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Research Article

Optimizing Coastal Management: A Comprehensive Value Chain Analysis Approach for Sustainable Economic Development in Java, Indonesia

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Abstract

Coastal areas have become an important part of Indonesia's evolving economy, with a variety of commercial activities taking place. The island of Java has both northern and southern coastal areas, each with its own distinctive characteristics and products. The studies about coastal development through its product value chain are still limited. This study aimed to determine the value chain of fishery products in Java to provide recommendations for enhancing coastal management. For the northern coast, milkfish and ariid catfish from Juwana Coast (Pati Regency, Central Java) were selected, while Whiteleg Shrimp from Mendit Coast and Trisik Coast of Kulon Progo Regency, Yogyakarta were chosen to represent the southern coast. The study involved 48 respondents, including small and medium-sized enterprises (SMEs), farmers, fishermen, wholesalers, middlemen, retailers, restaurants, and consumers. The analysis techniques used in this study included Porter's value chain, Hayami's added value, Return/Cost (R/C) Ratio, and marketing margin analysis. The results of the study revealed that the products followed various channels in the value chain, with longer chains leading to higher prices for the end consumers. The findings also indicated that processed and creatively packaged products tend to command higher prices and generate greater profits. Coastal management should not only focus on upstream activities but also consider downstream processes to increase the value of coastal products. Efforts to enhance coastal management should consider key actors and government interventions through developing the coastal local products.

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1. Introduction

Indonesian fisheries play a vital role in the global economy and national development. Indonesia boasts the second longest coastline in the world, with a length of 95,181 kilometers. The country's marine waters cover a total area of 5.8 million square kilometers, accounting for 71% of Indonesia's total territory (Ministry of Marine and Fisheries Indonesia, 2019). Between the years of 2012 and 2022, the highest level of fish production in Indonesia was recorded in 2017, reaching 23.19 million tons. In the third quarter of 2022, fish production totaled 18.45 million tons (Widi, 2022). These figures indicate significant economic growth in the fisheries sector. Coastal areas in Indonesia serve as the main source of livelihood for many people, not only for fishermen but also for other parties involved in the coastal product economy (Abidin *et al*., 2022). The Blue Economy, encompassing commercial activities derived from the sea, has become a central preoccupation of the Indonesian government (Bhattacharya and Dash, 2021). This is due to the immense potential of the sea and coastal areas in supporting the country's economic development (Talib *et al*., 2022).

There are two main types of fish supply: captured fish and aquaculture (Dewinta and Ma'ruf, 2020; Sin *et al*., 2023). Indonesia is known for its economically important wild-caught fishes, including skipjack tuna, scads, squid, sardinella, and mackerel tuna. Aquaculture also plays a significant role, with commodities like giant prawns, whiteleg shrimp, milkfish, carp, catfish, and tilapia contributing to the local and national economy (Sahri *et al*., 2020). Java Island, a significant region of Indonesia, has two distinct coastal areas with highly productive fisheries: the southern and northern coasts. These regions have divergent ecological profiles (Handayani *et al*., 2017; Novico *et al*., 2022). The southern coast of Java is known for its fine white sand, blue-tinged water, and high waves. By contrast, the northern coast features brownish black sand, murky sea water, relatively calm currents, and less powerful waves.

Pati Regency in Central Java is an area on the southern coast well-known for its fishery production, while Kulon Progo Regency in Yogyakarta is particularly noted for its contributions to the northern coast economy. The two regions play a significant role in the coastal development of Java Island through various products and economic activities (Nurzaman *et al*., 2020). Ariid catfish is a popular capture fishery commodity in the northern coast (Anggawangsa and Faizah, 2020). Whiteleg shrimp and milkfish are among the most significant aquaculture commodities in Indonesia (Nababan *et al*., 2022; Prijono *et al*., 1988). Juwana Coast in Pati Regency, Central Java is known for producing processed ariid catfish, which is smoked through traditional methods using coconut shells and corn cobs as fuel, in addition to milkfish production. Java Island also cultivates large volumes of whiteleg shrimp, with Mendit Coast and Trisik Coast in Kulon Progo Regency, Yogyakarta serving as key production centers.

Smoked ariid catfish is a fishery product that showcases the ability of economic actors to adapt and thrive in a challenging world. Raw fish has limitations as a commodity, given its brief shelf life and relatively low price (Tamiru *et al*., 2023). Through the smoking process, small and medium-sized enterprises (SMEs) can add value to the fish and extend its shelf life (Agüeria *et al*., 2018). These SMEs receive support from the government and other stakeholders to boost the local economy (Kusnandar *et al*., 2023).

The coastal products that can be developed are not limited to just food, but also include tourism, services, and trade. Each of them plays a role in the development of coastal areas (Talib *et al*., 2022). While existing coastal products possess many advantages, there are also obstacles and challenges that affect their development and cultivation (Mariño *et al*., 2019). To maximize the benefits of coastal products for local actors, it is crucial to understand the potential for added value and identify activities along the value chain that can enhance the quality and competitiveness of these commodities (Stacey *et al*., 2019). The value chain itself is not limited to food products, but also has a wide range of uses such as agriculture, forestry, industry, and fishery (Morales-Zamorano *et al*., 2020). However, studies regarding coastal area development through an understanding of its product value chain are still limited. This approach can make a valuable contribution to optimize coastal management and lead to an overall improvement of the coastal areas. Therefore, the aim of this study is to determine the value chain of coastal products and optimize coastal management in Java, Indonesia.

2. Materials and Methods

2.1 Location

This study was conducted in two representative areas of the Javanese coast. The first area under study is Juwana Coast, located in Pati Regency, Central Java Province in the northern coastal region. The second area is Mendit Coast and Trisik Coast, situated in Kulon Progo Regency, Yogyakarta in the southern region

(Figure 1). These two areas are known for producing coastal products that significantly contribute to the local economy.

2.2 Sample Procedure and Data Collection

The data were collected from June 2022 to January 2023. The sample was deliberately selected to include SMEs (milkfish and ariid catfish) and farmers (whiteleg shrimp) from the study areas, aiming to accurately represent local conditions. Additional respondents were selected based on the findings of the supply chain for each product. The total sample consists of 48 individuals, who were purposively selected based on their experience and knowledge in the specific coastal product. It is important to note that the data and survey were limited to the study area. A questionnaire which consists of materials, cost, price, volume, and process was utilized to gather the data (Table 1).

