Analysis of Klassen Typology and Spatial Pole of Economic Growth and Development of Disadvantaged Regions in Bangka Belitung Islands Province over the 2004-2019 Period

Darol Arkum[1,*] Pan Budi Marwoto[2] Nursilawati[3]

[1] *Sekolah Tinggi Ilmu Sosial dan Ilmu Politik (STISIPOL) Pahlawan 12 Bangka, Indonesia*
[2] *Regional Development Planning Agency (Bappeda) of Bangka Regency, Indonesia*
[3] *Functional Policy Analyst of Bangka Regency, Indonesia*
[*] *Corresponding author. Email: darolarkumugm@gmail.com*

ABSTRACT

This paper analyzes the location of regencies/cities with a high economic growth rate, unemployment poverty rate, human development index level, and income distribution inequality in Bangka Belitung Islands Province. To analyze these questions, it employed the Geographic Information System and the Moran index. The results of the Klassen typology analysis shows the analysis results of regional classifications based on economic growth and poverty rate levels in Bangka Belitung Islands Province over the 2004-2019 period. In the 2004-2008 period, there was one city with a high economic growth rate and a low poverty rate (pro-growth, pro-poor) in Quadrant I, namely Pangkalpinang City. Regions with a high economic growth rate and a high poverty rate (pro-growth, no pro-poor) in Quadrant II were East Belitung Regency, Belitung Regency, and Bangka Regency. The region with a low economic growth rate and a high poverty rate (no pro-growth, no pro-poor) in Quadrant III was Central Bangka Regency. Regions with a low economic growth rate and a low poverty rate (no pro-growth, pro-poor) in Quadrant IV were South Bangka Regency and West Bangka Regency. In the 2009-2019 period, regions with a high economic growth rate and a low poverty rate (pro-growth, pro-poor) in Quadrant I were South Bangka Regency and Pangkalpinang City. Regions with a high economic growth rate and a high poverty rate (pro-growth, no pro-poor) in Quadrant II were Belitung Regency and East Belitung Regency. Regions with a low economic growth rate and a low poverty rate (no pro-growth, pro-poor) in Quadrant III were Bangka Regency and Central Bangka Regency. The region with a low economic growth rate and a low poverty rate in Quadrant IV was West Bangka Regency (no pro-growth, pro-poor).

Keywords: *Economic Growth, Poverty, Klassen Typology, Spatial.*

1. INTRODUCTION

Natural resource wealth can affect vertical and horizontal injustice. Vertical inequality concerns between the poor and the rich while oblique is between regions with abundant mineral resources and those poor in mineral resources. Therefore, according to Humphreys, M, et al., one of the keys to success is the impact that mineral rents have on income distribution both vertically (between the rich and the poor) and horizontally (across all regions/regions within a country) [1]. Both types of injustice can be very damaging: severe vertical injustice can slow down development and weaken poverty reduction while inequality can lead to social conflict [2].

This chapter will analyze the location of regencies/cities with a high economic growth rate, poverty rate, and human development index, as well as estimate income distribution in Bangka Belitung Islands Province. To analyze these questions, the

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Geographic Information System (GIS) and the Moran index were used.

This analysis was used to observe development achievements in the regencies/cities. The findings of the subsequent analysis were used to support the findings of whether a region with rich natural resources had a record of development. Empirical findings show that some countries rich in natural resources had problems with development while some had impressive development records.

2. METHOD

This is a descriptive quantitative study. It employed spatial analysis using a using Geographic Information System (GIS) as the analytical method. A Geographical Information System (GIS) is defined as a tool/media for entering, storing, retrieving, manipulating, analyzing, and displaying data with geographic attributes (geospatial data) that is useful to support retrieval process decisions in natural resource planning and management, the environment, transportation, as well as urban and administrative matters [3]. Arnoff, defines a geographic information system as a computer system that includes, manages, manipulates, and analyzes data and provides explanations [4]. According to Murai, a geographic information system is an information system used to enter, store, process, analyze, and produce geographically referenced data or geospatial data to support decision making in the planning and management of land use, the environment, transportation, city facilities, and services. other common [5].

Geographic information systems have been widely used in various forms of other scientific applications, namely management science, business, the environment, planning, market analysis, natural resource management, land information, transportation, urban planning, property, decision-making systems, and land mapping [6].

Geographic information systems are useful for identifying (1) industrial locations; (2) areas with spatial clustering trends [7]. Some of the procedures performed in the analysis of geographic information systems are shown in Table 1.

Tabel 1. Procedures and main activities using a geographic information system

Procedure	Activity
Data collection	▪ Numbering on maps and documents, including data coding, data verification, and error correction ▪ Describing existing data sets, especially those from industry surveys published by BPS ▪ Conducting primary survey
Data processing preparation	▪ Interpreting or classifying the data obtained from the survey ▪ Developing digital data structures to select spatial models (based on objects, networks, and fields) ▪ Transforming/converting into a regular/common coordinate system
Basic data instruction or basic data (saving and recalling the data)	▪ Creating models based on data concepts ▪ Defining the database structure ▪ Establishing the latest procedures ▪ Sending data to the database
Spatial research/location/area with basic analysis or database (data storage and data retrieval)	▪ Retrieving data based on their location ▪ Calling data based on their class or attribute ▪ Finding the most suitable location based on the criteria ▪ Looking for patterns, groups, pathways, and interactions ▪ Modeling and simulating physical and social phenomena
Graphic appearance (visualization and interaction)	▪ Creating maps ▪ Exploring data ▪ Creating a three-dimensional view ▪ Generating reports

Geographic Information Systems (GIS) are valuable systems for governments, the general public, and companies to explain events, predict revenues, and perform strategic planning [8]. The software used to analyze GIS is ArcGis version 10.

