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The Determinants of Palm Oil Price in Malaysia

Nur Izzati Auni Abdul Rahman, Sharulshahida Shakrein Safian, Salwaty Jamaludin, Adibah Alawiah Osman

Faculty of Business and Management, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

Corresponding Author Email: sharulshahida@uitm.edu.my

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Abstract

Malaysia is now the international's second-top manufacturer of palm oil, with its huge and developing palm oil enterprise, and strong international call for palm oil. Malaysia has the capability to play a first-rate position in international markets. This paper aim to examine the palm oil rate towards palm oil export, import and trade charge withinside the financial system to peer the connection between those variables. Movements in palm oil costs provide crucial alerts to imports, exports, and trade fees in Malaysia's monetary interest. Thus, to recognize import, export and trade charge elements that can have an effect on the palm oil rate is essential to the enterprise gamers for the sustainability of palm oil activities. Thus, this study investigates the relative significance of imports and exports interest at the motion of palm oil fees in Malaysia's financial system. By using a regressive version on palm oil fee annual statistics from 2009 to 2020, the findings display that palm oil fee is extra dominant in affecting palm oil import. However, the findings on this examine additionally determined that palm oil fees have an extensively poor relationship with palm oil export and trade charge. This study is crucial because it will provide effect and advantage the monetary and environmental destiny withinside the lengthy term.

Keywords: Palm Oil Price, Palm Oil Export, Import, Exchange Rate, Malaysia

Introduction

The sector has never before been able to develop thanks to Malaysia's status as the world's top producer of palm oil. As a consequence of ongoing Research and Development efforts, Malaysia is now producing a larger range of by-products, turning downstream manufacturing into a separate business. As a result, Malaysia continues to dominate its rivals. Malaysia has a significant role to play in meeting the expanding worldwide demand for oils and fats sustainably as one of the largest producers and exporters of palm oil and palm oil-derived goods. Malaysia was responsible for 25.8% and 34.33%, respectively, of the global production and exports of palm oil in 2020. If additional oils and fats produced in the nation are included, Malaysia contributed 9.1% and 19.7%, respectively, of the world's total production and exports of oils & fats in the same year. In response to the government's desire for more industrialisation, palm oil refinery started in the early 1970s. A wide range of processed palm oil products was introduced with the development of refineries.

Malaysian Palm Oil's History started when the oil palm produces both male and female flowers on the same tree, it is monoecious. After 2.5 to 3 years of field planting, it begins to produce fruits in bunches and will continue to do so throughout the whole year. The usual bunch of an oil palm weighs 20 to 25 kilos and has 1,000 to 3,000 fruits on average. The fruit of the oil palm, also known as the fruitlet, is virtually spherical or elongated in form. Typically, the fruitlet is dark purple, nearly black, and when it is mature, the colour changes to orange red. A hard kernel (seed) and a shell (endocarp) with a soft mesocarp around it make up each fruitlet.

The oil palm has a lifespan of at least 100 years and may reach heights of up to sixty feet. Young, mature trees have fronds covering their trunks, giving them a rough look. With the exception of the scars left by the fronds that have wilted and fallen off, the elder trees have smoother trunks. Every 25 to 30 years, oil palm trees are often replaced with newer varieties for economic reasons. Tenera, a hybrid of the dura and pisifera species, is the oil palm species that is most often planted in Malaysia. Tenera was picked because it provides high yields for both palm oil and palm kernel oil. The world's most productive oil-producing crop is the oil palm. This is a result of its high yield per hectare, capacity to generate two different types of vegetable oils (palm oil from the mesocarp and palm kernel oil from the kernel), and lengthy economic viability. Malaysia is one of the leading producers and exporters of palm oil in the world, contributing 11% to global production of oils and fats and 27% to global commerce in oils and fats. Palm trees may reach heights of more than sixty feet. Young and old trees both have fronds covering their trunks, giving them a somewhat rough look. With the exception of the scars left by the fronds that have wilted and fallen off, the elder trees have smoother trunks.

