

Analysis of marketing distribution efficiency of small pelagic fish on Ambon Island with path analysis

Dientje Rumerung

Pattimura University, Department of Development Economics, Jln. Ir. M. Putuhena, Campus at Poka Village, 97233, Ambon City, Indonesia, rumerungd@gmail.com (corresponding author)

Steven Siaila

Pattimura University, Department of Management, Jln. Ir. M. Putuhena, Campus at Poka Village, 97233, Ambon City, Indonesia, sivenste57@gmail.com

Izaak Tonny Matitaputty

Pattimura University, Department of Development Economics, Jln. Ir. M. Putuhena, Campus at Poka Village, 97233, Ambon City, Indonesia, tonnymatitaputty@gmail.com

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Abstract: This study aims to develop a path analysis of marketing distribution efficiency of small pelagic fish in the islands, particularly on Ambon Island, and investigate its most significant determinant. Producer price, consumer price, marketing cost and marketing margin are examined as determinants of marketing efficiency. An efficient marketing system provides benefits for business actors involved in the production process, so that their products can reach target consumers. A longer marketing chain results in higher marketing costs, which ultimately determines the end consumer price. The data was analysed in a descriptive-quantitative manner, conducting a supply chain analysis and a path analysis to determine the marketing margin and marketing efficiency of small pelagic fish marketing distribution in Ambon City. The results show that all distribution channels are efficient because the calculated efficiency value is <30%. First path analysis producer prices (X1) have no significant effect on marketing margin (Y), consumer prices (X2) have a positive and significant effect on marketing margins (X3); and marketing costs have a significant effect on marketing margin (Y). The second equation, all variables (X1, X2, and X3) have a significant effect on marketing distribution efficiency (Z) through marketing margin (Y). It can be concluded that marketing costs and marketing margins greatly influence the efficiency of marketing distribution. These findings imply that to gain profits, small pelagic fish fishermen (as producers) must estimate marketing costs accurately.

1 Introduction

The welfare of communities on islands is influenced not only by the potential of plentiful natural resources, but also by efficient marketing distribution. The marketing distribution refers to a marketing activity that accelerates and facilitates a product's efficient delivery to end consumers. This condition implies that if producers have efficient marketing distribution channels, they can monopolize the market. An efficient marketing system will benefit business actors involved in the production process with the aim of getting their products to the consumers as a final sales process, because the longer the marketing chain, the higher the marketing costs and, ultimately, the higher the price for the end consumers. Marketing efficiency is defined as the difference between the selling price received by the producers and the price paid by the end customers.

This is related to the producers' ability to select the appropriate marketing distribution channels, which influences the marketing pattern of goods and services to the consumers [1-4]. In other words, this distribution channels are such a structure that outlines the alternative channels chosen as well as different marketing conditions used by various companies. Indirectly, this condition

implies that a variety of factors influence the distribution channels, which eventually leads to the marketing efficiency. On the other hand, fish is a highly perishable product, so inaccuracies in distribution channel placement, pricing, marketing periods, and even transportation will result in losses for fishermen as producers. Furthermore, this condition will have an impact not only on the distribution channels and marketing efficiency, but also on the macroeconomic level, making the welfare of fishermen's households more difficult to accomplish. As a result, the fishermen's households remain impoverished, and it is most likely that they will grow even poorer than before.

Maluku Islands have a larger water area (92.4% or 658,294.69 km²), than land area (7.6% or 54,184.96 km²). The domination of this marine area shows that Maluku has a significant fishing potential. This fact is supported by the control of three Fish Management Areas (Wilayah Pengelolaan Perikanan, WPP), namely WPP 714, WPP 715, and WPP 718. The control of this WPP has stretched from Seram Sea, Banda Sea, and Arafura Sea, with the significant potential for small pelagic fish and demersal fish. The following Table 1 shows the fisheries potential of WPPs in Maluku in 2023.

Table 1 Fisheries Potential of WPPs in Maluku Region in 2023

| WPP | Fisheries Potential | | |
|---|------------------------------|------------------------------|-------------------------|
| | Small Pelagic Fish (Tons) | Large Pelagic Fish (Tons) | Demersal Fish (Tons) |
| WPP 714 (Tolo Bay and Banda Sea) | 222,881 | 370,653 | 292,000 |
| WPP 715 (Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea, and Berau Bay) | 443,944 | 74,908 | 80,226 |
| WPP 718 (Aru Sea, Arafuru Sea, and Eastern Timor Sea) | 669,579 | 655,096 | 701,378 |
| Total | 1,136,404 | 1,100,657 | 1,073,604 |

Source: Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 19 of 2022.

