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Determinants of Economic Value Addition of Industrial Tuna Fish Processors in the Sea Food Processing Sub-Chain in Malaysia

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ABSTRACT

Value added is the difference between the output value, input material, and processing costs. The supply chain of tuna products is inseparable from production costs as a support for increasing the added value potential of fish. This study aims to determine the added value of supply chain entities as a whole for each alternative using the Hayami method and determine the level of marketing efficiency of existing supply chain flows using farmer's share analysis for this added value, using the Hayami method to find out which tuna product is the most profitable to increase the added value of this tuna. The tuna supply chain actors consist of fishermen as fish producers, transit docks, fresh tuna processing industries, canned tuna processing industries, tuna fillet processing industries, traditional market traders, supermarkets, export agents, and consumers. The added value obtained by fishing entities is MYR (Ringgit Malaysia) 1,061, with an added value ratio of 4.38% for one fish production, amounting to MYR 20,758 or 45.67%, a canned tuna processing entity of MYR 5,940 or 19.6%, a tuna fillet processing entity of MYR 8,485 or 25.91%, a traditional market trader entity of MYR 3,758 or 24.8%, canned tuna supermarket entity of MYR 561 or 15.41% tuna fillet supermarket entity in the amount of MYR 107 or 3.05% and an export agent entity of MYR 15,151 with a value-added ratio of 25%. Of all the entities that get the most significant added value, the fresh tuna processing entity amounting to MYR 20,758 per week.

Keywords: Added value, Sea Food, Tuna, Hayami method

INTRODUCTION

Fisheries is one of the fields that can play a role in Malaysia's economic growth because it has a significant potential for fish resources, both in number and diversity, so with wise management, the benefits can continue to be enjoyed (Delfino, 2023). Judging from the geographical conditions of LKIM Chendering Port, fishery resources can contribute significantly to economic development activities (Asiedu et al., 2015).

LKIM Chendering Port is one of the Technical Implementation Units in fishing ports under the guidance and responsibility of the Malaysian government. LKIM Chendering Port performs its functions by implementing arrangements for the departure, arrival, and presence of fishing vessels at fishing ports, log book checks, service services, fish grade inspections, fish unloading inspections, and fish distributors (Nawaz, 2019).

From January 2020 to December 2022, tuna catches totalled 1661 tons of fish. This illustrates that the demand for meeting fish needs is relatively high. In the process of fish processing, fish are grouped by type grade, so there are differences in the results obtained. The increased production of tuna and the high demand for finished processed tuna products require a tuna supply chain flow structure to become fresh tuna products, canned tuna, and tuna fillets. For processed fresh tuna products, LKIM Chendering begins as a producer of tuna raw materials landed by fishermen from LKIM Chendering. Fresh tuna processing companies take tuna from exporter agents, and then for the last part of the supply chain network for processed fresh tuna ends up at consumers. Processed tuna fillet and canned tuna products start from LKIM Chendering as a producer of tuna raw materials, from LKIM Chendering continued to canned tuna and tuna fillet processing companies, then distributed to supermarkets and ended to consumers (Sen, 2022).

The formulation of the problem in this study is how the supply chain strategy determines the added value of fish using the Hayami method based on the supply chain flow of tuna processing (Acharjee, 2023). This study aims to determine the added value of the supply chain entity for each alternative to determine the marketing efficiency level of the existing supply chain flow using Farmer's Share analysis (Mohibbullah, 2023).

Identifying the added value of fish requires understanding the supply chain flow entities involved in the production of fish products. Supply Chain Management includes good coordination and collaboration with suppliers and customers (Lavelli, 2021). In short, supply chain management integrates negotiation and demand management within the company. After determining the supply chain flow entity, the fish production process is continued with value-added analysis. For this added value, using the Hayami method to find out which processed fish products are the most profitable to increase the added value of fish (Borah, 2022; Choden, 2023; Kuddus, 2023). According to (Wang, 2014) (Annapurna 2022), there are two ways to calculate value added: value added for processing and value-added for marketing. This added value is identified from the leading suppliers of tuna raw materials, one of which is the LKIM Chendering Fishing Port (Mole, 2018).

A supply chain strategy to determine the added value of fish needs to be carried out. Supply Chain Management approach by assessing the flow of the tuna supply chain, which determines the flow of supply chains and entities involved in the production process (Materia, 2021). After the description of the entity and supply chain flow is achieved, the calculation of added value using the Hayami method and the calculation of the efficiency level of each supply chain flow using Farmer's Share (Difonzo, 2021). By taking a Supply Chain Management approach and value-added analysis, the right solution can be found to increase fish competitiveness (Waseem, 2021).

