

Costs and Returns of Salted Fish Production: A Case Study in Pakphayun District, Phatthalung Province, Thailand

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ABSTRACT

This study aimed to analyze costs and returns including marketing channel and share of salted fish products produced in Pakphayun district, Phatthalung province, Thailand. The study was conducted by interviewing 14 salted fish producers in the study area using questionnaires, and data analyzed by rapid market appraisal (RMA). Results showed that the most common fish species used to produce salted fish products were Gunther's walking catfish (*Clarias macrocephalus*), croaker (*Otolithes ruber*), spotted catfish (*Arius maculatus*) and soldier catfish (*Osteogeneiosus militaris*). Salted fish produced from Gunther's walking catfish generated the highest total cost per kg at 122.36 \pm 6.58 THB followed by croaker, spotted catfish and soldier catfish, with total costs of 95.75 \pm 6.28, 86.61 \pm 6.80 and 81.70 \pm 9.71 THB, respectively. The total revenues per kg of each type of product were 140, 110, 100 and 100 THB, respectively. In terms of profit, salted fish produced from soldier catfish generated the highest profit per kg at 18.30 \pm 9.71 THB, followed by Gunther's walking catfish, croaker and spotted catfish, at 17.64 \pm 6.58, 14.25 \pm 6.28 and 13.39 \pm 6.80 THB, respectively. Producers distributed 50% of salted fish products to consumers directly, 40% to retailers, and 10% to wholesalers.

Keywords: cost, return, salted fish products, Phatthalung, Thailand

INTRODUCTION

Pakphayun district, in Phatthalung province, is an important area of production and distribution of salted fish products in southern Thailand. Salted fish producers collect raw fish from local fishermen who mainly fish in Thale Noi, the most important freshwater fishing ground in the province. Thale Noi is located at the northern end of Songkhla Lake, the largest natural lake in

Thailand. Many species of fish used to produce salted fish products generate differences in characteristics and tastes in the products. These provide more variety for the consumers. The popularity of salted fish products produced in this area was investigated using the statistical data provided by the Department of Fisheries (2012) which reported that the quantity of salted fish disposed in Phatthalung province increased from 213 tons in 2009 to 803 tons in 2010.

This indicates a rapid expansion of salted fish production and a large number of local people engaged in this sector. Therefore this study focused on analyzing the costs and returns generated by local salted fish production. The study also explored the marketing channels and market share of salted fish products in order to provide primary information related to profitability and distribution. The results of this study will provide information to interested entrepreneurs on how to improve marketing strategies, improve profit, and gain knowledge on salted fish production techniques.

MATERIALS AND METHODS

Study site

Phatthalung province is located in southern Thailand, and some areas of the province including the area in Pakphayun district (Fig. 1) are adjacent to Songkhla Lake, the largest lake in the country located near the Gulf of Thailand. This lake has the most diverse water habitat and is considered as the very important fresh- and brackish-water fishing grounds of the southern region of the country. In 2011 and 2012,



Figure 1. The location of study site

the total catch volumes from fishing in the lake were 12,564.26 and 14,146.24 metric tons (Tanasomwang and Assava-aree, 2013), respectively. Hence, fish processing including salted fish production is largely operated around this area.

Data collection

Data were collected by interviewing salted fish producers residing in Pakphayun district, Phatthalung province. All the local producers (14 persons) were interviewed using a structured questionnaire with close and open-ended questions. The questionnaire comprised of two main parts: 1) cost and return of salted fish production, and 2) marketing channel and share.

Data analysis

Production costs were divided into two categories: fixed and variable costs. Fixed costs comprised of depreciation cost of production building, production equipment, and opportunity cost, while variable costs include raw materials (fish and salt), labor and miscellaneous expenses. The depreciation cost of every item was calculated using the straight-line method. Opportunity cost referred to the interest from capital investment and was calculated using the average of fixed deposit interest rate per year in 2012 at 2%. The opportunity cost per month was calculated as follows:

$$\begin{aligned} &\text{Opportunity cost per month} \\ &= \frac{\text{total capital investment}}{12} \\ &\times \frac{\text{interest rate at 2\% per year}}{12} \end{aligned}$$

The returns from production comprised of total revenue, net revenue and profit. Cost and return indicators were analyzed using profitability analysis method applied from rapid market appraisal (RMA). Marketing channels and shares of products were summarized through a schematic diagram.