In this research, the units of analysis were regencies/cities located in Bangka Belitung Islands Province with the observation year between 2004-2019. Bangka Belitung Islands Province is comprised of 6 regencies and 1 city, they are Bangka Regency, Belitung Regency, West Bangka Regency, Central

Bangka Regency, South Bangka Regency, East Belitung Regency, and Pangkalpinang City.

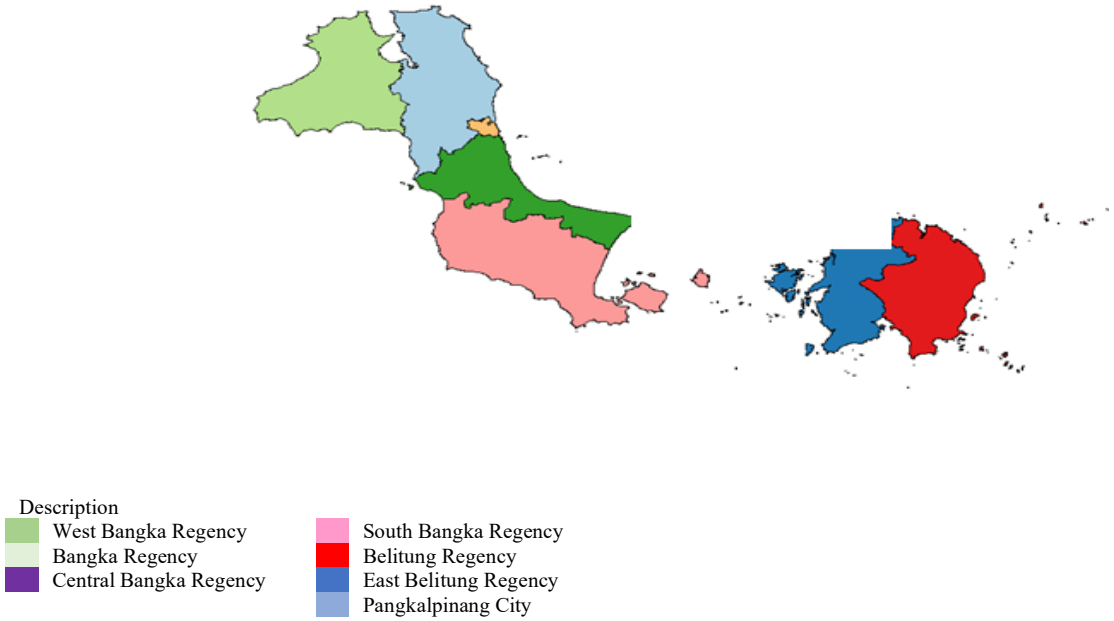

Figure 1 Regency/city area map in bangka Belitung Islands

The economic geography of the regencies/cities in Bangka Belitung Islands Province can be mapped by looking at their economic growth, poverty, unemployment, economic exploitation, and human development index from 2004-2019 as follows [9].

Table 2. Regency/city development performance achievements in bangka belitung islands province in 2004-2019

Regency/City	Economic Development (%)		Poverty (%)		Jobless (%)		HDI	
	2004	2019	2004	2019	2004	2019	2004	2019
Bangka	5.03	2.89	8.94	4.92	6.58	3.80	69.02	72.39
Belitung	4.57	3.30	11.68	6.29	11.08	2.98	70.20	72.46
West Bangka	4.25	7.13	8.66	2.67	8.66	2.94	66.95	69.05
Central Bangka	4.07	1.21	9.04	5.02	7.43	4.59	67.11	70.33
South Bangka	4.03	2.53	7.97	3.36	8.67	4.02	62.71	66.65
East Belitung	5.26	3.26	12.12	6.60	8.11	1.74	68.39	70.84
Pangkalpinang	4.31	3.34	5.78	4.25	11.65	5.27	73.67	77.97

3. RESULT AND DISCUSSION

3.1 Regional Analysis of Economic Growth in Bangka Belitung Islands Province

As the only region with a wealth of natural tin resources in Indonesia, Bangka Belitung Islands Province should have a promising level of economic growth. However, empirical facts suggest otherwise, some regencies/cities failed to meet the expected economic growth performance. In connection with this matter, empirical facts show that several countries with abundant natural resources had good economic performance and several countries with rich natural resources had impressive economic growth achievements.

On the other hand, many rich countries are still struggling to take off and pursue independent economic growth. Some of them even plunged into a severe economic crisis [10]. For example, when comparing two gem-rich countries Sierra Leone and Botswana, it can be seen that the Botswana economy has grown at an average rate of 7 percent over the last 20 years. In contrast, Sierra Leone collapsed in the wake of the civil war, with its gross domestic product (GDP) per capita plummeting 37 percent between 1971 and 1989.

