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SPATIAL MARKET INTEGRATION OF SHALLOT IN INDONESIA

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Abstract: Shallot is a horticultural commodity which has high economic and strategic values. Unbalanced supply and demand of shallot each province in Indonesia cause trade flows from surplus areas to deficit areas and indicate there is a market integration. This research aimed to analyze spatial market integration of shallot at the producer level in Indonesia. Methods of this research used included Johansen Co-integration, Granger Causality, and Error Correction Model. Results of this research exhibit that there is no complete spatial market integration among shallot producer markets. There are approximately 40 co-integrated pairs of producer markets (44.944%), and the rest of 49 (55.056%) pairs of producer markets are not co-integrated. Based on the causality test, the producer markets such as Central Java, East Java, and West Nusa Tenggara are price-leading markets. Approximately 74 pairs (83,146%) of producer markets are integrated into the short run. Government policy that can be implemented to control price fluctuations at producer level is fairly floor price policy specifically made for three price-leading markets. To improve spatial market integration of shallot in Indonesia, the government needs to make policies such as upgrading quality of physical infrastructure (length of paved roads) and educating human capital (producers) to access market information technology.

Keywords: producer market, shallot, spatial market integration, Johansen Co-integration, Granger Causality

Abstrak: *Bawang merah adalah komoditas hortikultura yang memiliki nilai ekonomis dan strategis tinggi. Ketidakseimbangan jumlah pasokan dan konsumsi bawang merah setiap provinsi di Indonesia menyebabkan adanya aliran perdagangan dari area yang kelebihan ke area kekurangan bawang merah dan ini mengindikasikan adanya integrasi pasar. Tujuan penelitian ini adalah untuk menganalisis integrasi pasar spasial bawang merah tingkat produsen di Indonesia. Metode analisis yang digunakan adalah kointegrasi Johansen, kausalitas Granger, and Error Correction Model. Hasil penelitian ini menunjukkan bahwa tidak tejadi integrasi yang menyeluruh antar pasar produsen bawang merah tingkat produsen di Indonesia. Terdapat sebanyak 40 pasang pasar produsen (44,944%) terkointegrasi dan sisanya 49 pasang pasar produsen (55,056%) tidak terkointegrasi. Hasil uji kausalitas dapat diketahui bahwa pasar produsen Jawa Tengah, Jawa Timur, dan Nusa Tenggara Barat merupakan pemimpin harga. Terdapat 74 (83,146%) pasang pasar produsen bawang merah yang terintegrasi pada jangka pendek. Kebijakan pemerintah yang dapat diimplementasikan untuk mengendalikan fluktuasi harga di tingkat produsen adalah kebijakan harga dasar yang adil khususnya dibuat untuk tiga pasar pemimpin harga ini. Untuk meningkatan integrasi spasial bawang merah di Indonesia, pemerintah perlu membuat kebijakan seperti peningkatan kualitas infrastruktur fisik (menambah panjang jalan beraspal) dan mengedukasi sumber daya manusia (produsen) untuk dapat mengakses teknologi informasi pasar.*

Kata kunci: *bawang merah, integrasi pasar spasial, pasar produsen, Johansen, kausalitas Granger*

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INTRODUCTION

Shallot is one important horticultural commodity in Indonesia, which has high strategic and economic values. Theoretically, this commodity is categorized like rice, eggs, or meat that is not too sensitive to price changes (inelastic) (Damanhuri and Findi, 2014) and becomes one commodity regulated by a policy that stabilizes food sovereignty that is targeted to escalate production, market stabilization, and improve prosperity of business actors (Kementan, 2015).

Efforts in increasing shallot production face a number of obstacles like price fluctuation in many production centers. Price fluctuations are influenced by many factors regarding both supply and demand, depending on which strength is stronger. In addition, it is also influenced by market structure or market integration (Jacks et al. 2011).