2.3 Data Analysis

Descriptive method was used as basic in this study. The analysis techniques used in this study include value chain analysis by Porter (1985), added value analysis by Hayami (1987), Return/Cost (R/C) Ratio, and marketing margin analysis. Value chain analysis consists of two main activities: primary and secondary. In Porter's analysis, the margin refers to the difference between the total value and the combined cost of conducting both primary and secondary activities. Each value activity involves inputs, human resources, technology, and information such as buyer data, product failure statistics, and performance or test parameters. Additionally, value activities can generate financial assets, including receivables, inventory, or accounts payable. On the other hand, value-added analysis involves cost calculations such as operational costs of production, receipts, and profit/revenue. Hayami's method is used for these calculations, wherein the main variables consist of output, input, price, revenue and added value (Table 2).

3. Results and Discussion

Coastal area optimization has various approaches, one of which is through an approach to the potential of coastal products such as both capture and aquaculture fisheries. Each coastal product certainly involves various parties starting from raw material procurement, processing, and marketing stages. These various processes can be used in the optimization and development of coastal areas.

3.1 Supply Chain Channel

Every commercial product goes through certain channels, known as the supply chain, to reach consumers (Do. Bagus and Hanaoka, 2022). An effective supply chain can lead to stable distribution, feasible profits, and reasonable prices for consumers (Li *et al*., 2021). Coastal products, including fishery and aquaculture products, make a significant contribution to the economic sector of those areas. These products also follow specific channels

Figure 1. Research locations (1: Juwana Coast, 2: Trisik and Mendit Coast)

to reach consumers. Understanding the distribution channels of coastal products provides insight into how these products reach consumers, and recommendations for product improvement can be developed based on this understanding (Asri *et al*., 2021). The findings of this study indicate that both whiteleg shrimp and ariid catfish have seven channels, while milkfish has six channels.

The whiteleg shrimp supply chain involves six actors: shrimp farmers, wholesalers, middlemen, retailers, restaurants, and consumers (Figure 2). Shrimp farmers utilize both intensive and conventional fry seeding systems, with some farmers even using mobile applications for shrimp feeding. The distribution of shrimp products extends beyond Yogyakarta to other areas such as Jakarta, Cirebon, and East Java. Shrimp consumption in Indonesia is high, as it is a key ingredient in local cuisines (Setyawan *et al*., 2022).

Table 1. Respondent and Data Information

No	Commodity	Respondent	Data
1	Milkfish	1. 2 SMEs	1. Materials, cost, price, process
		2. 1 Fisherman	2. Volume, price, process
		3. 1 Restaurant	3. Price, process
2	Ariid Catfish	1. 3 SMEs	1. Materials, cost, price, process
		2. 1 Fisherman	2. Volume, price, process
		3. 1 Middleman of fresh fish	3. Price, process
		4. 2 Middleman of smoked fish	4. Price, process
		5. 3 Retailers	5. Price, process
3	Whiteleg Shrimp	1. 10 Farmers	1. Production, cost, price, process
		2. Wholesaler	2. Price, process
		3. 3 Middleman	3. Price, process
		4. 4 Retailers	4. Price, process
		5. 2 Restaurants	5. Price, process
		6. 14 Consumers (8 Retail and 6 Restaurant)	6. Price, process
	Total	48 Respondents	

Whiteleg shrimp wholesalers acquire the product from farmers and distribute it to middlemen and restaurants. Some of the shrimp is exported, while other parts of the supply are used for locally processed products such as frozen or ready-to-cook shrimp. The role of middlemen in the supply chain is similar to that of wholesalers but focused on local distribution. They obtain shrimp directly from farmers or wholesalers and sell it to retailers, restaurants, or directly to consumers. Retailers are found to sell the products in local markets or roadside stands, where the products are in turn passed on to restaurants or consumers. This study reveals that retailers only purchase shrimp from middlemen. Restaurants serving whiteleg shrimp are commonly found near beaches popular with tourists, who form a significant portion of their customer base. These restaurants typically offer a variety of seafood in addition to whiteleg shrimp, such as sand crabs, small crabs, sea shrimp, and fish. These products are often prepared using frying methods to create crispy dishes. The end consumer of whiteleg shrimp can obtain it from all channels except directly from the farmer. The whiteleg shrimp supply chain thus offers a range of purchasing options for consumers. Surveyed consumers noted that they still purchase shrimp at retailers despite its high price due to its nutritional value and protein content.

The smoked ariid catfish supply chain begins with the fish auction, where fishermen sell their wild catches (Junaidi *et al*., 2018; Nurfadillah *et al*., 2022). Fishermen use special rods to catch the fish. The supply chain for smoked ariid catfish involves six actors, each with their own role (Figure 3). Fish sellers using the auction platform are required to pay a 1.14% fee based on the total purchased fish, while fishermen are charged 1.71% based on the total sold fish. This study shows that not only wholesalers, but also small and medium enterprises (SMEs) participate in the auction to purchase fresh ariid catfish.

