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Income Inequality Analysis in Sumatra (Case Study of South Sumatera, North Sumatera, West Sumatera Province)

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A B S T R A C T

One indicator of an area of high economic growth is a low level of income inequality. This study aims to determine the development of income inequality that occurs in the provinces of South Sumatra, West Sumatra and North Sumatra, as well as classify and analyze the province based on economic growth and income inequality. The Data used in this study is time series and cross section data with a six-year observation period of 2018-2023 with 3 provinces in Sumatra yajni South Sumatra, West Sumatra and North Sumatra. The methods of analysis used in this study are Wiliamson index analysis, Theil Entropy index analysis, and Klassen typology analysis. With the results of the study, the average level of income inequality in 2018-2023 is in the range of 0.30 to 0.59. The highest income inequality is in the province of South Sumatra 0.59 and North Sumatra 0.45. Inequality in West Sumatra province is at 0.30 then it is categorized as moderate inequality. From Klassen's typological analysis, using the average Wiliamson index in 2018 to 2023, South Sumatra is in Quadrant II which is a fast-growing region, West Sumatra and North Sumatra are in Quadrant IV of the relatively underdeveloped region. From the results of Klassen typology analysis in 2018-2023 regencies or cities in West Sumatra province are in Quadrant II and Quadrant IV, regencies/cities in North Sumatra are in Quadrant I, quadrant II and quadrant IV. While the district / city in South Sumatra province located in Quadrant II and Quadrant IV.

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INTRODUCTION

Development is a multidimensional process involving major changes in the social structure, mental attitudes that have been accustomed to and national institutions including the acceleration/acceleration of economic growth, reduction of inequality and poverty eradication yangpembangunaneconomy of a country is necessary through the process of improving the economic, social and political aspects that occur in people's lives. Economic development in a country is considered capable of improving the welfare of society as measured through the level of income and income distribution. Income distribution is a benchmark for a country to determine the level of public welfare. An even distribution of income will have an impact on the level of inequality that is decreasing. The gap that occurs in Indonesia is currently getting higher.(Sondakh et al., 2023)

The success of development programs is often judged by the high and low growth rate*national* and income, even the poor quality of government policies and the quality of its apparatus in the overall economic sector is usually measured by the speed of growth*national* produced. Economic development is seen as a multidimensional process that includes fundamental changes in social structures, community attitudes, and national institutions, in addition to pursuing accelerated economic growth, addressing income inequality, and poverty alleviation. (Todaro, 2000)

Income inequality is a condition in which the distribution of income received by society is uneven. Inequality is determined by the level of development, ethnic heterogeneity, and inequality related to dictatorships and governments that fail to respect property rights. (Joseph, 2021).

A measure of income inequality or inequality of income/ development of a region, was originally carried out is*Williamson Index*used in Jeffrey G's study. Williamson in 1966. In statistics, this index is actually a coefficient of variation that is usually used to measure a difference. The term*Williamson Index*emerged as a tribute given to early users of the index in measuring income inequality/ development in a region. (Sjafrizal, 2012).

Theil index has no value limit or lower limit and upper limit. The large Theil index shows that inequality in a region is also getting bigger. Conversely, if the index is smaller inequality in the region will be smaller or in other words evenly distributed. This is in line with the Williamson Index. The use of *Index*as a measure of inequality also has several advantages, namely: this index can calculate the inequality of a region and between regions at once, so that the scope of the analysis becomes wider.(Sjafrizal, 2012).

Economic growth is an indicator of well-being in a region. Economic growth is increasing in an area, it is expected that growth can be enjoyed by the entire community. High economic growth in a region is not always followed by a decrease in the level of income inequality, or vice versa low growth also does not describe the level of inequality in a region has increased. (Khairul Amri, 2017). Economic growth followed by equitable income distribution will encourage a decrease in inequality and can create an increase in welfare in an area. Simon Kuznets in (Arsyad, 2010) defines the economic growth of a country as an increase in the ability of a country to provide economic goods for its

population, the increase in this ability is caused by technological progress, institutional, and ideological adjustments needed.

Income inequality that occurs in a region can be grouped into low, medium or high income inequality. Grouping according to the size of inequality in countries with high levels of inequality ranged from 0.5 to 0.7, moderate inequality ranged from 0.36 to 0.49 and low inequality ranged from 0.20 to 0.35. Economic growth is an indicator of well-being in a region. Economic growth is increasing in an area, it is expected that growth can be enjoyed by the entire community. Based On Table 1. the highest economic growth in 2018 was in South Sumatra province at 6.01% or higher than Indonesia's economic growth which was only 5.43% while the lowest economic growth rate in North Sumatra province was -0.07%. Indonesia's economic growth has the lowest value of -2.03% in 2020.

Table 1. Economic Growth Rate in Three Provinces in 2018 – 2023 (%)

Year	Province			Indonesian
	West Sumatra	South Sumatra	North Sumatra	
2018	5.14	6.01	5.18	5.43
2019	5.01	5.69	5.22	4.98
2020	-1.61	-0.11	-1.07	-2.03
2021	3.29	3.58	2.61	3.71
2022	4.36	5.23	4.73	5.35
2023	4.62	5.08	5.01	5.06
Average	3.47	4.25	3.61	3.75

Source : Data in 2023

The average economic growth in three Sumatra Provinces, namely West Sumatra Province, South Sumatra Province, and North Sumatra Province ranges from 3.47 percent to 4.25 percent. The province that has the highest average economic growth is the province of South Sumatra with 4.25 percent and the average economic growth of North Sumatra is 3.61 percent. Indonesia has an average economic growth of 3.75 percent.