METHODS

Tuna Product Supply Chain Flow

In the supply chain cycle of tuna products, there are several supply chain channels from the processing of tuna products shown in Figure 1.

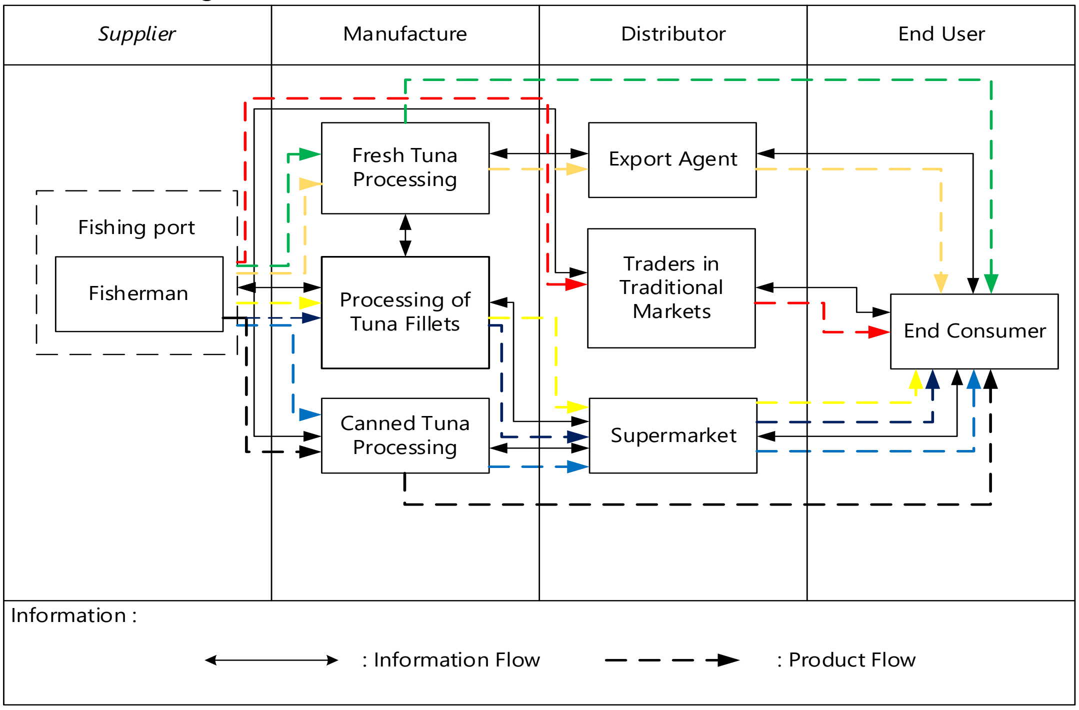

Figure 1 Tuna Product Flow

Data Collection Techniques

The data collection technique used in this study is a qualitative data collection technique obtained from (Hutauruk, 2018):

1. Observation

The type of observation in this study is direct observation. Researchers immediately went into the field to see the situation in the area (Wang, 2014).

2. Interview

This study used an open-ended interview instrument (open-ended questions to respondents. Interviews were conducted with fishermen, transit docks, processing industries, exporter agents, traditional market sellers, and customers (Sundari, 2021). Research instruments based on Supply Chain Management are divided into several entities, including suppliers, manufacturers, distributors, retailers, and consumers (Hartuti, 2021).

Data Processing Techniques

Added value is used to determine the added value of fish produced by LKIM Chendering Fishing Port using the Hayami method in Table 1 (Hidayat, 2019).

Table 1 Biological Method Value Added Calculation Formula

Variable	**Value**
Output, Input, and Price	
1. Output (Kg)	(1)
2. Input (Kg)	(2)
3. Manpower (HOK)	(3)
4. Conversion Factor	(4) = (1) / (2)
5. Labor Coefficient(Kg/HOK)	(5) = (2) / (3)
6. Output price (MYR)	(6)
7. Labor Wages (MYR/HOK)	(7)
Acceptance and Benefits	
8. Price of raw materials (MYR/kg)	(8)
9. Other input donations (MYR/Kg)	(9)
10. Output Value (MYR/Kg)	(10) = (4) x (6)
11. a. Added Value (MYR/Kg)	(11a) = (10) – (9) – (8)
b. Value Added Ratio (%)	(11b) = (11a/10) x 100%
12. a. labour income (MYR/kg)	(12a) = (5) x (7)
b. Labor Share (%)	(12b) = (12a/11a) x 100%
13. a. Profit (MYR)	(13a) = 11a – 12a
b. Profit rate (%)	(13b) = (13a/11a) x 100%

*MYR= Ringgit Malaysia

RESULTS

Added Value of Tuna to Fishermen Entities

The fishermen above have the exact cost of production and standard selling price for selling tuna to their consumers—the cost of goods produced and sold in Table 2.

