Integration of the North Maluku Copra Market with the Indonesian Copra Market

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Abstract—Copra exports in North Maluku have fluctuated, there has been a significant increase in 2019-2020, but there has been a decline in 2021, in line with the drop in copra prices. Farmers sell in primary form, namely young coconut or processed into traditional oil. Copra prices on the Indonesian market influence the dependence on copra prices in North Maluku. The cities of Manado and Surabaya are copra export destinations from North Maluku. This research aims to analyse the integration and transmission of copra commodity prices between the North Maluku market as a producer, the intermediary market (Manado City), and the consumer market (Surabaya City) using the Ravallion model. The types of secondary data are time series data (annual) for domestic market copra prices (North Maluku), intermediary market copra prices (Manado), and consumer market copra prices (Surabaya). The data source is the Central Bureau of Statistics (BPS), with data series from 2002- 2021. Based on the results of the integration analysis of the North Maluku copra market, it can be concluded that the correlation value is close to 1, which means that the price of copra in the market in North Maluku, with the intermediary market (Manado) and the destination market (Surabaya), are integrated or have a close relationship. In the short term, market integration only occurs in Surabaya and North Maluku markets. In contrast, in the long term, the two markets, namely Surabaya and Manado, are integrated with a change in Surabaya copra prices to North Maluku by 81 percent, Manado market, and North Maluku by 39 percent. Meanwhile, the influence of the previous year's copra price on market prices in the current year for the Surabaya market with the North Maluku market had an effect of 16 percent, and the Manado market with the North Maluku market had an effect of 4 percent.

Keywords—Market, Integration, and Transmission

I. INTRODUCTION

Plantation crops in North Maluku are dominated by coconut plants marketed in primary form or unprocessed as added value for coconut commodities utilization of coconut plants in processed meat, namely copra. Farmers in North Maluku processing copra are generally constrained by access to market information, which affects the movement of copra prices at the farm level. In addition to problems with copra marketing, the obstacle faced by copra farmers in North Maluku is the relationship between farmers and copra collectors where farmers are very dependent on copra traders in terms of farming financing and capital. The distance between farmers and the market and limited facilities in marketing copra make farmers the price takers in determining the price of copra. The long distance between consumers and producers is one of the factors for the high cost of production in marketing, resulting in weak integration of the agricultural crop commodity market so that a price stabilization policy is needed, but its implementation if under integrated market conditions, the policy will be more effective and efficient. Compared to unintegrated market conditions.

The price stabilization policy in an integrated market requires government intervention with the aim that the implementation of the pricing policy for agricultural crop commodities, especially plantation commodities, can be controlled at a lower price. So far, coconut farmers in North Maluku rely on production managed in copra and sold to inter-island collectors around the production area. So that farmers' income is only focused on income from selling copra. Data on the area of coconut plantations for North Maluku Province in 2021 reached 202,803 ha, with a production level of 211,405 tons in 2021 (Directorate General of Plantations, 2021).

One of the leading commodities of North Maluku Province is copra which is listed as a leading export commodity. During 2014, copra was exported nine times to the Philippines with a total amount of 17,322,200 kg, and exports were carried out through the Tobelo Seaport. In 2015 the frequency of copra exports decreased to seven times, with a total of 18,213,097 kg. There was a drastic decline in 2016, so North Maluku could only export once, with a volume of 850,400 kg. Since then, North Maluku's copra exports have stalled. Even so, North Maluku copra is still a leading export commodity, it is just that it is not made directly from North Maluku but is sent through the ports of Surabaya and Bitung, and then from there, it is exported. The following is a North Maluku Copra Exports graph for 2014 – 2021 (Ternate Quarantine Centre, 2022).
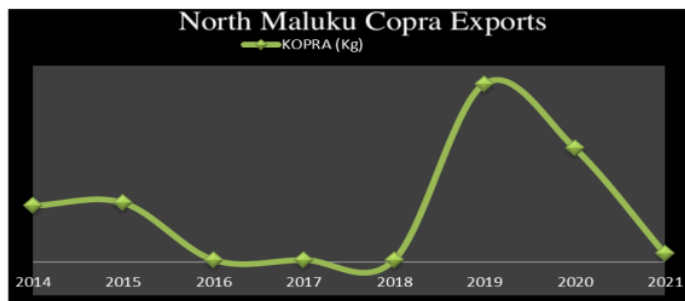
Source: Data from the Quarantine Centre, processed. 2022

Copra exports in North Maluku have fluctuated, there has been a significant increase in 2019 – 2020, but there has been a decline in 2021, in line with the drop in copra prices. Farmers sell in primary form, namely young coconut or processed into traditional oil. Copra prices on the Indonesian market influence the dependence on copra prices in North Maluku. The cities of Manado and Surabaya are copra export destinations from North Maluku.