Based on the description of economic growth data, it shows that there is inequality, both income inequality and development inequality between provinces in three provinces in Sumatra. For this reason, it is necessary to conduct an analysis of the inequality which in this study is associated with economic growth. Alisjahbana (2005) in Noegroho & Suelistianigsih (2007), suggests that income inequality also often occurs between districts/cities within the province itself. Income inequality between regions occurs as a consequence of concentrated development. Various programs developed to bridge inequality, both income and regional inequality, have not brought significant results. Results (Sultan, 2016) shows that income inequality has a negative influence on economic growth in Central Java, but the results of the study (Prapti, 2006) shows that increasing economic growth will be followed by the level of income inequality in Central Java Regencies/Cities. The purpose of this study is to classify and analyze provinces based on economic growth and income inequality. This

condition prompted the author to conduct research on "Income Inequality Analysis in Three Provinces in Sumatra.

LITERATURE REVIEW

The measure of income inequality or income inequality/development of a region, initially carried out is *Williamson Index* which was used in a study by Jeffrey G. Williamson in 1966. In statistics, this index is actually a coefficient of variation which is usually used to measure a difference. Term *Williamson Index* emerged as an award given to early users of the index in measuring income/development inequality in a region. (Sjafrizal, 2012).

Usage *Theil Index* As a measure of inequality, it also has several advantages, namely: This index can calculate inequality in a region and between regions at once, so that the scope of the analysis becomes wider. The Theil Index has no value limit or lower and upper limits. The large Theil Index shows that inequality in a region is also getting bigger. On the other hand, if the index is smaller, inequality in the region will be smaller or in other words, evenly distributed. This condition is in line with the Williamson Index.(Sjafrizal, 2012).

Delis (2009) researched on the Analysis of Income Inequality Between Regions in Indonesia for the Period 1990 – 2008. In his research, the government takes on the role of the main agent of national development. With a centralistic government, the results of development cannot be enjoyed by all regions equally, which has an impact on the difference in per capita income between regions in Indonesia. The analysis method used in this study is the Williamson index. The results show that during 1990 – 2008 the income inequality between regions was smaller compared to after 2008 as shown by the increasing Williamson index.

(Sultan, 2016) in the research on "Analysis of Regional Income Inequality in DIY - Central Java and Factors Affecting the Period 2000 – 2004. The results showed that there is inequality regional revenue in DIY and Central Java from 2000 to 2004. The growth of foreign investment has a negative and significant influence on regional income inequality in Yogyakarta and Central Java. Export growth has a negative and significant influence on regional income inequality in Yogyakarta and Central Java. Gross Regional Domestic Product (GDP) growth has a negative and significant influence on regional income inequality in Yogyakarta and Central Java in 2000-2004.

The Klassen typology was first introduced by Leo Klassen (1965) from *Netherlands Economic Institute.* Klassen considers the *(regions)* as a discrete microcosm *(discrete microcosmos)* namely economic regions that can be understood through the study of their economic magnitudes. Klassen proposed a simple technique of comparing the income level of a region with the national income level, and Klassen mentioned that the areas in the last quadrant are the areas that are the main concern for regional development planning. (Arsyad, 2010).

(Amri, Ki, 2017) in his research on Analysis of Economic Growth and Income Inequality: Data Panel of 8 Provinces in Sumatra. The results of his research explain that income inequality does not have a significant influence on economic growth in Sumatra, which indicates that on the one hand economic

growth in a region does not cause inequality but on the other hand income inequality has a negative impact on economic growth.

(Prapti, 2006) in a study on the Relationship Between Economic Growth and Income Distribution (Case Study of 35 Regencies/Cities of Central Java). The results of the study show that although the level of population income gap in 35 districts/cities of Central Java is relatively low (still below 0.3), the relationship that increasing economic growth will be followed by an increase in the level of population income gap occurs in most districts/cities in Central Java.

(Supriank, 2012) conducted research on Economic Growth and Regional Disparity in the Ex-Residency Area of Besuki East Java before and after the implementation of fiscal decentralization in Indonesia. The results of this study show that the development between the Ex-Kareisdenan Besuki region of East Java is evenly distributed and the Kuznets Hypothesis by making a graph between economic growth and the Williamson Index, before and after the fiscal decentralization policy was implemented during 1996 to 2010, shows that there is a relationship between economic growth and the Williamson Index, on the grounds that the relationship between the two shows negative, namely the increase in economic growth followed with a decrease in the level of income inequality (Williamson Index). (Isnowati & S, 2007) Development Area 1 Central Java. shows that the relationship between inequality and economic growth is true in the Development Region I of Central Java. This is evident from the results of trend analysis (both those using the Williamson index with growth and the Theil Entropy and growth index).

(Kurniasih, 2013) In the study on Regional Inequality in West Kalimantan Province The results of the study show that high growth is also accompanied by high inequality between regions does not apply in West Kalimantan Province. The test obtained the results of economic growth variables having a significant effect on regional inequality during the research period.(Mopangga, 2011) conducted research on the Analysis of Development Inequality and Economic Growth in Gorontalo Province. Based on the research, the results obtained are that the condition of inequality in Gorontalo Province at the beginning of development tends to increase and gradually decrease.

(Iswanto, 2015) In the research on income inequality between districts/cities in East Java in the research period using the Williamson index and the Theil Entropy Index, it was shown that the inequality/disparity of income between districts/cities in East Java Province was relatively high and had not shown a downward trend, because it was above the threshold of 0.5 (the limit of the Williamson Index). Klassen's typology with a regional approach shows that there are many regencies/cities in East Java Province during 2008-2012 which are relatively backward areas as many as 23 regencies/cities.