RESULTS

Costs and returns of salted fish production

Fish species mainly used to produce salted fish products in Pakphayun district are Gunther's walking catfish (*Clarias macrocephalus*), croaker (*Otolithes ruber*), spotted catfish (*Arius maculatus*) and soldier catfish (*Osteogeneiosus militaris*). Different types of products generated different production costs and returns. Moreover, costs and returns per month in each type of product also depended on their production volume. The average costs and returns per month for each type of product are as follows:

Type 1: Salted fish products produced from Gunther's walking catfish. The average production volume was $372 \pm 50.2 \text{ kg} \cdot \text{month}^{-1}$. The average fixed cost, variable cost and total cost of production were 362.3 ± 77.3 , $45,155.0 \pm 4,734.9$ and $45,517.3 \pm 4,780.4 \text{ THB} \cdot \text{month}^{-1}$, respectively, whereas, total revenue, net revenue, and profit were $52,080.0 \pm 7,027.9$, $6,925.0 \pm 3,193.3$ and $6,562.7 \pm 3,198.1 \text{ THB} \cdot \text{month}^{-1}$, respectively.

Type 2: Salted fish products produced from croaker. The average production volume was $180 \pm 26.5 \text{ kg} \cdot \text{month}^{-1}$. The

production generated average fixed cost, variable cost and total cost at 367.8 ± 94.9 , $16,867.0 \pm 1,559.8$ and $17,234.8 \pm 1,524.3$ THB \cdot month $^{-1}$, respectively, whereas, returned total revenue, net revenue and profit were $19,800.0 \pm 2,910.3$, $2,933.0 \pm 1,352.0$ and $2,565.2 \pm 1,397.8$ THB \cdot month $^{-1}$, respectively.

Type 3: Salted fish products produced from spotted catfish. The average production volume was 338 ± 50.2 kg \cdot month $^{-1}$. The average fixed cost, variable cost and total cost of the production were 319.4 ± 159.1 , $28,955.5 \pm 3,978.4$ and $29,275.0 \pm 3,989.4$ THB \cdot month $^{-1}$, respectively, whereas, the total revenue, net revenue and profit were $33,800.0 \pm 5,017.5$, $4,844.5 \pm 2,508.5$ and $4,525.0 \pm 2,525.9$ THB \cdot month $^{-1}$, respectively.

Type 4: Salted fish products produced from soldier catfish. The average production volume was 270 ± 73.9 kg \cdot month $^{-1}$. The average fixed cost, variable cost and total cost of the production were 270.8 ± 22.9 , $21,787.0 \pm 5,362.3$ and $22,057.8 \pm 5,377.6$ THB \cdot month $^{-1}$, respectively, whereas the total revenue, net revenue and profit were $27,000.0 \pm 7,393.7$, $5,213.0 \pm 3,187.4$ and $4,942.2 \pm 3,169.8$ THB \cdot month $^{-1}$, respectively.

More details on the monthly production costs and returns of each type of salted fish product are presented in Table 1.

In the cost and profit per kilogram analysis, results showed that salted fish products produced from Gunther's walking catfish generated the highest total cost

followed by croaker, spotted catfish and soldier catfish, at 122.36 ± 6.58 , 95.75 ± 6.28 , 86.61 ± 6.80 and 81.70 ± 9.71 THB \cdot kg $^{-1}$, respectively. The highest profit per kilogram gained was from the soldier catfish, followed by Gunther's walking catfish, croaker and spotted catfish, at 18.30 ± 9.71 , 17.64 ± 6.58 , 14.25 ± 6.28 and 13.39 ± 6.80 THB \cdot kg $^{-1}$, respectively (Table 2).

In addition, the cost structure which is the ratio of fixed costs to variable costs revealed that the majority of costs came from the variable costs (raw fish and salt, labor and miscellaneous expenses). Salted fish products produced from Gunther's walking catfish, spotted catfish, soldier catfish and croaker generated the ratio of variable costs at 99.2%, 98.9%, 98.8% and 97.8%, respectively. Therefore the ratios of fixed costs were 0.8, 1.1, 1.2 and 2.2, respectively (Fig. 2). The cost structures from the four salted fish products were not significantly different.

Marketing chains and shares of salted fish products

Salted fish producers usually distribute their products to consumers directly. Figure 3 shows the schematic diagram on proportion and flow of salted fish products distribution by the producers to the buyers. Most of the products were distributed to consumers (50%) and retailers (40%) who live within and nearby Pakphayun district, and the rest of the products were sold to the wholesalers who reside in Songkhla province (10%).