Based on the results of the Geographic Information System (GIS) analysis, the regencies/cities with economic growth center in Bangka Belitung Islands Province for the 2004-2019 period can be mapped as follows.

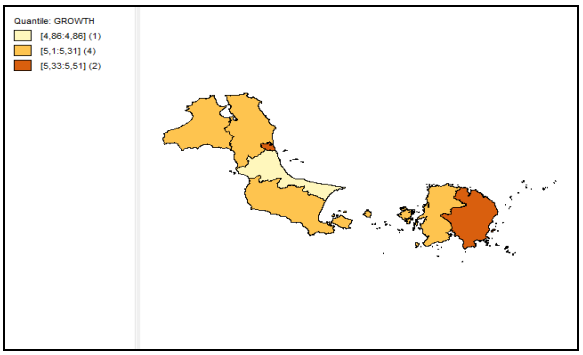

Figure 2 Mapping of regencies/cities in bangka belitung islands province by economic growth in the 2004-2019 period.

The figure explains that there are three groups of economic growth areas, namely:

- Classification I (the light brown area) with a value of 4.86%-4.86%

- Classification II (the yellow area) with a value range of 5.10%-5.31%

- Classification III (the brown area) with a value range of 5.33%-5.51%.

Based on Figure 2 from 2004 to 2019, there were three regencies/cities that belonged to Classification I with an economic growth value of 4.86%, namely Central Bangka Regency. Classification II was comprised of regions with an economic growth value of 5.10%-5.31%. The regencies/cities that belonged to this classification were Bangka Regency, South Bangka Regency, West Bangka Regency, and Belitung Regency. Meanwhile, regencies that belonged to Classification III with a value of 5.33%-5.51% were East Belitung Regency and Pangkalpinang City.

The analysis to determine regions experiencing economic growth was done using a Geographic Information System (GIS) with software named GeoDa. The results of the GIS analysis revealed regions with economic growth in Bangka Belitung Islands Province for the 2004-2019 period (Table 3).

Table 3. Mapping of economic growth of regencies/cities in bangka belitung islands province in 2004-2019

Regency	Economic development value (%)	Classification
Central Bangka	4.86%	I
Bangka	5.22%	II
South Bangka	5.10%	II
West Bangka	5.10%	II
Belitung	5.31%	II
East Belitung	5.51%	III
Pangkalpinang	5.33%	III

Table 3 also shows that industrial activities in the location of the tin mining industry do not necessarily serve as a driving factor for economic growth. Central Bangka Regency and West Bangka Regency as one of the largest mining processing industry locations, namely PT Tin and PT Kobatin, had lower economic growth compared to the other regencies. In fact, the centers of economic growth were situated in regions with no tin mining industry such as Pangkalpinang City and East Belitung Regency. Pangkalpinang City, which is the capital city of Bangka Belitung Islands Province, relies its economic growth on the trade and service sectors. Meanwhile, East Belitung Regency is an expansion area of Belitung Regency and the agriculture, fishery, livestock, and plantation sectors contribute to its economic growth.

This means that regions whose economy is based on natural tin resources do not make a significant contribution in encouraging regional economic growth. On the other hand, regions whose economy is based on agriculture and services play an important role in boosting regional economic growth.

In fact, empirical findings show that coal mining can significantly assist the development of countries such as China, India, and South Africa in accessing their natural resources. This can further promote economic growth and create further opportunities for those who are not involved in the mining sector [11]. Mining potential cannot play a role in increasing economic growth especially if the government is poor and lacks accountability or in the case of state ownership which is less able to control mining activities [12].

Corruption and macroeconomic mismanagement can severely limit the positive impact of mining's ability to create economic opportunities at both regional and national levels. Countries such as the Democratic Republic of the Congo and Zambia that mismanaged mining sector policies have caused state losses for development due to reduced copper production. Large state-owned mining industries tend to result in operational inefficiencies, leading to loss of revenue for the state. In truth, the revenue of state mining companies was diverted for personal gain by political leaders or to provide "off balance sheet" financing for political campaigns or military expenditures [13].

The relationship between regencies in Bangka Belitung Islands Province in mapping economic growth can be seen from the value of the Moran Index for the 2004-2019 period. The Moran Index value of -0.41071 is in the range of (-1.1) and is not significant at the level of = 5%. This is indicated by the Z value of

1.2245, which is smaller than the Z table value of 1.645. The insignificant Moran Index value indicates that no group of regencies has the same characteristics.

The grouping of regencies/cities is visualized using a Moran scatter plot. The following figure shows a scatter plot for the analysis of economic growth center locations in Bangka Belitung Islands Province for the 2004-2019 period.

