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Analysis of the Potential and Role of the Fisheries Subsector in the Economy in the Provinces of Sumatra

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ABSTRACT

This study examines the potential and role of the fisheries sub-sector in the economy of Sumatra's provinces using Gross Regional Domestic Product (GRDP) data from 2004-2023. The analysis includes Growth Rate Percentage, Fisheries Sub-sector Contribution Percentage, Location Quotient (LQ), Sectoral Contribution Index (IKS), and Localization Index (LI). The findings indicate that the fisheries sub-sector growth rate in Sumatra ranges from 7.99% to 46.01%, averaging 22.4%. Its contribution to the agricultural sector varies from 6.20% to 67.63%, with an average of 20.81%, while its share of total GRDP is between 1.69% and 6.53%, averaging 3.75%. The LQ values range from 0.56 to 2.17, with an average of 1.24, indicating that this sub-sector is a base industry with production exceeding local consumption. However, the IKS values (0.02-0.07, averaging 0.04) suggest that the fisheries sub-sector is not yet a key sector. The LI values (0.01-0.09, averaging 0.03) reflect a relatively balanced distribution across Sumatra. Overall, the fisheries sub-sector contributes significantly to regional and national economic growth. However, the low IKS value indicates that its potential remains underutilized. To maximize this potential and enhance export competitiveness, strategic support through innovative policies, infrastructure investment, and modern technology adoption is essential.

INTRODUCTION

The fisheries subsector in the Provinces of Sumatra has an important role in supporting the regional and national economy. In 2022, total fisheries production in the Provinces of Sumatra reached 5,858,222 tons, including marine catches and inland fisheries from lakes, rivers, and aquaculture ponds. Provinces in Sumatra, such as Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, and Riau Islands, utilize the potential of marine

and inland waters optimally for the development of the fisheries subsector of the Provinces of Sumatra (KKP, 2022). In accordance with Dahuri's opinion (2018), the provinces in Sumatra have strategic geographical access to the South China Sea and the Indian Ocean, enabling the development of marine fisheries. The island of Sumatra has 10 provinces, namely Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands and Riau Islands. Sumatra has large lakes such as Lake Toba in North Sumatra Province and Lake Singkarak in West Sumatra Province (BPS National 2023).

The economic structure of the Sumatran provinces in recent years has shifted from the agriculture, forestry and fisheries category to the mining and quarrying category. Where the largest contribution in 2023 came from the mining and quarrying category, followed by the agriculture, forestry and fisheries sector (BPS National 2023). However, the fisheries subsector can still be relied on in the provinces of Sumatra, especially amidst the unstable prices of palm oil and rubber commodities (BPS South Sumatra Province 2023). With the enactment of Presidential Instruction Number 7 of 2016 in driving the maritime axis concerning the acceleration of the development of the national fisheries industry, that in order to accelerate the development of the national fisheries industry in order to improve the welfare of the community, both fishermen, cultivators, processors, and marketers of fishery products, increase labor absorption and increase foreign exchange, the President of the Republic of Indonesia mandates the Regent/Mayor to support the procurement of national fisheries industry land in the regions. This is a new paradigm that demands efficiency, effectiveness and acceleration of development in the fisheries sector to keep up with the pace of development (Rustiadi, et al., 2011).

The contribution of the fisheries subsector can be seen from the size of the Gross Regional Domestic Product (GRDP), GRDP has an important role in increasing the economic growth of a region, where the higher the GRDP, the higher the economic growth. The economic growth of this region can also explain the relationship between economic growth and inequality between regions (Sjafrizal, 2014). Based on this background, this study aims to determine the potential and role of the fisheries subsector in the GRDP of the provinces of Sumatra.

LITERATURE REVIEW

Basic Economy

Regional economic activities are divided into two sectors, namely the basic sector and the non-basic sector. The basic sector is oriented towards exports or activities outside the economic region, while the non-basic sector is locally oriented, providing goods and services for the needs of the local community. The basic sector acts as the main driver of regional growth; the greater the exports of a region, the faster its growth. Sjafrizal (2008) stated that the basic sector is the backbone of the

regional economy because it has a high competitive advantage, while the non-basic sector is a supporting sector that is less potential.

Fisheries Potential

According to Musthofa (2019), fisheries potential in Indonesia plays an important role in the national economy, especially in the capture fisheries and aquaculture sectors which continue to grow. This is supported by data from the Ministry of Maritime Affairs and Fisheries (KKP) which shows that fisheries production continues to increase every year (KKP, 2020). Indonesia's fisheries potential is very large because it has a vast water area, consisting of oceans and various inland waters, including lakes, rivers, and reservoirs. With a sea area of 3.25 million km^2 and marine fisheries potential of around 65 million tons per year, Indonesia is one of the largest fish producing countries in the world (Sudirman, 2018).

Contribution of the Fisheries Sector

According to Mustofa (2017), the fisheries sector has a significant contribution to Indonesia's Gross Domestic Product (GDP), especially through the capture fisheries and aquaculture subsectors, which continue to grow every year. Setyawan (2021) explains that the fisheries sector has become one of the main pillars in coastal area development in Indonesia, with a direct contribution to poverty alleviation and improving the welfare of fishing communities.

