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ANALYSIS OF THE DETERMINATION OF LEADING AQUACULTURE COMMODITIES IN RIAU PROVINCE

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ABSTRACT

This study aims to identify and analyze leading commodities in the aquaculture sector of Riau Province, using the Location Quotient (LQ), Shift Share, and Klassen Typology approaches. The analysis was conducted on aquaculture production data from 2019 to 2023 to identify commodities with the greatest potential and optimal contribution to the regional economy. The results show that the leading commodities in Riau Province are pangas catfish (*Pangasianodon hypophthalmus)* and catfish (*Clarias gariepinus*), both of which have an LQ value greater than 1, indicating that they are basic commodities with high competitiveness at the provincial level. Meanwhile, commodities such as carp (*Cyprinus carpio* L), Nile tilapia (*Oreochromis niloticus*), giant goramy (*Osphronemus goramy*), vaname shrimp (*Litopenaeus vannamei*), and milkfish (*Chanos chanos*), despite production fluctuations, still require more efficient management to improve their competitiveness. Based on the shift-share analysis, catfish and tilapia contribute positively and significantly to the growth of the aquaculture sector in Riau Province. Furthermore, the Klassen Typology analysis shows that pangas catfish and catfish fall into the "Advancing and Growing Rapidly" quadrant, while other commodities are in the "Potential or Rapidly Developing" quadrant. This study concludes that the aquaculture sector in Riau Province has great potential for development, particularly for catfish and tilapia, which can be strengthened through improvements in infrastructure, aquaculture technology, and commodity diversification to reduce production fluctuations. Improvement of infrastructure, aquaculture technology, commodity diversification, and farmer training can enhance productivity, quality, and market competitiveness both domestically and internationally in a sustainable manner.

Keywords: Leading Commodities, Aquaculture, Location Quotient (LQ)

1. INTRODUCTION

Aquaculture is now recognized as the world's fastest-growing food supply sector. The State of World Fisheries and Aquaculture 2024 report shows that by 2022, global aquatic animal production will reach a record 185 million tons, of which 94 million tons (51%) will come from aquaculture, surpassing capture fisheries production for the first time. This phenomenon confirms the significant shift of the world's fish supply sources from the ocean to ponds, farms, and cages[1].

As a tropical archipelago, Indonesia ranks among the largest aquaculture producers alongside China, India, and Vietnam. The Ministry of Maritime Affairs and Fisheries (KKP) targets national

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fisheries production of 24.58 million tons in the 2025 RKP. KKP's "Blue Economy" program has also increased aquaculture output by 13.6% by 2024, mainly through strengthening five key export commodities: vaname shrimp, seaweed, Nile tilapia, crab, and lobster. At the regional level, Riau Province has promising but fluctuating aquaculture performance. Aquaculture production in 2023 was recorded at 124,734 tons, with an average growth of 4.25% per year over the past decade. The largest contribution came from pangas catfish (27.97%), catfish (26.07%), and Nile tilapia (23.67%). KKP data also shows that Riau's pangas catfish volume is stable at 30-31 thousand tons annually from 2020-2023[2].

However, aquaculture only contributes 47.88% of Riau's total fisheries production (260,507 tons), and the utilization of cultivated land is recorded at only 0.24% of the potential. 1.05 million ha. The low utilization of land causes the local supply to be unable to meet demand, and the domestic market tends to be saturated, so the contribution of this sector to provincial GDP is still not optimal[3].

One approach that can be applied is identifying and determining superior commodities, which become the main development focus. These superior commodities are selected based on high market interest and large selling value, hoping they can contribute significant income compared to other commodities. The marketing activities of superior commodities can be divided into two categories: local superior commodities and export superior commodities. Developing superior export commodities is expected to positively impact foreign exchange from the non-oil and gas sector and increase regional income[4].

From a supply perspective, superior fish commodities can be analyzed through various aspects, such as biophysical conditions, technology application, and socio-economic aspects faced by fishermen. This is important so the commodity can be used as a mainstay product to generate optimal income[5]. Meanwhile, from the demand side, superior commodities are characterized by high demand in the domestic and international markets[6].