After 30 months after field planting, oil palm trees will begin to produce fruit, and they will continue to do so for the next 20 to 30 years, assuring a steady supply of oils. Fresh Fruit Bunch is the popular name for each ripe bunch (FFB). Most oil palm trees grown in Malaysia are of the tenera kind, a cross between the dura and pisifera. The tenera variety generates around 1 tonne of palm kernels and 4 to 5 tonnes of crude palm oil (CPO) per hectare annually. The oil palm is the most productive oil-bearing crop in the world, using just 0.26 hectares of land to produce one tonne of oil, compared to 2.22, 2.02, and 1.52 hectares for soybean, sunflower, and rapeseed, respectively. The fact that the oil palm generates two different types of oil palm oil from the fruit's flesh and palm kernel oil from the seed or kernel that makes it special. About 1 tonne of palm kemel oil is also produced for every 10 tonnes of palm oil. The final palm oil is produced using a number of processing steps to satisfy user specifications. The mill is where the fruit's crude palm oil is extracted as the first stage of processing.

The next step of processing of oil palm allows for additional refinement of the crude palm oil to produce a variety of palm products of varying grade. The partially and fully treated grades require little more processing before to use, saving the end-user money on processing. Additionally, palm oil may be segregated using straightforward crystallisation and separation techniques to produce solid (stearin) and liquid (olein) fractions with different melting properties. The fractions can be used for a range of culinary and non-food products due to their unique qualities. Since Malaysia start the oil palm plantation the world demand for Malaysian oil palm and oil palm product increase consistently since the 1970s as a response to the government’s call for increased industrialization. The continuous increase in demand from the world market for palm oil has been actively carried by the related agencies in Malaysia and this includes the expansion of plantations and research and development.

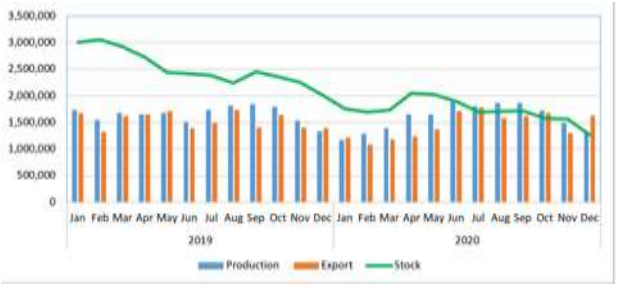

Figure 1: Malaysian Palm Oil Monthly total production, Export and End Stock, January 2019 to December 2020.
Source: MPOB

In December 2020, Malaysian palm oil stockpiles plummeted to 1.26 million tonnes, their lowest level since July 2007, which was 13 years ago. Due to limited production and increased CPO exports in the latter months of 2020, which took advantage of the suspension of the export tariff on crude palm oil, which would expire in January 2021, the Malaysian palm oil stockpiles have decreased.
The total volume of palm oil exported from Malaysia in 2020 was 17.368 million tonnes, down 1.103 million tonnes or 5.97 per cent from the 18.471 million tonnes recorded in 2019. Although Malaysia is one of the major producers of palm oil, the activities are still limited to upstream related industries, which are low in terms of value-added. Considering Malaysia producing huge amount of palm oil, Malaysia should have a greater comparative advantage as a producer of other palm oil related products. The ability to transform the palm oil industry from low to high value-added products can help Malaysia to reduce its dependence on its crude palm oil import and export.

Table 1
Ten Major Palm Oil Importers (By Volume, MT)

Country	Jan-Dec 2020	Jan-Dec 2019	Change	Country
China	2,730,660	2,490,503	240,157	9.64
India	2,726,956	4,409,511	(1,682,555)	(38.16)
Netherlands	1,072,952	880,728	192,224	21.83
Pakistan	1,003,723	1,085,546	(81,823)	(7.54)
Philippines	693,026	629,086	63,940	10.16
Turkey	615,872	709,262	(93,390)	(13.17)
U.S.A	540,349	542,161	(1,812)	(0.33)
Kenya	520,758	193,340	327,418	169.35
South Korea	453,278	423,105	30,173	7.13
Italy	439,053	476,279	(37,226)	(7.82)
Others	6,572,238	6,631,543	(59,305)	(0.89)
Total	17,368,865	18,471,064	(1,102,199)	(5.97)

