Keprok tangerine supply chain management in Batu City and Malang Region East Java

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Abstract. Changes in the strategic environment in the form of economic globalization, urbanization, and market segmentation, as well as consumer preferences, require changes in the approach to operating business organizations. This study aims to analyze the performance of *keprok* tangerine commodity supply chain management in Batu City and Malang, East Java. The research method was conducted with a survey method by conducting interviews with 60 respondents of the citrus commodity supply chain from upstream to downstream. Citrus commodity supply chains from production centers to consumption centers are classified as moderate involving four to five supply chain actors. The *keprok* tangerine marketing system in Batu City and Malang Regency is not yet efficient, which is reflected in the price share received by farmers (42.28%-57.94%) with marketing margins (42.06%-57.72%) respectively. Supply chain management performance in the planning aspect is at a moderate to very good level, procurement performance is at a moderate to good level, delivery performance is at a moderate to very good level, and the performance of receiving goods is at a lesser level. The *keprok* tangerine commodity development strategy can be done by building an integrated supply chain management from upstream to downstream with agricultural, post-harvest, and marketing infrastructure.

1 Introduction

Changes in the strategic environment in the form of economic globalization- trade liberalization, urbanization, and market segmentation, consumer preferences, as well as a flood of imported citrus fruits demand a change in the approach to operating business organizations and supply chain business actors for citrus commodities. It is estimated that the fruit commodity market, both tropical and sub-tropical fruit will be more dynamic and faced with increasingly competitive competition. The trade balance of national fruit products is still experiencing a deficit. This was due to increased demand due to the improvement in the people's economy, especially the middle and upper-class income groups, but this was not followed by a significant increase in domestic production [1].

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Some of the main problems that cause citrus fruit commodities to not have competitiveness in both domestic and global markets are the relatively low level of efficiency and productivity, post-harvest handling that is not yet prime, the logistics system that is not yet efficient, and expensive distribution and marketing costs. These problems are closely related to the small and scattered tenure of land, low technical skills and managerial capabilities of farmers, as well as high costs of distribution and marketing. The results of a study on the mapping of demand, trade, and production of horticulture show high damage during transportation and unloading at ports (10-20%) [2].

Indrajid and Djokopranoto define a supply chain as a place where a business organization system distributes goods and services to its customers [3]. The supply chain is a set of integrated management packages that are integrated and interrelated, starting from the upstream industry to the downstream [4]. The concept of supply chain management refers to the management of the entire process of production, distribution, and marketing where consumers are faced with products according to their wishes and producers can produce their products in the right quantity, quality, time, and location [5,6].

The linkages that occur include the flow of goods, services, money, and the flow of information from the initial producer to the final consumer. The supply chain is an activity to produce goods efficiently from production to consumers, while the value chain is an activity to produce products according to the wishes of consumers so that consumers are willing to pay for the value of the product which is greater than the cost to produce the product [7,8] . Providing added value to a product can increase the bargaining position and income of farmers [9].

Indicators of the success of a supply chain management for agricultural commodities including oranges are (a) increased margins and market knowledge for farmers as producers; (b) increasing the quality of the products produced; (c) increasing food safety guarantees; (d) sales volume increases significantly; (e) increasing the added value of the products produced [10]. In addition, successful agricultural commodity supply chain management must focus on customer or consumer satisfaction, ensuring logistics and distribution run efficiently, effective information and communication strategies, and building effective supply chain collaboration institutions [11]. If the SCM of citrus commodities goes well, there are at least 4 (four) benefits that can be obtained, namely: (1) there is added value including compliance with orders, accuracy in distribution, and conformity in charging production costs; (2) reduction of transaction costs resulting in a more customer-oriented market response; (3) reducing the risk of the citrus commodity business, namely providing marketing guarantees, capital development, as well as increasing efficiency and increasing the value of the produced citrus fruit commodities; and (4) SCM in the citrus fruit industry can be used as a means of transferring technology from partner companies to farmers in production centers.

