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Supply Chain of the Beef Market in Indonesia

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Indonesian beef market is very interesting considering the 250 million people residing in the country. In a year, around 670 million kg of beef are consumed; 440 million kg are supplied by local production and 230 million are imported. The price of beef in the Indonesian market (US$ 9.1) is about double that in Australia (US$ 4.2). The high price and the wide margin becomes an appeal for a deeper inquiry. This raises questions such as how does the supply chain look like, how is the distribution of the wide margin from importers to retailers, does corruption still exist due to the import licensed, and who really enjoys the profit. This study aims to analyze the supply chain of beef industry and the factors affecting meat prices in Indonesia. The data was collected through a survey of 134 respondents in seven districts and cities in Surakarta, Indonesia followed by in-depth interviews with breeders, slaughters, wholesalers, retailers and consumers. The results show that factors affecting meat prices are the bargaining power of several actors in the supply chain and the market structure discussed in this paper.

***Keywords**: supply chain, beef market, share margin, agribusiness, commodity, price formation, pricing*

***JEL Classification**: M10, O13, N55, Q13*

1. Introduction

The supply chain of a commodity is closely related to the price. Therefore, supply chain analysis is immensely needed to identify the critical points in the pricing formation process. Price is a multidimensional issue in business and industrial structure (Vickner and Davies, 2002; Bompard *et al.*, 2007; Heywood and Ye, 2009). Price is an important factor in the calculation of inflation and even inflation is connected to price increases. Price also indicates the market structure of an industry. Empirically, it is rare for an industry to have a monopoly structure, but it is not rare to have an oligopoly market structure controlled by certain business cartels (Zhao and Zou, 2002). Such a condition is characterized by an unnatural mechanism of price formation.

Agricultural commodities are vulnerable to such unnatural price formation mechanisms due to cartel dominance and a tendency toward oligopoly (Vickner and Davies, 2002). Agricultural commodities at global marketing level are interesting for investors and speculators. In Indonesia this sector is vulnerable to cartel behaviors that cause an oligopoly market structure. Some empirical research in Indonesia reveal that agriculture and its supporting industry has an oligopoly structure, for example rubber (Rizkyanti, 2010), dairy cows (Yusdja and Ilham, 2006), and agriculture in general (Amir and Nazara, 2005).

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A study of price mechanism and agricultural commodity chain is essential because this sector contributes substantially to the global economy. This study analyzes price mechanism and beef commodity chain because of its substantial contribution to the inflation in Indonesia.

2. Literature Review

Bank Indonesia has identified fundamental factors affecting inflation movements in Indonesia. They are adaptive and forward looking inflation, exchange rate movements and a gap between supply and demand reflected in the output gap movements. Aside from these factors, shocks occurred originated from a supply shock also influence the inflation movements in Indonesia. The shocks can be due to seasonal factors, natural disasters, distribution disturbances, and administered price.

Santoso (2011) revealed that Indonesia is a developing country with a large population so its demand for food commodities is encouraged to increase but sometimes the supply of food commodities is not enough to meet that demand. This leads to price increases of food commodities which then trigger inflation. Some study by several institutions such as FAO, IFAD, IMF, OECD, UNCTAD, WFP, The World Bank, the WTO, IFPRI, and the UN HLTF affirmed that volatility concerns are associated with price concerns especially with food commodities. Food commodities are agricultural commodities with relatively high volatility level.

A research on inflation in Asian developing countries conducted by Jongwanich and Park (2008) found that inflation is the biggest macroeconomic challenge for developing countries in Asia. The empirical results indicate that the inflation was due, in large part, to the shocks of food commodities. There are 9 developing countries in the research: China, India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam. In developing countries like Pakistan for example, people allocate most of their income to food. Price increases of food commodity will sink their purchasing power, so then, the level of welfare will inevitably decline. Thus, price stability of food commodity serves as an indicator of a country's economy (Mohsin and Zaman, 2012). Price change of food commodities in Indonesia is a dominant factor in determining inflation.

Indonesia is a country with a market that tends to turn to oligopoly in both commodity and industry markets (Kurniati and Yanfitri, 2010). The oligopoly market causes the process of price formation not to be solely based on supply and demand mechanism. Commodity price plays an important role in stabilizing the economy of a developing country.

