

The Structure-Conduct-Performance of Indonesian Apple Fruit Market

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Abstract — Apple is an original plant of the sub-tropical area. However, Indonesia as a sub-tropical country also has grown apple plant, specifically in Malang Region, East Java Province. This study aimed to understand the structure, conduct, and performance of the apple market in Indonesian. The study was conducted in Java Island, focusing on Malang Raya as the production area, and three other towns as the marketing area. The data includes the volume and production cost, traded volume, price, and marketing cost from the farmers and traders of Indonesian apple. We used concentration ratio, pricing description, and marketing profit to analyze the market structure, conduct, and performance, respectively. The result shows that the market structure of Indonesian apple is oligopoly at all levels of marketing channel, where the wholesalers have the highest concentration ratio. Consistent with the market structure, the wholesalers also have the strongest bargaining position in pricing, so that they become the price maker. In the market performance, the wholesalers also earn the highest profit. The research finding implies effort to increase the marketing profit and efficiency. The farmers need shorten the marketing channel towards the supermarkets. The wholesalers need to reduce the marketing cost by minimizing the fruits damage in transportation. Finally, the agents and retailers need to reduce the unsold apple.

Keywords—Indonesia apple fruit, market SCP

I. INTRODUCTION

Apple fruit is originally growth in the sub-tropic area. However, Indonesia as a tropical country also has apple fruit. Malang region of East Java province has been one of the Indonesia's centers for growing the apple plant. Indonesia apples meet the market competition both among the local products and with the imported ones. In a competitive market, the apple agribusiness actors want to reach the best market performance. It is related to the market structure and conduct.

Market structure is a competitive environment where buyers and sellers of a product operate. There are four market structures namely perfect competition at one extreme point, monopoly on the other extreme side, monopolistic competition and oligopoly that lies between the two extremes [1].

Market conduct is a pattern of behavior that firms follow in adapting or adjusting to the market. Behavioral dimensions include the firm methods in determining the output prices and marketing policies in choosing the proper strategies in dealing with the strong competitors or participants [2].

Market performance is economic results from the industry and how its efficiency and improvement or innovation.[2]. Market performance is an impact of market structure and behavior which is a measurement result from variables such as price, cost and output volume.

The structure-conduct-performance (SCP) approach describes the existing condition of the market structure and conduct and its implication on the market performance. The market structure influences the pricing and marketing strategy that should be determined by the market actors of an industry [3].

There are several types of research using the SCP approach on some commodities worldwide. The research analyzed the market structure in Bangladesh from the concentration ratio, entropy index, and the Gini coefficient. [4]. Mu'azu *et al.* also uses CR4 to analyze the competition of poultry in Malaysia [5]. Nzima *et al.* analyze the groundnut market SCP efficiency in North and Central Malawi [6]. The analysis of market conduct was by pricing description[[4],[5],[6]]. The market performance identification was by measuring the internal return [4]. Those researches are about agribusiness products.

So far, In Indonesia we found a very limited publication on SCP. Prasetyo *et al.* analyzed the SCP of bamboo crafts [7]. On the field of feed industry, we found two publications on the similar issue [[8], [9]]. We also found the SCP on corn seed industry [10]. There is no publication about SCP on Indonesian apple, even none on the fresh

agricultural products. The agribusiness actors need the SCP information to create a strategy in the competitive market. This research aimed to analyze the structure, conduct, and performance of the Indonesian apple. The result is beneficial in giving the information needed by the agribusiness stakeholders of Indonesian apple.

II. METHODS

A. Research Location and Sampling Technique

The study started from Malang Raya (Kabupaten Malang, Malang City, and Batu City) and continued up to retailers in three other cities in Java Island. The sampling technique used is snowball sampling to follow the apple fruits flow from farmers to wholesalers, agents, and retailers. The sampling technique is a non-probability sampling category, where the sample is selected based on non-random criteria [11]. The total samples are 40 farmers, 20 wholesalers, 4 agents, and 12 retailers. The total samples were 40 farmers, 20 wholesalers, 4 agents, and 12 retailers.