(Priyambodo, Danuargo et al., 2015) Based on the above descriptive and quantitative analysis during the 2006-2011 research in East Java Province, the following conclusions can be drawn: Based on the classification typology analysis tool, which divides regions into four quadrants, the average regency and city in East Java Province is in quadrant IV. There are 23 districts and cities that are included in this quadrant category, the region is a relatively backward area.

(Larasati, 2024) Based on the results of the inequality analysis and economic analysis that have been described. It was concluded that in the results of the Klassen typology analysis in the last 5 years, 3 out of 7 districts/cities are still classified as the fourth cluster, where the area is relatively lagging behind, while 2 districts/cities are in the first cluster as well as 2 district/city clusters. In Williamson's inequality analysis, it can be concluded that inequality conditions in the period 2016-2020 show stability in moderate inequality levels, although the growth rate tends to decline in 2019-2020. In addition, in the theil entropy index, it can be concluded that the average value of inequality in the SMA area (Surabaya Metropolitan Area) tends to be stable and does not exceed the value of inequality in East Java.

(Fitrima & Saputra, 2022) In the analysis of economic inequality between regions in Jambi Province with the thesis index approach as a result of research and discussion, it can be concluded: 1). Development inequality between regions in Jambi Province during the period 2001-2015 fluctuated. From 2006 to 2010 there was an increase in the thiil index from 0.0129 in 2001 to 0.0192 in 2010, then in the following year there was a decrease in 2011 to 0.0053 then increased again in 2012 to 0.0055 and in 2013 to 0.0073 then decreased again in 2015.

(Irmawati et al., 2013) Based on the results of the calculation of the Williamson Gap Index, it is known that the average GDP inequality per capita between provinces in Indonesia during the period 2006 – 2011 reached a value of 0.796. In general, the value of the Provincial Williamson Gap Index in Indonesia during the period 2006 – 2011 has tended to increase. The increase in inequality levels is also statistically significant. Meanwhile, the results of the calculation of the Theil Gap Index were obtained with an average value of the Theil Gap Index in 2006 – 2011 of 0.3513. In general, the value of the Theil Gap Index from provinces in Indonesia during the period 2006 – 2011 tended to increase at the end of the period even though there was no significant difference in income inequality growth.

RESEARCH METHODS

This study uses a descriptive method. Descriptive research involves collecting data to test hypotheses or answering questions about the final status of the research subject to obtain a complete and accurate description of a situation. This research was conducted in three provinces on the island of Sumatra, namely: South Sumatra Province, West Sumatra Province, and North Sumatra Province. The research period is six years, namely from 2018 to 2023. This study uses secondary data obtained from the publication of the Indonesian Central Statistics Agency from 2018 to 2023. The data of this study is in the form of *a time series* from 2018 to 2023, and cross section *data* consisting of three provinces, or a combination of *time series* and *cross section* data. The data used are: Gross Regional Domestic Product Per Capita on the basis of prevailing prices in provinces in Indonesia, Gross Regional Domestic Product Growth Rate on the basis of constant prices and population by province in Indonesia. The methods used in this research are the Wiliamson Index Analysis method, the Theil Entropy Index analysis and the Klassen Typology Analysis. This research was conducted twice

with X1 being the Williamson Index to Y economic growth and the second X1 being the Theil Entropy Index to economic growth.

Analysis of the Williams Index

The Williamson Index in this study uses income data measured using Gross Regional Domestic Product data on the basis of prevailing prices and the number of population. The Williamson Index can be used to determine income inequality or income inequality in an area, namely: (Sjafrizal, 2012).

$$IW = \frac{\sqrt{\Sigma(\mathrm{Yi} - \mathrm{Y})^2 . f/N}}{\mathrm{Y}}$$

Information:

Yi = GDP per capita of each region
Y = GDP per capita of a wider area
f = Number of residents of each region
N = Population of a wider area

Analysis of the Theil Entropy index

The Theil Index of Distribution is basically an application of the concept of information theory in measuring economic inequality in a certain period, and can be a more detailed picture of the gap/inequality between regions in a province. (Ying, 2000). To measure the inequality, the Theil Index formula is used as follows: (Sjafrizal, 2012).

$$\mathrm{T_d} = \sum_{i}^{n} \sum_{j}^{n} \left(\frac{\mathrm{yij}}{\mathrm{Y}}\right) * \log \left[\frac{\left(\frac{\mathrm{yij}}{\mathrm{Y}}\right)}{\left(\frac{\mathrm{nij}}{\mathrm{N}}\right)} \right]$$

Information:

Td = Theil Index
yij = GDP per capita of district i in province j
Y = Total GDP per capita of province j
nij = Number of residents of district i in province j
N = Number of inhabitants of province j

Klassen Typology Analysis

The Klassen typology in this study is used to classify provinces based on economic growth and income inequality. The data used are: average GDP per capita and average economic growth in each of the three provinces. Klassen proposed a simple technique of comparing the income level of a region with the national income level, and Klassen mentioned that the areas in the last quadrant are the areas that are the main concern for regional development planning.(Arsyad, 2010).