The results of the study revealed that imported oranges are still superior to local oranges, especially in terms of quality, however, *keprok* tangerines can relatively compete with imported oranges [12]. Quality is everything that shows a product's specialty or degree of superiority, in this case, citrus fruit products [13]. The results of research on the melon supply chain in Karanganyar district stated that product quality was the main factor in establishing efficient supply chain management [14]. The results of research on the supply chain of Siamese oranges in Gianyar Regency, Bali found that access to information, alternative reliability, and product quality performance indicators are important factors in creating supply chain analysis [15]. However, research on the performance of supply chain management on analysis of the *keprok* tangerine supply chain in East Java production centers has not been widely carried out. This article aims to: (1) analyze the supply chain and marketing margins for the *keprok* tangerine commodity; (2) Perform a supply chain management performance analysis for *keprok* tangerine commodities; and (3) Formulate supply chain management policy recommendations in an integrated and competitive manner.

The results of this study can be used as a policy recommendation to improve the tangerine supply chain management system so that it can compete with other citrus fruits, especially imported citrus fruits.

2 Research methods

2.1 Time, location, and research respondents

Keprok tangerine research was conducted in Batu City and Malang Regency, East Java Province. These locations are *keprok* tangerine production centers in Indonesia. Sample respondents consisted of 20 farmers in Batu City and 20 people in Malang Regency, 2 farmer groups in Batu City and 2 groups in Malang Regency, and 6 citrus traders consisting of 2 collectors, 2 wholesalers, and 2 retailers. Focus group discussions were also conducted with resource persons from the East Java Provincial Agriculture Office, Citrus and Tropical Fruit Research Center researchers, and Batu City citrus entrepreneurs. The total number of respondents reached 60 respondents.

2.2 Data and analysis methods

The data in this research includes secondary data and primary data. Secondary data was obtained from various related offices or agencies, both central, provincial, and district, as well as literature sources from various scientific publications related to supply chain management for citrus commodities. Primary data were obtained from respondents including farmers, farmer groups, commodity associations, PPL, post-harvest handling (packing house), collector traders, wholesalers/ wholesalers, suppliers, retailers in traditional markets, and modern retail (supermarket/ hypermarkets). Data collection was carried out through survey methods and focus group discussions (FGD). The survey method is aimed at collecting data at the household level of citrus commodity farmers and citrus commodity trading actors. The FGD was aimed at gathering data and information on the development of citrus commodities, supply chain management for citrus commodities, and supply chain actors for citrus commodities in each region. Analysis of the performance of the economic development of the orange commodity is carried out by analyzing the development of the area, productivity, and production. Next, analyze the development of demand or consumption. Finally, calculate the development of exports and imports.

Supply chain analysis and trading system margins for citrus commodities use primary data from actors at each supply chain node according to market objectives. The trading system margin analysis is only intended for supply chains with the main target market. Marketing margin describes the difference between the prices paid by consumers and the prices received by producers [16,17]. Included in the marketing margin are all marketing costs incurred by marketing actors and profits received by marketing actors starting from the level of farmer producers to consumers. Mathematically, the following formula is used:

$$M = \sum_{i=1}^{m} Ci + \sum_{j=1}^{n} \prod j \quad (1)$$

Description :
M = marketing margin
C_i = marketing costs I (I = 1,2,3, … , m)
m = number of types of financing
$\prod j$ = profits earned by commercial institutions j (j = 1,2,….n)

n = the number of commercial institutions that take part in the marketing process.

Analysis of supply chain performance is carried out by (1) identifying various forms of supply chain and the actors involved; (2) identifying the level of implementation of supply chain management by business actors; (3) identifying the level of satisfaction of supply chain actors with the four indicators used, namely planning, procurement, distribution, acceptance [18,19] .

