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Analysis of Leading Sectors and Characteristics of Provincial Economic Growth in Indonesia

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ABSTRACT

Gross Domestic Product or GDP is one indicator of a country's economy moving the economic sector. The Covid-19 pandemic caused the economy of Indonesia in the second quarter of 2020 compared to the second quarter of 2019 (YoY) to experience a 5.32 percent contraction. In increasing the economic growth rate, adjusting it to each region's potential is necessary, which is the leading sector. This study aims to analyze the basic or leading sectors and the economic growth conditions of the provinces in Indonesia and group the provinces based on their proximity characteristics. The method used is the Ward and Location Quotient using secondary data from Statistics Indonesia. The results show that 25 provinces in Indonesia have an agricultural base sector. The mining sector is primarily concentrated in eastern Indonesia and tends not to affect the Covid-19 because it can grow fast. Provinces with a manufacturing industrial base sector are focused on Java. The clustering results formed 5 clusters, each province having similar characteristics. The growing cluster is a province with a mining base sector. The sector with intense contraction is a province that provides accommodation, food, and drink. Local governments can restore the economy starting from the base sector.

Keywords: base sector, location quotient, ward method

INTRODUCTION

Development is closely related to the overall change process in the system in a region, such as politics, economy, infrastructure, education, and others. Development can be evaluated by economic growth, which shows the growth in the production of goods and services in an economic area within a specific time interval. This product is measured in the concept of added value (value-added) created by the economic sectors in the region concerned, known in total as Gross Domestic Product (GDP). Thus, GDP can be used as an indicator to measure economic performance or reflect the success of a government in moving economic sectors.

Indonesia is the largest country in Southeast Asia, with economic growth reaching 5.02 percent in 2019. However, the Covid-19 pandemic resulted in the Indonesian economy in the second quarter of 2020 compared to the second quarter of 2019 (y-on-y) to experience a growth contraction of 5.32 percent (Badan Pusat Statistik, 2021c). Growth contraction occurs in almost all business fields. Each Indonesian island has seen a different degree of growth constriction as a result of the COVID-19 epidemic.

Bali and Nusa Tenggara are two island groupings that are experiencing growth contraction (c-to-c); Java Island is experiencing growth contraction (2.51%); Kalimantan Island is experiencing growth 2.27%); and Sumatra Island is experiencing growth 1.19%). On the other hand, island groups that had

a noticeable rise in growth, such Sulawesi Island, which increased by 0.23 percent, and Maluku and Papua Island, which grew by 1.44 percent, were considerably less affected by COVID-19.

Every element of the government, both national and regional, need to pay attention to the development of the growth rate because it directly impacts the community's condition in handling the Covid-19 pandemic. The achievement of national and regional development through economic development needs to be adapted to the conditions and potentials of each region, and a coordinated development plan between categories is required. The policies determined do not need to be the same as national policies or other regional policies because the economic conditions are not necessarily the same as the economic conditions of other national or regional areas. In other words, the policies taken must be based on the conditions and situations of the area itself.

As one of Indonesia's economic improvements by identifying and optimizing regional potential during the Covid-19 pandemic, this research was conducted with the title " Analysis of Leading Sectors and Characteristics of Provincial Economic Growth in Indonesia". This study aims to analyze the characteristics of the basic or leading sector and the economic growth conditions of the Indonesian province, especially during the Covid-19 pandemic using the Location Quotient method. Then Cluster analysis is used to determine characteristics of economic growth and basic sectors in each province. By identifying leading sectors, the central and regional governments can formulate policies according to the base sector in the area so that it can improve the Indonesian economy in the macroscope. Furthermore, Ward's method is used to group provinces based on the proximity of average economic growth, economic contribution, and shock index variables.

METHODOLOGY

The variables used in determining the base sector using Location Quetion Analysis include the distribution of GDP and the distribution of provincial GRDP by field of business ADHK Quarter III-2021. The variables used as the basis for grouping the provinces in Indonesia using Ward's analysis include Economic Growth and Economic Contribution in 2020 sourced from Statistics Indonesia and the Economic Shock Index sourced from research (Wiratama & Nasida, 2021).