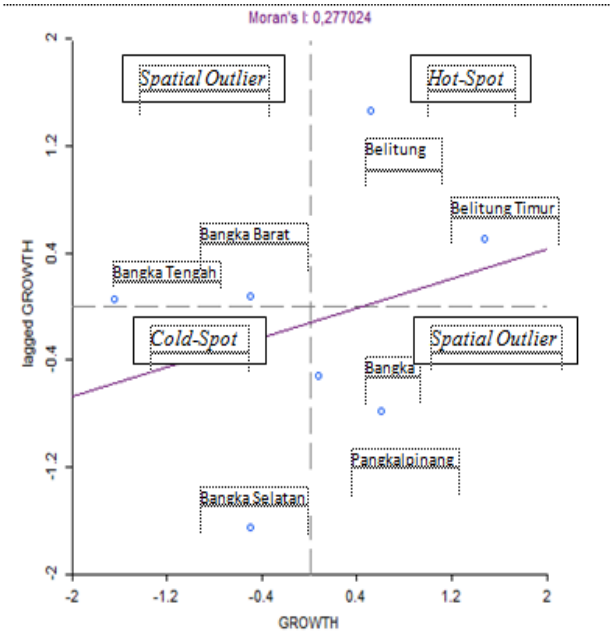

Figure 3 Moran scatter plot analysis of economic growth locations in bangka belitung islands province for the 2004-2019 period.

Based on the figure, it can be seen that regencies/cities tend to spread randomly in Quadrant I (the hot-spot area), and Quadrants II & IV (the spatial-outlier areas). Regencies/cities with a low economic growth rate are not surrounded by regencies/cities with a high economic growth rate. This can be seen in the mapping where regencies/cities in Bangka Belitung are dominated by those with economic growth. Regencies/cities tend to spread randomly in the hot-spot area and the spatial outlier areas, suggesting that the spatial relationship is negative.

Economic linkages basically describe the economic relationship between a region and the surrounding environment [14]. This linkage occurs as a result of influence from several aspects, including:

1. The limitations of a region make it a barrier to meeting the needs of the region itself. These limitations can be in the form of limitations in nature, human resources, technology, and finance.
2. The similarity of economic interests in several regions will allow the establishment of economic cooperation. This cooperation is expected to have a positive impact on the output of economic development in these regions.
3. Growing awareness to form synergies between regions in order to build regional economic strength. This will increase regional economic activity and is expected to be a driver of economic development in the regions and their surroundings.

This study shows that there were no economic linkages between regencies/cities in Bangka Belitung Islands Province in the 2004-2019 period. Such a condition resulted from geographical differences, geographical interests, and limitations of nature, human resources, technology, and finance.

3.2 Analysis of Regions with Poverty Levels in Bangka Belitung Islands Province

Fiscal income generated through taxes collected from the large and small-scale mining sectors and smallholder mining plays an important role for the state/region to intervene in poverty reduction policies. Several countries have succeeded in using the mining sector to reduce poverty, such as countries in Latin America and the Caribbean, Sub-Saharan and North Africa as well as Europe and Asia [15].

The important role of community mining in overcoming poverty has prompted the UK government and the Department of Development of International institutions to implement the Millennium Development Goals (MDGs) in efforts to eradicate poverty, reduce child labor, and combat HIV/AIDS related to community mining.

Regions with poverty levels in regencies/cities in Bangka Belitung Islands Province show differences. Some regions with potential tin wealth had a low poverty rate. However, there were also regions with a low poverty rate despite lacking tin potential. This shows that there were differences in poverty performance at the regency/city level.

The results of the geographic information system analysis show that the regencies/cities in Bangka Belitung Islands Province for the 2004-2019 period had the following poverty levels.

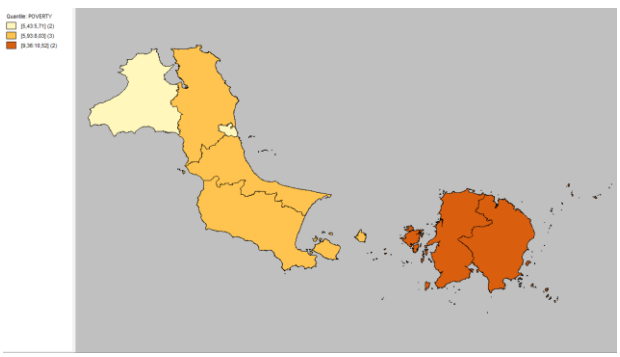

Figure 4 Mapping of the regencies/cities in bangka belitung islands province by poverty level in the 2004-2019 period.

Figure 4 explains that there are three groups of regions according to the location of the area of poverty, namely:

- Classification I (the light yellow area) with a value range of 5.43%-5.71%
- Classification II (the dark yellow area) with a value range of 5.93%-8.03%
- Classification III (the brown area) with a value range of 9.36%-10.52%

Based on the figure, in 2004-2019, there were two regencies that belonged to the category of underdeveloped regions because their poverty rates were above the average for the other regencies/cities. Belitung Regency and East Belitung Regency are regions with agriculture, fisheries, livestock, and plantation sectors as economic contributors. Currently, these two regencies have developed their tourism sector as a mainstay sector in the future. The two regencies are also trying to reject tin mining activities that interfere with the tourism sector. In fact, people's tin mining can be an alternative to overcome the problem of poverty in the short term.

Regencies that fell into Classification I with a value range of 5.43%-5.71% were West Bangka Regency and Pangkalpinang City. West Bangka Regency is a region popular for its tin mining industry known as the tin smelting industry. It played a role in efforts to reduce poverty, as indicated by a decrease in the percentage of poverty above the average of the other regencies/cities.

The achievement of West Bangka Regency in reducing poverty was inseparable from its geographical influence as an region with tin mining potential in Bangka Belitung Islands Province. This is in line with the local government's policy of loosening tin mining carried out by the community. Community access to tin mining exploitation had a significant impact on a reduction in the number of poor people.