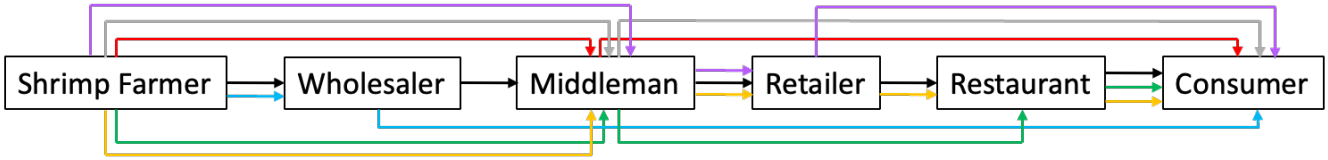

Figure 2. Whiteleg shrimp supply chain

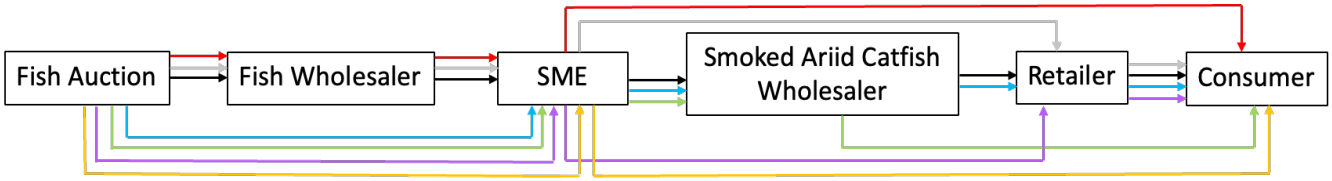

Figure 3. Smoked ariid catfish supply chain

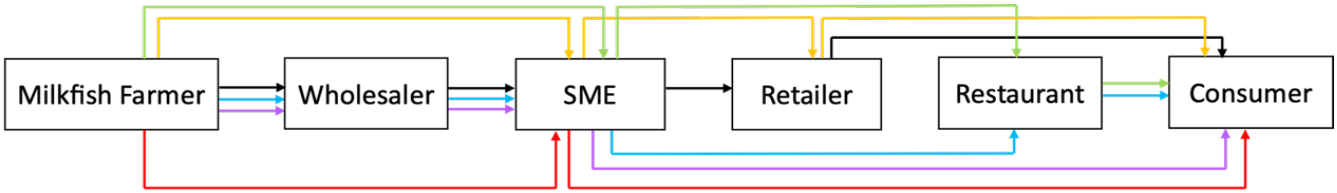

Figure 4. Milkfish supply chain

Table 2. Added Value Analysis of Hayami Method

No	Variable	Notes
***Outputs, Inputs* and Price**		
1	Output (kg/month)	a
2	Raw Material (kg/Month)	b
3	Workforce (Man-Day/ Month)	c
4	Conversion Factor	d = a/b
5	Labor coefficient (Man-Day/ kg)	e = c/b
6	Output price (IDR/kg)	f
7	Average labor wage (IDR/ Man-Day)	g
Revenue and added value		
1	Raw material prices (IDR/ kg)	h
2	Contribution of other inputs (Rp/kg)	i
3	Output value (IDR/kg)	j = d x f
4	Value added (IDR/kg)	k = j - i - h
5	Value added ratio (%)	l = (k/j)x100%
6	Labor benefits (IDR/kg)	m = e x g
7	Labor share (%)	n = (m/k) x100%
8	Profit (IDR/kg)	o = k - m
9	Profit Share (%)	p = (o/k) x100%

Table 3. Whiteleg Shrimp Added Value

Value Chain Actors	Added Value (IDR/ Kg)	
	Size 30 – 50/kg	Size 100-140/kg
Whiteleg Shrimp Farmers	54.834	33.834
Wholesaler	10.772	12.772
Middleman	8.350	4.350
Retailer	4.384	9.384
Restaurant	34.261	27.261

Table 4. Milkfish Added Value

No	Value Chain Actors	Added Value (IDR/ Kg)
1	Milkfish Farmers	20.452,23
2	SME 1	62.807,95
3	SME 2	50.271,73
4	Restaurant	24.569,23

Fish wholesalers acquire ariid catfish from the auction and sell exclusively to SMEs, and SMEs also purchase fresh ariid catfish directly from the auction and sell to smoked ariid catfish wholesalers, retailers, and directly to consumers. Smoking is the most popular method for processing ariid catfish, and it has gained popularity among consumers, making it the second most popular coastal product after milkfish. SMEs use coconut shells as the smoking material due to their

uniquely appealing aroma and taste. The processed smoked ariid catfish products are divided into four parts: head, sliced meat, tail, and innards. While meat parts are commonly purchased, other parts are also traded based on consumer preferences. Smoked-arid catfish wholesalers obtain products exclusively from SMEs, selling them directly to retailers and consumers.

Retailers obtain smoked ariid catfish through two channels: directly from SMEs and from smoked ariid catfish wholesalers. Sales approaches may differ between individual retailers, resulting in variations in added value and profit. Meanwhile, three channels are available to consumers. They can purchase the products directly from SMEs or may choose to buy from wholesalers or retailers.

preferences.

3.2 Added Value

Added value refers to the increase in worth of a certain product that comes from additional treatment or enhancements (Mehrez *et al*., 2023). It therefore represents the extra value that can be provided to customers. In Indonesia, coastal products are often sold in their fresh form, which may not have a high enough value compared to processed products (Partelow *et al*., 2023). There are various ways to increase the value of products, such as adding unique features, improving quality, establishing a strong brand, and building a positive reputation (de Chernatony *et al*., 2000). Marketing margin is one approach to assessing

Table 5. Ariid Catfish Added Value

No	Value Chain Actors	Added Value (IDR/Kg)				
		Head	Meat	Tail	Innards	Total
1	Fish Auction	-	-	-	-	42.327,63
2	Fish Wholesaler	-	-	-	-	3.716,33
3	SME A	6.877,82	16.779,23	4.201,76	5.539,79	33.398,60
4	SME B	7.742,27	16.355,67	7.437,11	-	31.535,05
5	SME C	7.886,60	19.237,95	3.346,06	-	30.470,61
6	Smoked Ariid Catfish Wholesaler 1	1.439,62	16.939,62	6.439,62	1.439,62	26.258,48
7	Smoked Ariid Catfish Wholesaler 2	3.401,53	20.901,53	8.401,53	-	32.704,59
8	Retailer 1	3.636,36	23.636,36	8.636,36	2.636,36	38.545,44
9	Retailer 2	38.265,62	93.265,62	18.265,62	-	149.796,86
10	Retailer 3	6.666,67	34.166,67	16.666,67	-	57.500,01

Milkfish farmers play a crucial role at the beginning of the milkfish supply chain. In Indonesia, ready-to-cook milkfish products (marinated and partially cooked, requiring only frying by the end consumer) are popular; milkfish is seldom cooked fresh. Farmers sell their products to wholesalers and SMEs (Figure 4). Milkfish wholesalers primarily supply fresh milkfish to SMEs, as they can sell the fish more quickly than other actors in the chain. SMEs process the milkfish into ready-to-cook products, such as “Bandeng Presto” (pressure-cooked milkfish). Other products, such as fish balls, are also prepared before sale. SMEs sell their products to retailers, restaurants, or directly to consumers. Halal certification is considered a strength when selling food in Indonesia and milkfish SMEs make a point of obtaining the certificate. However, the study indicates that retailers only sell the products to consumers. Restaurants typically offer both packaged and cooked forms of milkfish to cater to consumer

profitability, where a higher marketing margin indicates higher profit. Figures 5, 6, and 7 illustrate the marketing margin and profit for each actor in the whiteleg shrimp, milkfish, and ariid catfish supply chains respectively. The larger the marketing margin, the higher potential profit that can be achieved because the channels are shorter and more effective. Therefore, increasing marketing margin can become a key business development strategy .