Table 2 The Cost of Goods Produced And Sold

Information	**Price**
Purchase Price of Raw Materials	MYR 22.27 /Kg
Product Selling Price	MYR 24.24-/Kg
Basic Raw Materials	MYR 22,727/Ton
Direct Labor	70 people
Direct Labor Wages	MYR 45,5/ Person
Other Input Costs of Production	MYR 303
Other Non-Production Input Costs	MYR 152

Calculation of added value with the following approach:

1. Tuna supply chain actors consist of suppliers, manufacturers, and deliveries.
2. The primary raw material, namely tuna, is assumed to be evenly distributed in each supply chain entity, with only one tuna with an average weight of 50 kg.
3. In the production process, there is a shrinkage of raw material products. Namely as follows:
   a. Disposal of fish heads shrinks by 10%.

b. Tuna bone disposal has shrunk by 10%.

c. The process of selecting quality meat is reduced by 20%.

4. In the production process, it is assumed that the primary raw material for tuna is only 50 kg minus depreciation in each supplier of raw material suppliers.
5. For fresh tuna product supply chain entities, it is assumed to take 1 ton of products per week due to meeting export demand abroad and the resilience of fresh tuna when it is at the sales stage. Likewise, supermarkets are assumed to produce processed products only as much as 100 kg weekly to maintain product quality.
6. In canned tuna processing entities, the calculation unit is generalized to Kilograms (Kg) for calculating the added value of conversion.
7. For 30 Kilograms of canned tuna, fish produce 120 cans of tuna.
8. The formulation of Microsoft Excel calculations will obtain the added value of supply chain actors, the added value of the total supply chain, and the bandages.

The calculation of the added value of each fishing entity is shown in Table 3.

Table 3 The Calculation of The Added Value Of Each Fishing Entity

Variable	**Value**
Output, Input, and Price	
1. Output (Kg)	1000
2. Input (Kg)	1000
3. Manpower (HOK)	70
4. Conversion Factor	MYR 24,200 / MYR 22,700= 1.06%
5. Labor Coefficient(Kg/HOK)	22,700/ 70= 325
6. Output Price(MYR)	24.200
7. Labor Wage (MYR/HOK)	MYR 45.5
Acceptance and Benefits	
8. Price of raw materials (MYR/kg)	24,2
9. Other input contribution (MYR/Kg)	303
10. Rated Output (MYR/Kg)	24.200
11. a. Added Value (MYR/Kg)	24,200-(22,700-303-152)=1,046
b. Value Added Ratio (%)	(1,046/24,200) x 100%= 4.32%
12. a. labour income (MYR/kg)	45.5x325= 14,788
b. Labor Share (%)	14.788/1.046x 100%= 1.413%
13. a. Profit (MYR)	1,046– 45.5= 1000.5
b. Profit rate (%)	1000.5/24,200x 100%= 4.13%

*MYR= Ringgit Malaysia

Based on calculations on fishing entities, the added value of fish products is MYR 1,046 with a value-added ratio of 4.32%, and the profit from fish sales is MYR 1000.5, with a profit rate of 4.13%, and the company's profit rate is 83.75%. With the formula pattern in Table 3, the results of each data processing entity in the tuna supply chain are shown in Table 4. Table 4 recaps the added value of Fresh Tuna Processing Entities, Canned Tuna Processing Entities, Tuna Fillet Processing, Traditional Market Traders, Canned Tuna Supermarkets, Tuna Fillet Supermarkets, and Export Tuna Agents.