The study of superior commodities in Riau itself is still partial. Ramadhan & Vaulina[7] only captured Rokan Hilir Regency, while Manullang et al.[8] in Central Java confirmed using Location Quotient (LQ) and Shift Share methods to map commodity competitiveness. No integrated analysis at the provincial scale comprehensively identifies Riau's leading cultivated commodities. Departing from this gap, this research aims to identify and analyze the leading aquaculture commodities of Riau Province through the LQ, Shift Share, and Klassen Typology approaches. Later, it can be used as a consideration in aquaculture management based on the concept of efficiency to achieve cooperative and competitive advantages in the face of trade globalization.

Commodity development aligned with a region's natural resource potential can increase efficiency, maintain resource sustainability, and encourage increased trade activity. These conditions can, in turn, strengthen the local community's income and welfare. To ensure the success of these efforts, it is necessary to determine superior commodities supported by the availability of data and information on the biophysical and socioeconomic conditions in the region[9].

This study aims to identify the most promising aquaculture commodities in Riau Province using the Location Quotient (LQ), Shift Share, and Typology Klassen approaches. The hypothesis proposed is that the identified leading commodities will exhibit high competitiveness and significantly contribute to the Gross Regional Domestic Product (GRDP) and the improvement of local community welfare. The explicit goal of this study is to provide a comprehensive analysis of the leading aquaculture commodities in Riau Province and to offer strategic recommendations for the efficient, sustainable management of fisheries resources that can adapt to the

dynamics of global trade globalization. The findings of this study are expected to serve as a basis for formulating policies and strategies to optimize the development of the aquaculture sector at the provincial level.

2. RESEARCH METHOD

Time and Place

This research was conducted in Riau Province, and the location selection was based on the consideration that Riau Province has great potential in the fisheries sector, especially in the development of aquaculture, as seen in the development of the Minapolitan area. The research implementation time is 2025.

Method

The data used in this study includes primary and secondary data. Primary data is obtained through direct observation in the field and interviews with fishermen and related parties. In contrast, secondary data in capture fisheries production data is obtained from the Ministry of Maritime Affairs and Fisheries (KKP) Statistics for 2019-2023.

The sampling technique applied is purposive sampling, which is based on statistical data on aquaculture production in Riau Province from 2019 to 2023 and data on aquaculture production in Indonesia in the same period. The respondents selected in this study used purposive sampling because they are important in preparing and implementing policies to improve the competitiveness of leading fisheries commodities in Riau Province.

Procedures

Determination of Analysis, Shift Share Analysis, and Klassen Typology Analysis. Data processing was carried out using the Excel Application. Location Quotient (LQ) analysis compares the share of sub-commodities in aquaculture activities with the total share of these activities in total fisheries activities in the wider region. The LQ value is calculated by comparing the production of a type of fish to the total fish production in Riau Province, comparing the production of the same type of fish to the total fish production at the national level. The formula used in this calculation is as follows[10]:

$$LQ = \frac{x_i/x_t}{X_i/X_t}$$

Description:

x_i = Production of commodity i at the Riau Province level
xt = Total production of Riau Province
X_i = Production of commodity i at the Indonesian level
X_t = Indonesia's total production

The assessment criteria are as follows: The Location Quotient (LQ) is a valuable indicator for assessing the prominence of a particular fish species in Riau Province. If the LQ is greater than 1, it indicates that fish species i is a superior commodity in Riau Province, meaning its production or supply in the region exceeds the national average, making it a leading commodity in the area. When the LQ equals 1, fish species i is a superior commodity in Riau Province and Indonesia, as its production is proportionate to the national average. However, if the LQ is less than 1, it suggests that fish species i is not a leading commodity in Riau Province, as its production is lower than the national average, indicating it is less competitive or prevalent in the region.

Shift share analysis is generally used to analyze the role of a sector or the shift of an industry in the region towards the same sector in the national economy. Data often analyzed are related to economic activity or employment[11]. The analytical tool used to answer the second objective is the shift-share analysis, with the formula[12]:

$$\Delta E\ r,i,t = (Ns\ i + P\ r,i + D\ r,i)$$

Description:

Δ E r, i,t = All additional commodities
Nsi = National Share
P r, i = Proportional Shift
D r, i = Differential Shift.