The highest marketing margin in whiteleg shrimp can be found in the channel between farmers and middlemen or wholesalers, with IDR 53,274 for size (a), and IDR 45,302 for size (b). The lowest margin exists in the retailer-to-restaurant or consumer channel, with IDR 5,000 for size (a) and IDR 10,000 for size (b). This could be due to retailers’ reluctance to sell at prices higher than they think consumers would be willing to pay. In Indonesia, consumers still prioritize reasonable prices as the most important factor (Purbawa *et al*., 2023). Meanwhile, the highest profits are generated for

farmers through middlemen or wholesalers. However, this study also indicates that the value of whiteleg shrimp is rising, as evidenced by the increase in prices when the shrimp is processed into further products.

The milkfish chain exhibits a greater variety of processed products, which are primarily produced by SMEs. SMEs process milkfish in many ways, with some selling directly to consumers and others targeting restaurants. The highest marketing margin, amounting to IDR 98,000, is observed in SME 2 when selling to consumers. Milkfish farmers also generate the highest profits when selling to SME 2. Among milkfish products, Bandeng Presto is the most popular, as it can be easily sold to various segments of society (Abidin *et al.*, 2017).

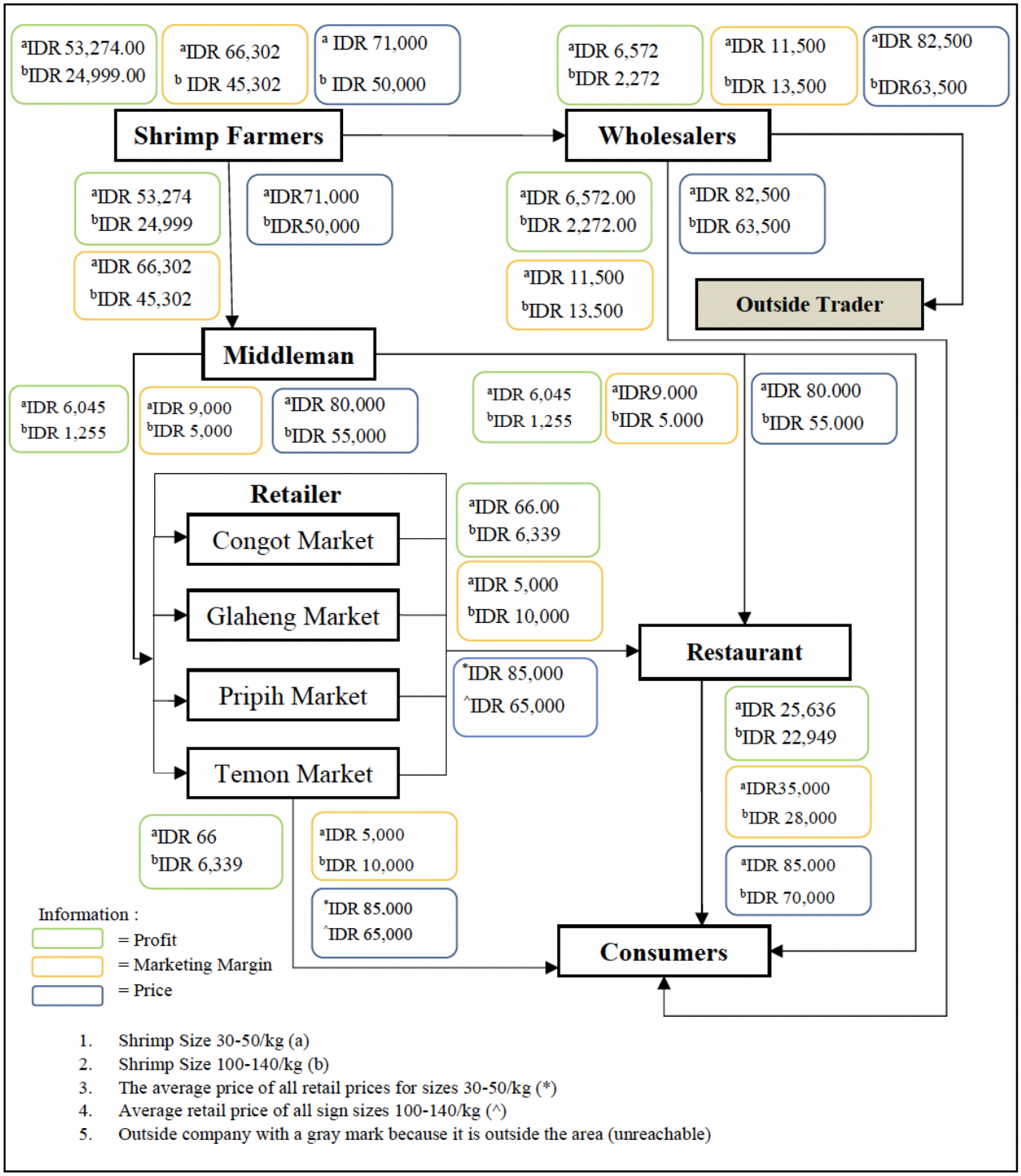

Figure 5. Profit and marketing margin of whiteleg shrimp

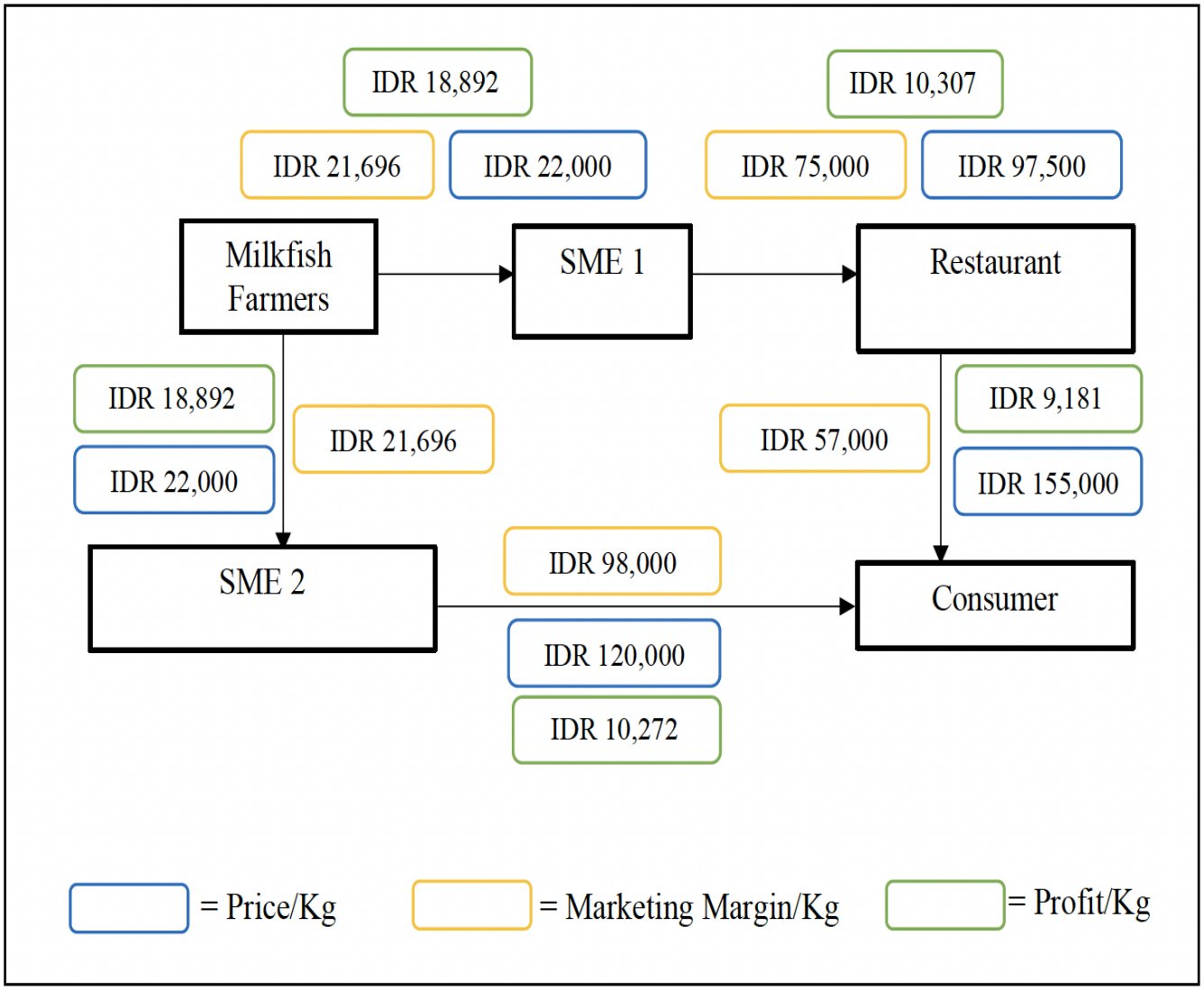

Figure 6. Profit and marketing margin of milkfish