Table 2. Klassen Typology Matrix

IW/IT / G	IWi/ITi > IW/IT	IWi/ITi < IW/IT
What > G	**Quadrant I (Fast Forward and Grow)** High economic growth and high inequality	**Quadrant II (Fast Growing)** High economic growth and low inequality
What < G	**Quadrant III (Forward and Stressed)** Low economic growth and high inequality	**Quadrant IV (Relatively lagging behind)** Low economic growth and low inequality

Source : Aswandi and Kuncoro , 2002

Information:
G : Indonesia's Economic Growth
Gi : Economic Growth of Province I
IW : Income Inequality (Williamson Index) Indonesia
IT : Indonesia's Income Inequality (Theil Index)
IWi : Income Inequality (Williamson Index) province i
ITi : Income Inequality (Theil Index) province i

RESULTS AND DISCUSSION

Williamson Index Analysis

Table 3. Results of the Calculation of the Williamson Index in Sumatra in 2018 – 2023

It	Year	Province			
		West Sumatra	South Sumatra	North Sumatra	INDONESIAN
1	2018	0.26	0.56	0.45	0.79
2	2019	0.27	0.56	0.46	0.80
3	2020	0.31	0.58	0.43	0.81
4	2021	0.31	0.51	0.44	0.79
5	2022	0.31	0.68	0.45	0.77
6	2023	0.31	0.67	0.44	0.59
	AVERAGE	0.30	0.59	0.45	0.76

Source : Data in 2023

Based on the results of the Williamson Index calculation in three provinces in Sumatra, namely South Sumatra, West Sumatra and North Sumatra from 2018 to 2023, the provinces that have a level of income inequality that is in the range of 0.21 to 0.35 are West Sumatra province in 2018-2019 of 0.27. This condition shows that West Sumatra province has a moderate level of income inequality even though it has increased from 2020 to 2023. The province that has the highest level of income inequality is South Sumatra province, which is at 0.68 in 2022 and

0.67 in 2023, and North Sumatra Province has a high level of inequality which is at 0.46 in 2018 and in 2023 drops to 0.44 in 2023, for a period of six years with an inequality rate close to 1. The results of the analysis of the Wiliamson Index mean inequality in West Sumatra is classified as moderate at 0.30, while in North Sumatra the high inequality is at 0.45 and in South Sumatra the high inequality is at 0.59.

Theil Entropy Analysis

Table 4. Results of the Calculation of the Theil Entropy Index in Sumatra in 2018 – 2023

It	Year	Province			
		North Sumatra	West Sumatra	South Sumatra	Indonesian
1	2018	0.13	0.17	0.07	0.35
2	2019	0.13	0.18	0.06	0.35
3	2020	0.41	0.19	0.07	0.34
4	2021	0.53	0.19	0.13	0.35
5	2022	0.13	0.19	0.09	0.38
6	2023	0.13	0.18	0.08	0.38
	AVERAGE	0.27	0.19	0.08	0.36

Source : Data in 2023

Table 4 shows the results of the calculation of the Theil Entropy Index in three Sumatra Provinces for six years. The province that has the largest Theil Index value is the province of North Sumatra which is at 0.55 in 2020 and 0.53 in 2021, this condition is in line with the results of the Williamson Index calculation because in West Sumatra province the level of income inequality is high. The level of inequality in the province of West Sumatra, South Sumatra actually has different conditions because the value of the Theil Index of the two provinces can be said to be low ranging from 0.06 to 0.19 with the lowest level of income inequality in the province of South Sumatra in 2019 from 0.06 to 2021 of 0.13.

Klassen Typology Analysis

Provincial classification using two indicators, namely income inequality and economic growth, is used as a classification typology analysis tool. This analysis was carried out to determine the classification of provinces in three Sumatra provinces based on income inequality and economic growth by comparing the two indicators in each province with the Indonesian average.

Table 5. Income Inequality (Williamson Index) and Provincial Economic Growth in Sumatra in 2018 – 2012

NO	**Province 2018**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,26	0.79	5,14	5,43
2	South Sumatra	0,56	0.79	6,01	5,43

3	North Sumatra	0,45	0.79	5,18	5,43
NO	**Province 2019**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,27	0,80	5,01	4,98
2	South Sumatra	0,56	0,80	5,69	4,98
3	North Sumatra	0,46	0,80	5,22	4,98
NO	**Province 2020**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,31	0.81	-1,61	-2,03
2	South Sumatra	0,58	0.81	-0,11	-2,03
3	North Sumatra	0,43	0.81	-1,07	-2,03
NO	**Province 2021**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,31	0,79	3,29	3,71
2	South Sumatra	0,51	0,79	3,58	3,71
3	North Sumatra	0,44	0,79	2,61	3,71
NO	**Province 2021**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,31	0,79	3,29	3,71
2	South Sumatra	0,51	0,79	3,58	3,71
3	North Sumatra	0,44	0,79	2,61	3,71
NO	**Province 2022**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,31	0.77	5,14	5,43
2	South Sumatra	0,68	0.77	6,01	5,43
3	North Sumatra	0,13	0.77	5,18	5,43
NO	**Province 2023**	**Income inequality**	**Indonesian**	**Economic Growth (%)**	**Indonesian**
1	West Sumatra	0,31	0,59	5,01	4,98
2	South Sumatra	0,67	0,59	5,69	4,98
3	North Sumatra	0,13	0,59	5,22	4,98

Source : Data processed from table 3

Classification of the Wiliamson index and economic growth by province in Sumatra in 2018 - 2023 in three provinces in Table 6, namely fast-growing regions. The fast-growing and growing regions in quadrant I have a high economic growth rate and income inequality as measured by a high Wiliamson index, namely in the province of South Sumatra 2023, meaning that high economic growth in both provinces cannot reduce the level of income inequality, on the contrary, high economic growth is followed by high income inequality as well.