The total capture fisheries potential in the three WPPs is dominated by small pelagic fish (669,579 tons in WPP 718), followed by large pelagic fish (655,096 tons) and demersal fish (701,378 tons). This data demonstrates that WPP 718 has huge potential for being capitalized on and enhanced to increase the income of fishermen and the region. However, in fact, the fishermen in Maluku have yet to reap the benefits of owning such a vast marine area. The Statistics Indonesia of Maluku Province in 2023 show that the province remains the fourth poorest province in Indonesia. Ambon City is located on a small island surrounded by bays and beaches, which allows for the growth and development of the fisheries sector and will eventually contribute to the regional economy. The fisheries sub-sector contributes 15% of Ambon City's Gross Regional Domestic Product (GRDP) on average per year, with relatively consistent annual growth of roughly 4.5%. This significant contribution is supported by the majority of coastal communities/sub-districts (32 villages) that engage in active fishing activities.

The Ambon City Fisheries Department [5] reported total fisheries production of 29,010.53 tons with a value of IDR 602,855,500. However, the poverty rate in 32 coastal villages in Ambon City has been significantly higher during the last four years, ranging from 16% to 18%. Meanwhile, the poverty rate in all 50 villages/sub-districts is between 14.9% and 17%. In fact, the efforts to grow the fisheries and marine sector should be supported by optimal resource utilization and management capacities to have an impact on increasing the community welfare, particularly the fishermen who serve as both economic actors and producers.

The fluctuating development of fish productivity, which is declining, suggests that the fish resources in the waters of Ambon Island have experienced overfishing. This overfishing condition has a number of consequences for fishing activities, including the need for the fishermen to travel longer distances at higher prices. Furthermore, an effective marketing strategy can determine the profitability that the fishermen can earn on Ambon Island, including the utilization of transportation to distribute their products. The marketing activities for catching small pelagic fish provide a source of income for the fishing community on Ambon Island. [6] and [7] believed that in order to obtain

profits, it takes several considerations on the determinants, such as reserves/stocks, fishing equipment, and workforce. It is because if the fishing activities are not profit-oriented, the fishermen's business sustainability will be at risk [8]. As a result, an effective marketing system must be able to meet two requirements: first, capable of collecting the results from the producers and delivering them to the consumers at low cost; and second, capable of sharing a fair compensation to all parties involved based on the end consumer price, including from the production to marketing activities [9] and [10].

Furthermore, in recent years, numerous studies have paid attention to investigate marketing distribution efficiency. These studies explained that a marketing distribution channel is considered efficient if there is a close distance between each marketing actor and the marketing location which can reduce the marketing cost incurred [11-13]; an influence of marketing institutions [14-16]; a high fish selling price [17,18] and available fish stock [19-22].

Based on the previous studies on marketing distribution efficiency, this present study proposes that fish marketing distribution efficiency in the islands has significantly more complex problem dynamics than continental areas. The marketing distribution frequently faces challenges of limited transportation access and high costs, affecting the low income and well-being of the fishing community on the islands. Furthermore, there has been little research on the fish marketing distribution efficiency in the islands. Therefore, the context of this research is intriguing, with a focus on the marketing distribution efficiency of small pelagic fish in the islands and its determinants.

The results of this study are expected to contribute to the development of studies on the fisheries resources in the islands, marketing distribution, island economy, and local fishermen's livelihood strategies. Thus, the research questions of this study are: "What is the marketing distribution channel pattern for small pelagic fish on Ambon Island?"; "How significant is the marketing margin and distribution efficiency for small pelagic fish?"; and "What factors influence the marketing efficiency of small pelagic fish on Ambon Island?".

2 Methodology

This study employed a quantitative approach – analysing the marketing margins and marketing efficiency using ratios or marketing margin percentage values as a measure of marketing efficiency; a descriptive approach – classifying the distribution channels of small pelagic fish

in the islands; and a statistical analysis to examine the determinants of marketing efficiency through a path analysis. The research was conducted on Ambon Island for four months, August to December 2023 at four locations, namely in Latahalat Country, Seri Village, Eri Village, Hutumuri Country and Hukurila Country (Figure 1).