METHOD

1. Analysis of Fisheries Subsector Potential in Sumatra Provinces

In this study, the analysis used to examine the potential of the fisheries subsector in the provinces of Sumatra includes several approaches. The analysis used is as follows:

A. Location Quotient (LQ)

Location Quotient (LQ) is a tool used to identify the fisheries subsector as a basic or non-basic sector (Destiningsih et al., 2022). If the value is more than 1, it means that the fisheries subsector is a basic subsector. However, if it is less than 1, it means that the fisheries subsector is a non-basic subsector. Using the following formula:

$$LQ = (Xia/Xa) / (Yia/Ya)$$

Description:
Xia = GRDP of fisheries sub-sector of Province i in Sumatra
Xa = Total GRDP of Province i in Sumatra
Yia = GDP of fisheries sub-sector of all Provinces in Sumatra
Ya = Total GRDP of all Provinces in Sumatra

B. Sectoral contribution index (IKS)

The sectoral contribution index (IKS) is used to see the ratio of the Gross Regional Domestic Product value of each sector to the total Gross Regional Domestic Product value. The Sectoral Contribution Index (IKS) value is between 0-1. If the index value approaches 1, it means that the contribution or role of the sector in the regional economy is getting bigger and more dominant so that it has the potential to become a mainstay sector or base sector (Destiningsih et al., 2022). Using the following formula:

$$IKS=(PDRBsp/PDRBtotal)$$

Description:
PDRBsp = PDRB of fisheries sub-sector of all provinces in Sumatra
PDRBtotal = Total PDRB of all provinces in Sumatra

C. Localization Index (LI)

Localization Index or Localization Coefficient is a tool used to identify whether the fisheries sub-sector is classified as a relatively balanced or relatively unbalanced distribution of subsectors. If the value is close to 0, then the fisheries sub-sector is classified as a relatively balanced distribution (Destiningsih et al., 2022). However, if the value is close to 1, then the distribution of the sub-sector is relatively unbalanced.

$$LI = \Sigma \mid Xr/Xn - Xir/Xin \mid / 2$$

Description:
Xr = GRDP of Province i in Sumatra
Xn = Total GRDP of Province i in Sumatra
Xir = GRDP of fisheries subsector of all Provinces in Sumatra
Xin = Total GRDP of fisheries subsector of all Provinces in Sumatra

2. Analysis of the Role of Fisheries Subsector in Provinces of Sumatra

In this study, the analysis used to examine the role of the fisheries subsector in the provinces of Sumatra includes several approaches. The analysis used is as follows:

A. Percentage of Growth Rate

The rate of economic growth of a region can be measured using the GRDP growth rate at constant prices (ADHK). The Percentage of Growth Rate is the annual growth of the GRDP value of the fisheries subsector in Province i of Sumatra in percent (Sukirno, 2007). By using the following formula:

X= (this year's fisheries GRDP-last year's fisheries GRDP)/(last year's fisheries GRDP) x 100%

This indicator is used to measure the growth trend of the fisheries subsector's contribution to the economy.

B. Percentage of Contribution of the Fisheries Subsector to the Agricultural Sector

The percentage of the contribution of the fisheries subsector to agriculture is the proportion of the fisheries subsector in the fisheries sector of Sumatra Province. According to Widodo (1990), the amount of contribution of the agricultural subsector can be calculated using the formula:

X= (fisheries GRDP)/(agriculture GRDP) x 100%

This analysis will show how much the fisheries subsector plays a role in the economy of the Sumatra Provinces as a whole.

C. Percentage of Contribution of the Fisheries Subsector to GRDP

The percentage of Contribution of the Fisheries Subsector to GRDP is the proportion of the fisheries subsector in the total GRDP of Sumatra Province. According to Widodo (2004), the contribution of the fisheries subsector to GRDP can be calculated using the formula:

X=(GRDP fisheries)/(total GRDP per province i of Sumatra) x 100%

This analysis will show how much the fisheries subsector plays a role in the economy of the Sumatra Provinces as a whole.

RESULT AND DISCUSSION

Potential of Fisheries Subsector in Sumatra Provinces

The fisheries subsector in Sumatra has shown a positive trend in recent years. The total capture fisheries production in 2023 was 2,100,674 tons, both for domestic consumption and export. This shows the great potential of the capture fisheries subsector to continue to develop and provide economic benefits to these regions (KKP, 2023). Capture fisheries in Sumatra have great potential to be used as export commodities. In addition, the diversity of fish species in Sumatran waters also allows for the development of a more sustainable fish processing industry.

In Aceh Province, the main fishery commodities and export targets are tuna and skipjack tuna. In North Sumatra Province, the leading fish commodities from North Sumatra Province that are in great demand are tuna, mackerel, grouper, red snapper, as well as cultivated products such as vaname shrimp and milkfish. In West Sumatra Province, the main fishery commodities include grouper, snapper, and various other types of reef fish. In Riau Province, the main commodities include mackerel, mackerel, and shrimp. In Jambi Province, there are river waters that support the diversity of freshwater fish. The main commodities include patin fish, catfish, and baung. In South Sumatra Province, the main fishery commodities include snakehead fish, toman, and various other types of river fish. In Bengkulu Province, the main commodities include tuna, skipjack tuna, and various types of reef fish. In Lampung Province, the main commodities include milkfish, shrimp, and seaweed. In the Bangka Belitung Islands Province, it has a high diversity and

abundance of fish resources. Some of the target fish species found include leopard grouper, yellow snapper, yellowtail fish, and peperek. In the Riau Islands Province, for example, apart from sea fish, there is also great potential for fishery products such as seaweed and molluscs which are in great demand in the international market (BPS, 2023).

Location Quotient (LQ)

The results of the Location Quotient (LQ) analysis if the value is more than 1 means that the fisheries subsector is classified as a basic subsector. However, if it is less than 1, it means that the fisheries subsector is classified as a non-basic subsector. Basic Subsector, meaning that the subsector has exceeded the consumption needs in all areas of the Sumatra provinces (Destiningsih et al., 2022).