Levy and Barton (2004) stated that there are a number of considerations influencing pricing strategy including cost structure, competition, and consumer communication strategy, and marketing strategy, in general. The oligopol market triggers a disparity of profit sharing between intermediary institutions and producers. The price at consumer level can be more influenced by a disparity in information. Ferreira and Ferreira (2010) showed that an oligopoly structure can benefit those that needed vital information and take more advantages in a distribution chain.

Price is an important variable in product and commodity marketing strategy. Noah and Alexander (2001) examined the determination of price mark up and can be useful for predicting consumer interest in making a purchase. Suryana and Nurmalina (1990) outlined the targets of price policy into three aspects. First, protecting producers from the drop of market prices of their products, second, protecting consumers from retail price increase which surpass the purchasing power, and third, controlling inflation through price stability.

In the context of agricultural commodities, Marks (2012) stated that political economic aspects play a role in commodity pricing. Marksț review (2012) on shrimp commodity trading in the USA showed that organizational change in fisherman and shrimp traders association, demographics, technological changes, and government macro policies in shrimp trade lead to price changes in the fisherman and consumer level.

Various pricing strategies cause price formation patterns to become more complex. Price is not only determined by the well-known formula such as cost structure and marketer's expectation of profit level. Instead, price is also determined by various aspects including market structure, consumer characteristics, distribution patterns, and marketing strategies.

The equilibrium price is formed through a supply-demand process in which the demand is equal to the supply. Shifts in demand curve such as consumer income, price of other products, and preference changes are influenced by input price factors, technical changes, or price of other products. Price can also be formed through several factors. First, input variables and other production factors used in the production process to become output. Second, non-production variables such as distribution costs, marketing costs, and profit margin, and third, market structure that reflects the degree of competition and the ability to influence price.

An economic agent makes a profit through one of these three efforts to increase the economic value of a certain commodity. However, the distribution activities remain central among these efforts because they deal directly with the consumers, after going through a process of change or storage. For some types of

agricultural commodities such as vegetables, change and storage process were not necessary because they can change their features and taste. In addition, the perishable nature in a commodity makes the distribution activities to consumers becomes more dominant.

The formed commodity price at the final stage or consumer level depends largely on the distribution efficiency. The distribution efficiency of a commodity is greatly influenced by the length of the distribution chain. The shorter the distribution chain, the smaller the profit margin, and then the distribution activity will become more efficient. Distribution efficiency is also influenced by the condition of transportation sector. Problems in transportation sector lead to increased cost and longer delivery times, and it will give negative effect to the distribution efficiency. The transportation problems can be in the form of lack of transportation vehicles, deterioration of infrastructure quality, and natural disturbance. It means that distribution efficiency desperately needs the support of transportation sector.

Heizer and Render (2001) argued that supply chain encompasses all interactions between suppliers, manufacturers, distributors, and consumers. This interaction is also related to transportation scheduling information, credit or cash transfers, and raw materials transfers. Levy and Barton (2004) defined supply chain management as an approach to achieve efficient integration between suppliers, manufacturers, distributors, retailers, and customers. Supply chain management needs to consider the impact of activities by suppliers, manufacturers, warehouses, distributors, retailers, on product costs that meet the customers' needs. Supply chain management is aimed to cut down the cost occurred in the transportations, the raw materials distributions, the in-process goods, and the finished goods. Supply chain management revolves around the efficient integration of suppliers, manufacturers, warehouses, distributors, retailers, and all corporate activities. Siagian (2005) stated, there are two important factors in supply chain management. The first consists of collaborative efforts between the involving parts and processes in the product cycle, and the second is the coverage of all product cycle activities. The implementation of supply chain is to win the competition with similar companies, create a cheap, quality, timely, and varied product. The final consumers will receive added value and the product gets its own positioning from the consumer.

Mainly, the supply chain is classified into two types of fresh and processed products. Fresh products such as fruits and vegetables do not require special processing and chemical transformation. Processed farming products require chemical transformation and deformation. Supply chain of processed products involves several players such as farmers, processors or manufacturers, distributors, and retailers. In this network, there is more than one business process that can be identified. At one time, parallel and sequential processes occur in the agricultural supply chain (Pujawan, 2005).

Study on supply chain is generally carried out by management and metal-based engineering researchers. Several studies examine agricultural supply chain such as, (Schiefer, 2002; De Haan *et al.*, 2003; Van Der Zee and Van Der Vorst, 2005; Aramyan *et al.*, 2006; Yandra *et al.*, 2007). There are a number of studies in horticulture supply chain (Van Der Vorst, 2000; Top and Rijgersberg, 2003; Buurma and Saranark, 2006; Dimyati and Muharam, 2006; Araki *et al.*, 2008; Marimin and Hadiguna, 2008). The unique characteristics of agricultural products cause the supply chain to be more complexed.