Source: MPOB

This study aimed to examine the relationship between the palm oil price with the economic variables of import, export and exchange rate. Previous study has been done by researchers to have an idea regarding palm oil prices. So far, there were no general studies conducted on the palm oil price related to the import, export and exchange rate. Most of the past studies were related to the effects of palm oil price and to forecasting palm oil prices in Malaysia

(Khalid et al., 2018). Thus, the understanding on the determinants of palm oil price is essential to support the government and related agencies in reshaping the strategies and policy, in maintaining Malaysia as one of the world's best major producers, not only on crude palm oil but also including the palm oil related products.

Literature Review

Overview of Palm Oil Industry

The British planted the first group of palm oil plants in Malaysia in the beginning of 1870. West Africa is where the palm oil tree originates from. The Tenanmaran Estate in Selangor was the first place in Malaysia where plants were planted for commercial purposes in 1917. It now serves as the cornerstone of Malaysia's palm oil industry (Nambiappan et al., 2018). To lessen the nation's reliance on rubber and tin for economic growth, the government established an agricultural diversification programme in 1960, which led to a large development in the oil palm industry. The majority of the oil palm farms in Malaysia are run under an autonomous smallholder programme and estate management. In order to cultivate oil palms, the government therefore also devised land settlement plans. The mature oil palm tree may grow up to sixty feet tall. Because of the fronds that were wrapped around the tree, the appearance of the palm oil tree appeared harsh. However, the first 30 months after planting, the palm oil tree does not produce any fruit. It will begin generating fresh fruit bunches and keep working over the following 20 to 30 years, ensuring the supply chain's consistency and sustainability. The tenera kind of oil palm tree predominates in Malaysia. It is a pisifera and dura hybrid (Ooi et al., 2016). A monoecious crop is one in which the palm oil tree produces both male and female flowers on the same tree. A single tree will provide 10 to 25 kilogrammes of compact bunches, with 1000–3000 fruits each bunch.

In 2020, Malaysia produced 25.8% of the world's palm oil and exported 34.3 percent of it. In 2020, Malaysia contributed 9.7% and 19.7% of the global production and exports of oils and fats, respectively. In 2020, the agriculture sector's Growth Domestic Product (GDP) was boosted by the palm oil business by 37.7%. (Refinitiv, 2021). Additionally, the palm oil business helped the nation's employment situation by providing jobs for almost 1 million people either directly or indirectly. However, due to a variety of internal and external causes as well as global instability, palm oil prices constantly change. For instance, the demand for palm oil from other nations like India and Europe would be impacted by the expansion of the global economy. The fluctuating export price of palm oil is also influenced internally by the Ringgit Malaysia exchange rate. According to the demand-supply principle, the price of palm oil would rise when demand rises, causing a tendency of swings in the Malaysian palm oil business. In general, businesses are eager to supply more when prices rise and vice versa as prices decline.

Therefore, the government must identify various variables influencing palm oil pricing and take mitigating action to preserve the export market share of palm oil in order to retain the demand for Malaysian palm oil.

Overview of Palm Oil Price

Zabid and Abidin (2015) reported that on the global market for oils and fats, palm oil is one of the most important agricultural commodities, with Malaysia and Indonesia topping the list of nations that produce the most palm oil. However, the cost of palm oil keeps fluctuating over time. Therefore, for investors and government organisations dealing with the associated risks and uncertainties, a grasp of the accuracy of CPO price predictions is crucial (Arasim &

Karia, 2015). In Malaysia, palm oil has grown to be a substantial export crop. From January 2020 to February 2021, the price of palm oil is shown in Figure 4. The price of palm oil was RM3,406,83 per month in February 2020, however it now costs just RM30,35.28. The price then decreased by almost 10.91 percent, reaching RM2,733.56 in March 2020 (Refinitiv, 2021).