Another issue of shallot availability is to concentrate the production in Java Island. Central Java is a center of shallot production that contributes to approximately 41.50% of national production. Furthermore, the second and the third places are filled by East Java and West Java of approximately 24% and 11.43% of national production. This condition induces shallot prices on Java to be lower than those in other places do, and this unfortunately gives impact on unequally supplies of shallots.

Differentiation of production in each province and escalation of shallot consumption every year split Indonesia into surplus and deficit areas. The surplus areas of shallot production include the Provinces of Central Java, East Java, West Java, West Nusa Tenggara, West Sumatra, South Sulawesi, Yogyakarta, and Central Sulawesi. On the contrary, the deficit areas of shallot production include Aceh, North Sumatera, Riau, Jambi, South Sumatera, Bengkulu, Lampung, Bangka Belitung, Banten, Bali, NTT, West Kalimantan, East Kalimantan, Central Kalimantan, Sulawesi North, Southeast Sulawesi, West Sulawesi, Maluku, North Maluku, and Papua.

This condition induces price disparity of shallots in every province because it is shaped by factors of demand and supply in which supply factor is hugely affected by harvest production. Apart from domestic production, Indonesia also imports shallots from several countries including Thailand, Vietnam, India, Philippines, Malaysia, and China. During the period of 2010-2014, Indonesia is still the net importer of shallots (Pusdatin, 2015). The price of imported shallots also affect national price fluctuation especially since the price of these imported shallots is lower than that of domestic shallots. Moreover, different demand factors among provinces are influenced by variations of consumption in line with the increase in population, income levels of society and industries that require shallot as their production input. Theoretically, provinces with surplus production of shallots will encounter a decreasing price of shallots if they do not immediately sell off their commodity to other areas. On the other hand, the deficit areas will undergo extremely increasing price of shallots if they do not bring shallots from other areas rapidly.

Price disparity among provinces encourages a spatial trade of shallots specially to supply the deficit provinces. Trading of shallots from surplus areas to deficit areas indicates the existence of market integration among provinces in Indonesia. Changing of shallot prices is expected to be quickly responded by market players so that they are able to take a right decision immediately to make the market more efficient (Asmara and Ardhiani, 2010). However, traders manipulate price information at the producer level since there is no available information received by producers (Irawan and Rosmayanti, 2007) often exert changes of price. In addition to low bargaining of shallot's producers, shallot's price variation is the highest at the producer level than the wholesalers and the retailers which is able to be checked that the high the value of variant coefficient (VC) (Ruslan et al. 2016).

Shallot is a strategic commodity in Indonesia so the government should pay its attention to this commodity. The government plays an important role in stabilizing the price of shallots in the market for an affordable price level in accordance with the purchasing power of people. The efforts of price stabilization will be more effectively implemented in integrated markets than in other markets (Goletti et al. 1995). Furthermore, market integration provides information related to the fluctuation of price in a specific area and its impacts on other areas. The captured information will be used as a precautionary measure in preventing widespread of the price fluctuation.

Based on the mentioned problems above, spatial market integration of shallots at producer level is important to conduct where a market of this commodity in one province influences other provinces. This integration extent is able to prepare information for the related stakeholders in deciding a proper policy related to widespread of price fluctuation of shallots, both at local and national levels. This research aimed to analyze the spatial market integration of shallot at the producer level in Indonesia.

METHODS

This study used time series data of monthly price of shallots at the producer levels from January 2008 to December 2014. These data were obtained from 28 provinces selected based on the publication of Indonesian Central Bureau of Statistics on Trade Distribution of Shallot Commodity in 2015, and Error Correction Model was used for data analyzing in this research. In establishing this model, there were five stages that had to be passed sequentially. Each stage of the analyzing process was described in detail below.

Stasionary Data Test

In this step, the variables of data were tested individually for their stationarity. If they were not stationary in the tested level, a different stationarity test would be applied for them. Furthermore, when time series data were not stationary, the applied test of statistical analysis of these data would be inappropriate and produce earmark spurious results (Juanda and Junaidi, 2012).