Table 6. Classification of Provinces in Sumatra Based on Economic Growth and Income Inequality (Williamson Index) 2018-2023

Williamson Index (IW)	**IWi > IW**	**IWi < IW**

Economic Growth (G)		
	Quadrant I	**Quadrant II**
What > G	- South Sumatra (2023)	- South Sumatra (2018) - South Sumatra (2019) - West Sumatra (2019) - North Sumatra (2019) - South Sumatra (2020) - West Sumatra (2020) - North Sumatra (2020) - South Sumatra (2022) - West Sumatra (2023) - North Sumatra (2023)
	Quadrant III	- **Quadrant IV**
What < G		- West Sumatra (2018) - North Sumatra (2018) - West Sumatra (2021) - North Sumatra (2021) - South Sumatra (2021) - West Sumatra (2022) - North Sumatra (2022)

Based on the results of the Williams index classification and economic growth by province in Sumatra in 2018 - 2023 in three provinces in Table 1.3, it is known that the provinces in quadrant II, namely developing regions that have a high economic growth rate and low income inequality compared to the Indonesian average, are the provinces of South Sumatra in 2018, South Sumatra in 2019, West Sumatra in 2019, North Sumatra 2019 South Sumatra (2020), West Sumatra (2020), North Sumatra (2020), South Sumatra (2022), West Sumatra (2023), North Sumatra (2023). This province has the highest per capita income compared to the other two provinces, namely West Sumatra and North Sumatra, but the high income can be enjoyed by all people because of higher economic growth.

Provinces that are in quadrant IV or included in the classification of relatively underdeveloped regions, have a high level of inequality and low economic growth are the provinces of West Sumatra 2018, North Sumatra 2018, West Sumatra (2018), North Sumatra (2018), West Sumatra (2021), North Sumatra (2021), South Sumatra (2021), West Sumatra (2022), North Sumatra (2022). The not so high economic growth rate in this province also has an impact on low income inequality.

In 2020 to 2021 Economic Growth was Very Weak Due to Covid-19 where in 2020 economic growth in three provinces, namely West Sumatra, South Sumatra and North Sumatra, was at -0.11 to -1.61. The Covid-19 pandemic has a very significant impact on the economy, ranging from changes in the world supply chain to a decline in investment in Indonesia. At the provincial level, the

economic crisis triggered by the Covid-19 pandemic has affected the employment situation in the province. A number of workers were forced to be laid off and even experienced termination of employment (PHK) due to the disruption of the company's operational activities affected by this crisis.

The Covid 19 pandemic has changed the political, environmental, and economic elements of human life affecting growth and sustainability. This has an impact on the standard of living and quality of human life.the covid 19 era has resulted in social problems and food crises. Infrastructure development has been delayed in the provinces and cities in Indonesia. One of the impacts of Covid-19 in West Sumatra, North Sumatra and South Sumatra is the decline in travel and tourism in the province. The hotel business in the province has stopped due to Covid-19, this has resulted in a decrease in income in each region.

After Covid-19 in 2020 to 2021, In 2022 to 2021 the local government carried out stabilization efforts, one of which in the SME sector was counseling for business actors, working capital financing, as well as providing tax incentives, online training, and helping debtors to ease installment payments so that the community's economy improved.

In 2022 and 2023, economic growth in three Sumatra provinces, namely North Sumatra, South Sumatra, and West Sumatra, increased compared to 2020 and 2021 during the pandemic. Economic growth in these 3 provinces is 5.18 to 6.01 in 2022 and 5.01 to 5.69 in 2023. South Sumatra Province in 2023 is included in Quadrant I, which is a fast-growing and growing region. In 2023, South Sumatra can be categorized as high economic growth when compared to the other two provinces.

Table 7. Average Income Inequality (Williamson Index) and Average Provincial Economic Growth in Sumatra in 2018 – 2023

It	Province	Average income inequality	Indonesia n	Economic Growth (%)	Indonesia n
1	West Sumatra	0,30	0,76	3,47	3,75
2	South Sumatra	0,59	0,76	4,25	3,75
3	North Sumatra	0,45	0,76	3,61	3,75

Source : Data processed from Table 3

Based on the results of the classification of the average Williams index and the average economic growth by province in Sumatra in 2018 - 2023 in three provinces in Table 7, it is known that the provinces in the second quadrant are developing regions that have a high economic growth rate and low income inequality compared to the Indonesian average is the province of South Sumatra. This province has the highest income inequality compared to the other two provinces, namely West Sumatra and North Sumatra, but the high income can be enjoyed by the entire community because of higher economic growth.

Table 8. Classification of Provinces in Sumatra Based on Average Economic Growth and Income Inequality (Williamson Index) 2018 - 2023

Williamson Index (IW) / Economic Growth (G)	IWi > IW	IWi < IW
	Quadrant I	**Quadrant II**
What > G		-South Sumatra
	Quadrant III	**Quadrant IV**
What < G		- West Sumatra - North Sumatra

Provinces that are in quadrant IV or included in the classification of relatively underdeveloped regions, have low levels of inequality and economic growth are the provinces of West Sumatra and North Sumatra. The not so high economic growth rate in this province also has an impact on low income inequality.