As many as 60 countries with a mining sector, both small-scale and small-scale mining, in Asia, Africa, and Europe had contributed to reducing the number of poor people [16]. This is because people can access natural resources in the region amidst the absence of employment opportunities in rural areas and the limited access of the community to get jobs from mining companies due to education.

Pangkalpinang, the provincial capital that relies on the service and trade sectors, had also succeeded in reducing poverty. This may be due to the head office of PT Timah located in Pangkalpinang City that managed to attract formal workers from the tin mining sector.

The group of regions in Classification II is comprised of regions with a poverty rate ranging from 5.93% to 8.03%. The regencies/cities falling into this classification were Bangka Regency, Central Bangka Regency, and South Bangka Regency. Meanwhile, the regencies falling into Classification III with a value range of 9.36%-10.52% were Belitung Regency and East Belitung Regency. These two regencies rely on the agricultural sector as a source of their economic growth, similar to Bangka Regency and South Bangka Regency. However, in recent years, East Belitung Regency has started to leave the tin mining sector and switched to the tourism sector.

The analysis to determine regions with poverty of various levels was done using a Geographic Information System (GIS) with the software GeoDa. The results of the GIS analysis revealed regions with poverty of various levels in Bangka Belitung Islands Province for the 2004-2019 period (see Table 4).

Table 4. Mapping of regency/city poverty levels in bangka belitung islands province 2004-2019

Regency/City	Poverty level (%)	Classification
West Bangka	5.71%	I
Pangkalpinang	5.43%	I
Bangka	8.03%	II
Central Bangka	7.88%	II
South Bangka	5.93%	II
Belitung	9.36%	III
East Belitung	10.52%	III

The visualization results also show that between 2004-2019, regions with the lowest poverty rate were West Bangka Regency, which has a tin mining industry, and Pangkalpinang City. Meanwhile, Central Bangka Regency is one of the locations for the tin mining industry, Bangka Regency is the largest tin mining concession area, and South Bangka Regency fell into Category II. East Belitung Regency and Belitung Regency, which are not locations for the tin mining industry, had the highest poverty rate.

In connection with the inter-regency/city linkages in the mapping of poverty levels in Bangka Belitung Islands Province, it can be seen based on the Moran index value for the 2004-2019 period. The Moran index value for the 2004-2019 period is 0.328252 The Moran index value is in the range (-1-1) and is significant. The Z value of 1.1277 is greater than the Z table value of 1.2. A positive and significant Moran

index value indicates the grouping of regencies/cities with the same characteristics.

The grouping of regencies/cities is visualized using a Moran scatter plot. The following figure shows a scatter plot for the analysis of regions by poverty levels in Bangka Belitung Islands Province for the 2004-2019 period.

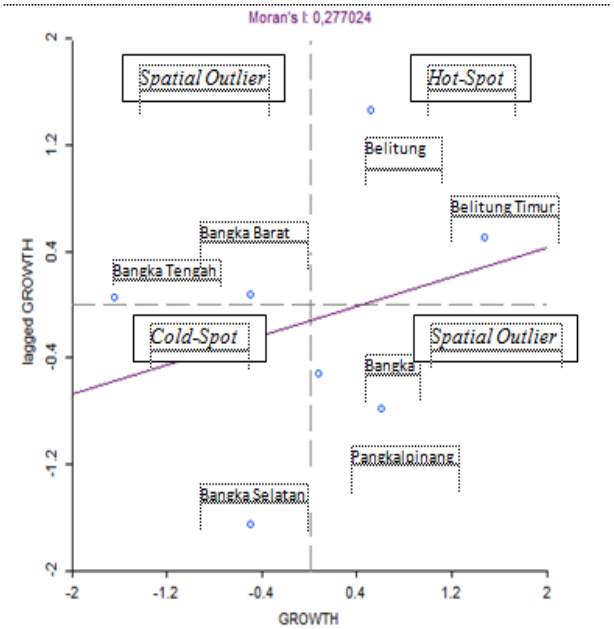

Figure 5 Moran scatter plot analysis of regions by poverty level in bangka belitung islands province for the 2004-2019 period.

Based on the figure, it can be seen that regencies/cities tend to cluster in Quadrant IV (the spatial outlier area). Regencies/cities with a low poverty rate are surrounded by regencies/cities with a high poverty rate. This can be seen in the mapping where regencies/cities in Bangka Belitung are dominated by regencies/cities with poverty of various levels. Regencies/cities tend to cluster in the spatial outlier area, meaning that the spatial relationship is positive.

3.3 Analysis of Regions with an Unemployment Rate in Bangka Belitung Islands Province

Large-scale mining activities at the regional level have the potential to significantly and positively affect economic opportunities for the poor. Regions where such companies are located can provide employment opportunities. Moreover, they can stimulate investment in basic public infrastructure, goods, and services such as transportation, water, and electricity. In addition to the direct employment effect, mining activities can develop other economic activities by fostering small and medium-sized enterprises that in turn generate employment opportunities.

Small-scale mining and community mining can also be important sources of promoting employment and income opportunities for workers, families, and communities. The income they generate is huge and important for economic development. Recent ILO research estimates that 13 million people are directly involved in small-scale mining activities worldwide, especially in developing countries [17].