3 Results and discussion

3.1 *Keprok* tangerine supply chain

The supply chain involves collector traders, inter-regional wholesalers, suppliers to supermarkets/hypermarkets, institutional consumers (hotels, restaurants, catering /HORECA), wholesalers, as well as retailers in markets and roadside fruit outlets. The supply chain for Batu 55 *keprok* tangerines from farmers to consumers in Batu City and Malang Regency is quite long (Fig 1)

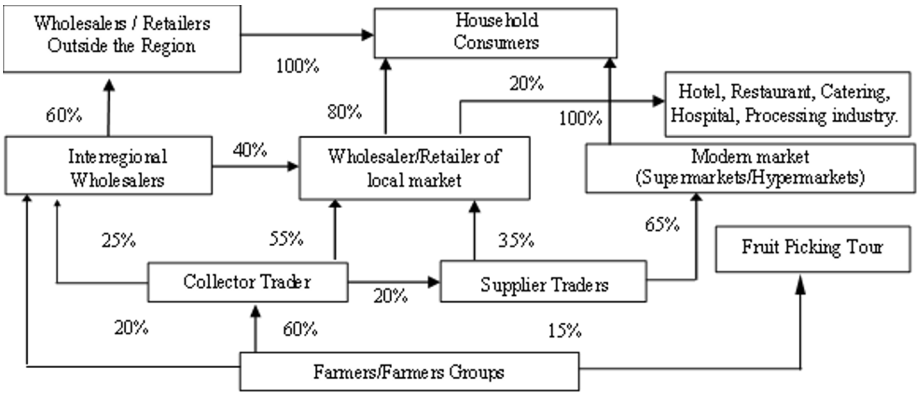

Fig. 1. The *keprok* tangerine supply chain from farmers to consumers in Batu City and Malang Regency, East Java.

The buying and selling transactions of *Keprok* tangerine Batu 55 oranges are carried out on farmer's land. Village collectors carry out picking, sorting, and grading activities, bagging, transporting, and packaging. Purchases are made based on weight per unit by weighing in mixed conditions. Small grades of oranges are taken out and bought at very low prices. Collector traders sell according to several quality classes, namely A, B, C, and D. In addition, farmers sell to inter-regional wholesalers (20%) and directly sell to wholesalers or retailers in the market (15%), and a small number of farmers, especially citrus farmers sell oranges through fruit picking tours (5%).

3.2 Margin of *Keprok* tangerines Trading System

In nominal terms and as a percentage of the retailer's trading system costs, the smallest trading system fee for the *Keprok* tangerines commodity during the main harvest is incurred by village collectors IDR. (5.13%). The biggest costs incurred by inter-regional wholesalers are transportation costs. Meanwhile, during non-harvest times, the smallest trading costs were incurred by village collectors, IDR 560 (2.24%), and the largest costs were incurred by

retailers, IDR 890, - (3.53%). The analysis of the trading system margin from the farmer to the retailer level is presented in Table 1.

Table 1. *Keprok* tangerines trading margin from Batu City and Malang Regency to retailers, 2019