Table 1. LQ of Fisheries Subsector in Sumatra Provinces

Years	Aceh	North Sumatra	West Sumatra	Riau	Jambi	South Sumatra	Bengkulu	Lampung	Bangka Belitung Islands	Riau Islands
2004	1,14	0,90	0,96	0,53	0,50	0,99	1,56	1,87	2,45	1,21
2005	1,37	1,01	0,36	0,63	0,58	1,12	1,79	2,32	2,84	1,38
2006	1,17	0,85	0,91	0,55	0,35	0,94	1,53	2,27	2,44	1,16
2007	1,23	0,82	0,88	0,55	0,40	0,92	1,55	2,37	2,24	1,13
2008	1,35	0,83	0,90	0,57	0,43	0,91	1,49	2,20	2,30	1,14
2009	1,48	0,83	0,91	0,58	0,41	0,92	1,33	2,13	2,28	1,09
2010	1,47	0,81	0,86	0,58	0,40	0,91	1,20	2,00	2,28	1,39
2011	1,43	0,68	1,00	0,73	0,60	0,94	2,39	2,10	1,92	0,79
2012	1,43	0,68	0,99	0,76	0,59	0,94	2,36	2,06	1,96	0,75
2013	1,42	0,67	1,00	0,78	0,58	0,94	2,29	2,06	1,97	0,73
2014	1,46	0,43	1,07	0,84	0,64	1,03	2,30	2,18	2,09	0,79
2015	1,42	0,66	1,03	0,82	0,60	0,95	2,07	1,97	1,94	0,75
2016	1,42	0,67	1,03	0,82	0,61	0,92	2,08	1,94	1,95	0,78
2017	1,43	0,69	1,05	0,80	0,62	0,89	2,09	1,99	1,85	0,75
2018	1,47	0,69	1,09	0,81	0,63	0,93	2,11	1,88	1,96	0,70
2019	1,53	0,66	1,11	0,80	0,64	0,97	2,17	1,87	2,05	0,64
2020	1,59	0,64	1,13	0,80	0,62	0,95	2,12	1,89	2,24	0,61
2021	1,54	0,60	1,18	0,80	0,65	0,97	2,20	1,91	2,30	0,58
2022	1,67	0,60	1,27	0,81	0,65	0,95	2,27	1,79	2,20	0,60
2023	1,82	0,59	1,28	0,80	0,66	0,91	2,30	1,81	2,11	0,60
average	**1,44**	**0,72**	**1,00**	**0,72**	**0,56**	**0,95**	**1,96**	**2,03**	**2,17**	**0,88**
Des	**Basis**	**Non Basis**	**Basis**	**Non Basis**	**Non Basis**	**Non Basis**	**Basis**	**Basis**	**Basis**	**Basis**

Based on table 1, the results of the calculation of the LQ of the fisheries subsector in 2004-2023 can provide an overview of the potential of the fisheries subsector in each region. The LQ of the fisheries subsector in Aceh Province, West Sumatra Province, Bengkulu Province, Lampung Province and Bangka Belitung Islands Province is recorded as having a value of >1 which indicates that the fisheries subsector in the Province is a base subsector, while North Sumatra Province, Riau Province, Jambi Province, South Sumatra Province and Riau Islands Province are classified as non-base subsectors because their values are <1. An LQ value of more than one illustrates that the subsector is able to meet the needs of the Sumatra provinces and can export to other regions or other countries (Morrissey, 2014). The results of this LQ analysis show that the Fisheries Subsector has a comparative advantage in developing the fisheries sector as a driver of its economic growth. In accordance with Muta'ali's statement (2015), the fisheries sector is a base and superior sector with a high level of specialization.

The fisheries sector also has the potential to be developed into an export-oriented market in addition to serving domestic and foreign markets.

Sectoral Contribution Index (IKS)

The results of the analysis of the Sectoral Contribution Index (IKS) in the provinces of Sumatra in the last 20 years from 2004 to 2023. If the Sectoral Contribution Index (IKS) value is between 0-1. If the index value approaches 1, it means that the contribution or role of the sector in the regional economy is getting bigger and more dominant so that it has the potential to become a mainstay sector or base sector (Destiningsih et al., 2022).

Table 2. Fisheries Subsector IKS in the Provinces of Sumatra

Years	Aceh	North Sumatra	West Sumatra	Riau	Jambi	South Sumatra	Bengkulu	Lampung	Bangka Belitung Islands	Riau Islands
2004	0,03	0,03	0,03	0,02	0,01	0,03	0,04	0,05	0,07	0,03
2005	0,03	0,03	0,01	0,02	0,01	0,03	0,05	0,06	0,07	0,03
2006	0,03	0,03	0,03	0,02	0,01	0,03	0,05	0,07	0,07	0,03
2007	0,04	0,03	0,03	0,02	0,01	0,03	0,05	0,07	0,07	0,03
2008	0,04	0,02	0,03	0,02	0,01	0,03	0,04	0,07	0,07	0,03
2009	0,04	0,02	0,03	0,02	0,01	0,03	0,04	0,06	0,07	0,03
2010	0,04	0,02	0,03	0,02	0,01	0,03	0,04	0,06	0,07	0,04
2011	0,05	0,02	0,03	0,02	0,02	0,03	0,08	0,07	0,06	0,02
2012	0,05	0,02	0,03	0,02	0,02	0,03	0,07	0,07	0,06	0,02
2013	0,05	0,02	0,03	0,02	0,02	0,03	0,07	0,07	0,06	0,02
2014	0,04	0,01	0,03	0,03	0,02	0,03	0,07	0,07	0,06	0,02
2015	0,05	0,02	0,03	0,03	0,02	0,03	0,07	0,06	0,06	0,02
2016	0,05	0,02	0,03	0,03	0,02	0,03	0,07	0,06	0,06	0,03
2017	0,04	0,02	0,03	0,03	0,02	0,03	0,07	0,06	0,06	0,02
2018	0,05	0,02	0,03	0,02	0,02	0,03	0,06	0,06	0,06	0,02
2019	0,05	0,02	0,03	0,02	0,02	0,03	0,06	0,06	0,06	0,02
2020	0,05	0,02	0,03	0,02	0,02	0,03	0,07	0,06	0,07	0,02
2021	0,05	0,02	0,04	0,02	0,02	0,03	0,07	0,06	0,07	0,02
2022	0,05	0,02	0,04	0,02	0,02	0,03	0,07	0,05	0,06	0,02
2023	0,05	0,02	0,04	0,02	0,02	0,03	0,07	0,05	0,06	0,02
average	**0,04**	**0,02**	**0,04**	**0,02**	**0,02**	**0,03**	**0,06**	**0,06**	**0,07**	**0,03**
Des	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis	Non Basis

Based on the calculations in table 2, it is known that the fisheries subsector over the past 20 years in the Provinces of Sumatra is as follows, namely the Bangka Belitung Islands Province has the highest IKS value of 0.07 although the highest IKS value of the Bangka Belitung Islands Province is still far from 1, which indicates that the fisheries subsector in the Bangka Belitung Islands Province is classified as non-basic. Although the Bangka Belitung Islands Province has abundant marine potential, its contribution to the GRDP of the Bangka Belitung Islands Province is still relatively small compared to other sectors such as plantations and agriculture. Most of the fisheries products in the Bangka Belitung Islands Province are not optimal to meet export needs or significantly develop the fisheries industry (BPS Bangka Belitung Islands, 2022).