The results of the geographic information system analysis show that the regencies/cities in Bangka Belitung Islands Province for the 2004-2019 period had the following unemployment levels.

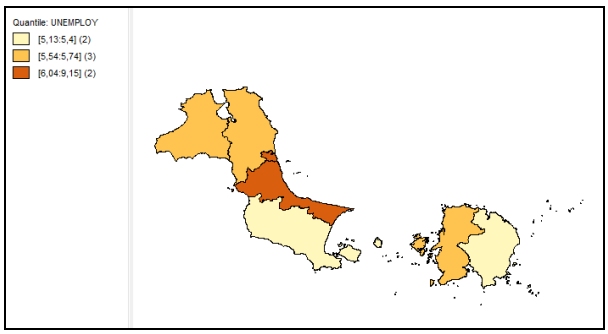

Figure 6 Mapping of Regencies/Cities in Bangka Belitung Islands Province by Unemployment Level in the 2004-2019 period.

The figure explains that there are three groups of regions with unemployment, namely:

- Classification I (the light yellow area) with a value range of 5.13%-5.40%
- Classification II (the dark yellow area) with a value range of 5.54%-5.74%
- Classification III (the brown area) with a value range of 6.04%-9.15%

Based on the figure, in 2004-2019, there were two regencies classified as underdeveloped regions, namely Central Bangka Regency and Pangkalpinang City. These two regions had an average unemployment rate above the average for the other regencies/cities. The regions falling into Classification I were South Bangka Regency and East Belitung Regency. The group of regions falling into Classification II consisted of regions with an unemployment rate value range of 5.54%-5.74%. The regencies/cities included in this classification were Bangka Regency, West Bangka Regency, and Belitung Regency. Meanwhile, regencies/cities in Classification III had a value range of 6.04%-9.15%, they were Pangkalpinang City and Central Bangka Regency.

The analysis to determine regions with unemployment of various levels was done using a Geographic Information System (GIS) with the software GeoDa. The results of the GIS analysis revealed regions with unemployment of various levels

in Bangka Belitung Islands Province for the 2004-2019 period (see Table 5).

Table 5. Mapping of Regencies/Cities in Bangka Belitung Islands Province by Unemployment Level in the 2004-2019 Period

Regency/City	Unemployment level (%)	Classification
South Bangka	5.13%	I
East Belitung	5.40%	I
Bangka	5.54%	II
Belitung	5.56%	II
West Bangka	5.74%	II
Central Bangka	6.04%	III
Pangkalpinang	9.15%	III

The visualization results also show that in 2004-2019, regions with the lowest unemployment rate were South Bangka Regency and East Belitung Regency. Meanwhile, West Bangka Regency, which has a tin processing industry, fell into Classification II. Pangkalpinang City, which also does not have natural tin resources, recorded the highest unemployment rate.

In general, regencies/cities had a high percentage of unemployment compared to the percentage of Pangkalpinang City and the average percentage of regencies/cities. This was inseparable from the policy of the local government that issued the people's tin mining policy. The policy of loosening smallholder mining had an impact on the absorption of non-formal workers in the mining sector. The workers absorbed by the tin mining sector consisted of women, children, and migrants from outside the region (Erman, 2013) [18].

It must be acknowledged that the small-scale tin mining sector and small-scale mining have played an important role in providing community workforce. MMSD conducted studies in several countries such as China, Ghana, Malawi, Mali, Mozambique, North Africa, Tanzania, Zambia, Zimbabwe, India, Indonesia, Papua New Guinea, the Philippines, Bolivia, Brazil, Ecuador, and Peru. In China, it is estimated that between 3 and 15 million people engaging in artisanal and small-scale mining activities had succeeded in reducing unemployment [19].

The research conducted by the World Bank (2008) yielded important findings about the important role of community mining in providing employment opportunities for the community with the following findings:

1. Community mining and small-scale mining have been practiced in about 50 countries. The mining sector has become an alternative job for people living in poor and remote rural areas.
2. At least 20 million people are involved in small-scale mining and mining, and more than 100 million people depend on the mining sector for their livelihoods.
3. As many as 650,000 women in the 12 poorest countries in the world are engaged in community mining [20].

According to the ILO, between 1 and 1.5 million boys and girls under the age of 18 are also involved in small-scale mining.

The relationship between regencies in Bangka Belitung Islands Province in the mapping of the unemployment rate can be seen from the value of the Moran Index for the 2004-2019 period. The Moran Index value of -0.041 is in the range (-1.1), but not significant at the level of = 5%. This is indicated by the Z value of 0.771, which is smaller than the Z table value of 1.645. The insignificant value of the Moran Index indicates that there is no correlation between unemployment rates between regencies/cities in Bangka Belitung Islands Province.

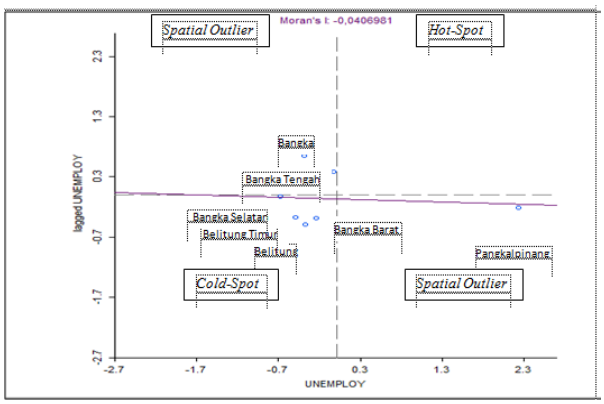

Figure 7 Moran scatter plot analysis of regions in bangka belitung islands province by unemployment rate for the 2004-2019 period.