Heizer and Render (2001) argued that supply chain covers all interactions between suppliers, manufacturers, distributors, and customers. The interactions also deal with transportation, sheduling information, credit and cash transfers, and raw material transfers. Siagian (2005) stated that supply chain management is related to the complete cycle of raw materials from suppliers to productions, warehouses, and distributions, to customers. Meanwhile, companies strengthen competitiveness through product quality, cost, and speed to create added value in the supply chain.

The implementation of supply chain management involves the introduction of supply chain members with whom they are related, the processes that need to be linked in each primary member, and the type of incorporation that needs to be applied. The purpose of this implementation is to maximize the competition and profit for the companies, members, and customers. The supply chain members include all corporations and organizations dealing with primary companies through suppliers and customers, ranging from the point of origin to the point of consumption. The primary members are all companies that run managerial and operational activities in producing goods for customers and markets. The secondary members are the provider of resource, knowledge, utilities, and assets for primary members. From the definition of primary members and secondary members, it can conclude that a point of origin of the supply chain is the point at which there is no primary distributor. All suppliers are secondary members, while the point of origin consumption is the point without the primary customers (Miranda and Tunggal, 2005).

3. Research Methodology

This research employed both quantitative and qualitative design. Quantitative design analyzed market structure while the qualitative, with structured interviews, analyzed the behavior of intermediery institution in the beef supply chain. The population in this study was those who are involved in the supply chain of beef in ex-Surakarta Residency, Indonesia. The base of the analytical unit included breeders, distribution agencies, and commodity marketers such as slaughterhouses, traditional markets, supermarkets, and retailers. This study used a combination of purposive random sampling and quota sampling for the surveys. There were 7 districts and city namely Sukoharjo, Boyolali, Wonogiri, Sragen, Klaten, Karanganyar, and Surakarta, with 36 respondents each. The total respondents were 134 respondents. Snowball sampling was used to determine the key respondents in the supply chain path to be interviewed. The composition of respondents included 16% of breeders, 10% of brokers, 10% of wholesalers, and 64% of small traders.

4. Result and Discussion

Supply chain of beef market in Indonesia consists of two traded commodity groups, beef and cattle. This supply chain consists of two regional characteristic, they are consumers and producers area. In Indonesia some provinces such as East Nusa Tenggara, West Nusa Tenggara, Bali, East Java, Central Java, Banten, Lampung, and North Sumatra serve well to meet both regional and national demands. The types of livestock and business actors also have different characteristics but still in the similar supply chain model.

This study was conducted in Surakarta residency, where most of the beef demand came from slaughterhouses in Boyolali. Slaughterhouses in Boyolali get beef supply from Cow Traders Association in Ampel. The association incorporates 100 members who provide cow breeds. The calves are taken fom East Nusa Tenggara, Madura, and Bali. The weigh is less than 450kg. Meanwhile, the need for beef in Klaten District comes from slaughterhouses in Boyolali, it is then delivered to traditional markets in Klaten and Tegal Gedhe Animal Market. Traditional markets in Klaten also receive their beef supply from certified slaughterhouses in Karanganyar. The certified slaughterhouses in Karanganyar deliver beef to traditional markets in Jaten, Jumantono, and Tegal Gedhe animal markets.

Slaughterhouses in Boyolali send beef to traditional markets in Wonogiri. Wonogiri get beef from local breeders through private slaughterhouses in Wonogori. Sragen is supplied from slaughterhouses in Sragen and Boyolali. Surakarta gets supply from slaughterhouses in Surakarta, Boyolali, and Kalioso. Traditional markets in Sukoharjo get beef from certified slaughterhouses in Sukoharjo and Boyolali. Slaughterhouses in Boyolali send beef to traditional markets in Boyolali and Kartasura, and outside areas such as Jakarta, Yogyakarta, Salatiga, Semarang, Madiun, and Ponorogo.

From the profit side, the highest level of profit margin ratio at the small traders' level was reaching up to 0.33. It is followed by business consummers level with 0.08, and then 0.04 for the wholesalers' level, and 0.03 and 0.04 for breeders and brokers respectively. Profit margin ratio is the ratio between the profit level obtained by the marketing agency and the costs incurred by the marketing agency.