The analytical tool used to answer the third objective, namely, finding the value of East Java GRDP projections, is the

summation of the National Share, Proportional Share, and Differential Shift projections. The three projections can be combined in the form of direct projections:

$$E_{r,i,t+m} = E_{r,i,t} \left\{ \frac{E_{n,i,t+m}}{E_{n,i,t}} + \frac{m}{n} \frac{D_{r,i,t}}{E_{r,i,t-n}} \right\}$$

Klassen's typology analysis can be used to understand the pattern and structure of the development of sectors in a region. This method is based on sector grouping, which considers the growth and contribution of each sector to the total GDP in a region.

The Klassen typology maps sectors into four quadrants based on growth rate and contribution[13]: Quadrant I = Advanced and fast-growing; Quadrant II = Advanced but depressed; Quadrant III = Growing fast; and Quadrant IV = Relatively Underdeveloped.

Table 1. Klassen typologi analysis

Commodity Share	Commodity Growth	
	Gi ≥ G	Gi < G
Si ≥ S	developed and fast-growing commodities K1	advanced and yet depressed commodities K2
Si < S	potential or fast-growing commodities K3	Relative lagging commodities K4

Description: Si = commodity value of the analysis area; S = commodity value of the reference region; Gi = commodity growth in the analysis area; G = commodity growth in the reference region

3. RESULT AND DISCUSSION

Riau Province has considerable potential in aquaculture, both in production and development. Based on the research conducted, it was found that the leading commodities in the aquaculture sector in Riau Province include various types of fish and shrimp. The following is data on cultured fish production in Riau Province from 2019 to 2023 based on data from the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia below:

Table 2. Aquaculture fish production in Riau Province

No	Fishery Commodities	Total Production (Ton)					Average Production
		2019	2020	2021	2022	2023	
1	Carp	9.927	6.907	8.868	12.264	12.022	9.997,6
2	Pangas catfish	27.334	30.967	31.230	30.352	31.598	30.296,2
3	Nile tilapia	29.369	20.326	22.819	27.099	29.723	25.867,2
4	Giant goramy	1.724	1.496	1.686	1.742	2.891	1.907,8
5	Catfish	24.778	26.325	28.469	31.097	31.337	28.401,2
6	Vaname shrimp	976	1.114	2.243	5.752	3.579	2.732,8
7	Milkfish	1.714	1.118	1.408	2.108	3.357	1.941,0
	Total	95.822	88.253	96.723	110.414	114.507	101.143,8

Source: KKP[2]

Based on the data in Table 2 regarding the production of fishery commodities from 2019 to 2023, it is possible to analyze the fluctuations in the production of each fishery commodity and its contribution to the total production in that period. This data includes seven main types of commodities produced, namely carp *(Cyprinus carpio* L.), pangas catfish *(Pangasianodon hypophthalmus)*, Nile tilapia *(Oreochromis niloticus)*, giant goramy *(Osphronemus goramy)*, catfish *(Clarias gariepinus)*, vaname shrimp *(Caridea)*, and milkfish *(Chanos chanos)*. The production of these fishery commodities was recorded in tons for five consecutive years.

Overall, the total production of fishery commodities experienced a significant

increase from 2019 to 2023. In 2019, the total production of fishery commodities was recorded at 95,822 tons, which then increased to 114,507 tons in 2023, with an average production of 101,143.8 tons per year. This increase shows consistent growth in the fisheries sector, although several commodities have fluctuations in production.

In particular, pangas catfish and catfish commodities have shown a steady and significant increase over the past five years. Pangas catfish production, which reached 27,334 tons in 2019, increased to 31,598 tons in 2023, with an average production of 30,296.2 tons per year. Meanwhile, catfish production increased from 24,778 tons in 2019 to 31,337 tons in 2023, with an average production of 28,401.2 tons per year. A similar increase was also seen in the Nile tilapia commodity, although production fluctuations occurred in 2020 and 2021. However, in 2023, the production increased again to 29,723 tons, with an average production of 25,867.2 tons per year.

Other commodities such as carp and giant goramy also experienced an increase, although with relatively smaller numbers compared to pangas catfish and catfish. Carp production in 2019 was 9,927 tons and increased to 12,022 tons in 2023, with an average production of 9,997.6 tons per year. Giant goramy experienced a fairly drastic increase, from 1,724 tons in 2019 to 2,891 tons in 2023, with an average production of 1,907.8 tons per year. In contrast, some commodities, such as vename shrimp and milkfish, show greater fluctuations. Vaname shrimp production experienced a significant spike in 2021 (2,243 tons) but fell back in 2023 to 3,579 tons, with an average production of 2,732.8 tons per year. Milkfish also showed fluctuations, with a decline in 2020 and 2021 but an increase again in 2022 and 2023, with an average production of 1,941.0 tons per year.