Factors that are thought to influence the low IKS of the fisheries subsector include limited natural resources, lack of policies that support the development of the fisheries sector, and competition with other more dominant sectors. Therefore, to increase the contribution of the fisheries subsector, better management efforts and development of this sector are needed so that it can provide a more significant contribution to the regional economy (Satria and Matsuda, 2004).

Localization Index (LI)

Localization Index If the value is close to 0, the fisheries subsector is classified as a relatively balanced distribution of fisheries subsectors including the concentration of fisheries subsectors is relatively balanced or not concentrated. This means that the subsector is evenly distributed in the regions in the provinces of Sumatra (Destiningsih et al., 2022).

Table 3. LI of Fisheries Subsectors in the Provinces of Sumatra

Years	Aceh	North Sumatra	West Sumatra	Riau	Jambi	South Sumatra	Bengkulu	Lampung	Bangka Belitung Islands	Riau Islands
2004	0,01	0,01	0,00	0,05	0,01	0,00	0,00	0,03	0,02	0,01
2005	0,02	0,00	0,07	0,03	0,01	0,01	0,01	0,05	0,02	0,01
2006	0,01	0,02	0,00	0,05	0,01	0,00	0,00	0,05	0,02	0,01
2007	0,01	0,02	0,00	0,05	0,01	0,01	0,00	0,06	0,01	0,01
2008	0,01	0,02	0,00	0,05	0,01	0,01	0,00	0,05	0,02	0,01
2009	0,02	0,02	0,00	0,04	0,01	0,01	0,00	0,05	0,01	0,00
2010	0,02	0,02	0,01	0,04	0,01	0,01	0,00	0,04	0,01	0,02
2011	0,01	0,03	0,00	0,03	0,01	0,00	0,01	0,05	0,01	0,01
2012	0,01	0,03	0,00	0,03	0,01	0,00	0,01	0,05	0,01	0,01
2013	0,01	0,04	0,00	0,03	0,01	0,00	0,01	0,05	0,01	0,01
2014	0,01	0,06	0,00	0,02	0,01	0,00	0,02	0,06	0,01	0,01
2015	0,01	0,04	0,00	0,02	0,01	0,00	0,01	0,05	0,01	0,01
2016	0,01	0,04	0,00	0,02	0,01	0,01	0,06	0,05	0,01	0,01
2017	0,07	0,17	0,02	0,10	0,06	0,03	0,06	0,28	0,06	0,05
2018	0,07	0,18	0,02	0,10	0,06	0,02	0,06	0,25	0,06	0,06
2019	0,08	0,21	0,02	0,11	0,06	0,01	0,06	0,24	0,06	0,07
2020	0,09	0,20	0,03	0,10	0,06	0,01	0,06	0,24	0,07	0,07
2021	0,02	0,07	0,01	0,04	0,02	0,01	0,02	0,06	0,02	0,03
2022	0,02	0,07	0,01	0,04	0,02	0,01	0,02	0,05	0,02	0,02
2023	0,03	0,08	0,01	0,04	0,02	0,02	0,02	0,05	0,02	0,03
average	**0,03**	**0,07**	**0,01**	**0,05**	**0,02**	**0,01**	**0,02**	**0,09**	**0,02**	**0,02**
Des	balanced	balanced	balanced	balanced	balanced	balanced	balanced	balanced	balanced	balancedg

Based on table 3, there are several provinces that have the highest LI values, such as West Sumatra Province at 0.01 and South Sumatra Province at 0.01. This balanced distribution of fisheries subsectors can reflect the potential that is spread across various regions and is not concentrated in one particular area. This shows that the fisheries subsector in Sumatra has fully utilized the concentrated potential that can strengthen the development of the fisheries industry in the region.

Analysis of the potential of the fisheries subsector in the Provinces of Sumatra based on ADHK GRDP data for the 2004-2023 period. This analysis uses three main indicators, namely Location Quotient (LQ), Sectoral Contribution Index (IKS), and Localization Index (LI). LQ measures whether the fisheries subsector in a province is basic or non-basic, IKS shows the contribution of the subsector to the regional economy, while LI describes the level of concentration of the fisheries subsector in a region.

Table 4. Analysis of the Potential of the Fisheries Subsector in the Provinces of Sumatra (2004-2023)

Analysis of Potential of Fisheries Subsector in Sumatra Provinces (2004-2023)				**Information**		
Provinsi	**LQ**	**IKS**	**LI**	**LQ**	**IKS**	**LI**
Aceh	1,44	0,04	0,03	Basis	Non Basis	balanced
North Sumatra	0,72	0,02	0,07	Non Basis	Non Basis	balanced
West Sumatra	1,00	0,03	0,01	Basis	Non Basis	balanced
Riau	0,72	0,02	0,05	Non Basis	Non Basis	balanced
Jambi	0,56	0,02	0,02	Non Basis	Non Basis	balanced

Analysis of Potential of Fisheries Subsector in Sumatra Provinces (2004-2023)				Information		
Provinsi	**LQ**	**IKS**	**LI**	**LQ**	**IKS**	**LI**
South Sumatra	0,95	0,03	0,01	Non Basis	Non Basis	balanced
Bengkulu	1,96	0,06	0,02	Basis	Non Basis	balanced
Lampung	2,03	0,06	0,09	Basis	Non Basis	balanced
Bangka Belitung Islands	2,17	0,07	0,02	Basis	Non Basis	balanced
Riau Islands	0,88	0,03	0,02	Non Basis	Non Basis	balanced

Based on the analysis results, several provinces such as Aceh, West Sumatra, Bengkulu, Lampung, and the Bangka Belitung Islands have an LQ of more than 1, which indicates that their fisheries subsector is a basic sector, meaning that fisheries production in these provinces exceeds local consumption needs. However, although several provinces have a basic fisheries subsector, the IKS value is generally low, meaning that this subsector has not become a mainstay sector for the Sumatran economy as a whole. In addition, the relatively small LI value indicates that the distribution of the fisheries subsector in the Sumatra region is relatively even or balanced.