Copra price movements tend to be unstable; demand and supply for copra fluctuate, making it difficult to control prices at the producer and consumer levels. The relationship between market integration in the short term and long term indicates fluctuating price movements. A strong level of market integration illustrates better efficiency from the market or marketing agency. From the background of the problem, this research was conducted with the aim of analysing the integration and price transmission between the North Maluku copra market as a producer, the market at the intermediary level (Manado City), and the market at the consumer level (Surabaya City) using the Ravallion model.

II. MATERIAL AND METHODS

The type of secondary data used in this study is annual time series data for domestic market copra prices (North Maluku), intermediary market copra prices (Manado), and consumer market copra prices (Surabaya). The data source is the Central Bureau of Statistics (BPS), with data series from 2002-2021. For testing market integration, the copra commodity reference prices used are copra commodity prices formed in the City of Surabaya and the City of Manado. It is assumed that the City of Surabaya is one of the transit areas for copra exports from North Maluku before export to the destination country. Besides, the City of Surabaya is the most significant entry point for imported copra. Apart from the City of Surabaya, the reference price used is the price of copra in the City of Manado, one of the copra intermediary areas in North Maluku. Data analysis used in analysing market integration and copra commodity price transmission uses the multiple regression equation methods with the Ravallion model (1986), namely the integration and transmission of prices from one market to another, according to Tahir and Riaz (1997). In addition to analysing commodity market integration, the analysis used to determine the market as a reference for price movements in regional markets uses the Ravallion Model. The initial equation for the Ravallion model is as follows:

$$R = f (P1, P2, P3, …, Pn, X)………………(2)$$
$$Pi = fi (R, Xi), i=1, …, n …………………… (3)$$

Where:

R = the price in the reference market, which is affected by the price in the local market (P1, P2, …, Pn). In this research, the reference price used is the price of copra in the Surabaya market.

P1 = price in one of the local markets (North Maluku), which is influenced by the price in the reference market. In this study, the price of P1 is the price on the domestic market.

P2 = prices in other regions affected by prices in the reference market. In this study, P2 is the price of copra in the Surabaya import market.

Xi = variable indicating other factors that may affect prices in specific markets (including reference markets and markets in other production centre).

Prices formed in a market (Surabaya market) will affect price formation in the local market (North Maluku market), taking into account the effect of prices in a particular year (t) on prices in the previous year (t-1). Pricing in the previous year (t-1) several years aims to see price fluctuations that occur. To see the effect of the previous year's price on the local market and the previous year's price on the reference market on the formation of producer prices in the reference market in a particular year, the Index of Market Connection (IMC) is used. IMC was developed by Timmer (1986) and is defined as the ratio of the provincial market coefficient to the reference market coefficient, ie:

$$IMC = \frac{b1}{b3}$$

According to Timmer (1986), if the coefficient is ($\beta 2 = 1$), then the two markets are perfectly integrated in the long run; $\beta 2$ is a measure of the degree of price change in the reference market that is transmitted to the regional market. This parameter measures long-term integration, and the expected value equals or closes to 1. The difference between these two indicators is that $\beta 2$ shows what percentage of price changes in the reference market is transmitted to other provincial markets if a market is said to be integrated with the short term if (b=-1) and IMC = 0. Suppose the market is not integrated with the short term, then the value of IMC=∞. If IMC<1, it can be concluded that the reference market has a strong relationship; conversely, if IMC> 1, there is no reference market. Long-term integration is indicated by the coefficient ($\beta 2$), i.e., if the value ($\beta 2$) is equal to 1, then there is long-term integration (price from the reference market is transmitted proportionally to the secondary market).

III. RESULTS AND DISCUSSION

Price Correlation

The price correlation method is used to calculate the closeness of the price relationship between producer and consumer markets. The copra price data analyzed from 2002 to 2021 uses the price correlation method from two different markets so that prices can be seen from year to year. The value of the correlation coefficient is generated to see the level of market integration; the higher the value of the correlation coefficient indicates the higher the level of integration of the two markets. In this case, markets in North Maluku (producers) and markets in Manado City (Distributors), and Markets in Surabaya City (consumers). The following is the result of the correlation analysis in the table below to see market integration.

Table 1. Correlation of Copra Commodity Prices in the North Maluku Copra Market

Region	North Maluku		Information
	Manado	Surabaya	
Pearson Correlation value	0.929	0.893	Integrated

Source: Secondary Data, Processed. 2022.

From the table above, it is known that the correlation value of copra commodity prices using time series data for 2002–2021 illustrates that the correlation value is close to 1, which means that copra is on the market in North Maluku, with the intermediary market (Manado) and the destination market (Surabaya). Integrated or closely related. This shows that copra price movements in the markets of the two regions will affect copra prices in North Maluku.

The copra commodity market's integration level is measured between the domestic market (domestic) and Surabaya as a reference market. The value of the price correlation between the domestic market (North Maluku) and the intermediary market (Manado), and the reference or consumer market (Surabaya) is positive and close to 1, meaning that the market system is efficiently integrated because there is a positive correlation (relationship) in the three different market locations. Different in the 2001 - 2021 range. The same is true for the copra market. The correlation coefficient directly measures how closely the prices of the copra commodities move together in different market locations.