In further analysis, despite fluctuations in some commodities, there is an overall positive trend in the increase of fisheries commodity production from 2019 to 2023. This reflects improvements in production capacity and better efforts in managing the fisheries sector in Indonesia. However, to improve the sustainability of production, it is necessary to conduct an in-depth evaluation of the factors that affect production fluctuations, such as weather conditions, government policies, and sustainable management of natural resources.

The continuous increase in production also shows the great potential of the fisheries sector as one of the important pillars of Indonesia's national food security and economy. Therefore, efforts to improve the productivity and quality of fisheries commodity production need to be encouraged through technological innovation, infrastructure improvement, and training for fisheries industry players.

Location Quotient (LQ) Analysis

Location Quotient (LQ) analysis is used to determine the leading aquaculture commodities in Riau Province based on the contribution of the aquaculture sector to the province's economy compared to its contribution at the national level. A location with an LQ value greater than 1 indicates that the industry has an advantage or is more dominant than other regions. The following LQ analysis results can be seen in Table 3.

Table 3 explains that for several aquaculture commodities in Riau Province, the results show that some commodities, such as pangas, catfish and catfish, have an average LQ value of more than 1. This indicates that these three commodities are superior in Riau Province, with higher production than the national average. In contrast, other commodities such as carp, Nile tilapia, giant goramy, vaname shrimp, and milkfish have an average LQ of less than 1, meaning their contribution in Riau Province is not higher than the national level.

Pangas catfish has a very high LQ of 4.21, indicating that pangas catfish production in the region is highly concentrated compared to national

production levels. With this high LQ value, catfish is categorized as a base commodity, which means it is one of the leading commodities in the region. This high concentration of production reflects the potential for development and firm competitiveness in the local fishing industry.

Table 3. Location Quotient (LQ) analysis.

No.	Fishery Commodities	2019	2020	2021	2022	2023	Average LQ	Base/Non-Base
1	Carp	0.81	0.63	0.69	1.06	1.07	0.85	Non-Base
2	Pangas Catfish	3.65	4.87	4.73	3.91	3.91	4.21	Base
3	Nile Tilapia	1.13	0.89	0.88	0.88	0.94	0.94	Non-Base
4	Giant Goramy	0.46	0.50	0.57	0.48	0.81	0.56	Non-Base
5	Catfish	1.16	1.36	1.38	1.24	1.19	1.26	Base
6	Vaname Shrimp	0.06	0.07	0.12	0.27	0.16	0.14	Non-Base
7	Milkfish	0.11	0.07	0.09	0.12	0.19	0.11	Non-Base

Catfish has an LQ of 1.26, indicating that catfish production in the region is more concentrated than at the national level. Thus, catfish is included in the base commodity category and is one of the leading commodities in the region. This indicates that the catfish fisheries sector is competitive and can be a mainstay for local economic development. With an LQ of 0.94, Nile tilapia falls into the non-base category, indicating that tilapia production in the region is not highly concentrated. This may indicate that the region is not a center of Nile tilapia production, and there may be a need for strategies to improve the productivity and quality of Nile tilapia to tap into wider market potential.

The carp commodity has an LQ of 0.85, indicating that carp production in the region is less concentrated than in the national carp production. As such, giant goramy is categorized as a non-base commodity, which means it is not a leading commodity in the region and may require improvements in terms of production or processing to compete with other commodities in the national market.

Giant goramy, with an LQ of 0.56, also falls into the non-base category. This indicates that giant goramy production in the region is less significant than at the national level. This condition could signal that the carp fisheries sector in this region needs to be optimized to compete better with other, more productive areas. Vaname shrimp has a very low LQ of 0.14, indicating that vaname shrimp production in the region is less concentrated than at the national level. As a non-base commodity, vaname shrimp in the region may need intervention to increase its productivity and capitalize on its market potential.

Milkfish also shows a very low LQ of 0.11, which means that milkfish production in the region is very low compared to the national level. This suggests that milkfish is not a leading commodity in the region and requires efforts to increase production and quality to compete in the market. These results indicate that the aquaculture sector in Riau Province has excellent potential in developing catfish and catfish commodities as superior commodities that support the regional economy.