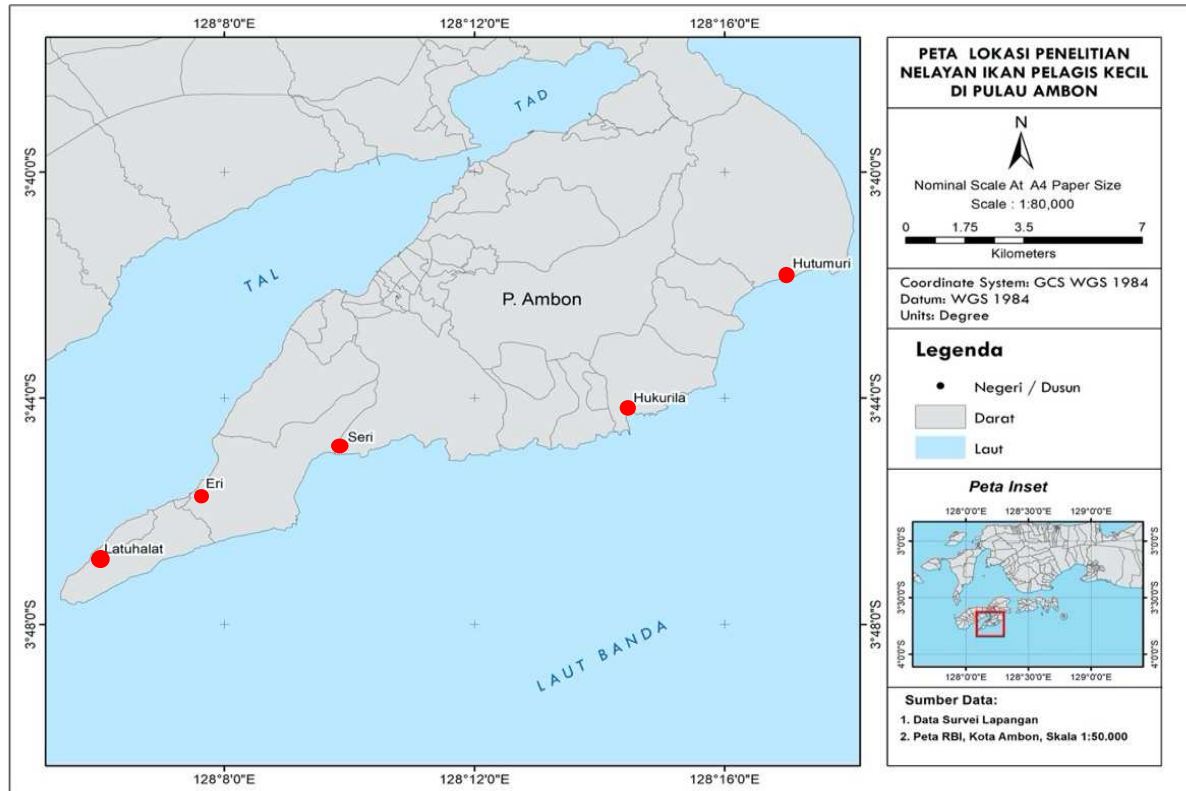


Figure 1 Research location map, 2024

Sampling was carried out non-proportionally so that a sample of 30 people was obtained at the research location. The sample consists of fishermen, collectors/auctioneers/gatherers, retailers and cold storage owners who buy fish from fishermen and then sell them to consumers during the lean season.

The parameters examined in field research are fish landing locations, interviews about distribution channels, marketing costs, costs for each distribution channel (transportation, ice, fees and labor) for fishing activities, purchase price (Rp/kg), and sales price (Rp/kg). Then, this study conducted a data analysis to calculate the marketing margin to determine the distribution of costs and profits from the marketing activities in each established marketing institution; in other words, the marketing margin analysis determined the level of competition from all marketing actors involved in the marketing process.

The marketing margin referred to the difference between the price producers received and the price consumers paid. The marketing margin was calculated by reducing the sales price at each level of the marketing

institution using the Marketing Margin formula [23] as follows (1):

$$MM = Cr - Pf \tag{1}$$

Note:

MP = Marketing Margin

Pr = Consumer Price

Pf = Producer Price

Then, the marketing efficiency analysis was performed using the total marginal price at the consumer level using the following formula (2) [24]:

$$MT = \frac{Pr - Pf}{Pr} \times 100\% \tag{2}$$

Note:

MT = Total Margin (%)

Pr = Consumer Price

Pf = Fisherman Price

Next, an estimation analysis was performed by utilizing the path analysis with the following equations (3), (4):

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + e_1 \quad (3)$$

Note:

Y = Marketing Margin

X1 = Producer Price

X2 = Consumer Price

X3 = Marketing Cost

b0 = Constant

b1, b2, b3 = Regression Coefficient

e1 = Error

$$Z = \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7Y + e_2 \quad (4)$$

Note:

Z = Marketing Distribution Efficiency

b4 = Path Coefficient of X1 to Z through Y

b5 = Path Coefficient of X2 to Z through Y

b6 = Path Coefficient of X3 to Z through Y

b7 = Path Coefficient of Y to Z

e2 = Error

3 Result and discussion

3.1 Profile of capture fisheries in Ambon Island

The fisheries resources in Maluku Province, particularly Ambon Island, indicated a high level of fisheries potential, both for capture and aquaculture. The potential for capture fisheries was divided into nine categories: small pelagic fish, large pelagic fish, demersal fish, coral, shrimp, lobster, crab, blue crab, and squid. The total production of capture fisheries in Maluku Province covering 11 districts/cities reached 536,112.6 tons per year in 2023, with a production value of IDR 13,820,522,191 [25]. Furthermore, geographically, Ambon City covered approximately 786 km², with 377 km² of land (48%) and 409.0 km² of water (52%). The land area of Ambon City was also over half that of Ambon Island, with a 102.7-kilometer shoreline.