Table 1. Average costs and returns per month of salted fish production by fish species (THB•month⁻¹)

Costs and returns	Gunther's walking catfish	Croaker	Spotted catfish	Soldier catfish
Total capital investment	14,600.2±5,601.3	10,222.0±3,776.6	10,915.5±5,321.1	8,271.8±3,240.8
1. Fixed costs*				
1.1 Depreciation cost of production building	78.2±32.7	69.4±25.2	60.5±27.9	51.4±11.2
1.2 Depreciation cost of production equipments	259.8±78.1	281.3±67.1	240.8±81.8	205.6±8.4
1.3 Opportunity cost (interest at 2% on capital investment)	24.3±9.3	17.0±6.3	18.2±11.2	13.8±5.4
(I) Total fixed cost	362.3±77.3	367.8±94.9	319.4±159.1	270.8±22.9
2. Variable costs				
- Raw fish (kg)	620.0±83.7	360.0±52.9	845.0±125.4	675.0±184.8
- Price of raw fish per kg	50.2±2.9	30.0±0.0	16.5±0.5	15.0±0.0
2.1 Cost of raw fish	31,120.0±4,378.6	10,800.0±1,587.5	13,947.1±2,151.1	10,125.0±2,772.6
2.2 Salt	330.0±67.1	250.0±30.0	328.0±44.0	330.0±81.2
2.3 Labor cost (household labor)*	13,280.0±334.7	5,400.0±692.8	14,180.0±1,127.8	10,800.0±2,947.3
2.4 Miscellaneous expenses	425.0±101.6	417.0±66.8	504.5±146.1	532.0±66.5
(II) Total variable cost	45,155.0±4,734.9	16,867.0±1,559.8	28,955.5±3,978.4	21,787.0±5,362.3
(III) Total cost (I+II)	45,517.3±4,780.4	17,234.8±1,524.3	29,275.0±3,989.4	22,057.8±5,377.6
3. Production and Revenue				
3.1 Salted fish product (kg)	372.0±50.2	180.0±26.5	338.0±50.2	270.0±73.9
3.2 Price of product per kg**	140.0	110.0	100.0	100.0
(IV) Total revenue	52,080.0±7,027.9	19,800.0±2,910.3	33,800.0±5,017.5	27,000.0±7,393.7
(V) Net revenue (IV-II)	6,925.0±3,193.3	2,933.0±1,352.0	4,844.5±2,508.5	5,213.0±3,187.4
(VI) Profit (IV-III)	6,562.7±3,198.1	2,565.2±1,397.8	4,525.0±2,525.9	4,942.2±3,169.8

Note: * refers to non-cash expenditure

** refers to retail price

Table 2. Average costs and returns per kilogram of salted fish production by fish species (THB•kg⁻¹)

Costs and returns	Gunther's walking catfish	Croaker	Spotted catfish	Soldier catfish
1. Fixed cost	0.97±0.20	2.04±0.76	0.95±0.32	1.00±0.22
2. Variable cost	121.38±6.46	93.71±5.64	85.67±6.73	80.69±9.67
3. Total cost	122.36±6.58	95.75±6.28	86.61±6.80	81.70±9.71
4. Total revenue	140.0	110.0	100.0	100.0
5. Net revenue	18.62±6.46	16.29±5.64	14.33±6.73	19.31±9.67
6. Profit	17.64±6.58	14.25±6.28	13.39±6.80	18.30±9.71