Then, in April 2020, there is a 2.99 percent drop to RM2,651.88. In April, the price fell dramatically. With a price of RM2,504.71 in May 2020, palm oil prices were at their lowest level all year. Along with the decline, the price increases to RM2,806.79 in June 2020 amounted to around 12,06 percent more than in May 2020. Later on, in July, the cost slowly increased to RM2,959.72 (5.45 percent). The amount is RM3,181.16 (7,65%) in August 2020, RM3,305.09 (3,73%) in September 2020, and RM3,402.78 (7,42% in October 2020). (2.96 percent). November 2020 saw a sharp increase in pricing to RM3,779.19 (11.06 percent) (Refinitiv, 2021). The price rises 9.27 percent in December 2020, reaching a maximum of RM4,129.47. Later in 2021, the cost of palm oil was RM 3,997.72 (3.19 percent), a drop from the previous month in the first month of January 2021. Finally, palm oil prices rocketed to RM4.116,12 in February 2021, up 2.96 percent from January 2021 (Refinitiv, 2021).

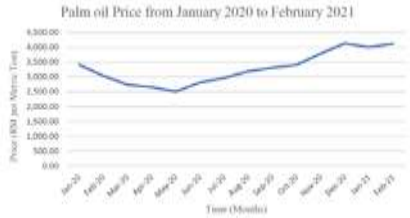

Figure 2: From January 2020 through February 2021, the price of palm oil (Refinitiv, 2021)

According to data, demand for palm oil has been rising globally (Bentivoglio et al., 2018). Palm oil is a desirable product because of its many uses and competitive price. Rahman (2013) claims that palm oil, which accounts for 14.35% of the world's production of seventeen key oils and fats, is currently the second-most significant vegetable oil in the oils and fats market.

Palm Oil Export

The shift share approach may be used as a forecasting tool to examine the export prospects for items made from Malaysian palm oil. Despite its drawbacks, this method was developed in 1960 and has gained popularity as a forecasting tool since 1980. 1980's Stevens & Moore While Fothergill and Gudgin (1979) demonstrated that the shift-share methodology is an appropriate instrument to examine regional growth in the United Kingdom, Huff and Sherr (1979) contended that the method is not entirely suitable. Tervo and Okko (1983), who asserted that shift share analysis may be utilised to analyse regional expansion, agreed with this. Additionally, Reynolds (1980) used it to examine the rise in regional and sectoral productivity in modern-day Mexico. For the first time, Green and Allaway (1985) employed the shift-share method to find export prospects. By utilising it to depict the market patterns in the commerce between Singapore and the US, Green & Couture (1986) demonstrated how this approach might be used to follow market movements. Notably, the shift-share approach may be used to identify worldwide marketing opportunities for local businesses (Wee & Wong, 1987a). Additionally, it has been demonstrated that using certain items, it is possible to locate export potential to particular nations (Wee & Wong, 1987b). In a later research, Rubin (2005) demonstrated how this method may be used to find chances for small enterprises to export to foreign countries. Peh Kian-heng used the shift-share technique in

1999 to examine patterns in the expansion of Singapore's export market by analysing export data from 1991 to 1996. The shift-share method was used by Brownie and Dalzie (1993) to examine New Zealand's exports from 1970 to 1984. Additionally, the method may be applied to comparative analyses of the export performance of two nations (Briggs & Ballingall, 2001). It is well known that the growth rate of a worldwide brand may be determined by analysing the sales data (Yandle, 1979). According to 2002 research by Haque, shift-share analysis may be used to analyse four factors, including product, market growth, percentage growth, and net-shift, despite certain restrictions. Several studies that are all connected to industry, market, and export potential analyses have all been published in journals at the same time. Green and Larsen (1991); Wee and Wong (1987); Khalifa (1996), and Peh Kian-Heng are a few of this research (1999). Additionally, experts' perspectives demonstrated that it is important to consider both the absolute and relative changes in growth over time when examining market growth (Huff & Sherr, 1967). Wilson, Chern, Ping, and Robinson evaluated Singapore's export competitiveness in another research that was released in 2005. The shift-share technique has been approved as an empirical analysis not only for the aim of analysing company export opportunities, but it can also be employed as a useful tool in many sciences or sectors using the same analytical approach. Studies by Castaldi (2009) on employment productivity, Saiz (2007) on "national level of immigration into urban regions," Yasin, Alavi, Koubida, and Small (2011) on tourism in Moracco, and Millie (2004) on a decline in burglaries, to mention a few, have all demonstrated this.

