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Analysis of Value Added of Fresh Organic Vegetables for The Development Supply Chain Strategy

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Abstract

Organic vegetables have a specific consumer, limited numbers of consumers, and higher willingness to pay than fresh non-organic vegetables. Research carried out directly on each tier supply chain from farmers (suppliers), collectors, wholesalers, middlemen (traders), and point of sales in modern trade. The research objective was to determine the distribution of the added value and classify the supply chain strategy for each type of vegetable. Results showed the greatest added value is the recipient of modern trade and traders with the greatest added value: red lettuce, chili, beans, broccoli and carrots.

Keywords: *organic vegetables, tier, supply chain, modern trade, value added*

1. INTRODUCTION

Organic products' being sold is still quite expensive, because most of these products are imported from abroad. Although organic products are still relatively expensive because of limited production and complicated process compare with the non-organic product. However, demand for organic products increased significantly and much higher than in the food industry in general in both developed and developing countries. Organic food products take into account 2% of the total sales of all food products throughout the world, according to The Global Market for Organic Food and Drink. While the growth of 20% per year since the early 1990s and taken into account future growth could reach 50% per year (Anonim[1], 2015).

Yogyakarta and Magelang are the area that produce organic and non-organic vegetables and very pivotal in meeting the needs of consumers. The flow of the vegetable supply chain from farmers to consumers is important to be noticed (Guritno[1], 2013). This is because consumer demand can be fulfilled, while businessmen from upstream to downstream get the benefit from the distribution of these vegetables. Vegetables are agricultural commodities that have the perishable nature (perishable and broken) because they have a high water content and keep running their biochemical activity even though have been harvested which causes relatively low shelf life. Besides perishable, vegetables also are voluminous (not heavy but need space or space that is wide enough). Therefore vegetables require proper handling of harvesting by farmers, gathering to collectors, and delivery to suppliers and supermarkets to the consumer (Guritno[1] *et al*., 2013).

The purpose of this study was to determine the flow of the vegetable supply chain from farmers Yogyakarta and Magelang until distributed to consumers through a modern market in Yogyakarta, measure and analyze the ability of members of the supply chain in running the business. In addition, the study was conducted because there is no supply chain performance measurement using parameter vegetable supply chain from farmers that are distributed to consumers through modern lines market. Performance measurement method that can be used to evaluate the performance of the supply chain is a method of Supply Chain Operations Reference (Anonim[2], 2015).

2. METHODS

The object of this study as many as four vegetable supply chain consisting of farmers (suppliers) and collectors (broker) in DI Yogyakarta and Magelang, and traders and

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supermarkets in the area of Yogyakarta and surrounding areas. Trader consists of 4 companies, they are CV. Organic Merapi (S), CV. Agrosery (S), PT. Indmira (S3) and CV. Anteronusa (S4). The next stage is to identify the condition of the supply chain are ongoing. Vegetable supply chain performance measurement is obtained by calculating the performance for each attribute obtained from the literature. Performance metric is derived from the book Supply Chain excellence: A Handbook for Dramatic Improvement Using the SCOR Model (Bolstorff and Rosenbaum, 2003). Furthermore, the data obtained during the performance measurement is used again to calculate the value added at each chain. Value added is an objective indicator to assess the success of a business and demonstrate the ability of the company in the creation of value by calculating the difference between output and input (Guritno and Harsasi, 2013). The output represents the revenue and covers all products and services sold in the market, while the input covers the entire load used in obtaining revenue (Aramyan *et al.*, 2006; Guritno[2] *et al.*, 2013).

3. RESULT AND DISCUSSION

The method used to measure the performance of vegetable supply chain is Supply Chain Operatios Reference (SCOR), which consists of three levels of assessment. Level 1 is the level associated with the types of processes consisting of plan, source, make, deliver and return.

Based on the results in delivery performance and perfect order fulfillment attributes, organic suppliers have a high percentage of the non-organic supplier. This is due to the number and types of vegetables being ordered by the collectors or traders directly to the supplier more than non-organic organic suppliers, so that organic suppliers more easily fulfill the order. The number of orders received by organic suppliers' is 20 kinds of organic vegetables, while non-organic suppliers' as much as 30 species with an average of 150kg / day of organic vegetables and 250 kg / day of non-organic vegetables. For attribute order fulfillment lead times and supply chain response time, both non-organic and organic suppliers have the same value which are respectively 1 day. That is because vegetables product is easily broken, so that after harvesting process it must immediately be sent to the next tier to be sent to the supermarket in order to keep the product fresh when purchased by consumers.