The grouping of regencies/cities was visualized using a Moran scatter plot. The following figure shows a scatter plot for the analysis of regions in Bangka Belitung Islands Province by unemployment rate for the 2004-2019 period.

Based on the figure, it can be seen that regencies/cities tended to cluster in Quadrant III (the cold spot area). Regencies/cities with a low unemployment rate are surrounded by regencies/cities with a high unemployment rate. This can be seen in the mapping where regencies/cities in Bangka Belitung are dominated by those with a low unemployment rate. Regencies/cities tended to cluster in the spatial outlier area, meaning that the spatial relationship is positive.

3.4 Regional Analysis of the Human Development Index Level in Bangka Belitung Islands Province

The United Nations Human Development Index provides an overview of the wide variation in welfare across all rich countries (Human Development Report 2005). This report compiles information on income, health, and education around the world. In this report, Norway, a major oil producing country in the world, is at the top of the index. Other oil-producing countries that rank relatively high include Brunei, Argentina, Qatar, United Arab Emirates, Kuwait, and Mexico. Meanwhile, the countries that rank the lowest in the world are Equatorial Guinea, Gabon, Republic of the Congo, Yemen, Nigeria, and Angola. Chad is near the bottom of the ranking at 173 out of 177 countries.

Variations in the effects of wealth on well-being are found not only among all countries, but also within each country's territory. Although the rankings of rich countries are quite good, at home they are also often plagued by increasing inequality, meaning that these countries are rich, but the people are poor. Venezuela is the Latin American country that has the most people live in poverty, which is almost half of its population. Historically, Venezuela is the fruit of the control of wealth resources by the country's elite minority.

This reality also raises another paradox. At least in theory, it can be taxed without creating disincentives for investment. Unlike the case of movable assets such as capital, where high taxes can encourage capital outflows. Oil mining and others are immovable commodities. Since taxes generated from the sale of oil can be used to create a more egalitarian society, it should at least be expected to reduce inequality in rich countries, not widen it. However, the reality is that it rarely happens.

Regions with the level of human development index in regencies/cities in Bangka Belitung Islands Province showed the otherwise. Some regions with potential tin wealth had a low level of human development index. However, there were also regions that did not have tin potential and had a low level of human development index. This shows that poverty performance varied the regency/city level.

The results of the geographic information system analysis show that the regencies/cities in Bangka Belitung Islands Province for the 2004-2019 period had the following human development index level.

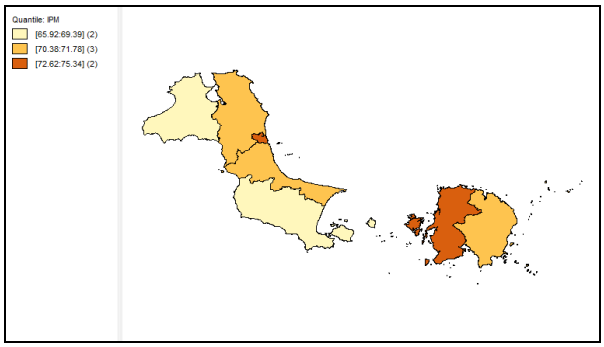

Figure 8 Regional mapping of regencies/cities in bangka belitung islands province by human development index Level for the 2004-2019 period

Figure 8 explains that there are three groups of regions with poverty, namely:

- Classification I (the light yellow area) with a value range of 65.92-69.39
- Classification II (the dark yellow area) with a value range of 70.3-71.78
- Classification III (the brown area) with a value range of 72.62-75.34.

Based on the figure, in 2004-2019 there were two regencies in Classification I with a value range of 65.92-69.39, namely West Bangka Regency and South Bangka Regency. This means that West Bangka Regency, which is popular for its tin mining industry known as the tin smelting industry, did not play a role in increasing the human development index as indicated by a decrease in the percentage of poverty below the regency/city average.

The low achievement of West Bangka Regency in increasing the human development index level could not be separated from its geographical influence as an area with the potential for tin mining in Bangka Belitung Islands Province. This is in line with the local government's policy of loosening tin mining carried out by the community. Community access to tin mining exploitation has no significant impact on improving human development.

This finding is in line with the Human Development Index report issued by the United Nations that describes the magnitude of the variation in welfare across all natural resource-rich countries. This report compiles information on income, health, and education around the world for countries that are rich in natural resources. This report explains that Norway, as a major oil producing country in the world, is in the top position.

Other oil-producing countries are, for example, Brunei, Argentina, Qatar, United Arab Emirates, Kuwait, and Mexico. Meanwhile, the countries that rank the lowest in the world are Equatorial Guinea, Gabon, Republic of the Congo, Yemen, Nigeria, and

Angola. Chad is near the bottom of the ranking at 173 out of 177 countries [22].