As late as 2011, Hassan, Rashid, and Hamid employed this method in their business research to analyse the success of the Malaysian government's regional development corridor. They applied Shift-Share Analysis. Using the shift-share method, Huaxiong and Fang (2011) conducted study on the regional economic structure in Central China. Finally, Akkemik (2011) applied the methodology to assess Turkey's export competitiveness in the market of the European Union.

Palm Oil Import

Kadir and Parveez (2020), palm oil accounted for the majority of (74.7%) of total of oil palm goods imports in Malaysia's in 2019, followed by palm kernel oil (PKO) (19.8%) and palm kernel (5.5%). Malaysia imported 1.31 million tonnes of oil palm goods in 2019, an increase of 12.6% from 1.16 million tonnes in 2018. Imports of palm oil increased by 16.1% in 2019 to 977 131 tonnes, up from 841 452 tonnes in 2018. The increase was made in part to meet a contract requirement for palm oil delivery based on either Malaysian or Indonesian supply, as well as to compensate for lower palm oil output growth in 2019 to meet rising demand from the local processing industry. Labys (1973), a country model should account for both exports and imports in order to accurately reflect global trade. Despite the small number of imports into Malaysia, palm oil is imported from Indonesia due to its lower price and the excess capacity of Malaysian refineries. Kadir and Parveez (2020), the Malaysian industrial output index, the local price of palm oil, and the global price of palm oil all indicate positive coefficients for Malaysian economic growth. The outlook for palm oil stocks is expected to be negative, as imports tend to rise as Malaysian palm oil stock levels fall.

Exchange Rate in Palm Oil Industry

The exchange rate is the price at which one currency is swapped for another. It was understood to be the comparison of one country's currency to another. The exchange rate is a macroeconomic fundamental that affects the price of crude palm oil, according to earlier studies. The exchange rate is used in this study as one of the independent variables to determine CPO in Malaysia. Additionally, Aziz and Applanaidu (2017) used the Dynamic Ordinary Least Squares (DOLS) approach to analyse monthly time series data from 1983 to 2015 to assess the effects of palm oil prices on currency rates in Malaysia and Indonesia. They discovered a correlation between CPO and exchange rate that was positive, indicating the importance of CPO as an exchange rate predictor. Additionally discovering a favourable correlation between CPO and currency rate was Rifin (2010). According to him, the rupiah's depreciation will make Indonesian CPO less expensive, which will encourage more manufacturers to export their CPO.

Additionally, Adeyemo (2015) used the Augmented-Dickey Fuller unit root test, co-integration, and error correction specification to analyse the factors that affected the production of palm oil in Nigeria between 1971 and 2010. In the short- and long-term, he discovered significant relationships, and the exchange rate in Nigeria has a favourable relationship with CPO. He added that the exchange rate's short- and long-term elasticity values indicate that devaluation will reduce imports of goods containing palm oil, which will in turn boost domestic production and increase palm oil production. Using vector error correction estimates to examine the impact of oil price fluctuations on the nominal exchange rate of the U.S. dollar in Libya from January 2000 to December 2015, Ahmadian (2015) discovered a negative association between exchange rate and crude oil price (VECM).

Research Methodology

Data and Description of Variables

Monthly frequency data of palm oil import and export per tonnes, price of palm oil, exchange rate from 2009 to 2020 are used in this study. Several crises occurred during that time period, which might have affected the price of palm oil and the variables. For this analysis, variables were taken into account that, according to earlier literature, to investigate the relationships between price of palm oil and the variables. Therefore, the independent variables under this research were Malaysia's palm oil import, export, as well as the actual exchange rate and palm oil price as the dependent variable in this study. Table 2 summarises the specifics of the variables.