Optimal Lag Determination

An optimal lag length is required to see the effect of each variable on other variables. The value of the lag of a variable can affect other variables because it takes time for a variable to respond to the movement of other variables.

Cointegration Johansen Test

This test aimed at determining whether the non-stationary variables are co-integrated or not, and it is used for determining whether there is a long run equilibrium relationship (Nurhidayati, 2015). This research used Johansen co-integration test, and the hypotheses built to this test were H0 and H1 signed as an unintegrated and co-integrated respectively. Furthermore, if trace statistics were higher (>) than a critical value, the H0 would be rejected, indicating the equation was co-integrated.

Granger Causality test

Causality test is a test to determine the causal relationship between variables (Saragih et al. 2017). To find out whether the price in the y market affects the market price x or vice versa. The results of this test were able to detect the relationships among variables, at least one-way relationship. Moreover, the test also was used for determining which market dominated the price.

Error Correction Model Test

An Error Correction Model (ECM) was used to assess the short run dynamics of the relationship between two prices in a separate market. Estimation on co-integration regression was conducted first, and the ECM was estimated using the following equation:

$$\Delta\widehat{P_t^i} = \alpha_0 + \alpha_1 \Delta P_{t-1}^j + \alpha_2 \widehat{u_{t-1}} + \varepsilon_t$$

$$\widehat{u_{t-1}} = \Delta\widehat{P_t^i} - \alpha_0 - \alpha_1 \Delta P_{t-1}^j - \alpha_2$$

Where α_1 is a short run effect and α_2 indicates a speed adjustment error. An important parameter is α_2 because it describes the dynamics of the system and explains the rate at which variables adjust the balance.

The characteristics of a valid ECM model are the value of error correction term (ECT) coefficient (α_2) is between ($0 < X < 1$) and negative. The subsequent criterion is that the t-statistic value of the ECT variable regression coefficient should be positive and significant so that it is able to answer the objectives of this study.

Nowadays, market integration researches using an approach with ECM are widely used (Adiyoga et al. 2006; Van Sickle, 2006; Zahid et al. 2007; Siddique, 2008; Worakos et al. 2008; Hossain and Verbeke, 2010; Ghafoor and Aslam, 2012; Firdaus and Gunawan, 2012; Jubaedah, 2013; Adeoye et al. 2013). In addition, market integration researches for shallot are used by Asmara and Ardhiani (2010), Firdaus and Gunawan (2012), Susanawati et al. (2015), and Kustiari (2017).

RESULTS

Root unit test using Augmented Dickey-Fuller (ADF) was conducted for the stationarity test of data in this research. Un-rooted unit data move randomly, or they can be said as stationarity data. Non-stationarity data will be heteroscedastic or auto-correlated (Juanda and Junaidi, 2012).

The stationary test showed that at level I (0), there were 23 out of 28 provinces used data were not stationary at level confidence of 1%, 5%, and 10%. These results are indicated by the ADF) t-statistic value that is higher than the critical value of McKinnon. An unstable assumption of stationarity at level I (0) causes all variables to be tested by using an integration degree or first difference. A variable becomes stationary at first difference when the value of ADF Test is less than the critical value of McKinnon.

The results of root unit test for first difference of all used variables in this research were stationary. Stationarity of all variables can be spotted by the ADF value where it is smaller than the critical value of McKinnon at a 1% confidence level. Based on this value, it can be inferred that all variables have the same degree of integration, namely I (1). By this result, a co-integration analysis can proceed.

Cointegration Test

The results of Johansen co-integration test from 89 pairs of shallot producer markets in Indonesia based on the statistical trace value indicate that approximately 40-paired markets (44,944%) are co-integrated and 49-paired markets (55,056%) are not co-integrated. These results show that there is no full co-integration among the producer markets in Indonesia. An absence of this price integration in markets means that in the end the producer markets will not be integrated. The undergone spatial market integration points out that price changes in a producer market would be reflected as changes in prices for producer markets that are geographically different (Suryana et al. 2014). Table 1 below represents the integration relationship among shallot producer markets in Indonesia.