The Juwana area is renowned for its smoked variant of ariid catfish, which has gained popularity beyond the region. The highest marketing margin is observed in Retailer 2 when selling to consumers, with IDR 50,000, IDR 105,000, and IDR 30,000 for the head, meat, and tail respectively. Retailer 2 has made improvements in terms of quality and packaging, resulting in higher selling prices. The highest profit is also obtained by Retailer 2. In the case of ariid catfish, the special treatment given to the product may enhance its profitability (Wang *et al*., 2023).

The highest added value of whiteleg shrimp is observed at the farmers' level, followed by the restaurant sector, with values of IDR 54,834 and IDR 34,261 per kilogram for size 30-50/kg, respectively (Table 3). In the case of milkfish, SME 1 achieves the highest added value by implementing extensive product treatment, thereby increasing its worth (Table 4). Ariid catfish is sold in unique forms, including the head, meat, tail, and innards, which are marketed separatelydue to variations in consumer preferences. Retailer 2 demonstrates the highest added value for smoked ariid catfish meat, reaching IDR 93,265.62. Additionally, this retailer also has the highest total added value for all fish parts, amounting to IDR 149,796.86 (Table 5).

3.3 Value Chain Activities

The primary and secondary activities in the value chain process reveal aspects that can be improved and play a vital role in enhancing added value. The primary activities in the whiteleg shrimp value chain demonstrate commonalities in product processing, while the secondary activities have been enhanced through the utilization of digital media for accessing and delivering information (Figure 8). The results indicate that the whiteleg shrimp value chain is quite effective, enabling the continued development of this product to maximize its benefits.