The selling price of beef at breeders' level ranges between IDR 38,000 – IDR 44,000, then sent to brokers in other regions. The brokers sell to wholesalers with price ranging from IDR 44,000 to IDR 65,000, and for small traders the price range from IDR 84,000 up to IDR 90,000. Small traders sell beef to business consumers with a price range between IDR 93,000 to IDR 100,000. The price from industry consumers to end consumers was IDR 95,000 to IDR 120,000.

The price of a living cow set by the government is IDR 38,000/kg. The highest price from breeders reach IDR 45,000/kg and the lowest is IDR 30,000/kg. This price is influenced by the nursery cost (IDR 4,000,000 to IDR15,000,000), the cost of making permanent cage with capacity of 50 cows (IDR 130,000,000), vitamin B complex (IDR120,000), worm medicine (IDR 240,000), disinfectant (IDR 280,000), feed cost (IDR 1,000 / kg), concentrate (IDR 3,000 / kg), and labor cost (IDR 1,500,000 to IDR 1,750,000).

At brokers' level, the price range of cattle is IDR 70,000 to IDR 150,000 / kg. Slaughtered cattles into meat and bone (carcass) with a ratio of 2: 1. Carcass is meat plus bone minus legs plus internal organs plus head. Carcass consists of 2/3 meat and 1/3 fleshy bones. At the wholesalers level, the price range is IDR 75,000 to IDR 140,000/kg. At the level of small traders, the price range of beef reaches IDR 50,000 to IDR 150,000/kg.

Farmers take up 37% of the producer share, while the share at the brokers' level is 54%. Retailers hold a share of 75%, and the producer's share at small trader's level is 83%. The analysis indicates that the average market share is very good from the small traders' point of view. The highest marketing margin is direct sales from farmers to end consumers, with a margin rate of IDR 76,000 - whereas marketing margin from brokers to consumers is IDR 49,600. Average margin through wholesalers to consumers was IDR 10,100. The margin

from small traders to end customers is IDR 8,300 and the average marketing margin from brokers, wholesalers, and small traders reaches IDR 68,000.

Beef is a staple food with high protein content that is not only consumed by end consumers but is also as raw materials for industries, hotels, restaurants, and catering. The national consumption of beef increases along with the raising population and changes in consumption patterns.

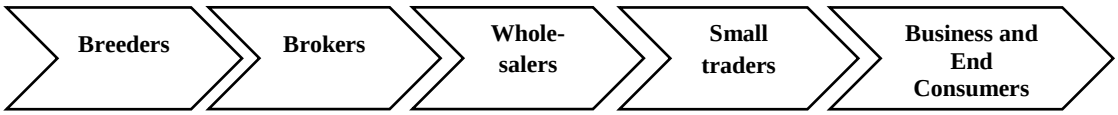

Figure 1. *Market structure along the supply chain of beef market in Indonesia*

Table 1. *Market structure along the supply chain of the beef market in Indonesia*

	Breeders	**Brokers**	**Wholesalers**	**Small traders**	**Business and End consumers**
Average margin		IDR 49.600	IDR 10.100	IDR 8.300	
Profit ratio	0,03	0,03	0,04	0,33	
Price	IDR 38.000 – IDR 44.000	IDR 44.000 – IDR 65.000	IDR 84.000 – IDR 90.000	IDR 93.000 – IDR 100.000	IDR 95.000 – IDR 120.000
Market share	37%	54%	75%	83%	
Transmission elasticity	1	2,174	2,873	4,770	
Concentration ratio	80,27%	69,55%	59,66%.	17,78%.	
Market structure	Oligopoly - perfect competition	Oligopoly	Oligopoly	Perfect competition	

The amount of beef consumption should be balanced with sufficient beef supply to prevent price fluctuations. In spite of that, there are also some factors causing the increase of beef price in the market such as marketing subsystems. The marketing subsystems deal with the supply chain trading system of beef commodity. The subsystem comprises of business actors, market and slaughterhouse institutions, and distribution facilities, which are useful for the identification of beef distribution to the consumers' area.

Based on the calculation of concentration ratio, at farmer level (80.27%), broker (69.55%), and wholesaler (59.66%), they are in an oligopoly market structure. While at a small trader level, the market structure tends to be perfectly competitive. The transmission elasticity of the price of beef at the producer level to the consumer equals 1 means that the rate of price change at the consumer level is equal to the rate of price change at the producer level so that the prevailing market is a perfectly competitive market with an efficient market. This does not occur at broker level (2,174), wholesalers (2,873), and small traders (4,770) indicating that markets are inefficient and tend to oligopolist market structures (see Figure 1).