Table 9. Income Inequality (Theil Entropy Index) and Economic Growth in West Sumatra Regencies/Cities in 2018 – 2023

Regency/City	Income inequality	Province	Economic Growth (%)	Indonesian
Padang Panjang	0.063	0.18	5.71	5.14
Mentawai Islands	0.030	0.18	4.89	5.14
Solok City	0.044	0.18	5.49	5.01
Dharmasraya	0.001	0.18	4.94	5.01
Sijunjung	0.001	0.19	-1.10	-1.61
Bukittinggi	0.047	0.19	-1.74	-1.61
South Solok	0.001	0.19	3.32	3.29
Padang Pariaman	0.048	0.19	3.61	3.29
Payakumbuh	0.021	0.19	4.51	4.36
South Coast	-0.015	0.19	4.01	4.36
Plain	-0.009	0.19	4.44	4.62
Pariaman	0.034	0.19	4.79	4.62

Source : Data in 2023

Based on the results of the classification of the theil entropy index and economic growth by province, regencies/cities in West Sumatra in 2018 - 2023 in Table 2.0, it is known that the provinces in quadrant II, namely developing

regions that have a high economic growth rate and low income inequality compared to the Indonesian average, are Padang Panjang Regency, Solok City, Sijunjung, South Solok, Payukumbuh and Pariaman. This area has a high Economic Growth income compared to the economic growth in West Sumatra Province, but the high income can be enjoyed by the entire community because of higher economic growth.

Table 10. Classification of Regencies/Cities in West Sumatra Based on Economic Growth and Income Inequality (Theil Entropy Index) 2018-2023

Theil Entropy Index (IT) / Economic Growth (G)	**ITi > IT**	**ITi < IT**
	Quadrant I	**Quadrant II**
What > G		- Padang Panjang - Solok City -Sijunjung - South Solok - Payukumbuh - Pariaman
	Quadrant III	**Quadrant IV**
What < G		- Mentawai Islands - Dharmasraya - Bukit Tinggi - Padang Pariaman - South Coast - Plain

In table 1.0, the areas that are in quadrant IV or included in the classification of relatively underdeveloped regions, have a low level of inequality and economic growth are the Mentawai Islands, Dharmasraya, Padang Pariaman, South Coast and Tanah Datar. The economic growth rate that is not so high in this area also has an impact on low income inequality.

Table 11. Income Inequality (Theil Entropy Index) and Economic Growth in North Sumatra Regencies/Cities in 2018 – 2023

Regency/City	**Income inequality**	**Province**	**Economic Growth (%)**	**Indonesian**
South Tapanuli	0.1306	0.131	5.19	5.18
Karo	0.0027	0.131	4.55	5.18
Mandailing Christmas	-0.0658	0.131	5.30	5.22
Nias	-0.0680	0.131	5.04	5.22
Central Tapanuli	0.5687	0.412	-0.76	-1.07
North Tapanuli	0.6022	0.412	1.50	-1.07

Toba	0.4036	0.412	-0.27	-1.07
Deli Serdang	0.2649	0.412	-1.78	-1.07
Samosir	0.4656	0.412	-0.59	-1.07
Simalungun	0.0121	0.525	3.70	2.61
Dairi	0.0061	0.525	2.05	2.61
South Labuhanbatu	0.0295	0.130	4.74	4.73
Tanjungbalai	0.0160	0.130	3.94	4.73
Padang Sidimpuan	0.0016	0.128	5.09	5.01
Mount Sitoli	0.0124	0.128	3.69	5.01

Source : Data in 2023

Classification of the Theil Entropy index and economic growth by district/city in North Sumatra province in 2028 – 2023 in Table 1.1, namely fast-developing regions. The fast-growing and growing regions in quadrant I have a high economic growth rate and income inequality as measured by a high Theil Entropy index, namely in Central Tapanuli, Samosir and North Tapanuli, meaning that high economic growth in these areas cannot reduce the level of income inequality, on the contrary, high economic growth is followed by high income inequality as well.

Based on the results of the classification of the entropy index and economic growth by province in North Sumatra in 2018 - 2023 in Table 1.2, it is known that the provinces in quadrant II, namely developing regions that have a high economic growth rate and low income inequality compared to the Indonesian average, are South Tapanuli Regency/City, Mandailing Natal, Toba, Simalungun, Labuhan Batu Selatan and Padang Sidimpuan. This area has a high Economic Growth income, but the high income can be enjoyed by the entire community because economic growth is higher.

Table 12. Classification of Regencies/Cities in North Sumatra Based on Economic Growth and Income Inequality (Theil Entropy Index) 2018-2023

Theil Entropy Index z(IT) / **Economic Growth (G)**	**ITi > IT**	**ITi < IT**
	Quadrant I	**Quadrant II**

What > G	-Central Tapanuli - North Tapanuli - Samosir	- South Tapanuli - Mandailing Natal -Toba - Simalungun - Labuhan Batu Selatan - Padang Sidimpuan
	Quadrant III	**Quadrant IV**
What < G		- Karo - Nias - Deli Serdang - Dairi - Tanjung Balai - Plain - Mount Sitoli

In table 12, the regions that are in quadrant IV or included in the classification of relatively underdeveloped regions, have a low level of inequality and economic growth are Karo, Nias, Deli Serdang, Dairi, Tanjung Balai, Tanah Datar, Gunung Sitoli. The economic growth rate that is not so high in this area also has an impact on low income inequality.