Table 2

Description of Variables

Variable	Notation	Description
Palm Oil Export (tonnes)	POX	Palm Oil Export in a thousand ton ('000)
Palm Oil Import (tonnes)	POM	Palm Oil Import in a thousand ton ('000)
Exchange Rate	ER	Malaysia Real Exchange rate
Palm Oil Price	POP	Malaysia Palm Oil Price

The Malaysia Palm Oil Board (MPOB), the International Financial Statistics (IFS), the International Monetary Fund (IMF), and World bank Data, Statistics were all used to compile the data. A quantitative survey method is used in this research. A secondary data collection will be used for this study, the data was collected and used to gain result for descriptive statistics, frequency, mean, standard deviation, reliability test, multiple correlation analysis, multiple regressions. This research study will be conducted based on time series analysis, by interpreting the result with descriptive approach and random walk to test the stationarity in the regression model then using the methods of OLS model from Eviews software to fulfil the expected outcome for this research.

Data and Analysis Procedure

Regression Model

In this research, it shows that there is more than one independent variable, so there will be more X stated in this equation. Therefore, the complete formula for the regression model can be explained as follows

Y =B0 +B1X1 +B2X2+B3X3+et

Where:

Y = Palm Oil price

B0 – constant

B1, B2, B3 – regression coefficients

X1 = Palm Oil Export

X2 = Palm Oil Import

X3 = Exchange Rate

et = Error term/Disturbance term

As this study uses more than one independent variable, it is more suitable to use a multiple linear regression model. This type of method is convenient for research that requires many factors as it is easier to analyse the results separately. Thus, the effect of each part can be estimated. This type of research is beneficial to identify the effect of various simultaneous influences upon a single dependent variable. The data used for the variables within the selected period were analysed through descriptive statistics.

Correlation Coefficient Model

In this research, the correlation coefficient method is also used to study the strength of the relationship between the independent variable and dependent variable. This method is used to measure the interdependence between the three variables and to understand how the two variables move together. The formula would return a value between 0, -1, and 1 as the result where;

-1.0 to -0.7= it indicates that there is a strong negative relationship
-0.7 to -0.3= it indicates that there is a weak negative relationship
-0.3 to +0.3= it indicates that there is little or no relationship
+0.3 to +0.7= it indicates that there is a weak positive relationship
+0.7 to +1.0= it indicates that there is a strong positive relationship
To represent the idea, let's start with the formula:

$$r=n(\Sigma xy)-(\Sigma x)(\Sigma y)\sqrt{[(n\Sigma x2-(\Sigma x)2][n\Sigma y2-(\Sigma y)2]}$$

where,
x= the independent variables
y= the dependent variables
n= number of data points in the sample
From the results obtained, they are examined to determine whether the relationship between the two variables exists or not. When the correlation coefficient is one, it defines that the three variables have a perfect positive correlation. If one variable moves at a given amount, the second variable will move in the same direction same goes to the third variable. A positive correlation coefficient of less than one indicates it is a less than perfect positive correlation, with the strength of the correlation growing as the number approaches one. When the correlation coefficient is zero, it defines that there is no relationship between the two variables conducted in the study. In this case, if one variable moves, the movement of the other variable can be predicted. Thus, showing that they are uncorrelated. However, if the correlation coefficient is -1, the three variables are perfectly negatively correlated and move in opposition to each other. If one of the variables increases, the other variable will decrease proportionally. This can be concluded that a negative correlation coefficient greater than -1 shows a less than perfect negative correlation, with the strength of the correlation growing as the number approaches -1.

Results and Discussion

Descriptive Statistics

Data of variables in Malaysia: Palm Oil Price, Palm Oil Export (per tonnes), Palm Oil Import (per tonnes) and Exchange rate from 2009 to 2020.

Table 4
Results of the Descriptive statistics of the dependent and independent variables.

	POP	POX	POM	ER
Mean	2554.299	1429749.0	73167.00	4.493055
Median	2473.500	1419943.0	66370.50	4.558600
Maximum	3818.500	1843602.0	282058.0	5.083000
Minimum	1794.500	972646.0	1792.000	3.862400
Std. Dev	442.0757	178335.7	46282.61	0.329818
Skewness	0.698764	0.034653	1.309987	-0.198612
Kurtosis	2.964783	2.413206	6.132899	1.843282
Jarque-Bera	11.72596	2.094782	100.0759	8.974701
Probability	0.002843	0.350852	0.000000	0.011250
Sum	367819.0	2.06E+08	10536048	646.9999
Sum Sq. Dev	27946617	4.55E+11	3.06E+11	15.55554

Table 4 displays the descriptive analysis results. According to the table, the average price of palm oil (POP) over the last 14 years is RM2554 per metric tonne. The lowest reported price

is RM1794 (in 2018), while the highest reported price is RM3818 (in 2011). The price varies by about RM442 around or away from the mean. The POP price data is slightly positively skewed to the right.