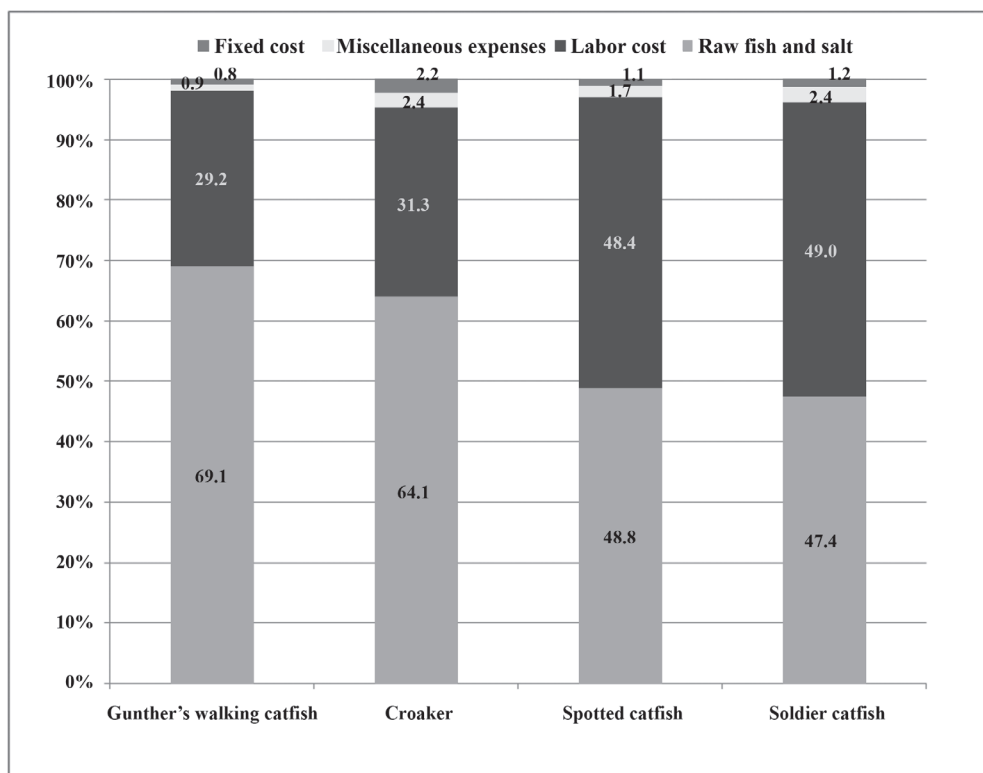


Figure 2. Ratio of fixed costs to variable costs per kilogram of salted fish product by fish species

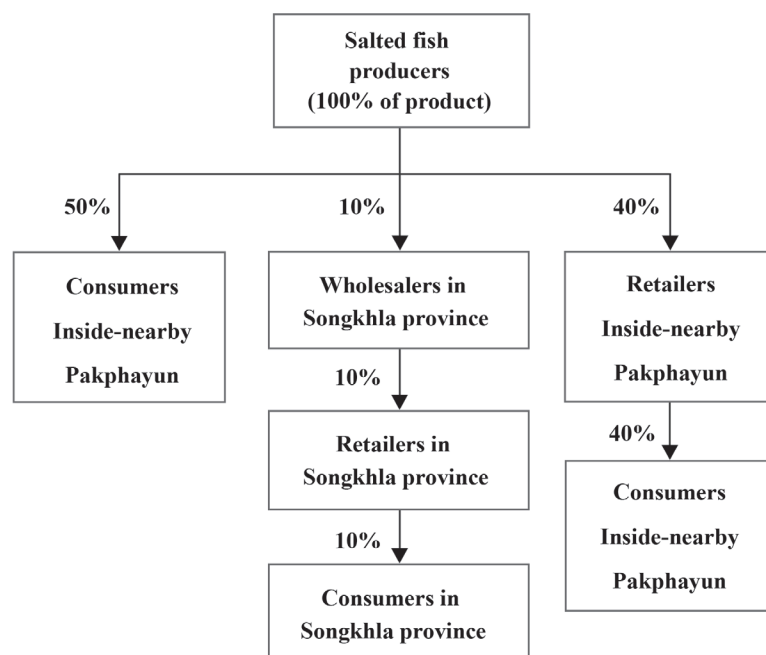


Figure 3. Marketing channels and market share for salted fish products

DISCUSSION

Salted fish production in the study area is a household processing activity. The production facilities are either within the house of the producer or in a production building extended from his/her house. The production was operated mainly by household members with simple production methods. The average costs and returns per kilogram of salted fish product in the study area was found to have little difference with those of salted fish products from nearby provinces such as Trang province (Fig. 1). Laeiadkan and Khaisa (2007) investigated the costs and returns of salted fish production in Trang province and reported that salted fish production generated a fixed cost, variable cost and total cost of 0.26, 102.20 and 102.46

THB•kg⁻¹, respectively, while returned total revenue and profit were at 123.33 and 20.87 THB•kg⁻¹. The variable costs were mostly for raw materials (raw fish and salt) and labor costs. These components comprised more than 90% of the total production cost which is similar to the production costs of anchovy salting plants, which are also sensitive to variable costs and make up about 85% of the total production cost (Zugarramurdi *et al.* 2004). However, cost of raw fish produced had more impact on the cost of production, due to different costs of production for each fish species.