Trade actors	Cost and price components		Main Harvest (IDR/Kg)	(%)	Non-Main Harvest (IDR/Kg)	(%)
1. Farmers	-	Selling price	7,565	47.28	14,515	57.94
2. Collector Trader	-	Purchase price	7,565	47.28	14,515	57.94
	-	Transportation	225	1,41	225	0.90
	-	Unloading and loading	150	0,94	150	0.60
	-	Handling and packaging	50	0,31	50	0.20
	-	Storage	75	0,47	75	0.30
	-	Retribution	20	0,13	20	0.08
	-	Other	40	0,25	40	016
	-	Trading costs	560	3,50	560	2.24
	-	Profit margin	1,475	9,22	2,025	8.08
	-	Selling price	9,600	60.00	17,100	68.26
3. Interregional Wholesalers	-	Purchase price	9,600	60.00	17,100	68.26
	-	Transportation	450	2.81	450	1.80
	-	Unloading and loading	150	0.94	150	0.60
	-	Handling and packaging	50	0.31	50	0.20
	-	Storage	85	0.53	85	0.34
	-	Retribution	25	0.16	25	0.10
	-	Other	10	0.06	10	0.04
	-	Trading costs	50	0.31	50	0.20
	-	Profit margin	820	5.13	820	3.27
	-	Selling price	1,180	7.38	1,580	6.31
	-	Purchase price	11,600	72.50	19,500	77.84
4. Wholesaler	-	Purchase price	11,600	72.50	19,500	77.84
	-	Transportation	350	2.19	350	1.40
	-	Unloading and loading	100	0.63	100	0.40
	-	Handling and packaging	60	0.38	60	0.24
	-	Storage	75	0.47	75	0.30
	-	Retribution	15	0.09	15	0.06
	-	Other	10	0.06	10	0.04
	-	Trading costs	25	0.16	25	0.10
	-	Profit margin	635	3.97	836	3.34
	-	Selling price	1,565	9.78	1,814	7.24
	-	Purchase price	13,800	86.25	22,150	88.42
5. Retailer of Local market	-	Purchase price	13,800	86.25	22,150	88.42
	-	Transportation	100	0.63	100	0.40
	-	Unloading and loading	350	2.19	350	1.40
	-	Handling and packaging	60	0.38	60	0.24
	-	Storage	40	0.25	40	0.16
	-	Retribution	10	0.06	10	0.04
	-	Other	5	0.03	5	0.02
	-	Trading costs	25	0.16	25	0.10
	-	Profit margin	590	3.69	890	3.55
	-	Selling price	1,610	10.06	2,010	8.02
	-	Purchase price	16,000	100.00	25,050	100.00

The size of the profit margin both nominal and percentage of the price received by retailers during the main harvest season from the smallest in a row is the wholesaler between

regions of IDR 1,180 (7.38%), village collectors IDR 1,475 (9.22%), wholesalers/ wholesalers IDR 1,565 (9.78%) and retailers IDR 1,610 (10.06%). During the non-harvest season, the village collectors receive the largest profit margin of IDR 2,025 (8.08%), retailers IDR 2,010 (8.02%), wholesalers IDR 1,814 (7.24%), and wholesalers between regions IDR 1,580 (6.31%). The biggest profit margin is obtained by retailers of IDR 1,610 per Kg, whereas in non-harvest conditions the wholesalers get the biggest profit margin, which is IDR 2010,-per kg.

3.3 Supply chain management analysis

The performance of the implementation of supply chain management (supply chain management/SCM) is seen from the management elements of planning, procurement, delivery to buyers, and receipts from buyers [4]. Overall the level of participation in the implementation of supply chain management for the Batu 55 *keprok* tangerine commodity in East Java is moderate to high. Likewise, the performance of the implementation of supply chain management for the *Keprok* tangerines commodity in East Java is already at a moderate to high level. Table 2 presents the performance of supply chain management for both Batu 55 *keprok* tangerines in Batu City and Malang.

Table 2. Performance of supply chain management for *Keprok* tangerine Farmers in Batu City and Malang Regency, 2019.

Elements of Management	Indicator	Participation (%)	Average SCM Performance
Planning	Finance	86	83
	Procurement	96	73
	Transportation	89	73
	Stock	93.5	72
	Sale	61	74
Procurement	Supplier Selection	82	70
	Pricing	93	72
	Delivery	94	76
	Payment	96	83
Delivery from seller to buyer	Transportation	85	78.8
	Punctuality	86	72.8
	Handling	84	75.2
Receipt from Buyer	Orange Returns	0	0
	Service	30	60
	Replacement Products	0	0

In the planning element, it can be seen that more than 80% of Batu 55 *keprok* tangerine farmers have planned in terms of finance, procurement, transportation, and stock, except for the sales indicator, only 61% of farmers have carried out sales planning, meaning that farmers do not plan sales goals and segments the oranges. This is because some farmers are bound by subscriptions to local collectors.