Several empirical findings conducted by Erman (2012) stated that mining areas have had a negative impact on education and health. This finding is similar to empirical findings conducted by World Bank (2010, 2012, 2013) that almost all mining-rich countries face problems with education and health. In some of these countries, there are many children who have dropped out of school work in the community mining sector. This is because people can access natural resources in the midst of high prices in rural areas and the limited access of people to get jobs from mining companies due to education [23].

Likewise, South Bangka Regency, which relies on the agricultural sector and since 2004 has started providing access to smallholder mining, has also not succeeded in increasing the level of the human development index. This may be due to the fact that it is one of the regencies that provides policies for the community towards people's mining access.

The group of regions in Classification II was comprised of regions with a human development index level value range of 70.3-71.78. The regencies/cities included in this classification were Bangka Regency, Central Bangka Regency, and East Belitung Regency. Meanwhile, the regencies/cities included in Classification III with a value range of 72.62-75.34 were Belitung Regency and Pangkalpinang City. They rely its economic growth on the agricultural sector, similar to Bangka Regency and South Bangka Regency. However, in recent years, East Belitung Regency has started to leave the tin mining sector and switched to the tourism sector. Meanwhile, Pangkalpinang City is the provincial capital that relies on the service and trade sectors.

The analysis to determine regions with human development index of various levels was done using a Geographic Information System (GIS) with the software GeoDa. The results of the GIS analysis revealed regions with human development index of various levels in Bangka Belitung Islands Province for the 2004-2019 period (Table 6).

Table 6. Mapping of regencies/cities in bangka belitung islands province by human development index level for the 2004-2019 period

Regency/City	HDI level (%)	Classification
South Bangka	65.92	I
West Bangka	69.39	I
Central Bangka	70.38	II
Belitung	71.08	II
East Belitung	71.08	II
Bangka	71.78	II
Pangkalpinang	75.34	III

The visualization results also show that in 2004-2019, the regions with the lowest human development index level were West Bangka Regency, which has a tin processing industry, and South Bangka Regency. Meanwhile, Central Bangka Regency, which is one of the locations for the tin mining industry, Bangka Regency, which is the largest tin mining concession area, and South Bangka Regency fell into Categorization II. East Belitung Regency and Belitung Regency, which are not locations for the tin mining industry, had the highest human development index level.

In connection with the inter-regency/city linkages in the mapping of the human development index levels in Bangka Belitung Islands Province, it can be seen by the value of the Moran index for the 2004-2019 period. The Moran index value for the 2004-2019 period is 0.328252 The Moran index value is in the range (-1-1) and is significant. The Z value of 1.1277 is greater than the Z table value of 1.2. A positive and significant Moran index value indicates a grouping of regencies/cities that have the same characteristics.

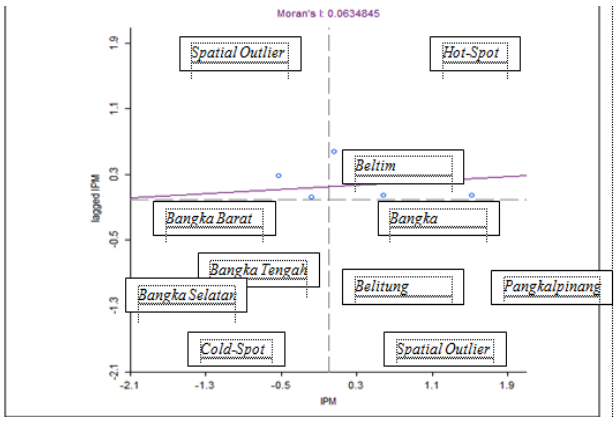

Figure 9 Moran scatter plot analysis of the human development index in bangka belitung islands province for the 2004-2019 period.

The grouping of regencies/cities was visualized using a Moran scatter plot. The following figure shows a scatter plot for the analysis of regions in Bangka Belitung Islands Province by the human development index level for the 2004-2019 period.

Based on the figure, it can be seen that regencies/cities tended to cluster in Quadrant IV (the spatial outlier area). Regencies/cities with a low human development index level are surrounded by regencies/cities with a high human development index

level. This can be seen in the mapping where regencies/cities in Bangka Belitung are dominated by those with a human development index level. Regencies/cities tended to cluster in the spatial outlier area, meaning that the spatial relationship is positive.

4. CONCLUSION

Based on the analysis using Geographic Information System (GIS) and the software GeoDa, this study found out that:

First, East Belitung Regency and Pangkalpinang City became the poles of economic growth in Bangka Belitung Islands Province for the 2004-2019 period. This is evident from their economic growth that was above the average economic growth in Bangka Belitung Islands Province. In East Belitung Regency, the main sectors contributing to its economic growth were agriculture, fisheries, animal husbandry, and forestry. While in Pangkalpinang City, which is the capital city of Bangka Belitung Islands Province, the biggest supporter of its economic growth came from trade, service, hotel and restaurant sectors.

Second, the regions that belonged to the category of an underdeveloped region based on the indicators of economic growth, poverty, unemployment, the human development index, and the economic exploitation index in the 2004-2019 period were Central Bangka Regency, East Belitung Regency, Belitung Regency, and West Bangka Regency. This is evident from the low economic growth, as well as the high poverty rate, unemployment rate, economic exploitation index, and human development index, which were above the average of the other regencies/cities in Bangka Belitung Islands Province.

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