The Role of the Fisheries Subsector in the Provinces of Sumatra

The fisheries subsector in the Provinces of Sumatra plays a very important role in the regional and national economy. With vast water areas and diverse types of fishery resources, this subsector makes a significant contribution to job creation, food provision, and increased exports. The Fisheries Subsector in the Provinces of Sumatra has a major contribution to regional economic growth, both in terms of domestic production and state revenue. Provinces in Sumatra, such as Aceh, North Sumatra, Riau Islands, and Riau, have abundant fishery resource potential. According to the Ministry of Marine Affairs and Fisheries (2023), North Sumatra, as one of the provinces with the largest contribution to the fisheries subsector, recorded marine fisheries production of 386,833 tons in 2023, the majority of which came from tuna and other pelagic fish catches. This production plays a role in accelerating the growth of the fisheries subsector and supporting regional income through fishery exports.

Value of the Fisheries Subsector in the Provinces of Sumatra

This study analyzes the GRDP value for the last 20 years, namely 2004-2023 from each province on the island of Sumatra. In 2004-2010, the constant price (ADHK) of 2000 was used, while in 2011-2023, the constant price (ADHK) of 2010 was used. Based on the results of the analysis that has been carried out, the growth in the value of GRDP in units of trillion rupiah in the fisheries sub-sector for 20 years in the provinces of Sumatra was obtained.

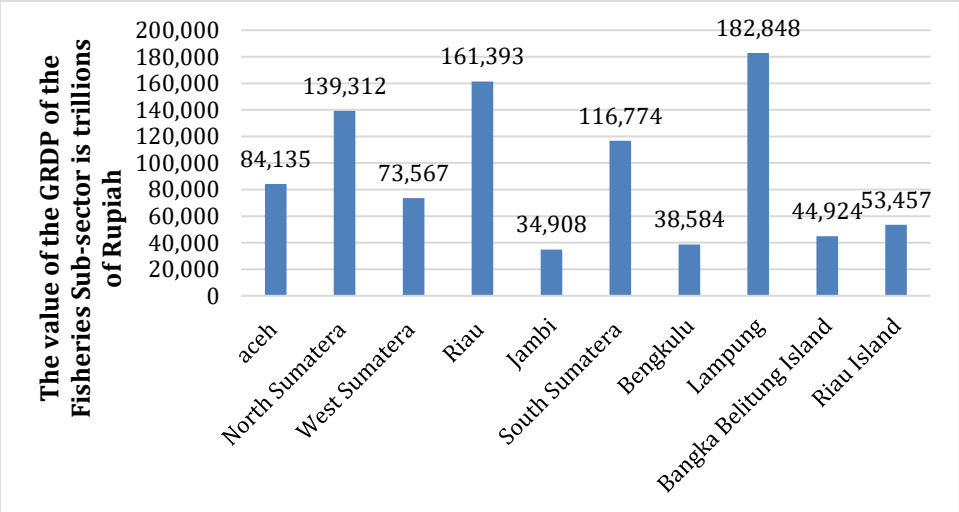

Figure 1. GRDP Value of Fisheries Subsector in Sumatra Provinces

Figure 1 above shows that the fisheries subsector in Sumatra Provinces over the past 20 years that has the highest fisheries production is Lampung Province, where the GRDP value of Lampung Province over the past 20 years is IDR 182,848 trillion. This is because Lampung Province, which has a diverse coastal ecosystem, provides an ideal habitat for economically valuable fish. The diversity of marine biota such as tuna, grouper, and sea pomfret are important assets that support high fisheries productivity in the Lampung Province area and the strategic location of Lampung Province bordering the Sunda Strait is also an important factor that facilitates the distribution of fishery products. Fishery products from Lampung can be easily distributed to South Sumatra, Banten, and the Jabodetabek area. In addition, adequate port access allows for increased exports of fishery commodities to the international market (Lampung Marine and Fisheries Service, 2022).

Then followed by Riau Province with a total GRDP value of GRDP for the last 20 years of IDR 161.393 trillion, this is driven by superior fish commodities that support high productivity including mackerel, white snapper, grouper, and various types of shrimp and crabs which are export products. The distribution of fishery products in Riau Province not only covers the Sumatra region, but also reaches export markets to neighboring countries such as Malaysia and Singapore. Riau Province takes advantage of direct access to the Malacca Strait trade route, this is also due to the location of Riau Province in the central part of Sumatra Island, with a strategic position in the east directly bordering the Malacca Strait, an important international sea route that provides great benefits for fisheries and trade activities. Riau Province has a total area of around 107,932.71 km^2, with 19.91% being waters. Data from the Ministry of Maritime Affairs and Fisheries (2023) shows that capture fisheries production in 2023 reached 135,773 tons.

North Sumatra Province is the third highest province in Sumatra with a total GRDP value of Rp. 139.312 trillion in the last 20 years, this is because there are superior fish commodities from North Sumatra Province that are in great demand

such as tuna, mackerel, grouper, red snapper, and cultivated products such as vaname shrimp and milkfish. The distribution of fishery products from North Sumatra not only covers the domestic market in the Sumatra and Java regions but also reaches exports to countries such as Japan, Hong Kong, and Thailand, especially for high-value fishery commodities such as grouper and shrimp. North Sumatra Province has a sea area of 110,000 km^2, covering around 60% of the total provincial area, and a coastline length of 1,300 km. The details of the coastline consist of 545 km on the East Coast, 375 km on the West Coast, and 380 km on Nias Island. This geographical condition creates great potential for fishing and fisheries cultivation. Capture fisheries production in 2023 reached 386,833 tons (KKP, 2023).