There are five provinces becoming shallot center production in Indonesia: West Java, East Java, Central Java, and West Nusa Tenggara. These provinces have more integrated relationships with shallot producers than with other provinces as listed in Table 1. For instance, East Java Province in Table 1 is the second largest shallot producer in Indonesia which has the largest integration and distribution of 12 trading markets such as West Kalimantan, East Kalimantan, Bali, Cetral Java, Riau, Bengkulu, West Java, Yogyakarta, West Nusa Tenggara, Central Kalimantan, North Sulawesi, and Papua. The province of East Java is more integrated with the eastern Indonesia region and categorized as the more integrated center of producer with the eastern Indonesia.

The largest shallot producer in Indonesia is Central Java Province. This province has the smallest trading integration and distribution of the five major shallot producers above. This is because its production of approximately 78.50% is sold in its own province (BPS, 2015). Furthermore, in the long run, there is a price asymmetric transmission of shallots in Central Java province due to market power at retailer level. This is also supported by market structure of shallot in Central Java, which is oligopsonic, and the inelastic demand for shallots in urban areas causes the market power owned by retailers to be relatively large (Ruslan et al. 2016).

The result of integration analysis in this research was found to have a similar result in which producer markets in one island are more integrated than in other conditions (Jubaedah, 2013). For example, East Java Province is integrated with Central Java, West Java, and Yogyakarta. This condition is supported by good infrastructures of transportation, namely, long pave roads and high ways in Java Island. Hidayanto et al. (2014) states that a better road condition as one of transportation infrastructure will further enhance market integration. It will reduce the transportation cost of trades or the flow of goods among those markets.

According to Juanda and Junaidi (2012), an existence of co-integration exhibits a long-run equilibrium relationship between the two variables. Although there is a long run balance, in the short run, they may not achieve an equilibrium. On the contrary, in the short run, what the economic actors desired does not necessarily happen in actual situation. A difference between the desired and an actual condition requires an adjustment.

Table 1. Information on the integration relationship among shallot producer markets in Indonesia

Provinces	Relationship among shallot producer markets in Indonesia
Aceh	Integrated with North Sumatra
North Sumatra	Integrated with Aceh
West Sumatra	Integrated with Jambi
Jambi	Integrated with Bengkulu
Bengkulu	Integrated with Jambi
West Java	Integrated with North Sumatra, Riau, Jambi, Lampung, East Java, Banten
Central Java	Integrated with South Sumatra, Bengkulu, Yogyakarta, East Java, Bali, West Kalimantan, Central Kalimantan
Yogyakarta	Integrated with West Java, East Java
East Java	Integrated with Riau, Bengkulu, West Java, Cental Java, Yogyakarta, Bali, West Nusa Tenggara, West Kalimantan, Central Kalimantan, East Kalimantan, North Sulawesi, Papua
Banten	Integrated with Lampung
Bali	Integrated with West Java
West Nusa Tenggara	Integrated with Bengkulu, East Java, Bali, East Nusa Tenggara, Central Kalimantan, East Kalimantan, North Sulawesi, Central Sulawesi, South Sulawesi, Papua
North Sulawesi	Integrated with South Sulawesi
Central Sulawesi	Integrated with North Maluku
South Sulawesi	Integrated with Central Kalimantan Tengah, East Kalimantan, North Sulawesi, Papua
Southeast Sulawesi	Integrated with North Maluku

Granger Causality

According to Cahyaningsih (2015), when two or more markets are integrated with each other, the causality test is able to provide information on which market causes variation of other markets in one way or mutual (two ways) because of co-integration test has a limited information.