Meanwhile, administratively, Ambon Island was separated into two regions: Ambon City and Central Maluku Regency. Ambon City was the administrative and economic centre of Maluku Province, located in the southern Ambon Island, specifically in the coastal areas of Ambon Bay and Baguala Bay. As a result, exploiting the captured fisheries resources in the coastal areas played an essential role in the community's life by offering work opportunities, ensuring food security, and meeting nutritional demands. According to the data from the Ambon City Fisheries Department (Table 2), the total fisheries production in 2022 reached 29,010.53 tons, with 36.68% coming from Nusaniwe District – Ambon City's largest fish producing district; and Teluk Ambon Baguala District accounting for 23.12% [26].

Table 2 Development of fisheries production and value in Ambon City, 2023

| Year | Production (Tons) | Production Value (Thousand Rupiah) |
|------|-------------------|------------------------------------|
| 2018 | 23,506.11 | 1,175,306 |
| 2019 | 25,176.93 | 50,353,860 |
| 2020 | 25,176.93 | 2,824,852 |
| 2021 | 28,482.63 | 534,389,073 |
| 2022 | 29,010.53 | 602,855,500 |

Source: Regional statistics of Ambon City, 2023

Meanwhile, flying fish was the most popular fish in Ambon City, but tuna fish production increased by 4,638.41 tons in 2022, with a value of IDR 115,960,250. The massive increase in production and production value over the previous five years were also linked to the fishing facilities and infrastructure held by the fishermen in Ambon City. According to the [26], the fishermen employed seven different types of fishing equipment, including fishing nets, bubu nets, rakes, tug fishing rods, huhate, hoisting nets, gill nets, purse seines, and beach seines, as indicated in the following figure (Figure 2).

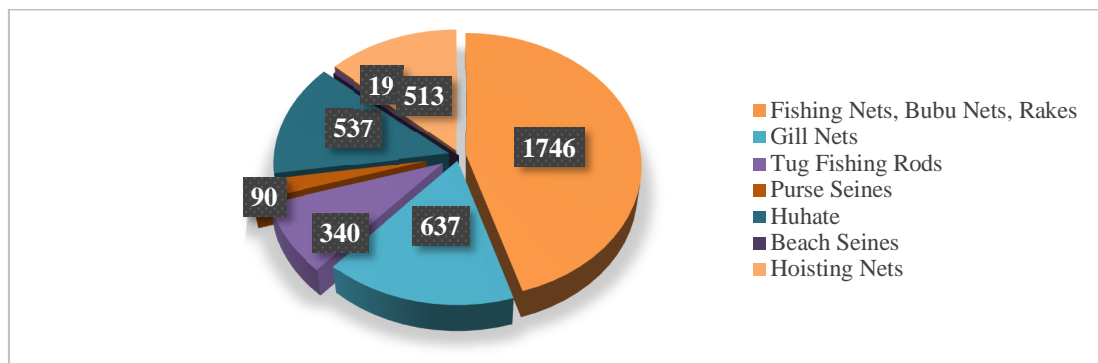


Figure 2 Type and number of fishing equipment in Ambon City in 2023

Source: Statistics Indonesia of Ambon City in 2023

Aside from that, Ambon Island had 3,820 fisheries households, according to the data by [5]. Meanwhile, there were 2,475 fishing boats of varying sizes in operation. The most common size of fishing boats was small, with 1,760 boats in total. Ownership of this size boat undoubtedly influenced the productivity of the fishermen themselves.

Further, it was explained that the fish captured by the fisherman in Negeri Latuhalat, Seri Village, Eri Village, Negeri Hutumuri, and Negeri Hukurila were distributed to Mardika market and a number of other small markets, as well as to adjacent communities. The process of captured fish distribution to the markets involved a number of economic entities collaborating. Furthermore, Ambon Island was small, having a bigger sea area than the mainland, and had several potential fisheries and marine resources. The small pelagic fish, such as trevally, mackerel, and tuna, were among the fisheries resources in Ambon Island that had economic value and the potential to be exploited. This variety of fish was typically captured with the bubu nets. The results of this study also found that there were 2,473 capture fisheries households on Ambon

Island in 2020, divided into three categories: small, medium, and large.