Index of market connections (IMC)

The index of market connection is an index that is restricted to the coefficient ratio of the previous year's secondary market (t-1) to the primary market (reference) of the previous period (Heytens in Arnanto et al. 2014).

Table 2. Results of Copra Market Integration Analysis at Producer (North Maluku), Distributor (North Sulawesi), and Consumer (East Java) Levels

variables	Coefficients	t	Sig	IMC		$\beta 2$	
				Surabaya	Manado	Surabaya	Manado
(Constant)	(3.253)	(2.016)	0.063	(3.10)	1.49	(0.081)	0.039
Lag Malut	(0.121)	(0.479)	0.639				
Lag Surabaya	(0.081)	0.150	0.883				
Lag Manado	0.039	(0.300)	0.768				
R Square	0.863						
Adjusted R square	0.814						

** Significant at 90% level of significance
Source: Processed Secondary Data, 2022.

Table 2 shows the results that copra in the reference market or consumer market (Surabaya) is related to prices in the local market (North Maluku). The IMC value < 1 (-3.10) means that the two markets have short-term vertical integration, while the IMC value for the Manado market as an intermediary market, the IMC value obtained is 1.49 where the IMC value > 1 means that the market is not vertically integrated into the short term with the copra market in Manado. If there is a change in the price of copra in the Manado market, in the short term, the price of copra in North Maluku is not affected; on the other hand, changes in the price of copra are affected by changes in the price of copra in the market in the city of Surabaya as the destination area before export to other countries.

In the long term, it can be seen from the variable coefficient value of the difference in copra prices for the reference market or consumers (Surabaya) at time t with the copra prices for the reference market or consumers (Surabaya) at time t-1 (lag of copra prices = β2). The value (β2) at these two market levels reaches a value of (-0.081) < 1, so it can be said that the two copra markets are also integrated with the long term. For the market in Manado City, the value of (β2) reaches 0.039, meaning that the market is in the long term integrated.

The IMC value < 1 indicates that there is relatively high integration or short-term integration between copra prices in the market (consumers) and copra prices received by copra farmers (producers). The IMC value > 1 indicates that there is no short-term integration or integration of prices, while the β2 value is (0.081) and 0.039 means that the β2 coefficient value <0.10 indicates that there is integration or integration of copra prices in the long-term between markets in North Maluku, Manado and Surabaya, which means that if there is a change in the price of copra in the Surabaya and Manado markets, it will affect the price of copra in the North Maluku market.

The coefficient of determination (R2) is 86.3 percent, meaning that it is 86.3 percent. Variables can explain variations of copra prices in the North Maluku domestic market, the previous year's copra prices in the domestic market, changes in copra prices in the Surabaya and Manado markets, and the previous year's copra prices in the Surabaya and Manado markets and the remaining 13.7 percent were explained by errors.

The β2 coefficient value of 0.081 indicates that a 100 percent change in the price of copra in the Surabaya market will increase the price of copra in the North Maluku domestic market by 81 percent. Meanwhile, the β2 coefficient of 0.039 in the Manado market indicates that a 100 percent change in the price of copra in the Manado market will increase the price of copra in the domestic market by 39 percent in the North Maluku domestic market.

If transmitted in full to North Maluku and Surabaya copra prices, the β3 − β1 coefficient of 0.160 indicates that the previous year's copra price in Surabaya significantly influenced this year's copra price in the domestic market (North Maluku), namely 16 percent. During the copra price transmission between the Manado and North Maluku markets, the coefficient β3 − β1 is 0.040, meaning that the previous year's copra price in Manado did not have a very significant effect on this year's copra price in the domestic market (North Maluku), namely only 4 percent. This shows that the pricing of copra in North Maluku is strongly influenced by the previous year's copra price movements in the Surabaya market. Even though the distance between North Maluku and Surabaya is relatively far compared to Manado City, the behaviour of the copra commodity market is very dependent on the Surabaya market because Surabaya is the final destination for copra producers in North Maluku.

IV. CONCLUSION

Based on the results of the integration analysis of the North Maluku copra market, it can be concluded that the correlation value is close to 1, which means that the price of copra in the market in North Maluku, with the intermediary market (Manado) and the destination market (Surabaya), are integrated or have a close relationship. In the short term, market integration only occurs in Surabaya and North Maluku markets. In contrast, in the long term, the two markets, namely Surabaya and Manado, are integrated with a change in Surabaya copra prices to North Maluku by 81 percent, Manado market, and North Maluku by 39 percent. Meanwhile, the influence of the previous year's copra price on market prices in the current year for the Surabaya market with the North Maluku market had an effect of 16 percent, and the Manado market with the North Maluku market had an effect of 4 percent.

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