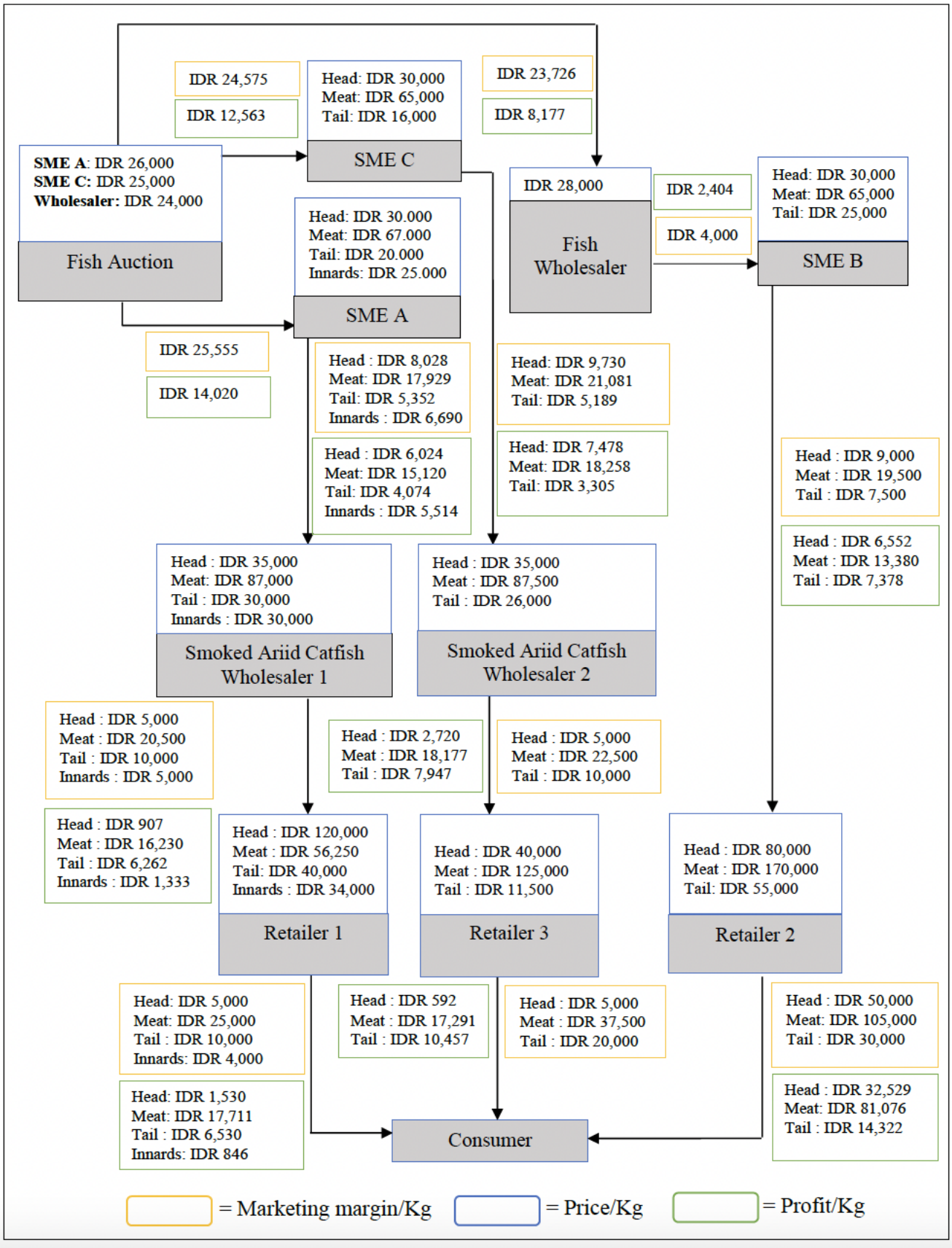

Figure 7. Profit and marketing margin of ariid catfish

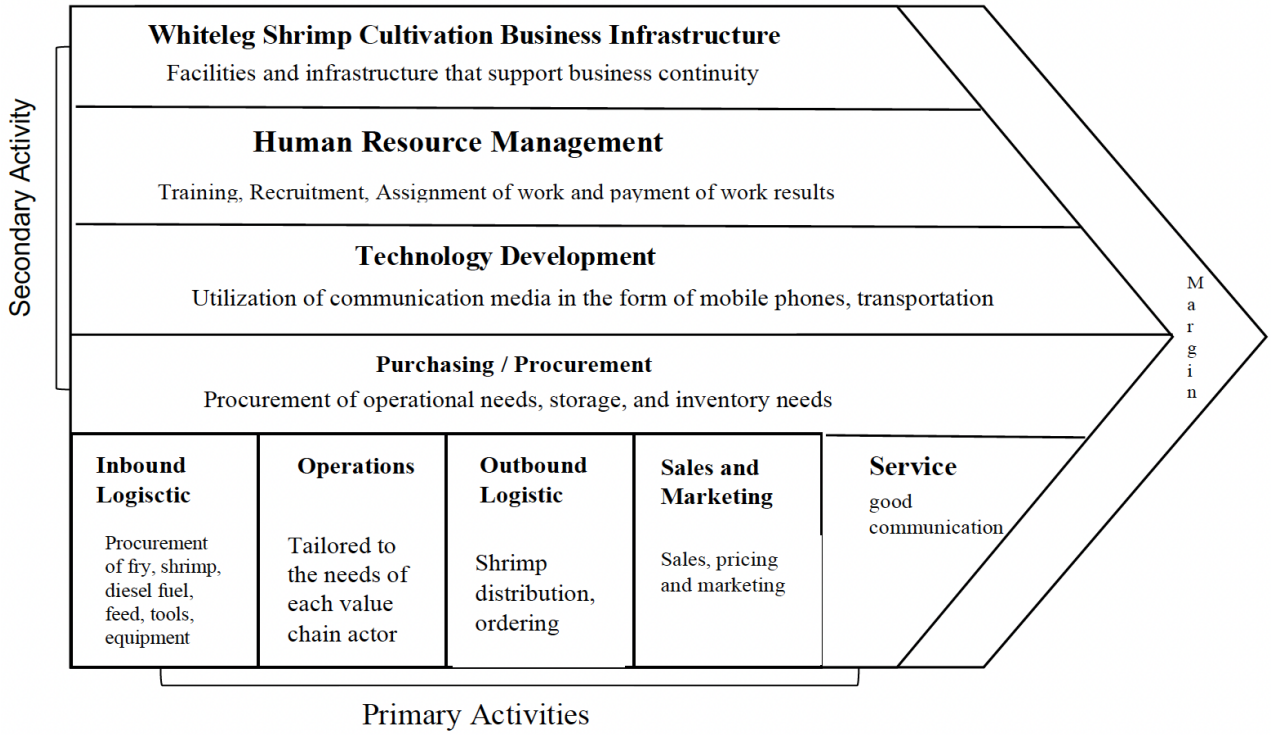

Figure 8. Porter added value of whiteleg shrimp

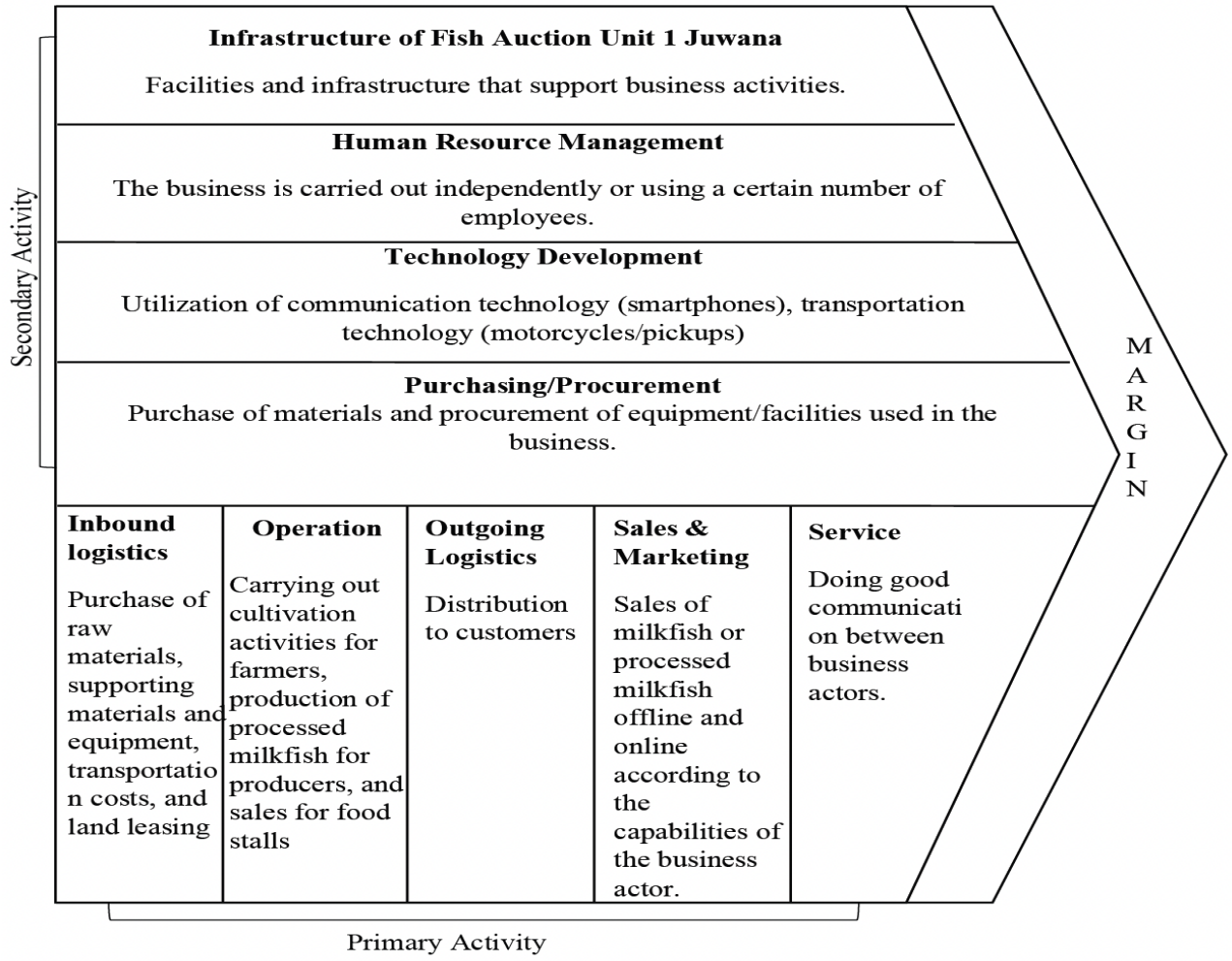

Figure 9. Porter added value of milkfish

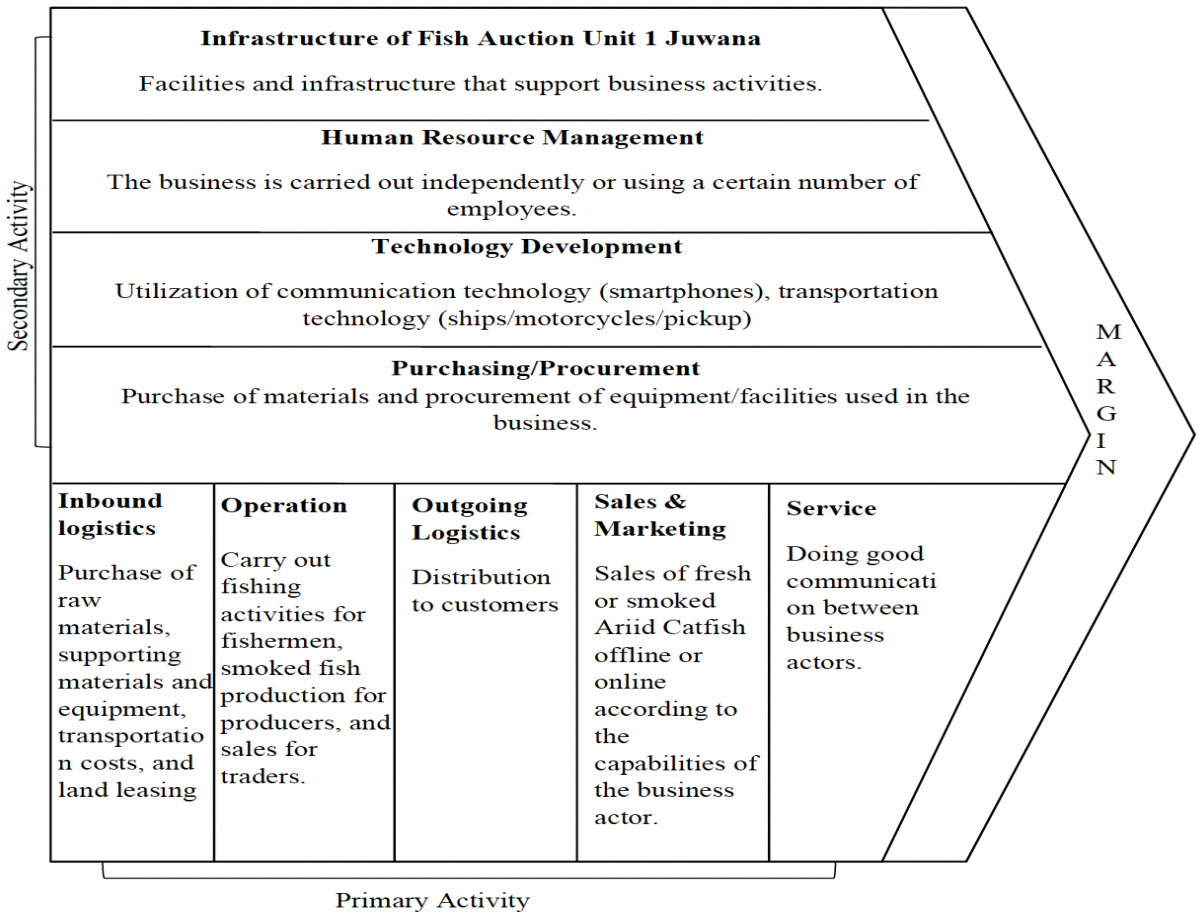

Figure 10. Porter added value of ariid catfish

The primary activities involved in milkfish production are not significantly different from those used for other products, though online marketing has increased due to the impact of the Covid-19 pandemic. Nonetheless, the secondary activities are distinguished by their unique approach, utilizing social media and digital marketing for promotion of milkfish products (Figure 9). In the case of smoked ariid catfish, primary activities require more time for processing the product, but the use of online media for promotion has improved, leading to increased recognition of the products across various social strata (Figure 10). The effectiveness of digital media promotion, including social media, has been demonstrated by increased sales and product enhancements (Ayuni *et al*., 2019). Both milkfish and smoked ariid catfish exhibit an effective value chain process.

3.4 Discussion

The development of coastal areas, aimed at increasing the added value of coastal food products, necessitates consideration of production factors as observed in value chain activities (Náthia-Neves *et al*., 2020). Enhancements can be achieved through various measures, such as improving the quality of production facilities to yield higher quality, more competitive products. Additionally, providing financial assistance facilities to support the quality and production capacity of various actors, including fishermen, fish farmers, and SMEs, is crucial. Effective human resource management is also essential in ensuring smooth production processes that prioritize human welfare (Saeidi *et al*., 2022). The remaining natural potential of coastal areas can serve as an asset, and its development for the benefit of the surrounding community can be facilitated through the involvement of relevant stakeholders, including the government and the private sector (Nurzaman *et al*., 2020). The government, through various programs, plays a role in promoting the development of regions based on local flagship commodities, including those from coastal areas (Noguer-Juncà *et al*., 2021).