3.2 Profile of small pelagic fish fishermen in Ambon City

On Ambon Island, the fishermen had a unique role in capturing the small pelagic fish. In addition to experience, their understanding of capturing fish was based on knowledge passed down for generations and is still practiced today. It was done by looking at natural signs, such as stars, moons, and clouds. The field observations revealed that the fishermen were the traditional ones who ran a modest business and resided along the coast. Most of them did not use modern fishing equipment, and their behaviour remained subsistence-oriented. Profile of small pelagic fish fishermen on Ambon Island could be classified according to gender, age, latest education, length of business / work experience, and mileage, as shown in the table below (Table 3).

Table 3 Profile of small pelagic fish fishermen in Ambon City

| No. | Characteristic | Total | % | Average | |
|-----|--------------------------------------|--------------------|----------------|---------|----------------|
| 1. | Gender | Male | 30 | 100 | |
| | | Female | 0 | 0 | |
| 2. | Age | < 30 Years Old | 3 | 10 | 40 Years Old |
| | | 30 - 40 Years Old | 10 | 37.33 | |
| | | 41- 50 Years Old | 10 | 37.33 | |
| | | > 50 Years Old | 7 | 23.33 | |
| 3. | Lats Education | Elementary School | 0 | | |
| | | Junior High School | 0 | | |
| | | Senior High School | 30 | 100 | |
| 4. | Length of Business / Work Experience | < 10 Years | 0 | | 20 Years |
| | | 10 - 20 Years | 29 | 96.67 | |
| | | 21 - 30 Years | 1 | 3.33 | |
| | | > 30 Years | 0 | 0 | |
| 5. | Total Training Attended | 0 | 0 | | |
| 6. | Fishing Time Allocation | < 5 Hours | 14 Respondents | 46.66 | |
| | | > 5 Hours | 16 Respondents | 53.33 | |
| 7. | Fishing Frequency | 3 - 5 Times / Week | | | 5 Times / Week |
| 8. | Mileage | 3 - 4 Kilometers | | | 3.5 Kilometers |

Source: Results of Field Research, 2023

According to Table 3 above, the fishermen activities could be identified based on the following characteristics:

Based on the fishermen's **gender and age**, the fishermen on Ambon Island were mostly men of a productive age, with an average age of 40 years old. Their age had a vital impact in productivity through physical strength and work experience as a fisherman. These fishermen benefitted from their productive age and their extensive expertise in pursuing this as their primary source of income. On average, the fishermen who resided in the coastal areas were of older ages, therefore fishing was not their sole source of income. The fishermen in the coastal

areas tended to seek additional income outside of their work as fishermen due to their inability to maximize their income [27-29].

Further, in terms of the fishermen's **latest education**, they were typically high school graduates. This condition, of course, contrasted with the reality of the low degree of education that the fishermen in the coastal areas typically had, who only graduated from elementary school or even did not graduate from the elementary school [27,30,31]. This finding implied that, on average, the Ambon Island fishermen understood the value of education for them. This fact demonstrated that they faced no limited access to high

school education, because high schools existed in practically all research locations. However, they did face limited funding problems to continue their studies at a higher level (university).

Furthermore, according to the fishermen's **length of business / work experience**, they had been in business for an average of 15 years. This demonstrated that the business activities in which they had been involved had been ongoing for some time. People with more work experience had better work abilities than those who were new to the world of work, because they had learned from the activities and problems occurred in their workplace. The work experience had resulted in an increase in knowledge and abilities that could help self-development in the face of current developments. An individual's ability to carry out their work obligations would improve as they gained experience [32-34]. In relation to this, the fishermen's experience in fishing was usually driven by the efforts to maximize their income [35].

Then, in terms of **total training attended**, despite the fact that the typical length of business was regarded quite long, the fishermen received no training that could develop their knowledge and skills as fishermen. Although the trainings for fishermen could improve their knowledge not only of how to capture fish, but also of sustainable fisheries and captured fish quality which ultimately determined the prices and opportunities for product marketing and fishing industry in the coastal areas [36-38].

Finally, in terms of **Fishing Time Allocation and Mileage**, the fishermen allocated more than 5 hours each day to capture the fish, with a weekly frequency of 4 to 5

trips. Meanwhile, the average mileage to fishing grounds was only 3.5 kilometres. The fishing time in question covered the time they needed for preparation to after the trip [39-41]. An increase in the fishing time allocation would have an impact on boosting their income, since the longer they stayed at the sea, the farther the distance traveled and the bigger the amount of fish captured – hence increasing their income [42-45].