Based on the Granger causality test (Table 2), no province has a two-way relationship. Price to market relationships among shallot producers in Indonesia show a one-way relationship. East Java Province, which has the integration and distribution of the most trade, only affects the price in the market of producers outside Java such as Riau, Central Kalimantan, and East Kalimantan. As a province that distributes many shallots to other regions, the price in East Java province is influenced by the provinces of West Java and Yogyakarta. This is because East Java besides distributing its shallot production also brings in shallot stock from other regions including Yogyakarta and West Java (BPS, 2015). Furthermore, Yogyakarta Province, a non-center of shallot production, will influence prices in two main shallot production centers, West Java and East Java. According to the data of BPS (2015), Yogyakarta has distributed its shallot production to the three central markets, namely, West Java, East Java, and Central Java.

As the main center of shallot production in Indonesia, Central Java Province's shallot prices are not affected by any other provinces; however, this province influences prices of the commodity outside central markets besides Java Island such as Southern Sumatra, Bali, and Central Kalimantan. The last most integrated shallot producer market, West Nusa Tenggara, influences prices of shallots in many producers such as Bengkulu, Central Kalimantan, and North Sulawesi. Moreover, both producer markets, West Sumatera and Bengkulu, affect prices of shallots in Jambi, while two other provinces in Sulawesi, North Sulawesi, and Southeast Sulawesi, affect prices at the producer level of shallot commodity in two different areas in eastern Indonesia of South Sulawesi and North Maluku.

Based on the causality test in this research, shallot producer markets such as Central Java, East Java, and West Nusa Tenggara are leaders for prices whereas the other provinces are the followers. Hence, a good policy in controlling shallot prices that should be taken by the government is by paying attention to those market leaders' prices. Furthermore, the taken policy can be effectively implemented and cost-efficient. According to Ruslan et al. (2016), the government can carry out floor price policy to overcome price fluctuation of shallot at the producer level. Therefore, the government needs to determine a fair price policy especially for shallot producers in Central Java, East Java and West

Nusa Tenggara so that the national price fluctuation of shallot can be controlled, but the producers can still get a worthy price.

Error Correction Model Test

Error Correction Term (ECT) variable regression coefficient is the speed of adjustment between the actual value and the desired value, which will be eliminated in one period (Juanda and Junaidi, 2012). This may explain the time needed for prices to be transmitted from one market to another so that the results can be used for policy makers to make food distribution plans and good price stabilization (Goletti et al. 1995).

Table 3 shows the summary of the coefficient of Error Correction Term (ECT) or speed adjustment in the short run dynamic analysis. Wimanda (2006) explains that it is important to understand which provinces that have the high and low speed adjustment, and these provinces are divided into three categories, namely, high, moderate, and low speed adjustments. According to Jubaedah (2013), the paired markets based on the ECT values are classified into three different ranged speed adjustments, namely, high, moderate, and low of -0,200; -0,100 to -0,200 and more than -0,100, respectively. Before they were classified, these values were qualified first in order to estimate an error. The correction model is valid when it has a significant coefficient and a correct sign.

The analysis of ECT coefficient shows that the speed adjustment from the latest to the fastest is between -0,049 (Central Java with Southeast Sulawesi) and -0,612 (West Java with Jambi). Approximately 4,900% and 61,200% of the price of shallot in the market of Central Java and West Java market are eliminated by price changes in the Southeast Sulawesi market and prices in Jambi per month. Central Java and Southeast Sulawesi have the lowest speed adjustment because the manufacturer's market is not integrated in the long run whereas West Java and Jambi have a long run integration relationship.

An example of short run models between the JWB-JMB producer market is as follows:

$$dJWB = 3250{,}521 + 0{,}361dJMB - 0{,}612u_{t-1}$$

The coefficient of error correction term (ECT) of the paired producers of West Java and Jambi is approximately -0,612 where it is significant at the level of 1%. This result indicates that the short run balance fluctuation will be corrected which leads to a long run equilibrium. An approximately 61,200% of the adjustment process occurred in the first month and the rest occurred in the following months. The dJMB variable coefficient is also significant at 1% and is marked as positive, indicating that in the short run, the market price changes of producers in Jambi affect the market price changes in West Java.