Table 4 Value-Added Analysis of Tuna Fish Processing

Variable	Supply Chain Management Entity							
	Supplier	Manufacture			Distributor			
	Fisherman	Fresh Tuna Processor	Canned Tuna Processor	Tuna Fillet Processor	Traditional Market	Canned Tuna Super Market	Supermarket Tuna Fillet	Tuna Export Agent
Material Purchase Price (MYR)	22.72	24.24	24.24	24.24	22.72	30.3	33.3	45.5
Product Selling Price (MYR)	24.24	45.5	30.3	33.3	30.3	36.4	34.8	60.6

Total Value Added (RM)	1.52	21.21	6.06	9.09	7.6	6.06	1.52	15.15
Input, Output, and Price								
Sales Volume Output (Kg)	1000	1000	1000	1000	500	100	100	1000
Sales Value (MYR) output	24,242	45,454	30,303	33,333	15,152	3,636	3,485	60,606
Basic Raw Material (RM)	22,727	24,242	24,242	24,242	11,364	3,030	3,333	45,455
Direct Labor	70	25	50	45	2	1	1	2
Conversion Factor (%)	1.06	1.87	1.25	1.37	1.33	1.2	1.05	1.33
Direct labour coefficient	325	970	485	539	5,682	3,030	3,333	22,727
Direct Labor Wage (MYR)	45.45	36.36	45.45	45.45	60.6	45.45	45.45	60.6
Acceptance and Added Value								
Other Input Cost of Production (MYR)	303	151.5	91	303	30.3	0	0	0
Other Non-Production Input Costs (MYR)	151.5	303	30.3	303	0	45.45	45.45	0
Value Added (MYR)	1,061	20,758	5,940	8,485	3,758	561	107	15,151
Value Added Ratio (%)	4.38%	45.67%	19.60%	25.91%	24.80%	15.41%	3.05%	25%
Profit (MY)	1.015	20.721	5.894	8.440	3.697	515	61	15.090
Profit Rate (%)	4.18%	45.58%	19.45%	25.77%	24.40%	14.16%	1.73%	24.90%
Remuneration of Production Factor Owners								
Margin (MYR)	1.212	21.061	5.970	8.788	3.758	606	152	15.151
Other Input Cost Contribution (%)	37.50%	2.15%	2.03%	5.17%	0.80%	7.50%	30%	0%
Company Profit (%)	83.75%	98.38%	98.73%	97.75%	98.38%	85%	70%	99.60%

Farmer's Share

As a result of the supply chain mapping of tuna products, there are seven marketing channels for tuna products (Padhi, 2022). The size of the farmer's share is determined by the length of the marketing channel and the selling price that applies to the final trader (Kumar, 2022). The farmer's share calculation technique calculates the price at the Supplier level divided by the price at the last trader level of tuna products and then multiplied by 100 per cent (More, 2020).

The marketing efficiency level of the seven marketing channels is quite good because the average is above 50% and can be categorized as the efficient marketing level. Only track I is less efficient because it is at the 40% level due to the high costs incurred and the use of export agent intermediaries. In comparison, channel II does not use export agents' services directly to consumers, with an efficiency level of 54% (Rao, 2022). For channel III, traditional market traders buy tuna straight from the ocean fishing port, sell directly to consumers without going through many intermediaries, and produce an efficient level of 75% (Donkor, 2018). Channel IV is at the 67% level even though through long intermediaries buying products from canned tuna businesses supermarkets to consumers, this channel is quite good at marketing because the prices are appropriate and quite suitable from Channels I, II, and Channel III (Haq, 2022). Channel V is the best channel, and channel V does not go through supermarket intermediaries. Consumers directly buy canned tuna business with an efficiency level of 80%. Channel VI is almost the same as channel IV through several business intermediaries for tuna fillets supermarkets and only reaches consumers with an efficiency level of 69% and is categorized as efficient. While channel VII is the same as channel V, it does not go through supermarket intermediaries. It goes directly to consumers with an efficiency level of 72%, categorized as efficient (Rashid, 2020) (Naik, 2022).

CONCLUSION

The added value obtained by fishing entities is MYR 1,061, with an added value ratio of 4.38% for one fish production. The added value received by the fresh tuna processing entity is MYR—20,758, with an added value ratio of 45.67% for one fish production. The added value obtained at the canned tuna processing entity is MYR—5,940, with an added value ratio of 19.6% for one fish production. The added value obtained at the tuna fillet processing entity is MYR—8,485, with an added value ratio of 25.91% for one fish production. The value obtained at the traditional market trader entity is MYR—3,758, with an added value ratio of 24.8% for one fish production. The added value obtained at the canned tuna supermarket entity is MYR—561, with an added value ratio of 15.41% for one fish production. The added value obtained at the tuna fillet supermarket entity is MYR—107, with an added value ratio of 3.05% for one fish production. The added value obtained at the export agent entity is MYR 15,151 with an added value ratio of 25% for one fish production. Of all the entities that get the most significant added value, the fresh tuna processing entity amounting to MYR 20,758 per week. The calculation of the added value of the Hayami method based on the supply chain flow can be used in more complex industrial types.

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