B. Analysis method

This research separated the analysis of market structure, conduct, and performance for the apple farmers and traders. This research analyzed the market structure by using the Concentration Ratio (CR4), Herfindahl Hirschman Index (HHI), and description of the entry and exit barrier. The CR4 and HHI analysis have been used by Mua'zu *et al.* [5] and Raha *et al.* [4]. The CR formulation follows formula (1), where CR is the concentration ratio of a number of m farmers (or traders), S_i is the market share of ith farmers (or traders) which is sorted from large to small (descending), m is the number of farmers (or traders) counted.

$$CR_m = \sum_{i=1}^m S_i, \quad m = 4, 8, 10 \dots \dots \dots, 20 \dots \dots \dots$$

(1)

The formulation of HHI follows the formula (2), where MS_i is the market share of the ith seller, and n is number of seller in the market.

$$HHI = \sum_{i=1}^n MS_i^2 \dots \dots \dots$$

(2)

This research analyzed the market conduct through the description of the apple marketing system and pricing. Meanwhile, this research analyzed the market performance by observing the marketing profits of apples.

III. RESULT AND DISCUSSION

A. Market Structure

Table 1 shows that the majority of farmers have marketing volume less than 50 tons per season (around six months). There are only a few farmers who have marketing volume more than 50 tons per season. It means that there is market concentration on a few numbers of farmers.

The analysis results of the Concentration Ratio (CR4) and HHI show that the market structure is competitive but

has led to oligopoly, both on farmer and wholesaler levels (Table 2). At the farmer level, a number of the four largest farmers controlled a market share of 27%. At the wholesale level, a number of the four largest wholesalers controlled 44% of Indonesia's local apple market. This CR4 result shows that the local apple market is moderately concentrated industry.

TABLE I. FARMER DISTRIBUTION BASED ON YIELD AND MARKETING VOLUME

Volume (Ton)	% Farmer	Marketing Volume	% marketing volume
≤25	39.02	246.50	18.04
25-49	51.22	750.00	54.88
50-74	4.88	105.00	7.68
75-100	2.44	90.00	6.59
≥100	2.44	175.00	12.81
	100.00	1,366.50	100.00

The value of HHI at the level of farmers and wholesalers is 0.04 and 0.07 respectively. This Figureure is still below the competition index limit (0.1). The value of HHI for apple wholesalers is slightly higher than that of HHI for farmers. That is, the market structure of wholesalers is more directed towards oligopolistic. Field data shows the marketing volume at wholesaler ranges from 10 tons up to 225 tons per month. The CR4 analysis result supported the fact by showing there is a concentration of the four largest apple farmers and wholesaler.

TABLE II. THE CR4 ON FARMERS AND WHOLESALERS

The four biggest	Farmers			Wholesalers		
	Volume (ton)	Market share* (%)	HHI ***	Volume (ton)	Market share** (%)	HHI ***
1	175	12.80	0.04	225	14.51	0.07
2	90	6.59		165	10.64	
3	55	4.02		150	9.67	
4	50	3.66		140	9.03	
Total		27.08			43.86	

Note: *Total apple volume marketed by total farmers sample = 1,366.5 ton
 **Total apple volume marketed total wholesaler sample =
 *** It is counted from the total farmers and total wholesalers

The results of market structure analysis at the farm level indicate that CR4 is 27.08%. Farmers are only a small part

of many individual actors who produce apples and are a small part of the entire Indonesian local apple market. Therefore, an individual producer does not have any power to influence the market. So, the concentration of sales at the farm level is very low. On the other hand, the concentration of traders in Malang Raya is relatively higher. Compared to the market structure of horticultural commodities, onions are almost the same, because the market structure of onion is undergoing a change from oligopsony to a perfectly competitive market [12]. Comparing with the rice market structure at the farm level in Bangladesh, there has been a calculation in several regions showing results of less than 50% and more than 75% [4], the level of local apple market concentration at the farmer level is much lower.

The result of market structure analysis at the wholesale level indicates that CR4 is 44%. Based on CR4, the local apple market structure at the wholesale level is moderate monopolistic. Local apple CR4 results are almost the same as previous studies in the animal feed industry in Indonesia which has a moderate oligopoly market structure with a CR4 of 37.45% [8]. As a comparison, in the market structure of SME, the CR4 value is lower, namely 18.91% [7].

This research presented the market structure along with the description of its entry and exit barriers to the market (the business). The majority of apple farmer stated that starting an apple farming business is difficult, because they have to have skill on apple cultivation, and have or rent suitable land. However, quitting from the business is very difficult, because it is not easy to change the crop.