Meanwhile, for the independent variables during the 14 years, the average palm oil export is 1429749 per tonnes and the average of palm oil import is 73167 per tonnes. The highest palm oil export recorded around 1843602 per tonnes and the lowest around 972646 per tonnes. While, the highest palm oil import recorded around 282058 per tonnes and the lowest around 1792 per tonnes.

Whereas, the average exchange rate of RM to USD (RM/USD) is RM4.493055, the highest exchange rate of RM/USD is RM5.08 while the lowest is RM3.86. The exchange rate shows the most considerable dispersion or volatility through the standard deviation. The data series of the palm oil export and palm oil import are skewed to the right, while the exchange rate, slightly skewed to the left. The other statistics summarized in the table above.

Table 6
Results of Unit Root Test

Variable	Level		1st Different	
	No Trend	Trend	No Trend	Trend
POP	-1.943090 (0.7523)	-2.881830 0.0717	-1.943090 (0.0000)	-2.881830 (0.0000)
POX	-1.943090 0.5522	-2.881685 (0.0000)	-1.943090 (0.0000)	-2.881830 (0.0000)
POM	-1.943074 0.1157	-2.881685 0.0010	-1.943090 (0.0000)	-2.881830 (0.0000)
ER	-1.943090 0.7104	-2.881830 0.2890	-1.943090 (0.0000)	-2.881830 (0.0000)

** Indicates that the variables are stationary at 5 per cent significance level*

We use Augmented-Dickey Fuller (ADF) to verify the normality test in this study. Table 7 displays the ADF unit root test results for each parameter at the trend and no trend. According to the findings, palm oil export and import are stationary or have no unit root at both trends at level order, whereas the other factors are not stationary at level order. However, only when researchers transform the information to the first difference did researchers discover that each of the variables are stationary or integrated in the same sequence, namely at the first difference. We base our conclusions on probability (p) values that are less than 5% significant.

Correlation Analysis

The results of the correlation analysis for the variables series are showed in table 7.

Table 7
Results of Pearson's Correlation Test

Correlation Probability	POP	POX	POM	ER
POP	1.000000 -----			
POX	-0.183406 0.0278	1.000000 -----		
POM	0.331027 0.0001	-0.059493 0.4787	1.000000 -----	
ER	-0.192263 0.0210	-0.047695 0.5703	-0.188280 0.0238	1.000000 -----

The relationship between the palm oil price (POP) and the three macroeconomic variables is shown in Table 7. The findings show that palm oil export (POX) has a negative but weak correlation with the price of POP. As a result, when the palm oil price rises relative to the palm oil export, the price of POP falls, but when the palm oil export falls, the price of POP rises. In the meantime, the other two variables, notably palm oil import and exchange rate, demonstrate positive but weak connections with POP prices, with palm oil import showing a positive correlation and exchange rate having a negative but weak correlation with POP prices.

Table 8
Results of Multiple Linear Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3836.833	579.4826	6.621136	0.0000
POX	-0.000429	0.000193	-2.219615	0.0281
POM	0.002802	0.000757	3.703695	0.0003
ER	-194.7125	106.1102	-1.835002	0.0686

R-squared	0.156757	Mean dependent var	2554.299
Adjusted R-squared	0.138687	S.D. dependent var	442.0757
S.E. of regression	410.2768	Akaike info criterion	14.89893
Sum squared resid	23565792	Schwarz criterion	14.98142
Log likelihood	-1068.723	Hannan-Quinn criter.	14.93245
F-statistic	8.675224	Durbin-Watson stat	0.217398
Prob(F-statistic)	0.000026		