One of the theories in developing regional economic improvement is the export base theory (or economic basis theory). According to Glasson (1990), basic activities are activities to export goods and services outside the economic boundaries of the community or market goods and services to immigrants from outside the economic boundaries of the community concerned. Meanwhile, non-basic activities provide the resources needed by people living within the economic limits of the community concerned.

Referring to the basic economic theory, the Location Quotient Technique can divide the economic activities of an area into 2 groups, including:

a. Economic potential (base), namely economic activities that serve in the area itself and outside the area concerned.
b. The non-potential (non-basic) economy or local industry is an economic activity that can only serve the market in the area itself.

In the export base theory framework, it is known that an increase in exports occurs when a region has a large competitive advantage in several economic categories. A category in an area with an LQ > 1 means that the category is a top category in the region and can be developed as a driver of the regional economy. Vice versa, if the LQ value < 1, it means that the category is not a top category in the region and has less potential to be developed as a driving force for the regional economy.

Cluster Analysis is a multivariate analysis technique that aims to group observation data or variables in clusters. Each cluster has homogeneous properties according to the factors used in the clustering. To get a homogeneous cluster, it is necessary to have the same scores of values analyzed.

Data regarding these similarities can be analyzed by cluster analysis to determine cluster (Gudono, 2011).

The Variance Method aims to obtain clusters that have the smallest possible internal cluster variance, one of which is the Ward Method. In Ward's Method, the mean for each cluster is calculated, and the Euclidean distance between each object value and the mean value. In each stage, the two clusters with the smallest increase in the sum of squares are combined (Simamora, 1996).

This study uses a quantitative approach to identify the leading sectors in each province. Furthermore, cluster analysis is carried out to group provinces based on economic growth. The variables used in this study are the distribution of GDP by business field in the third quarter of 2021 in the competition dataset sourced from Statistics Indonesia or Central Bureau of Statistics data, the distribution of GRDP by the business sector in the third quarter of 2021, which is sourced from the official statistical news publication of Statistics Indonesia for 34 provinces in Indonesia, the average economic growth of the provinces in Indonesia 2020, the economic contribution of each province in Indonesia 2020 from the publication of the 2021 Indonesian Economic Report by Statistics Indonesia, as well as data on the economic shock index to Covid-19 for each province in Indonesia 2021 taken from research (Wiratama & Nasida, 2021). Economic shock index as an illustration COVID-19 pandemic situation. As an example, consider the COVID-19 pandemic situation and the economic vulnerability index. The index is created not just for the country of Indonesia, but also for the individual provinces. The economic shock index to COVID-19 can be used, particularly in the context of recovery during the Covid-19 pandemic, to map regional economic vulnerabilities and group economic policy priorities.

The stages of analysis in this study are as follows:

a. Calculating the Location Quotient value to find out the base sector in each province in Indonesia using Provincial GRDP data by Field of Business.
b. Conduct cluster analysis using a hierarchical clustering approach with the ward method to determine the characteristics of economic growth and the base sector in each province.
c. Interpretation of results and discussion.

Location Quotient

LQ analysis is used to determine the level of specialization of economic sectors in an area that utilizes the base sector or the leading sector. Location Quotient calculates the share of sector output in the lower regions and the output shares in the upper regions (R. Jumiyanti, 2018). In general, LQ analysis determines the economic base in an area from the contribution criteria (Basuki & Mujiraharjo, 2017). LQ is formulated as follows:

$$LQ = \frac{S_i/S}{N_i/N} \quad (1)$$

Description:

LQ = Location Quotient Value
Si = GRDP ADHK sector i province
S = Total provincial ADHK GRDP
Ni = GRDP ADHK sector i national
N= Total national ADHK GRDP