Table 13. Income Inequality (Theil Entropy Index) and Economic Growth in South Sumatra Regencies/Cities Restrictions in 2018 – 2023

Regency/City	**Income inequality**	**Province**	**Economic Growth (%)**	**Indonesian**
Ogan Komering Ulu	0.005	0.070	4.88	6.01
Penukal Abab Lematang Ilir	0.018	0.070	6.38	6.01
Estuary Enim	0.026	0.070	7.02	5.69
Ogan Komering Ilir	-0.015	0.070	5.08	5.69
Palembang	-0.025	0.070	5.86	5.69
Prabumulih	0.021	0.070	-0.18	-0.11
Lahat	0.001	0.070	0.36	-0.11
Four Doors	-0.007	0.133	3.79	3.58
Musi Rawas	0.009	0.133	2.33	3.58
OKU Timur	-0.012	0.094	5.44	5.23
Nature Fence	0.003	0.094	4.86	5.23
Banyuasin	-0.016	0.094	5.32	5.23
North Musi Rawas	0.015	0.089	4.34	5.08

Lubuk Linggau	0.003	0.089	4.44	5.08

Source : Data in 2023

Based on the results of the classification of the theil entropy index and economic growth by province in South Sumatra in 2018 - 2023 in Table 1.3, it is known that the provinces in quadrant II, namely developing regions that have a high economic growth rate and low income inequality compared to the Indonesian average, are Penungkal abab lematang Ilir, Muara Enim, Palembang, Lahat, Four Lawang, East Oku, Banyuasin. This area has a high Economic Growth income, but the high income can be enjoyed by the entire community because economic growth is higher.

Table 14. Classification of Regencies/Cities in South Sumatra Based on Economic Growth and Income Inequality (Theil Entropy Index) 2018-2023

Theil Entropy Index (IT) / Economic Growth (G)	**ITi > IT**	**ITi < IT**
	Quadrant I	**Quadrant II**
What > G		- Reveal Abab Lematang Ilir - Muara Enim -Palembang - Lahat - Four Doors - East Oku - Banyuasin
	Quadrant III	**Quadrant IV**
What < G		- Ogan Komering Ulu - Ogan Komering Ilir - Prabumulih - Musi Rawas - Nature Fence - North Musi Rawas - Lubuk Linggau

In table 1.4, the areas that are in quadrant IV or included in the classification of relatively underdeveloped regions, have a low level of inequality and economic growth are Ogan Komering Ulu, Ogan Komering Ilir, Prabumulih, Musi Rawas, Pagar Alam, Musi Rawas Utara, Lubuk Linggau. The economic growth rate that is not so high in this area also has an impact on low income inequality.

Table 15. Average Income Inequality (Theil Entropy Index) and Average Provincial Economic Growth in Sumatra in 2018 – 2023

It	Province	Income Inequality (Theil Index)	Economic Growth (%)
1	West Sumatra	0,19	3,47
2	North Sumatra	0,27	3,61
3	South Sumatra	0,08	4,25
Indonesian		0,36	3,75

Source : Data processed from Table 4

Based on the results of the classification of the average entropy index and the average economic growth by province in Sumatra in 2018 - 2023 in three provinces in Table 1.6, it is known that the provinces in quadrant II, namely developing regions that have a high economic growth rate and low income inequality compared to the Indonesian average, are the province of South Sumatra. This province has the highest Economic Growth income compared to the other two provinces, namely West Sumatra and North Sumatra, but the high income can be enjoyed by the entire community because of higher economic growth.

Table 16. Classification of Provinces in Sumatra Based on Average Economic Growth and Income Inequality (Theil Entropy Index) 2018-2023

Theil Entropy Index (IT) / Economic Growth (G)	ITi > IT	ITi < IT
	Quadrant I	**Quadrant II**
What > G		-South Sumatra
	Quadrant III	**Quadrant IV**
What < G		- West Sumatra - North Sumatra

Provinces that are in quadrant IV or included in the classification of relatively underdeveloped regions, have low levels of inequality and economic growth are the provinces of West Sumatra and North Sumatra. The not so high economic growth rate in this province also has an impact on low income inequality.

CONCLUSIONS

Based on the results of the research that has been carried out, it can be concluded that:

1. Average Income inequality as measured by the Williamson index is included in the high category. Income Inequality in South Sumatra, West Sumatra and North Sumatra basically does not fully describe the welfare conditions of the community because there are differences in the level of

income inequality between provinces. The inequality in the highest wiliamson index occurred in the province of South Sumatra. Meanwhile, the average inequality of the theil entropy index is included in the low category. The highest inequality in the theil entropy index occurred in North Sumatra Province. The Theil Entropy Index aims to see how much disparity occurs within a district/city within a province. The income inequality of districts/cities in three provinces, namely South Sumatra, West Sumatra, and North Sumatra, is included in the low or close to zero category, this explains that there is no income disparity in districts and cities.

2. Provincial classification using classification typology analysis using the Wiliamson index from 2018 to 2023 South Sumatra is in quadrant II which is a fast-developing region, West Sumatra and North Sumatra are in Quadrant IV which is a relatively underdeveloped region. From 2018 to 2023, there are three quadrants, namely in Quadrant I there is South Sumatra Province in 2023, Quadrant II is South Sumatra Province (2018), South Sumatra (2019), West Sumatra (2019), North Sumatra (2019), South Sumatra (2020), West Sumatra (2020), North Sumatra (2020), South Sumatra (2022), West Sumatra (2023), North Sumatra (2023) and quadrant IV is West Sumatra Province (2018), North Sumatra (2018), West Sumatra (2021), North Sumatra (2021), South Sumatra (2021), West Sumatra (2022), North Sumatra (2022).