Analysis of marketing channels and share, defined as alternative routes of product flows from producers to consumers (Kohls and Uhl 1980; Acharya and Agarwal 2001),

showed that 50% of salted fish products was distributed to the consumers directly and the remaining 50% was distributed to middlemen, who sell to retailers. At present, there are a number of retailers who play key roles in local product distribution because most of them settled around local communities near production places, enabling them to buy large quantities of the products. Nowadays, producers prefer to sell their products to large volume retailers through the middlemen (Rhodes *et al.*, 2007). This indicates that salted fish producers are dependent on middlemen. Moreover, product distribution involves a few marketing channels due to a limited supply of natural products including fishery products. The producers do not store their products for long periods of time. They try to sell their products as soon as possible to avoid quality and price risks (Anantasuk *et al.* 2010). Furthermore, cost of storage add to the cost of marketing, whereas products which are produced and sold immediately without any storage attract lower marketing cost (Acharya and Agarwal, 2001).

CONCLUSION

Four fish species are mainly used to produce salted fish in the study area, namely, Gunther's walking catfish, croaker, spotted catfish and soldier catfish. The profitability analysis of each type of product revealed that salted fish produced from Gunther's walking catfish generated the highest total cost per kg whereas soldier catfish returned the highest profit. However, the cost structures (ratio of fixed cost to variable cost) of all types of product were similar.

The bulk of the production costs were on the variable costs which include raw fish and labor costs. Production costs were sensitively affected by these two variables and further affect profits. Henceforth, improving raw materials and product quality including labor skill development should be implemented to reduce costs and gain more profits. The producers should select raw materials with good quality, consequently resulting in good quality products, taste and price. In addition, seasonal fish which are abundant and largely caught during the high season should be used to produce salted fish products because they have better quality but cheaper than in the low season. In terms of product distribution, salted fish product distribution involved a few channels. Products were usually transferred from producers to consumers, producers to retailers and producers to wholesalers. Thus, improvement of product distribution should be examined. In the study area, product distribution tends to depend on consumers and retailers due to their being able to buy large quantities of products. Therefore, the consumers and retailers are essentially producer's targets. Producers should find the right products needed or required by the consumers and retailers and then try to meet their needs. In this way, producers could extend the market share of the product including increase their distribution channels.

LITERATURE CITED

- Acharya, S.S. and N.L. Agarwal. 2001. **Agricultural marketing in India.** 3rd ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 349 pp.

- Anantasuk, R., A. Songrak, P. Tongnunui and C. Sudtongkong. 2010. Socioeconomic conditions of hard clam (*Meretrix casta*) fishermen in Trang Province, Thailand. **Proceedings of the 5th Program of the East Asian Cooperative Experiments, International Ocean Workshop**, Gangneung, Korea. pp. 90-96.
- Department of Fisheries. 2012. **Fisheries statistics of Thailand 2010**. Information Technology Center, Department of Fishery, Ministry of Agriculture and Cooperatives, Bangkok. 91 pp.
- Kohls, R.L. and J.N. Uhl. 1980. **Marketing of agricultural products**. Macmillan Publishing Co. Inc., New York. *cited in* Acharya, S.S. and N.L. Agarwal. 2001. Agricultural marketing in India. 3rd ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 349 pp.
- Laeiadkan, J. and S. Khaisa. 2007. **The market system of salted Talang queen fish (*Sconberoides* spp.): A case study in Sikao and Kantang district, Trang province**. Department of Fisheries Technology, Faculty of Science and Fisheries Technology, Rajamangala University of Technology, Trang. 52 pp. (in Thai)
- Rhodes, V.J., J.L. Dauve and J.L. Parcell. 2007. **The agricultural marketing system**. 6th ed. Holcomb Hathaway Publishers, Scottsdale, Arizona. 372 pp.
- Tanasomwang, V. and A. Assava-aree. 2013. Fishery status and total catch in year 2011 and 2012 after restoration of fishery resources in Songkhla Lake. **Thai Fisheries Gazette** 66(5): 393-418. (in Thai)
- Zugarramurdi, A., M. A. Parin, L. Gadaleta, G. Carrizo and H. M. Lupin. 2004. The effect of improving raw material quality on product quality and operating costs: a comparative study for lean and fatty fish. **Food Control** 15 (7):503-509.