By interviewing some actors in the beef industry, this research revealed that the supply chain of beef market in Indonesia involves breeders, brokers, wholesalers, small traders, and industrial and end consumers. Slaughterhouses only serve as a place to animal slaughter and have no effect on price formation.

- *It's from breeders, and then taken by blantik (wholesaler), blantik sell to slaughterhouse with the method of appraisal. After the slaughter house? That I say it is then sold to consumers, but we call that kind of consumer as prembe (**Small trader/31/male**).*

The distribution of beef commodity is influenced by four key actors and each of the actors has their own roles:

- *I activate within a local scope, local beef comes from breeders, to traders (wholesalers), and then slaughterhouses both governmental and private slaughterhouses, and then to small traders **(Broker/52/male**).*
- *Prembe is a kind of small trader, not slaughterhouse because our layer is under slaughterhouse, from prembe then to bakso-maker consumers (bakso is a traditional food resembling meatballs but containing more starch as), and end consumers (**Small trader/47/female**).*

Breeders, wholesalers, slaughterhouses, and small traders earn different profit margins. Each layer also sells different parts:

- *All slaughterhouses give the same estimates (for live cattle). When one estimates a cow at the price of 20 million rupiah, it will all be the same. We farmers sell jugrug (cow sold alive) at a price of 21 million. A slaughtered cow has a price 20 million rupiah (**Breeder, 50/male**)*

- *What the breeder sells can not be compared to us. It's through the process. Breeders sell live cows, and when cows have been slaughtered it consists of meat and carcasses. 500 kg consists of 2/3 meats, the rest is carcass. The price of dried meat is IDR 105.000 (**Wholesaler/50/female**).*
- *It's difficult to sell beef on 110 thousand rupiah. We take from wholesaler 105 thousand rupiah for pure beef, dried beef. We can get 93 thousand rupiah for mixed beef ...Before 2010 we can earn 10-15 thousand rupiah per kilogram. Now we take profit only Rp 1,000, - or Rp 2,000, - per kilogram (**Small trader, 47/female**).*
- *A cow gives us 2 million profits. We like thick-skinned cows, but slaughterhouses and brokers like thin-skinned cows (**Breeder/50/male**)*

The difference in profit margin is not a problem for every layer of the beef supply chain.

- *Yes it is natural. 110 or 105 per kilogram are reasonable. We all can always survive. Breeders survive. Slaughterhouses, brokers, small traders, bakso-makers, they all survive (**Small trader/31/male**)*
- *No, it's not because of the price game. The current price is in line with the market, just slightly different during religious holidays (**Small trader/47/female**)*

It is important to remark that market structure of beef market along the supply chain in Indonesia is still oligopoly. This has an impact on the formation of beef prices that tend to be high. The large number of actors involved in the supply chain also contribute to the price of beef in Indonesia.

5. Conclusions

The result of this study revealed that there is inefficiency in the market that tends to be oligopoly indicates cartel involvement in the supply chain of beef commodity. Price stabilization of beef commodity is also corelated with the margin distribution at each supply chain level. There is a disparity. Breeders get a small profit margin ratio. Inefficiency is the main cause of this problem. The appropriate step for the government is to give assistance and access to capital.

The highest level profit margin ratio is at the small traders followed by business consumer's level then the wholesaler's level, breeders and brokers. This research identified that the market is inefficient. This indicates that price formation occured is not only caused by market mechanism but also is influenced by certain groups that have power in determining the price. At the level of cow breeders, brokers, and wholesalers, the market structure tends to be oligopoly. At the level of small traders, the market structure tends to be in perfect competition. Governments should encourage distribution agencies to stabilize price. Cooperative or breeder association at the breeder level needs to be strenghtened to avoid unfairness of price formation.

Government intervention could be a solution to restrain inflation especially in commodity markets. The policy is aimed to support domestic farmers by taking into account the production capability of the domestic agricultural industry in meeting the market needs. The ultimate goal is to create self-sufficiency of various food products. This policy should have positive impact for domestic farmers in increasing their productions. However, problems arise when control of horticultural imports is implemented without a certain level of readiness and required strategies from the government.

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