Shift Share Analysis

The shift-share analysis is used to analyze the dynamics of economic growth in the aquaculture sector in Riau Province by comparing the sector's performance against the growth trend of the same sector nationally and the factors that influence its growth. The following results of the Shift-share analysis can be seen in Table 4.

Table 4 presents calculation data for the shift-share analysis for various fisheries commodities, including the value of national share, proportional shift, differential shift, and shift share. Each column refers to the contribution or change recorded in the

fisheries sector in a particular region. The Carp experienced a decrease in the national share value of -108,60 and the proportional shift of -2.089,46. However, the differential shift value (Cij) shows a positive number of 4.293,06, which reflects the contribution of this sector to the overall economic growth of the fisheries sector. This indicates that despite the decline in national share, the fisheries sector contributed significantly to the region's growth. The shift-share (Dij) recorded at 2.095,00 reinforces this by showing that the commodity-specific economic changes are considerable.

Table 4. Shift-Share Analysis

No.	Fishery Commodities	National Share	Proportional Shift	Differential Shift	Shift Share
		Nij	Mij	Cij	Dij
1	Carp	-108,60	-2.089,46	4.293,06	2.095,00
2	Pangas Catfish	-299,03	-1.984,08	6.547,12	4.264,00
3	Nile Tilapia	-321,30	1.457,69	-782,39	354,00
4	Giant Goramy	-18,86	-311,20	1.497,06	1.167,00
5	Catfish	-271,07	1.359,30	5.470,78	6.559,00
6	Vaname Shrimp	-10,68	99,47	2.514,20	2.603,00
7	Milkfish	-18,75	-88,41	1.750,16	1.643,00

There was a sharper decline in the pangas catfish commodity, with the national share value recorded at -299,03 and a proportional shift of -1.984,08. However, the differential shift recorded at 6.547,12 indicates a substantial positive influence on the economic change of the fisheries sector. The shift-share of 4264,00 further confirms that despite the decline of pangas catfish in some aspects, the sector's contribution still shows a significant growth trend. Nile tilapia commodity shows a negative value in the national share of -321,30 and a proportional shift of 1.457,69. However, the negative differential shift (-782,39) indicates a significant decline in this sector's contribution to the fisheries sector's economic growth. The shift-share of 354,00 emphasizes the larger decline in this commodity compared to the others despite the external factors at play.

Although the national share value slightly decreased by -18,86 for the carp commodity, the proportional shift was negative at -311.20. However, the significant differential shift of 1.497,06 indicates a considerable contribution to the change in the fisheries sector. Shift-share was recorded at 1.167,00, indicating that although there was a slight decline in the contribution of giant goramy to the fisheries sector, the industry still significantly impacted specific economic changes. The catfish commodity considerably impacts the fisheries sector despite decreased national share (-271,07) and proportional shift (-1.359,30). However, with a very positive differential shift value of 5.470,78, this sector contributes significantly to the economic growth of the fisheries sector. A Shift share of 6559.00 confirms that despite the decline in some aspects, the catfish commodity has a vital role in the overall economic movement of the fisheries sector.

The vaname shrimp commodity had a small decrease in the national share value (-10,68) but experienced a slight increase in proportional shift (99,47) and differential shift (2.514,20), indicating that shrimp plays a more stable role in the dynamics of the fisheries sector. The shift-share value was recorded at 2.603,00, which shows the positive role of this sector despite its lower contribution compared to other commodities. The milkfish commodity declined in national share (-18,75) and proportional shift (-88,41). However, despite its low value, the milkfish commodity still contributed significantly to the differential shift of 1750.16 and shift

share of 1.643,00, indicating a stable economic influence in the changes of the fisheries sector as a whole.

Overall, this data provides an overview of the movement of the fisheries sector in a particular region by considering the role of each fisheries commodity. Positive values in differential shift and shift share indicate that some commodities, despite facing a decline in certain aspects, still contribute significantly to economic change. The decrease in value of some commodities, such as carp, pangas catfish, and Nile tilapia, can be explained through market dynamics that affect the demand and production of these commodities. At the same time, the positive contribution in the shift share indicates external factors that support the economic growth of the fisheries sector in the region.