In the citrus fruit procurement management element, there are four performance indicators, namely supplier selection, pricing, delivery, and payment. Farmers' participation in all indicators is good with participation rates between 82% - 96%. The performance of each indicator is good – very good. The results of this study reflect that most of the *keprok* tangerine farmers only procure oranges from their production, some citrus farmers who are members of commodity groups or associations carry out joint marketing. This means according to the wishes of farmers, namely, farmers are free to determine buyers with prices

according to market mechanisms, delivery of goods to buyers on time, and with cash payments or pay on the spot. *Keprok* tangerine farmers, both those who are members of farmer groups and independent farmers, have a fairly good bargaining position in front of collectors and wholesalers or wholesalers in the market, both during the main harvest and non-harvest seasons, because production volume is still limited compared to the amount demanded.

There are three indicators in the management element for sending citrus fruits to buyers, namely transportation, timeliness, and handling during transportation. There are around 84-86% of respondent farmers who have carried out these three indicators with a good level of satisfaction. This means that according to the perception of citrus farmers, most collectors of citrus commodities have implemented transportation management with a relatively high level of participation (85%) and some farmers market themselves to the market using the available modes of transportation. According to the farmer's perception, the collection or delivery to the buyer is by the agreed time, and handling during transportation does not experience difficulties. Even though they haven't used refrigerated modes of transportation because the durability of *keprok* tangerines is quite good and the distance to the market destination is not too far away. Handling is still limited to providing shade and spraying citrus fruits with water during hot weather. Except for modern market purposes it has been carried out with standard packing with ventilated cardboard.

In the element of management of receipts from buyers, there are three management indicators, namely the presence or absence of oranges returned by the buyer, the presence or absence of the receiving service for returns, and the delivery of replacement products. Farmers do not carry out these two indicators but still participate in one indicator as much as 30%, namely respondent farmers or farmer groups providing services for receiving goods returned, especially for modern market purposes. The indicator for the return of citrus fruits, the results of the study show that no citrus commodities that have been received are returned, meaning that the citrus commodities that are transacted are according to the order because the parties conducting the transaction see firsthand the performance of the oranges. The indicator for reception service for citrus fruits, most of the farmers have implemented management for the reception of citrus fruits with a relatively low level of participation (30%), whereas the performance of the indicators for the supply chain management for *keprok* tangerines as a whole is in moderate condition (100%). As a whole, there are no farmers or farmer groups who have implemented substitute product management for *keprok* tangerine commodities and there have been no cases of buyers returning the *keprok* tangerine commodities they have purchased.

4 Conclusions and policy implication

4.1 Conclusions

The supply chain for *keprok* tangerines from the production centers in Batu City and Malang Regency to the consumption center in Surabaya City involves four to five supply chain actors, namely village and inter-village collectors, inter-regional wholesalers, wholesalers, and retailers in the market.

The marketing system for *Keprok* tangerines in Batu City and Malang Regency is not yet efficient, which is reflected in the share of prices received by farmers, each of which is (42.28%-57.94%) with each marketing margin of (42.06%-57, 72% The market structure tends to approach the oligopolistic market during the main harvest season and tends to approach the perfectly competitive market during the non-harvest season.

The performance of the application of supply chain management for *keprok* tangerine commodities from East Java in the aspect of planning performance is at a moderate to very good level, procurement performance is at a moderate to good level, goods delivery is at a moderate to very good level, and goods receiving performance is at a poor level.

The problem faced in the development of *keprok* tangerine supply chain management in the research location is the lack of variety, quantity, quality, and continuity of supply in accordance with the dynamics of market demand and preferences of domestic and global consumers. This problem is evident for *keprok* tangerine fruit products for modern market purposes and institutional consumers.

4.2 Policy implication

Keprok tangerine development strategy can be done with the following 5 (five) steps: (1) In building an empowered *keprok* tangerine supply chain management institution, it is necessary to improve production performance, product quality, and supply continuity according to the dynamics of market demand and consumer preferences; (2) Supply chain management institutions must be able to explore sources of productivity growth of *keprok* tangerine farming through the application of advanced technology; (3) Implementation of excellent post-harvest handling to provide satisfaction to customers; (4) Improve the efficiency of integrated supply chain management through product process integration and integration; and (5) Increase the content of professional entrepreneurship, especially in farmer youth groups to be able to access modern markets, institutional consumers, and digital markets.

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