Performance measurement results show the attributes of delivery performance on collectors or broker that is 92.23% higher than the 64.39% of non-organic. At the attributes perfect order fulfillment, value for organic broker account for 89.64% which is higher than the percentage of non-organic broker is 61.20%. That is because demand for organic vegetables less than non-organic vegetables each day by an average of 100-150 kg 200-300 kg of organic vegetables and non-organic vegetables, making them easier to fill orders organic vegetables. As for the attribute order fulfillment lead times and supply chain response time of organic and non-organic have the same time is one day. Orders from traders

Table 1. SCOR Performance in Suppliers and Collectors' Tier

	Attributes	Metrics	OrV		NOrV	
			SP	CL	SP	CL
Customer Facing	Supply Chain Delivery Reliability	Delivery Performance (%)	78.63	92.23	41.77	64.39
		Perfect Order Fulfillment (%)	73.50	89.64	39.99	61.20
	Supply Chain Responsiveness	Order Fulfillment Lead Time (days)	1	1	1	1
	Supply Chain Flexibility	Supply Chain Response Time (days)	1	1	1	1
Internal Facing	Supply Chain Cost (Rp)	Cost of Goods (%)	13.08	64.33	50.00	79.00
		Total Supply Chain Management Cost (%)	12.11	11.85	2.00	3.00
		Warranty/ Return Processing cost (%)	2.49	2.00	2.00	1.50
	Supply Chain Asset Management Efficiency	Cash –to-Cash Cycle Time (days)	7	14	14	14
		Inventory Days of Supply (days)	7	14	14	14
Shareholder Facing	Profitability	Gross margin (%)	86.92	35.67	50.00	21.00
		Operating income (%)	75.78	23.82	48.00	18.00

Notes: OrV = Organic Vegetables; NOrV = Non-organic Vegetables ; SP = Suppliers ; CL = Collectors

Table 2. SCOR Performance in Poin of Sales (POS)' Tier

	Attributes	Metrics	Performance			
			S.1	S.2	S.3	S.4
Customer Facing	Supply Chain Delivery Reliability	Delivery performance (%)	65.56	98.26	51.00	85.04
		Perfect Order Fulfillment (%)	65.33	96.26	51.00	70.94
	Supply Chain Responsiveness	Order Fulfillment Lead Time (days)	1	1	1	1
	Supply Chain Flexibility	Supply chain response time (days)	1	1	1	1
Internal Facing	Supply Chain Cost (Rp)	Cost of Goods (%)	92.27	80.39	85.53	79.88
		Total Supply Chain Management Cost (%)	2.73	2.73	7.98	13.30
		Warranty/ Return Processing cost (%)	9.28	2.00	0.00	8.95
	Supply Chain Asset Management Efficiency	Cash –to-Cash Cycle Time (days)	30	30	30	30
		Inventory Days of Supply (days)	30	30	30	30
Shareholder Facing	Profitability	Gross margin (%)	7.73	19.61	14.47	20.12
		Operating income (%)	5.00	17.24	6.50	6.82

Notes: S.1 to S.4 represents data from company 1 to 4 as sample in this research.

received by the broker via short messages service (SMS) during the day and the product must be shipped in the evening, so that the next day consumers can get fresh vegetables at the supermarket. The process of harvesting until delivery of vegetables to the supermarket is short because the vegetable is easily damaged. Additional orders can be met by a broker if the order through the message received in the afternoon. After obtaining the order, then the broker sends SMS to order vegetables on demand of traders to farmers who are their partners or regulars.