The lowest GRDP value in the Provinces of Sumatra based on Figure 1 Produced by Jambi Province shows the lowest GRDP value among the Provinces of Sumatra with a total GRDP over the past 20 years of IDR 34,908 trillion. Despite having a relatively low economic value, Jambi Province has significant fisheries potential. Jambi Province has superior commodities in the fisheries sector in Jambi including mackerel, white snapper, pomfret, and grouper from capture fisheries, as well as tiger prawns with a production of 31 tons in 2020 and milkfish with a production of 67 tons in 2020 from the cultivation sector. The distribution of Jambi's fishery products mostly meets the local market in the Sumatra and Jabodetabek regions, with the potential for exporting cultivated commodities, especially tiger prawns, to international markets such as Singapore and Malaysia. Jambi Province is located in the central part of Sumatra Island, Jambi has a total area of around 53,435.72 km^2, with a land area of 50,160.05 km^2 and a water area of around 3,274.95 km^2. The main water areas are in West Tanjung Jabung and East Tanjung Jabung Regencies, with a coastline of 185 km. This geographical condition provides great potential for the fisheries sector, both capture fisheries and aquaculture, to boost regional economic growth (Jambi Provincial Marine and Fisheries Service, 2022).

Growth Rate of the Fisheries Subsector in the Provinces of Sumatra

Based on the results of the analysis that has been carried out, the Percentage of Growth Rate over the past 20 years with units of % in 2004-2023 in the provinces of Sumatra against the value of the fisheries sector.

Based on Figure 1, the highest growth rate of the fisheries sector in Sumatra from 2004 to 2023 was produced by Jambi Province, with an average growth rate over the past 20 years of 46.01%, as seen from the increase in capture fisheries production of 54,808 tons in 2023. However, despite high sectoral growth, the GRDP value of Jambi Province is still low due to the small economic base with sector dominance. The low productivity of fishermen is often caused by a lack of knowledge and skills, as well as the use of less than optimal fishing gear and vessels (Aminah, 2011).

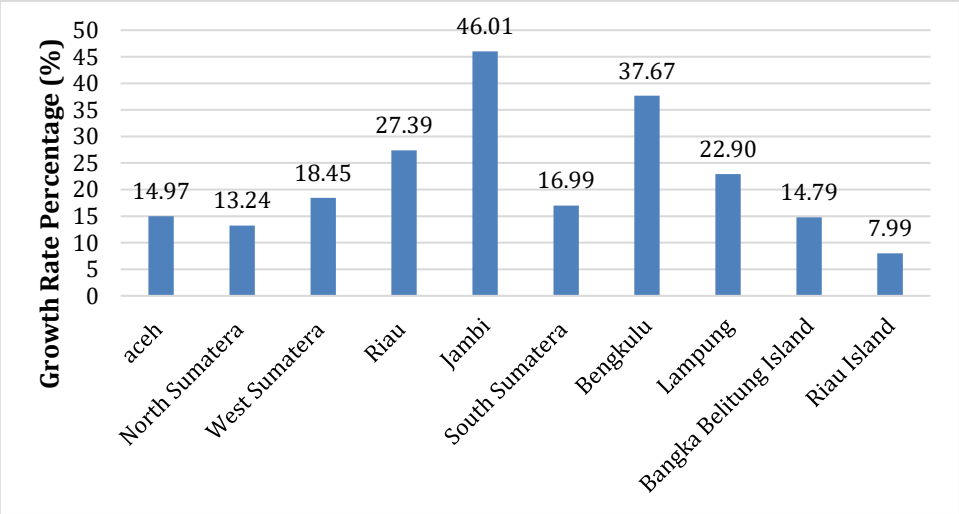

Figure 2. Percentage of Growth Rate to Fisheries Sector Value in Sumatra Provinces

The effectiveness and efficiency of fisheries management are hampered by a lack of expertise and understanding, as well as the use of simple fishing gear and vessels (Wibowo et al., 2019).

Then followed by Bengkulu Province with an average of 37.67% over the past 20 years. On the other hand, Bengkulu Province, which is located on the southwest coast of Sumatra Island and borders the Indian Ocean, showed quite good growth. However, in 2022, Bengkulu's fishery production increased by 10.43% compared to 2021 so that total production reached 249,677 tons. This high growth was driven by Bengkulu's vast sea area, which is 132,165.28 km^2, which is rich in fishery resources such as pelagic and demersal fish (tuna, skipjack, mackerel), as well as shrimp and lobster produced by the Baai port. In accordance with the Regulation of the Minister of Marine Affairs and Fisheries Number Per.8/Men/2012 concerning Fishery Ports, fishing ports as a stimulant for the emergence of the fishing industry so that they need the ability to provide professional and quality services. Fishing ports have an important influence in the development of the fishing industry. The fishing industry located around the port can save on land transportation, and the catch landed at the port can be immediately processed for production so that there is no decrease in sales value.

Riau Province has the third highest growth rate of the fisheries subsector in Sumatra, with an average of 27.39% over the last 20 years. However, Riau Province recorded the highest GRDP value of the fisheries subsector among the provinces of Sumatra, with a total value reaching Rp. 161.393 trillion. This data shows that although growth is relatively high in several other provinces in Sumatra, the economic potential generated by the fisheries sector in Riau remains superior, the fisheries subsector of Riau Province includes all activities of catching, breeding and cultivating all types of fish and other aquatic biota, both freshwater and saltwater. Fishery commodities include tuna, carp, milkfish, shrimp, squid and seaweed

(Hamidi, 2011).

