysia which are the world's main producers of palm oil, has an impact on increasing world palm oil prices (Zaenal et al., 2012; Rahman et al., 2012, 2013; Kamil and Omar, 2016, Hasan et al., 2018). This is easy to understand because the decline in palm oil productivity in the world's main palm oil producers will have a major impact on a decrease in global palm oil supply, so global palm oil demand continues to create excess demand on the global palm oil market which triggers an increase in global palm oil prices.

The increase in global palm oil prices as a result of El Nino is reflected in the price trends for the 2019-2021 period (Figure 1). El-Nino that occurred in 2019 (PASPI Monitor, 2019) was one of the factors that caused global CPO prices (CIFF Rotterdam) to increase significantly from USD 602 per ton in 2019 to USD 754 per tons in 2020 and continues to increase to USD 1,131 per ton in 2021.

Despite the increase in palm oil prices, the impact of El Nino, which reduces palm oil productivity on a net basis, results in a decrease in the income of farmers and companies. The study by Zainal et al. (2012) calculated that every one-degree Celsius increase in air temperature (from the comfort zone temperature) would reduce the net revenue of oil palm plantations by RM 37.7 to RM 45.7.

The study of Khor et al. (2021) revealed the economic losses resulting from El Nino in Malaysia's oil palm plantations. In the event of a very strong El Nino, the value of economic losses for oil palm plantations reaches USD 522 million. Meanwhile, during an El Nino with moderate intensity, it causes a loss of USD 416 million. A weak El Nino caused an economic loss of USD 231 million.

The results of the studies above indicated that El Nino-induced economic losses significantly lead to quite large losses for oil palm plantations. The economic losses for oil palm plantations due to El Nino with very strong intensity are greater than those due to El Nino with moderate and weak intensities.

POTENTIAL FOREST AND LAND FIRES AND ITS MITIGATION EFFORTS

Another potential impact of El Nino is triggering forest and land fires. Data and empirical studies have shown that the El Nino phenomenon was very strong in 1997/1998 and 2015 and El Nino with a weak intensity in 2019 triggered forest and land fires that occurred in Indonesia (PASPI, 2019).

Forest and land fires which is accompanied by dense haze, causes economic and social (health) losses to surrounding communities, including oil palm plantations and communities involved in oil palm plantations. Forest and land fires cause decrease the dry weight production of FFB by approximately 4-12 percent (Harahap and Rahutomo, 1999). The haze causes also has an impact on the yield of palm oil which tends to decrease (Hasibuan and Pradiko, 2018). The haze also cause stresses the oil palm plants and inhibits the photosynthesis process as well as the formation and growth of the oil palm fruit, thereby reducing productivity by around 0.2-5.5 percent. The potential loss per hectare due to decreased productivity caused by forest and land fires in the vicinity can reach 12-15 million per hectare (PASPI, 2023).

The magnitude of the potential losses caused by forest and land fires accompanied by haze in the palm oil industry requires prevention efforts. Even efforts to mitigate forest and land fires have become part of the governance of the oil palm plantation itself (PASPI, 2023). Oil palm plantation companies have mitigation efforts in the form of Standard Operating Procedures (SOP) related to guidelines for preparation, prevention efforts, and early detection of forest and land fires by forming a Fire Alert Team/*SATGAS* (company internal) equipped with fire fighting technology and equipment. To prevent forest and land fires externally, oil palm plantation companies also cooperate with surrounding communities by forming Fire Care Communities and coordinating with other authorities such as the local government, TNI-POLRI, BNPB/BPBD, Fire Department, and Task Force for other oil palm plantation companies.

CONCLUSION

El Nino is a natural part of recurring climatic phenomena that happen periodically. The intensity of El Nino is divided into very strong, strong, moderate and weak, which have different impacts on the palm oil industry. The impact of El Nino on oil palm plantations reduces the productivity and production of FFB or CPO. The magnitude of the El Nino's impact on palm oil production varies for each El Nino intensity. The higher the intensity of El Nino, the greater its impact on reducing palm oil production.

El Nino also affects the increase in FFB and CPO prices. The higher the intensity of the El Nino event, the greater the decrease in palm oil production, leading to a larger increase in global palm oil prices. This indicates that El Nino events create losses for oil palm plantations. The higher the El Nino intensity, the greater the economic loss it causes.

The El Nino also has the potential to trigger forest and land fires which will also add to losses for the palm oil industry. In addition to disrupting the health of the oil palm plantation communities, forest and land fires incident accompanied by haze also causes stress on oil palm trees and decreases productivity (FFB weight and oil yield). This condition creates a large potential loss for the palm oil industry. Therefore, oil palm plantation companies have governance and Standard Operating Procedures (SOP) to mitigate forest and land fires.

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