3.3 Marketing channels of small pelagic fish in Ambon Island

The distribution of small pelagic fish capture on Ambon Island also involved multiple actors or economic entities working together, from the fishermen to end consumers. The cooperative relationship between these actors had lasted for a long time; there was even a relationship between their parents that was still maintained by their children. For obvious reasons, the goal of this cooperative relationship was to ensure that the fishing and fish-selling activities functioned smoothly and profitably. Furthermore, this collaborative relationship was commonly referred to as a 'supply chain' or marketing channels. The marketing channels were a means of distributing products from the producers to customers in an organized manner that was mutually dependent on each other.

The empirical findings of this study reveal that the small pelagic fish supply chain on Ambon Island had four established supply networks as shown in the following Figure 3.

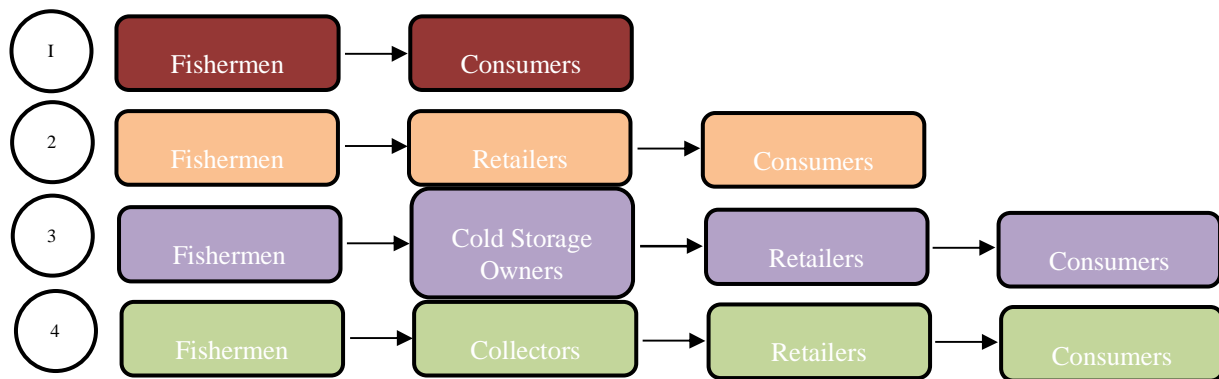


Figure 3 Small pelagic fish supply chain in Ambon Island, 2023

According to Figure 3 above, the supply chain pattern for small pelagic fish on Ambon Island could be explained as follows:

- 1) The first distribution chain involved the fishermen selling directly to local consumers, specifically at the time of landing.
- 2) The second distribution chain involved the fishermen selling directly to retailers, who then sold them to the end consumers.
- 3) The third distribution chain involved of two intermediaries, followed by the end consumers. The capture of small pelagic fish was transferred to cold storage before being sold to the retailers, who subsequently sold them to the end customers.
- 4) The fourth distribution chain started with the fishermen used the collectors' service, then the collectors sold the fish to the retailers, and the retailers would sell the fish to the end consumers.

The business actors involved had different tasks as follows (Table 4):

- The fishermen prepared the fishing facilities, determined the capture zone, captured the fish, sorted the fish, and transported the fish.
- The collectors distributed the fish, determined the fish price, and were in charge in retail sales. In this case, the fishermen as producers did not determine the selling price no paid for the marketing cost. The collectors would receive 10% of the total sales revenue.
- The retailers were in charge of the purchasing activities, determined the price, and sold the fish to the end consumers.
- The cold storage owners were in charge of the purchasing activities, and storing and selling the fish, particularly during the lean season.

Table 4 Small pelagic fish sales distribution and volume on Ambon Island

| Marketing Channel | | Percentage of Sales Volume (%) | Total (Individual) |
|-------------------|---|--------------------------------|--------------------|
| I | Fishermen – Consumers | 10 | 3 |
| II | Fishermen – Retailers – Consumers | 15 | 7 |
| III | Fishermen – Cold Storage Owners – Retailers – Consumers | 15 | 5 |
| IV | Fishermen – Collectors – Retailers – Consumers | 60 | 15 |

Source: Results of Field Research, 2023

Based on the data presented above, the distribution of small pelagic fish capture on Ambon Island reveals that only 10% of the fish captured were sold directly to the consumers upon landing. These consumers were from the same Negeri as the fishermen, as well as from nearby villages. On the other side, the majority of sales volume was distributed to Borok/auctioneers/collectors, with 60% auctioned to the retailers and sold from the retailers to the end consumers. Meanwhile, the remaining 15% of the capture were transferred to cold storage owners, which was then sold to the end consumers through the retailers. The fish sales in this channel were often conducted during the lean season. The other 15% were then sold directly by the fishermen to the retailers, who then sold them directly to the end consumers.