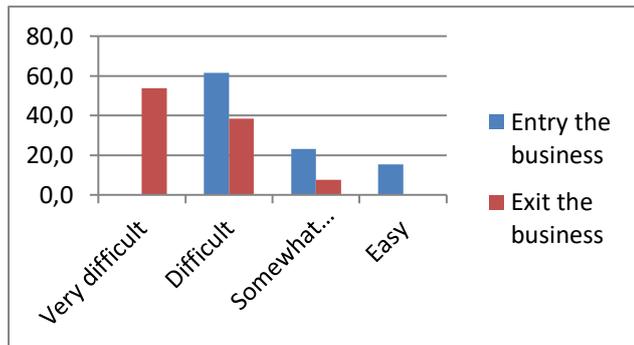


Figure 1. Difficulty at farmer level

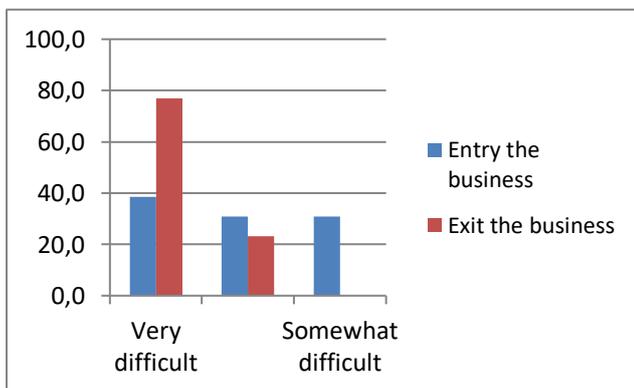


Figure 2. Difficulty at wholesaler level

Figure 1 until Figure 4 shows the difficulty of entry and exit the business of Indonesian apple, according to the respondent's answer. On the upstream of apple agribusiness (farmers and wholesalers), there are some exit barriers, because their efforts are specific on apple commodity only (Figure 1 and Figure 2). On the contrary, on the downstream (agents and retailers), it is more difficult to entry rather than to exit the businesses (Figure 3 and Figure 4).

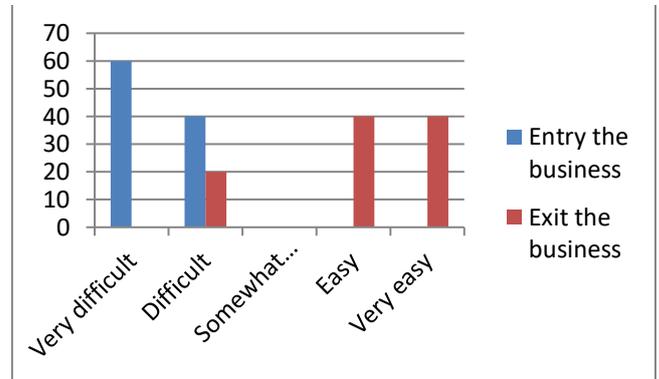


Figure 3. Difficulty at agent level

The difficulty in quitting the businesses is due to the long-term investment of apple plant. Replacement of commodities is also a problem. The facts show that a number of farmers replace apple crops with orange because the damage land caused the apple less productive. However, if the apple plants are still productive, farmers do not switch to other crops.

The wholesalers also acted as the information source on the entry and exit barriers to the market. The majority of wholesalers stated that starting an apple marketing business was very challenging, even though some of them claimed that it was challenging and somewhat challenging (Figure 2). Likewise, to stop the business is felt very difficult.

The discussion of market structure at the agent level is limited to the entry and exit barriers to the business. At the agent level, traders generally feel that starting a business is more difficult than stopping business (Figure 3). To start a business, they need a lot of capital and a place of business in the central market which is not easy to obtain. Whereas to quit the industry of apple marketing is easier because agencies do not only trade apples. This phenomenon is different from obstacles to entry and quit at the level of farmers and wholesalers, where they feel that quitting the business is more difficult than entry a business (Figure 1 and Figure 2).

For retailers, starting to sell apples when the business already exists is not difficult, even to stop selling apples is even easier. This fact is a result of the respondents' answer proportion (Figure 4). Respondents considered their difficulty in selling the local apples was due to unresponsive buyers; the answer of which has become the primary option for the retailers from outside Malang area. For the retailers, there is no difficulty to purchase apple because the apple wholesaler is available in the city. Meanwhile, the reason for stopping the sale of apples is easy because they still have other fruit merchandise and

they are not bound to buy and sell with wholesalers because of the purchase of apples in cash.