In the matrix delivery and perfect order

Table 3, Value Added for Organic and Non-organic Vegetables

Vegetables	Total Value Added (Rp)	
	NOrV	OrV
Bayam Hijau *(Amaranthus sp)*	8,667	9,088.24
Bayam Merah *(Celosia argentea)*	15,333	11,754.90
Caisim *(Brassica juncea L)*	8,667	11,068.63
Caisim *Baby*	3,450	5,013.73
Kalian *(Brassica oleracea)*	14,667	9,068.63
Kangkung *(Ipomoea aquatica)*	4,333	10,568.63
Kangkung *Baby (Ipomoea reptana)*	7,000	7,068.63
Kemangi *(Ocimum basilicum)*	5,167	7,609.80
Kenikir (*Cosmos caudatus)*	4,167	5,068.63
Loncang *(Allium schoenoprasum)*	5,500	10,554.90
Pakchoy *(Brassica rapa)*	8,667	7,068.63
Pakchoy *baby*	15,333	8,068.63
Pakis (*Diplazium esculentum)*	2,667	5,068.63
Parsley *(Petroselinum sativum)*	8,667	12,609.80
Selada Hijau *(Lactuca sativa)*	13,333	9,768.63
Selada Merah	16,333	14,054.90
Seledri *(Apium graviolens)*	12,000	10,568.63
Daun Gingseng *(Nothopanax scutellarium)*	4,333	11,554.90
Siomak	12,667	11,054.90
Cabai Rawit *(Capsicum frutescens L,)*	5,600	13,554.90
Terong Lalapan	2,967	6,568.63
Terong Ungu *(Solanum melongena)*	7,967	11,652.45
Timun Acar *(Cucumis sativus)*	7,950	11,013.73
Tomat *(Solanum Iycopersicum)*	5,890	9,527.45
Tomat Cherry *(Lycopersicon lycopersicum)*	39,250	12,054.90
Oyong *(Luffa acutangula)*	4,000	9,513.73
Labu *(Sechium edule)*	11,450	8,527.45
Okra *(Abelmoschus esculenthus)*	11,600	11,082.35
Pare Hijau *(Momordica charantia)*	3,950	7,513.73
Buncis *(Phaseolus vulgaris)*	7,450	11,388.24
Buncis *Baby*	15,260	16,201.18
Kecipir*(Psophocarpus tetragonolobus)*	10,950	7,054.90
Kacang Panjang *(Vigna sinensis)*	6,250	17,554.90
Brokoli *(Brassica oleracea)*	9,500	18,983.73
Wortel *(Daucus carota)*	9,000	11,027.45
Bit *(Beta vulgaris)*	8,333	8,255.00

fulfillment performance, the performance of S.1, S.3 and S.4 are still less than the set targets while S.2 has hit the target. This is because the orders received by S.2 is less than the others, so it is easy to fulfill the order. As for the metric order fulfillment lead time and supply chain response time obtained by the actual value is equal to the target of 1 day. This is because products such as vegetables which is easily broken so that the process of harvesting until distributed to supermarkets should be in quick time. Moreover, after the vegetables being harvested, it must be packaged and distributed in order to stay fresh when consumers buy it (Yandra *et al*., 2007).

At the cost attribute, the value of the gap obtained from the reduction in the value of the target with the actual costs incurred for the purpose of doing business should be minimal (Guritno and Harsasi, 2013). In other words, the costs incurred by the trader should be less than or equal to the target. Negative values of the results obtained showed the costs incurred by the trader more than the set targets (Lambert and Cooper, 2000; Yandra *et al*., 2007).

For metric cost of goods, only S.4 that can achieve the target while the total supply chain management metrics of cost, there are 2 traders achieve of S.1 and S.2. In the metric cash to cash cycle time and inventory days of supply, four traders can reach the target of 30 days as it relates to the contract with the supermarket in terms of payment delivered products to the trader. The payments are then used to run the business back. On the gross margin metrics, S.4 only reach the target of 20%, while operating income for the target can only be achieved by S.2.

Measurement of the value added on the non-organic vegetables tier is performed on the entire supply chain of this research, while at the organic vegetables do not measure tier 2. It is because the broker of non-organic vegetable supply chain has process of repackaging, so that the cost for packaging and packaging labor counted on input costs. However, not all vegetables obtained from brokers but there are vegetables that are obtained directly from the farmers or suppliers. In this study, input costs are assumed to Rp 500, - per package which consists of the cost of packaging, transportation, packaging labor. Details of selling prices, input prices and input costs across businesses. At tier 3, the vegetables were purchased bulk then repackaged and subject to input costs Rp 800.00 for each packing that as the cost of packaging, barcode, expiration date, energy packaging and transport. While the product has been packaged by brokers especially leaf vegetables, the trader provide input costs Rp 200.00 per package or each bunch is used as transportation costs. At the level of the modern market, input costs charged Rp 500.00 for each packaging as labor and operational costs. Tier 3 does not always get the vegetables from tier 2 but it can also come from tier 1 direct as it appears in the measurement results add value above

3. CONCLUSION

Supply chain performance measurement vegetables that has been done shows that the tier 1, 2 and 3 can not meet orders from customers. Tier 3 has the largest percentage of the cost with the smallest percentage of profit. Strategies that can be applied to ensure that customer needs are met is to increase the number of farmers to supply vegetables to the tier 2 and 3. In the organic vegetables, the biggest value added obtained by tier 4 that is the supermarket from vegetable leaves and fruit products. Similarly, in the non-organic vegetables, supermarket also obtain the greatest value added from vegetable leaves, flowers and young beans.

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