Based on the results of Figure 2, the Riau Islands Province is the province with the lowest growth rate in Sumatra in 2023 at 5.50% and an average of 7.99% over the past 20 years. The growth of the Riau Islands Province shows an increase in fisheries production in 2022 of 6.24% compared to 2021, with a total production reaching 966,330 tons. Although the Riau Islands sea area is very large, which is around 7,873.65 km^2, there are challenges in managing the resources of the Riau Islands Province, namely illegal fishing activities carried out by foreign vessels and spread across thousands of islands, including 2,408 islands, most of which are unnamed, causing difficulties in optimizing production (Akbar et al, 2022).

Contribution of Fisheries Subsector to the Agricultural Sector (Agriculture, Forestry and Fisheries)

Results of the Percentage Contribution of the proportion of the Fisheries Subsector in the provinces in Sumatra to the agricultural sector. The average Percentage Contribution of the Fisheries Subsector to the agricultural sector in the last 20 years in 2004-2023 is obtained with units of %.

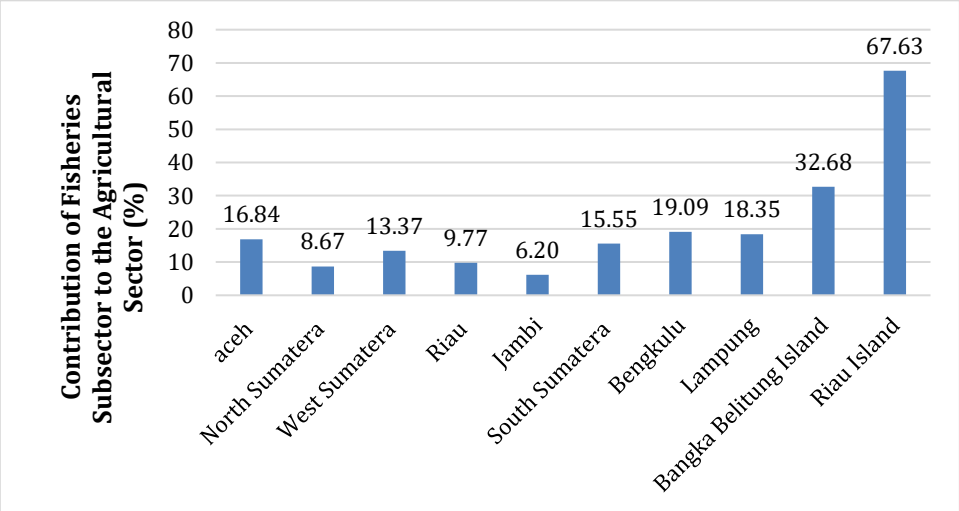

Figure 3. Contribution of the Fisheries Subsector to the Agricultural Sector

The Riau Islands Province has the highest contribution of the fisheries subsector to agriculture, with a total contribution of 67.63% over the past 20 years. This high contribution is influenced by the dominance of economic activities based on marine and fisheries, considering that around 96% of the province's area is sea waters with a total area of 7,873.65 km^2. In addition, the existence of large ports such as Tanjung Pinang Port and Tanjung Balai Karimun Port is a center for distribution and trade of fishery products, not only for local needs but also for export to neighboring countries such as Singapore and Malaysia. Law Number 17 of 2008 concerning Shipping provides an opportunity for local governments who want to utilize and act as managers at ports and do business in ports, namely by establishing a Port Business Entity (BUP), where this Port Business Entity is equivalent to a State-

Owned Enterprise that manages ports as assets of the Ministry of Transportation of the Republic of Indonesia throughout Indonesia, namely PT Pelabuhan Indonesia (PT. Pelindo).

Then followed by the Bangka Belitung Islands Province with the contribution value of the fisheries sub-sector to agriculture, the average contribution of the fisheries sub-sector to agriculture over the past 20 years has averaged 32.68%. This is due to the Dominant Sea Area With a total area of around 81,725.06 km^2, 65,301 km^2 or 79.90% is sea area, making it one of the main centers of marine production in Indonesia. The vastness of this sea area provides an ideal habitat for various types of deep-sea fish and other marine biota such as snapper, white pomfret, shrimp, and crabs which have high economic value. Capture fisheries activities are one of the mainstay sectors in this province, supported by coral reef ecosystems which are habitats for thousands of biota, both temporary and permanent. Coral reefs have a complex physical structure, branching and caves making this ecosystem attractive to many types of marine biota, both flora and fauna. The ecological functions of coral reef ecosystems include being a habitat (living place) for various types of associated biota such as benthic animals (Akbar, 2019).

Bengkulu Province has the third highest contribution of the fisheries subsector to agriculture with an average contribution of the fisheries subsector to agriculture over the past 20 years of 19.09%. This is because Bengkulu Province is located on the west coast of Sumatra Island, directly bordering the Indian Ocean. With a coastline of around 525 km and a sea area reaching thousands of square kilometers, Bengkulu has great potential in the marine fisheries sector. These geographical conditions provide a natural habitat rich in various types of fish with high economic value such as tuna, skipjack, and grouper, which are the leading commodities of the capture fisheries sector in Bengkulu Province. This great potential has encouraged the development of significant marine fisheries activities as a supporter of the regional economy. Another factor that supports the high contribution of the fisheries subsector is the existence of fishing ports that are the center of fishing activities and distribution of marine products, such as Pulau Baai Port. The potential production of marine fisheries resources is 29,246 tons, and produces a production value of Rp. 251,706,089,000 (Mulyasari, 2015).

Contribution of Fisheries Subsector to Total GRDP

Percentage Contribution of the proportion of the Fisheries Subsector in the Provinces in Sumatra to the total GRDP in the Provinces in Sumatra in the last twenty years in 2004-2023.