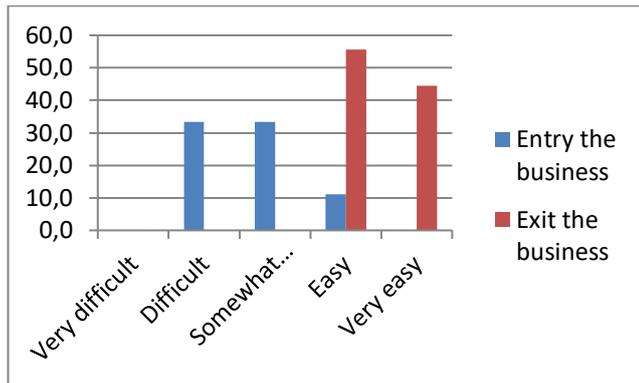


Figure 4. Difficulty at retailer level

The analysis of the market structure at the retail level also described the level of stock differentiation. Local apples commonly cultivated by farmers in Malang, it consists of three cultivars, namely: Manalagi, Rome Beauty and Anna (Figure 5). Each plantation usually has three types of apple. The diversity in apple types planting is the effort of the farmers in avoiding the crops collapse on one of the cultivars. On the other hand, diversity is also to gain a high price for one of the cultivars. Nevertheless the biggest proportion of plants is Manalagi cultivars, because they adjust to the preferences of consumers who prefer apples with sweet taste



(a) (b) (c)

Figure 5. Cultivar of Indonesian apple: (a) Manalagi, (b) Rome Beauty, (c) Anna

Overall the structure of the Indonesian apple market is an oligopoly market. The market concentration in the four largest farmers did not cause any significant profit difference between the large and small-scale farmers. Likewise, the insignificant difference also occurred in term of purchasing price between the large and small-scale traders despite the market concentration in the four largest wholesalers. This finding is different from previous research which states that market concentration affects prices more than profit [13].

B. Market Conduct

The marketing system starts from the process of buying and selling apples between farmers and wholesalers of apples in Malang. Furthermore, wholesalers sell apples directly to retailers in Malang Raya and to agents outside city (Figure 6). In this study, out-of-town agents included wholesalers in Surabaya, Yogyakarta. and Bandung. From wholesalers outside the town, Indonesian apples are marketed to retailers in each city.

Buying and selling transactions start from apple wholesalers who visit apple farmers or vice versa.

However, in general there has been there subscription and sale between traders and farmers. Most farmers tend to sell to the same trader every time of harvest, except at the same time the trader has oversupply. Likewise, traders tend to prioritize the purchase of their farmers subscriber, unless there is a shortage of supply.

The apple purchasing from the farmers was by a mixed system, that is no grading nor sorting for the apple stock. Traders observe farmer's apples for several days (usually one week) to estimate the proportion of grade super, A, B, C, and D. Here it is necessary to have the skills of traders to avoid loss in estimating apple grading. When taking field data, the price of apples per kg ranges from Rp.8,000 to Rp.10,000, this is where the price negotiation is located. If the proportion of apple size tends to be small, traders buy at a price of Rp. 8,000 per kg. However, if the quality of apples tends to be large, the traders dare to buy at a price of Rp.9,500 per kg, and even Rp.10,000.

After they settle the deal, the farmers harvest the apples in all grades and calculate the transaction value. Traders and farmers sorted the quality of apples. Traders buy all sizes of apples from farmers, but generally they do not buy the sorted apple (there was a prior agreement). Apples that are sorted are apples that have collisions or foul defects from the tree. This sorting appliance is sold separately by farmers to other traders (there are middlemen or apple retailers who accept this particular apple sorter). The number of sorting apples is relatively small and not taken into account in the analysis of this study.

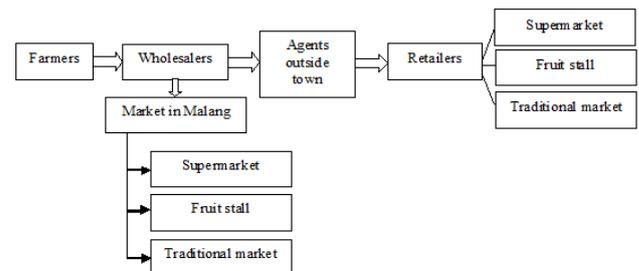


Figure 6. The marketing channel of Indonesian apple

Market conduct shows that market prices are determined through negotiations between sellers and buyers. But those who are stronger in determining prices are wholesalers in Malang Raya and agents outside the city. Although there are bargains in the transaction process, farmers and retailers only act as price takers.