In Yogyakarta itself, the coastal area is classified as a marginalized region, receiving special attention from entities including the provincial government (Maulida and Subejo, 2021). This is supported by the historical significance of the southern sea, which is inseparable from Yogyakarta. The marginal aspects and historical factors that have led the provincial government to create a development vision for Yogyakarta, which

includes the improvement of coastal areas, are framed as "The Realization of PANCAMULIA, Jogja's Society through Kalurahan (village governance) Reform, Empowerment of the Southern Region, as well as Innovation Culture and Information Technology Utilization." The "southern region" refers to the coastal zone of Yogyakarta. Similarly, Central Java prioritizes the development of coastal areas, emphasizing the need for multi-sector cooperation in such efforts. Juwana's coastline receives special attention due to its nationally recognized bandeng (milkfish) products, which have become a signature food in Semarang, the capital city of Central Java province.

The development of coastal area products cannot only be viewed from the perspective of individual actors, but needs to be approached holistically, considering all participants in the supply chain (Arifin *et al*., 2023). The development of products within each value chain actor can vary, as each participant possesses different levels of knowledge, needs, and experience in adapting to current trends and the digital era (Waiho *et al*., 2020). In the present moment, some participants are innovative and technology-savvy, while others still rely on conventional techniques or prioritize manual labor in their primary and secondary activities. Consequently, the outcomes for various participants' products differ, particularly in terms of added value.

Government intervention and support can greatly benefit the development of coastal areas, not only in terms of seafood production or aquaculture but also in other sectors, such as trade or services carried out by the local community (Achmad *et al*., 2022). Rosales *et al*. (2017) suggested the same thing where government plays an important role in coastal area development. Innovations in coastal products can effectively respond to ever-changing consumer interests. Establishing a strong brand, like Bandeng Juwana, can contribute to the long-term success and acceptance of the product within society. However, branding itself does not yield immediate impact; it takes time for the community to become aware of the product and develop loyalty towards it. Providing support to economic actors in coastal areas will empower them to operate sustainably and thrive (Lin *et al*., 2021).