These small pelagic fish collected by the fishermen were sold in pans, with the cheapest being IDR 300,000 per pan and the most expensive ranging from IDR 800,000 to IDR 1,000,000 each pan. During the peak season, there were plenty of fish, with the capture ranging from 20 to 30 pans at a time per trip. However, during a bad fishing season, the capture was limited to only 5 to 10 pans. One pan weighted approximately 30 kilograms, and the transportation would cost IDR 20,000 each pan. According to the data above, the fourth marketing channel was the most commonly preferred marketing channel by the fishermen, accounting for up to 15 individuals or 60% percent of all existing marketing channels for the small pelagic fish.

Table 5 Analysis of marketing margin and marketing channel efficiency of small pelagic fish on Ambon Island

| Marketing Channel | Fisherman Price/Pan (IDR) | Consumer Price/Pan (IDR) | Marketing Margin | Efficiency |
|-------------------|---------------------------|--------------------------|------------------|------------|
| I | 600,000 | 600,000 | 0 | 0 |
| II | 620,000 | 700,000 | 80,000 | 11.43 |
| III | 620,000 | 750,000 | 130,000 | 17.33 |
| IV | 540,000 | 700,000 | 160,000 | 22.86 |

Source: Results of Field Research, 2023

The marketing margin and efficiency calculations implied the marketing distribution channel patterns as follow (Table 5):

- The first marketing channel was a direct distribution of small pelagic fish on Ambon Island from the fishermen to the end consumers at the landing locations without the help of intermediaries, and could sell the fish for IDR 600,000 per pan. It was clear that there was no marketing cost paid as a result of costs borne by both the fishermen and end consumers that could influence the pricing; and that the marketing margin was equal to zero.
- The second marketing channel involved an assistance of retailers as the intermediaries between the fishermen and end consumers. The price from fishermen to the retailers was IDR 620,000 per pan, which was then resold by the retailers to end consumers in the market for IDR 700,000. Therefore, the marketing margin was IDR 80,000 per pan, with the fisherman receiving 88.57% of the share.
- The third marketing channel involved an assistance of cold storage owners and retailers as the intermediaries between the fishermen and end consumers. The price from fishermen to the cold storage owners was IDR 620,000 per pan, which was then resold to the end

consumers for IDR 750,000 per pan. Therefore, the marketing margin was IDR 130,000 per pan, with the fishermen receiving 82.66% of the share.

- The fourth marketing channel involved an assistance of collectors and retailers as the intermediaries between the fishermen and end consumers. The price from fishermen to the collectors was IDR 540,000 per pan, which was then resold to the end consumers for IDR 700,000 per pan. Therefore, the marketing margin was IDR 160,000 per pan, with the fishermen receiving 77.14% of the share.

This analysis shows that the consumer price was much higher than the selling price received by the fishermen in each distribution channel, resulting in a big marketing margin, causing the consumer price to rise. Similarly, a study by [46] confirmed that each institution performing different marketing functions would result in considerable pricing discrepancies between the fishermen/producers and consumers, causing the consumer price to rise. Thus, the

findings of this study suggest two crucial conclusions: first, the longer the marketing distribution channel, the more ineffective it would be; and second, all distribution channels (I-IV) could be considered efficient, with each marketing distribution channel ranges from 0% to 30%.

3.4 The path analysis of marketing distribution efficiency of small pelagic fish in Ambon Island

The efficiency with which small pelagic fish were marketed and distributed on Ambon Island was dynamic. The consumer price, producer price, and marketing cost had a significant impact on the marketing efficiency. In other words, there were various determinants of small pelagic fish distribution in the market. This study conducted a path analysis based on the collected field research data, and the results can be seen in the following Table 6.

Table 6 Results of path analysis of factors affecting the marketing distribution efficiency of small pelagic fish on Ambon Island

| No. | Variable | B | Sig. Prob. | Result |
|--------------------------|----------------------------------|------------|------------|-----------------|
| I First Equation | | | | |
| | Constant (13,622.32) | | | |
| | Producer Price (X ₁) | 0.031 | 0.071 | Not Significant |
| | Consumer Price (X ₂) | 0.045 | 0.020 | Significant |
| | Marketing Cost (X ₃) | 1.023 | 0.000 | Significant |
| I Second Equation | | | | |
| | Constant (0.054) | | | |
| | Producer Price (X ₁) | -0.0000344 | 0.042 | Significant |
| | Consumer Price (X ₂) | 0.0000902 | 0.037 | Significant |
| | Marketing Cost (X ₃) | -0.001 | 0.046 | Significant |
| | Marketing Margin (Y) | -0.014 | 0.039 | Significant |