IMPLICATIONS/LIMITATIONS AND SUGGESTIONS

This study found that when income inequality increases, economic growth decreases or vice versa, so it is necessary to consider a better strategic plan so that economic growth increases and inequality is expected to decrease or be evenly distributed. The inequality that occurs in the three provinces is expected so that the government can make a policy that is able to balance the acceleration of economic growth with the income earned by the community. One of them is that development planning is prioritized in relatively underdeveloped areas, especially in the provision of public facilities and is expected to empower the community so that they can manage the potential owned by their respective regions, so that income inequality can be minimized.

REFERENCES

Arsyad. (2010). *Ekonomi Pembangunan*. Upp Stim Ykpn.

Bps.Go.Id. (N.D.). Jumlah Penduduk 2018-2023 (Ribu Jiwa). Bps.Go.Id. Retrieved May 11, 2021, From Https://Sumatera Selatan.Bps.Go.Id/Site/Resulttab

Bps.Go.Id. (N.D.-E). Jumlah Penduduk2018-2023 Menurut Jenis Kelamin Dan Kabupaten/Kota Sumatera Utara (Jiwa). Bps.G0.Id. Retrieved May

Bps.Go.Id. (N.D.-D). Jumlah Penduduk 2018-2023 Menurut Kabupaten/Kota Dan Jenis Kelamin Di Provinsi Sumatera Barat (Jiwa). Bps.Go.Id. Retrieved May 10, 2023, From Https://Sumbar.Bps.Go.Id/Site/Resulttab

Bps.Go.Id. (N.D.-A). [Seri 2010] Produk Domestik Regional Bruto Per Kapita Menurut Kabupaten/Kota Di Sumatera Barat (Ribu Rupiah). Bps.Go.Id.

Umbar.Bps.Go.Id/Site/Pilihdata.Html
Bps.Go.Id. (N.D.-A). [Seri 2010] Produk Domestik Regional Bruto Per Kapita Menurut Kabupaten/Kota Di Sumatera Selatan (Ribu Rupiah). Bps.Go.Id. Sumsel.Bps.Go.Id/Site/Pilihdata.Html
Bps.Go.Id. (N.D.-A). [Seri 2010] Produk Domestik Regional Bruto Per Kapita Menurut Kabupaten/Kota Di Sumatera Utara (Ribu Rupiah). Bps.Go.Id. Sumut.Bps.Go.Id/Site/Pilihdata.Html
Fitrima, S., & Saputra, R. (2022). *Analisis Ketimpangan Ekonomi Antar Daerah Di Provinsi Jambi Dengan Pendekatan Indeks Theil*. *1*(2), 224–232.
Irmawati, S., Damelia, D., & Puspita, D. W. (2013). *Analisis Perubahan Ketimpangan Pendapatan Dan Pertumbuhan Ekonomi Antar Propinsi Di Indonesia 2006-2011*. *5*(62), 271–279. Https://Doi.Org/10.15294/Jejak.V7i1.3596
Isnowati, & S. (2007). *Pengujian Hipotesis Kuznets Di Wilayah Pembangunan I Jawa Tengah Oleh : Sri Isnowati Dosen Stie Stikubank Semarang Key Word : Economic Growth , Income Imbalance , Williamson Index , Entrophy Theillindex , And Kuznets Hypothesis . Diterbitkannya Undang-Und*. *14*(1).
Iswanto, D. (2015). *Signifikan Vol. 4 No. 1 April 2015*. *4*(1), 41–66.
Khairul Amri. (2017). *Analisis Pertumbuhan Ekonomi Dan Ketimpangan Pendapatan : Panel Data 8 Provinsi Di Sumatera*. *1*(1).
Kurniasih, E. P. (2013). *Ketimpangan Wilayah Di Provinsi Kalimantan Barat Suatu Kajian Terhadap Hipotesis Kuznet*. *9*(2009), 36–48.
Larasati, A. Fitri. (2024). *Surabaya Metropolitan Area*. *16*(1), 87–92.
Mopangga. (2011). *Analisis Ketimpangan Pembangunan Dan Pertumbuhan Ekonomi Di Provinsi Gorontalo*. *10*(1), 40–51.
Prapti. (2006). *Ekonomi Dan Distribusi Pendapatan (Studi Kasus 35 Kabupaten / Kota Jawa Tengah 2000-2004)*.
Priyambodo, Danuargo, K., Luthfi, A., & Edy, S. (2015). Analisis Disparitas Pendapatan Kabupaten Dan Kota Di Provinsi Jawa Timur (An Analysis The Income Disparity Of Regency And Town In East Java Province). *E-Journal Ekonomi Bisnis Dan Akuntansi*, *2*(1), 29–36.
Sjafrizal. (2012). *Ekonomi Wilaya Dan Perkotaan*. Pt. Raja Grafindo Persada.
Sondakh, C. A., Rorong, I. P. F., & Sumual, J. I. (2023). *Pertumbuhan Ekonomi Empat Kota Di Provinsi Sulawesi Utara*. *23*(4), 1–12.
Sultan, S. (2016). *Analisis Ketimpangan Pendapatan Regional Di Diy-Jawa Tengah Serta Faktor-Faktor*. *8*(1), 33–44.
Supriank. (2012). *Analisis Hipotesis Kuznets Pada Pertumbuhan Ekonomi Dan Disparitas Regional Wilayah Eks-Karesidenan Besuki Jawa Timur Sebelum Dan Sesudah Penerapan Desentralisasi Fiskal Di Indonesia Analysis*.
Todaro. (2000). *Pembangunan Ekonomi Di Dunia Ketiga*. Penerbit Erlangga.
Yusuf, M. (2021). *Analisis Pertumbuhan Ekonomi Dan Ketimpangan Wilayah Di*. *1*(1),