Klassen Typology Analysis

Klassen's typology analysis is used to classify regions based on the economic performance of the aquaculture sector. Based on the study results, Riau Province is categorized as a region with great potential for aquaculture commodity development. Using Klassen's typology, Riau Province falls into the category of developing regions, which indicates that although some leading commodities have shown good results, there is still great potential to increase productivity and competitiveness. The following results of the Klassen typology analysis can be seen in Table 5:

Table 5. Klassen Typology Analysis.

No	Fishery Commodities	Quadrant	Description
1	Carp	3	Potential or can still grow rapidly
2	Pangas Catfish	1	Progressing and Growing Fast
3	Nile Tilapia	3	Potential or can still grow rapidly
5	Giant Goramy	3	Potential or can still grow rapidly
6	Catfish	1	Progressing and Growing Fast
7	Vaname Shrimp	3	Potential or can still grow rapidly
8	Milkfish	3	Potential or can still grow rapidly

Based on Table 5, the fisheries commodities listed are divided into several categories that illustrate each commodity's potential and development level. These commodities are grouped based on their status expressed in different quadrants, with each category providing an overview of their progress and growth prospects. Pangas catfish, which is listed in quadrant one, is classified as an advanced and fast-growing commodity. This indicates that pangas catfish have reached an optimal production stage and have strong market demand. Patin farming in Indonesia, for example, has shown significant development in recent years thanks to improved production efficiency and sustainability in fisheries practices.

Catfish is in quadrant one, declared as an advanced and fast-growing commodity. Catfish is one of Indonesia's fastest-growing commodities in the freshwater fisheries industry. Catfish has become the leading choice in fish farming, with relatively low production costs and high market demand. The carp commodity falls into quadrant three, meaning it still has the potential to grow rapidly. This indicates that although there is already significant carp production, there is still room to increase the scale of production and effectiveness in the cultivation industry. This development potential can be driven by advances in fish farming technology and increased domestic and international markets for giant goramy.

The Nile tilapia is also included in quadrant three, which indicates that this commodity still has the potential to grow rapidly. Tilapia is one of the leading commodities in freshwater aquaculture due to its high adaptability to various environmental conditions. Therefore, with

proper management, the potential for expansion of the Nile tilapia industry can be enormous.

The Giant goramy, which also falls into quadrant 3, shows that it has the potential to grow rapidly. This commodity is known for its taste, which is favored by domestic and international markets. Although giant goramy requires more intensive management, the prospects are bright with improved cultivation technology and counselling to fishery farmers.

The vaname shrimp, which is listed in quadrant 3, also shows potential for rapid growth. The shrimp industry, especially vaname shrimp, has become an important export commodity for countries like Indonesia. The potential for shrimp farming development is wide open with technological innovation and better management to ensure the sustainability of production and quality.

The milkfish, also in quadrant 3, represents a commodity that still has the potential to grow rapidly. Although milkfish production is already relatively stable, with improved cultivation technology and more efficient management, opportunities to expand markets and increase productivity are very open. Commodities such as pangas catfish, and catfish are in a strong position in terms of development, while other commodities such as carp, tilapia, gourami, shrimp, and milkfish still require special attention in management and marketing. Thus, based on Klassen's typology, Riau Province needs to improve the aquaculture sector's productivity and efficiency to maximize its leading commodities' potential and strengthen its market position.

4. CONCLUSION

The aquaculture sector in Riau Province holds significant potential to support the regional economy, with leading commodities such as pangas catfish and catfish making substantial contributions to total production. Pangas and catfish have high Location Quotient (LQ) values, indicating their competitiveness in the province. However, commodities like goldfish, carp, vaname shrimp, and milkfish still face production fluctuations and lower LQ values, suggesting weaker provincial and national competitiveness. The sector needs more efficient management and a focus on developing leading commodities to improve competitiveness.

Shift share analysis reveals that despite declines in some commodities, pangas, catfish, and catfish contributed positively to the economic growth of the fisheries sector, highlighting the role of external factors and supportive policies. Klassen's typology places pangas catfish and catfish in quadrant 1, indicating rapid development, while other commodities remain in quadrant 3, showing growth potential. To strengthen its market position, Riau Province must focus on increasing productivity and efficiency in the aquaculture sector. With improved management, the industry can maximize its potential, supporting the regional economy by developing leading commodities.

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