Table 2. Granger Causality result test

Producer Markets		
Influence	Direction	Affected Areas
West Sumatra	→	North Sumatra, Jambi, South Sumatra
South Sumatra	→	Lampung
Bengkulu	→	West Sumatra, Jambi, South Sumatra
West Java	→	North Sumatra, East Java
Central Java	→	South sumatra, West Java, Bali, Central Kalimantan
Yogyakarta	→	West Java, East Java
East Java	→	Riau, Central Kalimantan, East Kalimantan, Maluku
West Nusa Tenggara	→	Bengkulu, Central Kalimantan, East Kalimantan, North Sulawesi
North Sulawesi Utara	→	Bangka Belitung, South Sulawesi, North Maluku
South Sulawesi	→	Central Kalimantan, East Kalimantan
Southeast Sulawesi	→	North Maluku

Table 3 Short run dynamics of shallot spatial market integration in Indonesia

Provinces	Speed adjustments		
	High	Moderate	Low
Aceh	North Sumatra	-	-
North Sumatra	Riau and Aceh	-	-
West Sumatra	Riau, Jambi, South Sumatra	Bengkulu and North Sumatra	-
Bengkulu	Jambi	West Sumatra and South Sumatra	-
West Java	North Sumatra, Riau, Jambi, Bengkulu, Lampung, Bangka Belitung, Central Java, East Java, and Banten	-	-
Central Java	Bali	West Java, East Java, West Kalimantan	Central Kalimantan and Southeast Sulawesi
Yogyakarta	-	Central Java, East Java, West Java	-
East Java	Bali, West Kalimantan, North Sulawesi, Central Sulawesi, Maluku	North Sumatera, Bengkulu, West Java,Central Java, West Nusa Tenggara, Central Kalimantan, South Selatan, Papua	East Nusa Tenggara, East Kalimantan
Bali	West Java	-	-
Banten	Lampung, Bangka Belitung, West Java	-	-
West Nusa Tenggara	Central Java, North Sulawesi, Central Sulawesi, East Sulawesi,	North Sumatra, Bengkulu, East Java, Bali, East Nusa Tenggara, South Sulawesi,Papua	Central Kalimantan, East Kalimantan, Southeast Sulawesi
West Kalimantan	-	-	Bali and East Nusa Tenggara
East Kalimantan	Banten	Southeast Sulawesi, West Sulawesi	West Nusa Tenggara
North Sulawesi	-	North Sulawesi	Bangka Belitung
Central Java	-	North Maluku	-
South Sulawesi	Bangka Belitung, Central Kalimantan, East Kalimantan, North Sulawesi, East Sulawesi, Southeast Sulawesi, West Sulawesi, Maluku, Papua	-	-
West Sulawesi	East Kalimantan	-	-

As many as 74 (83.146%) pairs of shallot markets are integrated into the short run, and only 55.056% of the markets will be integrated in the long run period. This comparison indicates that markets of shallot producers in Indonesia are more integrated into the short run, and this short run condition is not necessarily integrated over the long run. For instance, the Central Java producer market has a short run relationship with Bengkulu, Bangka Belitung, and Central Java, but this relationship is not sustained for the long run. This producer also has both kinds of relationships with a high-speed adjustment to six areas (North Sumatera, Riau, Jambi, Lampung, East Java, and Banten).

In the short run, the main production centers of shallot generally have a moderate speed adjustment except for West Java, which has a high speed adjustment because the distance of West Java to other integrated provinces is relatively close such as North Sumatra, Riau, Jambi, Bengkulu, Lampung, Bangka Belitung, Central Java, East Java, and Banten. In addition, West Java is close to the information centers for agricultural commodity prices such as PIKJ (Pasar Induk Kramat Jati), Ministry of Trade, and Ministry of Agriculture.