To create an efficient marketing channel, many suggest cutting out intermediaries, skipping the middleman, and selling directly from the producer to the consumer (Papacharalampous, 2021), like research by Indrasari and Komari (2021) about laying fish value chain. However, the realization of this goal is not as simple as it seems, as middlemen, wholesalers, and retailers still play an important role in the product's journey to reach consumers (Crona *et al*., 2010). There are many conveniences or advantages, such as faster absorption (sales) of products, when sold to middlemen, compared to the longer time it may take to sell directly to consumers. Additionally, distribution costs may be higher when selling directly to consumers (Abebe *et al*., 2016). Therefore, the middleman is still integral to the coastal product marketing world.

4. Conclusion

Coastal regions in Indonesia have emerged as a highly promising sector for bolstering both local and national economies. With the world's second-longest coastline, Indonesia boasts significant potential for the development of its coastal areas. By examining the value chains of three coastal products—whiteleg shrimp, milkfish, and ariid catfish—this study illustrates that these value chains are fairly effective and efficient. Nevertheless, there is an opportunity to enhance added value by engaging all stakeholders in the value chain, including government and private entities. Small and Medium Enterprises (SMEs) play a pivotal role in advancing coastal products and contribute significantly to increasing their value. Providing various forms of support and assistance through SMEs, as opposed to individuals, offers a viable avenue for nurturing the growth of SMEs in the coastal products sector. Gaining insights into the key players in coastal area economics can offer valuable perspectives for optimizing coastal management by involving stakeholders at every level.

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Authors' Contributions

The contribution of each author is as follows, Zuhud Rozaki; conceptualized, collected the data, analyzed data, drafted paper, and designed the figures. Ahmad Shabudin Arifin and Mona Fairuz Ramli; conceptualized. Elvina Nurrohma, Nova Nurvinka Ramadhani, and Winda Ismah Setyoasih; collected data, analyzed data. Masateru Senge: drafted paper. All authors discussed and contributed to the final manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

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