The regression equations are as follow:

$$Y = 13622.323 + 0.031\chi_1 + 0.045\chi_2 + 1.023 \chi_3 + e$$

$$Z = 0.54 - 0.00003442 \chi_1 + 0.00009022\chi_2 - 0.001\chi_3 - 0.014 Y + e$$

The first equation shows that the producer price (χ_1) has a positive and insignificant effect on the marketing margin; the consumer price (χ_2) has a positive and significant effect on the marketing margin; and the marketing cost (χ_3) has a positive and significant effect on the marketing margin. These findings confirm that increasing the producer price (χ_1) led to a higher marketing margin. It could be explained as the producer price, or selling price of the product, was defined by the production cost incurred while the product was in the production stage, which included operating costs, such as direct labour costs. If the production cost was high, the producer price/selling price would also be high, and this would lead to a higher consumer price/purchasing price in subsequent marketing

phases, which would be even higher if the marketing cost was accumulated.

A high consumer price would have a significant impact on the marketing margin. In contrast, the producer price did not appear to have a substantial impact on the marketing margin. This suggested that the producer price was only determined by operational costs that remained within appropriate boundaries, implying that the producer price was determined reasonably and it had had no effect on the determination of consumer price or marketing margins. Further, the marketing margin was positively impacted by the consumer price (χ_2) as a result of longer marketing chains, which caused the marketing cost to be greater and simultaneously would have an impact on the higher marketing margin. In addition, the high marketing cost (χ_3) could boost the marketing margin [47,48].

[49] and [50] underlined in their respective research that the fishermen/producers had little bargaining power while conducting transactions. Thus, an increase in the consumer price due to an increase in the marketing cost

would not result in a major fisherman price increase. This condition could also emerge as a result of the extensive marketing chain of small pelagic fish established on Ambon Island. Ultimately, it would affect the marketing margin and efficiency the small pelagic fish on Ambon Island. The second equation above shows that both producer price (χ_1) and consumer price (χ_2) have a negative and insignificant impact on the marketing distribution efficiency of small pelagic fish on Ambon Island. Meanwhile, the marketing cost (χ_3) and marketing margin (Y) have a negative and significant effect on the marketing distribution efficiency of small pelagic fish on Ambon Island.

The total effect of the analysis model can be calculated as follows:

| | |
|--|-----------------------|
| Total Effect of Fisherman Price (χ_1): - 0.0000344 + (0.001 x 0.031) | = -0.003409 |
| Total Effect of Consumer Price (χ_2): 0.0000902 + (0.001 x - 0.045) | = 0.000857 |
| <u>Total Effect of Marketing Cost (χ_3): - 0.001 + (0.001 x 1.023)</u> | <u>= -0.000001023</u> |
| Total Effect | = 0.00255098 |

Based on the above explanation, it could be concluded that the marketing margin mediates the fisherman price on the marketing distribution efficiency of small pelagic fish on Ambon Island, and that it has a negative and significant effect, with a total effect of -0.0003409. Furthermore, the consumer price has a positive effect on the marketing distribution efficiency of small pelagic fish on Ambon Island, with a total effect of 0.000857. Meanwhile, the marketing cost has a negative and significant effect on the marketing distribution efficiency of small pelagic fish on Ambon Island, with a total effect of -0.000001023. Thus, the marketing margin, in its role as a moderating variable, led the effect of all independent factors to decrease in the same direction, with the exception of the fisherman price and marketing cost variables, which have a negative effect on the marketing distribution efficiency of small pelagic fish on Ambon Island.

4 Conclusions

This study finds that there are four marketing distribution channels for small pelagic fish on Ambon Island: Fishermen – Consumers; Fishermen – Retailers – Consumers; Fishermen – Cold Storage Owners – Retailers – Consumers; and Fishermen – Collectors – Retailers – Consumers. Furthermore, the longer the marketing chain, the higher the marketing margin, reducing the efficiency of marketing distribution of small pelagic fish on Ambon Island. For this reason, it is best to develop marketing distribution activities for small pelagic fish on Ambon Island using short distribution chains. Meanwhile, the marketing distribution efficiency of tiny pelagic fish on Ambon Island demonstrated that all four marketing distribution channels were efficient, with a range of less than 30%. Then, the marketing cost and marketing margin have a significant effect on the efficiency of marketing distribution, implying that if the fishermen/producers wish

It should also be noted that the marketing efficiency in each existing supply chain could be influenced by the behaviour of producers and consumers, which might play a role in lowering a product's selling price. Thus, the higher the marketing cost, the higher the marketing margin, and the more inefficient the marketing distribution would be. In conclusion, the longer the marketing chain, the higher the marketing cost, and the higher the discrepancies between the selling price and the purchasing price. These would cause the marketing margin to increase, and eventually resulted in inefficiencies in the marketing distribution [51-53].

to obtain profits, the first thing they need to consider is to accurately estimate the marketing cost.

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Review process

Single-blind peer review process.