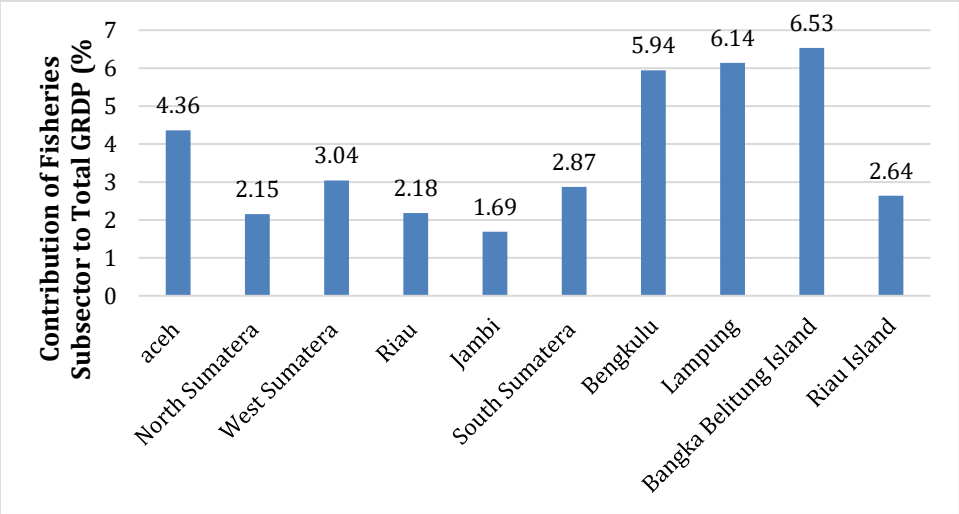

Figure 4. Contribution of the Fisheries Subsector to Total GRDP

From the data obtained, the contribution of the fisheries subsector to the total GRDP of the Province that shows the highest contribution is the Bangka Belitung Islands Province with an average contribution of the fisheries subsector to the total GRDP over the past 20 years of 6.53%. This province consists of two main islands, namely Bangka Island and Belitung Island, which have vast sea areas and are rich in fisheries potential. The vast sea area provides an ideal habitat for various types of high-economic fish such as grouper, pomfret, and mackerel, which are superior commodities of the capture fisheries subsector with a capture fisheries contribution in 2023 of 228,616 tons (KKP, 2023).

Jambi Province is the province with the smallest contribution of the fisheries subsector to the total GRDP with a value of 1.69%. The low contribution of the fisheries subsector can be influenced by various geographical, socio-economic factors, as well as suboptimal fisheries sector management policies. As a province located in the central part of Sumatra Island, the waters of Jambi Province do not have direct access to the sea. Fishing activities depend more on inland fisheries sources such as rivers, lakes, and aquaculture ponds with the contribution of the fisheries subsector in 2022 amounting to 102,241 tons. The Batanghari River, which is the longest river in Sumatra, is the main source of capture fisheries for the local community (KKP, 2022).

Analysis of the role of the fisheries subsector in the Provinces of Sumatra during the period 2004-2023 provides an overview of the contribution of this subsector to the regional economy. The indicators used in this analysis include the value of the fisheries subsector GRDP, the growth rate of the subsector, the contribution to the agricultural sector, and the contribution to the total GRDP.

Table 5. Analysis of the Role of the Fisheries Subsector in the Provinces of Sumatra (2004-2023)

Analysis of the Role of the Fisheries Subsector in the Provinces of Sumatra (2004-2023)				
Province	**GRDP Value (Trillion)**	**Growth Rate (%)**	**Contribution to Agriculture (%)**	**Contribution to Total GRDP (%)**
Aceh	84.135	14,97	16,84	4,36
North Sumatra	139.312	13,24	8,67	2,15
West Sumatra	73.567	18,45	13,37	3,04
Riau	161.393	27,39	9,77	2,18
Jambi	34.908	46,01	6,20	1,69
South Sumatra	116.774	16,99	15,55	2,87
Bengkulu	38.584	37,67	19,09	5,94
Lampung	182.848	22,90	18,35	6,14
Bangka Belitung Islands	44.924	14,78	32,68	6,53
Riau Islands	53.457	7,99	67,63	2,64

Based on table 5, Jambi Province recorded the highest growth rate of the fisheries subsector at 46.01%, although its contribution to the total GRDP was still low. Meanwhile, the Bangka Belitung Islands showed the highest contribution of the fisheries subsector to the total GRDP at 6.53%, indicating the importance of this subsector in the regional economic structure. The Riau Islands had the highest contribution of the fisheries subsector to the agricultural sector at 67.63%, indicating the dominance of the fisheries subsector in the agricultural structure. Overall, although several provinces showed good growth and contribution, the fisheries subsector in Sumatra still faces challenges in increasing its role as a leading sector in the regional economy.

CONCLUSION

Based on the results of the discussion, several conclusions can be drawn as follows:

1. Several provinces in Sumatra, such as Aceh, West Sumatra, Bengkulu, Lampung, and the Bangka Belitung Islands, have the fisheries subsector as a base sector (LQ > 1), which has met local needs and has the potential for export. However, although Aceh has the highest IKS (0.04), its value is still far from 1, indicating that this subsector has not become a leading sector because its contribution is still smaller than other sectors such as plantations and agriculture. The utilization of the large marine potential for export and the fisheries industry is also not optimal. The Localization Index (LI) with an average of 0.03 reflects the relatively even distribution of the fisheries subsector in Sumatra, opening up great opportunities for its development in the region.
2. Lampung is the leading fisheries center in Sumatra, with the highest GRDP, supported by marine biodiversity and a strategic location. Riau and North Sumatra also play significant roles with key commodities like snapper, grouper, shrimp, and tuna exports. Jambi has the lowest fisheries production but the highest growth at 46.01% from a small base. Bengkulu and Lampung also show strong growth, while the Riau Islands struggle with large-scale sea management. The fisheries subsector contributes most to agriculture in the Riau Islands and Bangka Belitung, while Jambi ranks lowest due to limited sea access. Bangka

Belitung leads in total GRDP contribution, whereas Jambi remains the lowest due to its focus on freshwater fisheries. Despite high growth, Jambi's economic impact remains limited by infrastructure and production scale challenges.

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