Bargaining between farmers and wholesalers always occurs in the purchase of apples. However, wholesalers determine the price, as it is answered by 92.7% of farmers and 38.5% of wholesalers. Other wholesalers, 61.5% answered that market determines the price, meaning that it is based on bargaining. There are no respondents who state that farmers have the right determine the stock price. This shows that the farmer position is as a price taker, although there is an opportunity to bid prices, but the position of farmers is weaker. The traders' power in determining the apple price is because of the limited purchasing power of consumers, and perishable character of apple commodity.

Maximum within one month after harvested, apples must be sold to consumers.

The apple marketing system is wholesale from the farmer level to wholesalers and followed by a consignment system from wholesalers to out-of-town agents. The consignment system on apple marketing from the local wholesalers to the out-of-town wholesalers is beneficial in shortening the marketing channels. However, the short marketing channel does not mean the marketing efficiency. The delayed payment systems ranging from retailers to wholesalers, wholesalers to the local wholesalers, and lastly from the local wholesalers to the farmers have caused the inadequate payment system. The greatest impact is the enormous capital requirement at the local wholesaler level, which is the main barrier to entry the business of local apple marketing.

The marketing channel is short enough but does not mean that there is marketing efficiency. Market behavior shows that market prices are determined through negotiations between sellers and buyers. But those who are stronger in determining prices are the wholesalers in Malang Raya and agents outside the city. The number of farmers who are far more numerous and the more competitive market structure causes a farmer do not be able to influence market prices. Farmers are positioned as price takers, even though they also have a strategy to set the starting time of cultivation to get harvest time at higher prices. But this strategy has not been fully successful due to weather constraints and others.

C. Market Performance

Table 3 is arranged in such a way that the benefits between local apple agribusiness players can be compared. It appears that the biggest advantage in the number of apples per truck is the farm profit obtained by farmers. However, remember that the apple farming period since the leaf decomposition to harvest takes 5 to 6 months. Therefore, the profit comparisons are also carried out per season (six months) and per month. In both categories, the highest profit is obtained by wholesalers. If the comparison is the total profit, the result is more contrast. Because the greatest number of farmers (54%) has only 1-3 hectares apple land. It means that the monthly profits range from Rp.8 million up to Rp.25 million. Whereas the highest number of traders has apple sales volume in the range of 50 tons per month, with an average profit of IDR 70 million. This means that the monthly profit of wholesalers is almost three times the profits of farmers.

Table 3. The Marketing Profits For Various Agribusiness Players Of Indonesian Apple

Agribusiness player	Per 5 ton (per truck)	Per season (5-6 month)	Per month
Farmer* (Rp)	24,230,440*	49,430,100**	8,238,350***
Wholesaler	7,000,000	420,000,000	70,000,000
Agent	3,914,444	189,846,000	33,893,333

*Farm profit per 5 ton of yield (average productivity of 10.2 ton/Hectare)

** Farm profit per Hectare per season (six month)

***Average farm profit per month

The apple marketing gives the good profits to all local apple agribusiness actors. The highest profit is enjoyed by the local wholesalers. However, they also have the highest risk of payment. The marketing performance in Malang Raya is not the most efficient although the marketing channel and the shortest market mileage. The premium price of local apples in supermarkets is not enjoyed by the farmers, because the purchasing apple to farmers is done with a mixed system without any grading.

Consistent with the market structure, the more oligopolistic i.e. the wholesalers have a stronger bargaining position in pricing. The wholesalers become the price maker, while the farmers become the price takers. The market structure and conduct also have the impact on the market performance, where the highest profit is obtained by the local wholesalers.

IV. CONCLUSION

The market structure of the local apple is oligopoly, because there is a market concentration on the big farmers and local wholesalers, and there are also market entry and exit barriers from the upstream to downstream level. Consistent with the market structure, the market conduct shows that there are parties who have a stronger bargaining position in pricing, namely the local wholesalers. They become the *price maker*, in the opposite, the farmers become the price taker. The market structure and conduct consistently affect the market performance, where the strongest oligopolists earn the highest profit.

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