Where: C = Constant on Palm Oil Price; POX = Palm Oil Export (tonnes); POM = Palm Oil Import (tonnes); ER = Exchange Rate. Table 8 summarizes the results of a multiple regression test and the econometric model or equation is as shown below:

POP = C(1) + C(2)*POX + C(3)*POM + C(4)*ER

Substituted Coefficients:

POP = 3836.833 - 0.0004289*POX + 0.002802*POM - 194.7125*ER

Based on the findings, we discovered that palm oil imports (POM) are main economic variables that impacts palm oil prices (POP) in Malaysia. Furthermore, POM has a positive influence on POP prices, with POM having a significant effect. On the other hand, show that palm oil export (POX) and exchange rate (ER) are really not significant factors impacting POP

prices in Malaysia. Despite their insignificance, both palm oil export and exchange rate may have a negative impact on POP prices. As a result, the effects of both macroeconomic variables on the POP price must be considered by the relevant parties when making forecasts or decisions.

The R-squared value is really quite advantageous at 15.67%, however after modification, the value remains in the 15% range. The three economic indicators can describe 15% more than of the variance or variability in the POP price. Other influences not examined in this research accounted for the remaining 85%. As a result, we advise that those undefined variables be used in future research. However, the variables chosen for this study only fit in the model because the probability of F-statistic is 0.000026, which is less than 5% significance level.

The model above reveals that the Palm Oil Import (tonnes) is positively related to palm oil price which implies that every unit increase in palm oil import (tonnes) will result in an increase in palm oil price. The fluctuating export price of palm oil is also influenced internally by the Ringgit Malaysia exchange rate. The current study findings agree with or support those of (Shariff et al., 2006; Susila et al., 2004).

Conclusions

The primary goal of this study is to examine the relationship and impact of three macroeconomic variables, namely Palm Oil Export (POX), Palm Oil Import (POM), and Exchange Rate (ER), on the Palm Oil Price (POP) price in Malaysia from 2009 to 2020. The data were discovered to be integrated but not stationary. However, based on the ADF test results, when converted into the first difference, Pearson's correlation test revealed that the POP price is negatively correlated with the POX and ER. Despite the weak relationship, it is hypothesised that whenever the Malaysian ringgit (RM) solidifies against the USD, the Malaysian POP price declines, and likewise. Given that Malaysia is the nation's second exporter of POP, this comparison makes sense. The vast majority of exporters are carried out in US dollars. As even the RM grows stronger against the USD, importers' costs for palm oil will increase. In other phrases, transporting countries' demand for CPO will be reduced or limited. POP prices will decline due to decreased demand. Meanwhile, the POP price is positively related to the POM. Palm oil prices, as Malaysia's main commodity, will be affected or increased as palm oil imports rise. The outcome explains why more products are produced, primarily palm oil-based products in this case. It translates into increased demand for POP and a rise in its price. POM is a key macroeconomic variable, according to multiple regression results, but POX and ER are not. The multiple regression test yielded similar results to the regression analysis, namely POX and ER (negative impact) and POM (positive impact) (positive impacts).

Recommendations

As a recommendation, Malaysia government agencies and policymakers should take a more proactive approach to dealing with fluctuations in palm oil prices. The Malaysian Central Bank (BNM) must ensure that Malaysian currency exchange and money supply policies are effective for a long-term. The National Economic Action Council (MTEN) must continue to take tactical and optimistic actions to encourage economic activity in the country, resulting in increased GDP growth. To keep inflation from rising, departments under the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP) should indeed take legal action strictly. Finally, Malaysian Palm Oil Board (MPOB) should be more assertive in boosting Malaysia's palm oil industry by developing partnerships with related industries to bring further palm oil-

based goods to market. To summarise, it is critical for the palm oil price remain stable in all economic conditions so that it does not negatively impact our economy and national income. The government may also need to look into related agricultural policies in order to improve the production and quality of the palm oil industry using cutting-edge technology. In conjunction of the global evolution of consumer lifestyles, numerous potential growth opportunities for the palm oil industry have emerged. The variety of palm oil and its applications will continue to gain attention, opening up new opportunities around the world as a result of increased consumer knowledge and exposure to the information on the internet, and social media.

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