East Java producer market is the most widely integrated and influenced by other shallot producer markets in the short run because it has the second highest production surplus in Indonesia i.e. 201 tons (BPS, 2016). Market integration can make low price volatility of shallot (Jacks et al. 2011). This is in line with the results of Pertiwi et al. (2013) that shallots at the producer level have a low price volatility.

Central Java as the main production area of shallots in Indonesia has the least short run relationship, and the markets in West Java, East Java, West Kalimantan, Bali, and Central Kalimantan only influence the price movement. Table 3 shows in general that the speed adjustment of shallot prices among provinces is high. Because shallots are basic needs for the Indonesian, the price movement is always observed especially for producers and the government such as Ministry of Trade. Futhermore, the Ministry of Trade has built and launched the online infrastructure of price information of shallot monitoring system. This application can monitor the planting time plan and realization of shallot harvests in 11 districts of Brebes, daily supply of shallot from Brebes in 10 markets, and pricing information in 10 major markets that sell shallots.

Managerial Implications

Based on the analysis of shallot market integration and Granger causality, markets are integrated in the long term and have efficient causal relationships. An efficient market will provide maximum benefits to all actors in the shallot marketing system so that it can have an impact on high welfare of producers. The shallot producer market that is integrated and has a causality relationship is Central Java with South Sumatra, Central Kalimantan, and Bali. Central Java market in the long run has a price movement that is positive and affects prices of South Sumatra, Central Kalimantan, and Bali. Producers in managing production and marketing shallots to other regions can use information regarding the relationship of integration among regions. Shallot producers in Central Java should focus on marketing to South Sumatra, Central Kalimantan, and Bali, especially during harvests or surplus production. This inter-regional trade is also one of the solutions to deal with high price fluctuations at the producer level.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This research found that there is no full integration among markets of shallot producers in Indonesia. Only 40 pairs (44.944%) of producer markets are co-integrated and the remaining 49 pairs (55.056%) are not co-integrated. Furthermore, there are three provinces as producer markets of shallots examined by causality test, and they become the pricing leaders: Central Java, East Java, and West Nusa Tenggara, while other provinces are identified as followers.

In addition, there are 74 pairs (83,146%) of producer markets of shallots integrated to the short run. To compare with the number of long run integrated producer markets, it can be inferred that shallot producer markets in Indonesia are more integrated into the short run. In general, speed of ajustment of shallot price within provinces in Indonesia is high. To compare with the number of long run integrated producer markets, it can be inferred that shallot producer markets in Indonesia are more integrated into the short run.

Recommendations

This study has exhibited a number of eminences in analyzing shallot markets in Indonesia; however, any limitation that cannot be denied should be covered for an excellent result in the future. The followings are a number of suggestions:

East Java, Central Java, West Nusa Tenggara play role as leading regions of shallot price markets; as a result, the price changes in these three provinces will be transmitted conformably to other regions. Therefore, in stabilizing shallot prices in Indonesia, these provinces should be managed more effectively and efficiently in order to prevent price fluctuations not to spread to other areas. The government can carry out fairly floor price policy specifically made for the three price leading markets to stabilize the price of shallot at the producer level.

To improve the efficiency of shallot marketing in Indonesia especially in relating the market integration, the government should pay its attention to several prescribing factors of the integration so that efficiency and integration of this commodity can be advanced. According to the previous research, the key factors

that influence market integration include gross regional domestic income, human capital (empowerment in market information), and length of paved roads positively related to market integration (Gonzalez-Rivera and Helfand, 2001; Varela et al. 2012; Hidayanto et al. 2014). In addition, the factors of shallot production and distance are negatively related to market integration (Gonzalez-Rivera and Helfand, 2001; Varela et al. 2012).

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