Ward Method

Cluster analysis using the ward method is a clustering approach that aims to group data to minimize internal variance. The number of clusters is determined based on the ward method's dendrogram. The measure used is the Sum Square Error (SSE) variable. The stages of clustering using the ward method are as follows:

a. The first stage begins by paying attention to N groups of subjects with one subject in each group. Sum Square Error (SSE) will be equal to zero for the initial stage because each observation will form a cluster.
b. The first group is formed by selecting two of the N groups. When combined will result in Sum Square Error in the value of the objective function.
c. Look again at the N –1 group in determining the two groups that can minimize the goal. Therefore, N groups are reduced to N – 1, then to N – 2, and finally, one group is formed.

$$SSE = \sum_{j=1}^{p} \left(\sum_{i=1}^{n} X_{ij}^2 - \frac{1}{n} \left(\sum_{i=1}^{n} X_{ij} \right)^2 \right) \quad (2)$$

Description:

Xij = value of the ij variable
p = number of variables measured
n = number of objects in the formed cluster

before clustering, the data is standardized using the Z-score. With this formula, each feature value is reduced by miu (μ) which is the average value of the feature, then divided by sigma (σ) which is the standard deviation.

$$x_{new} = \frac{x_{old} - \mu}{\sigma} \quad (3)$$

RESULTS AND DISCUSSION

Base sector classification in this method is based on the LQ value of each sector. If the LQ value > 1, the sector is included in the base sector. On the other hand, if the LQ value < 1, the sector is included in the non-base sector. The results of the Location Quotient (LQ) analysis show that almost all provinces in Indonesia, namely 25, have an agricultural base sector, as shown in Figure 1. Several provinces in Indonesia do not have an agricultural base sector, namely DKI Jakarta, West Java, Banten, DIY, East Java, Riau Islands, East Kalimantan, Papua, and West Papua.

Figure 1. Distribution of the agricultural base sector in Indonesia
Source: BPS (2021), data processed.

The mining sector is primarily concentrated in eastern Indonesia. Reporting from Statistics Indonesia data for the third quarter of 2021, the mining sector is a sector with a fast growth rate of 7.78% (YoY), even this growth rate is the highest since 1995 (Badan Pusat Statistik, 2021a). This shows that the mining sector tends not to be affected by the Covid-19 pandemic because it can still grow fast during the pandemic. The following is the distribution of provinces by mining base sector:

Figure 2. Distribution of the mining base sector in Indonesia
Source: BPS (2021), data processed.

Provinces with a manufacturing industrial base sector are concentrated on the island of Java. Provinces with a manufacturing base sector include Riau, Riau Islands, Bangka Belitung, Lampung, Banten, DKI Jakarta, West Java, Central Java, East Java, Central Sulawesi, North Maluku, and West Papua. Based on data published by Statistics Indonesia, the growth rate of the manufacturing industry in quarter III-2021 was 3.51% (YoY) or lower than the achievement in Quarter II-2021, which was 7.07% (YoY). Although it decreased compared to the previous quarter, the manufacturing industry's economy in quarters III-2021 still grew by 1.55% (q-to-q) (Badan Pusat Statistik, 2021b).

Figure 3. Distribution of the manufacturing industry based sector in Indonesia
Source: BPS (2021), data processed.

Providing accommodation and food and drink is the primary sector in the majority of Java-Bali. These provinces include Bangka Belitung, Banten, DKI Jakarta, West Java, Central Java, DIY, East Java, and Gorontalo. Based on the Statistics Indonesia publication report, in Quarter III-2021, the accommodation and food and drink supply sector contracted by -0.13% (YoY). In addition, when compared to Quarter II-2021, the growth rate of the accommodation and food and beverage supply sector decreased by -5.73% (q-to-q) (Badan Pusat Statistik, 2021c). This sector is supported by several provinces that favor the tourism sector, such as Bali. This contraction occurred due to the closure of tourist attractions and restrictions on overseas flights during the Covid-19 pandemic, affecting the accommodation and food and drink sector.

Figure 4. Distribution of basic sectors for providing accommodation and food and drink
Source: BPS (2021), data processed.

Clustering results formed five clusters. Each cluster contains provinces that have similar characteristics. In general, provinces that are members of cluster 1 have economies that grew during the Covid-19 pandemic. Meanwhile, the provinces that are members of cluster 2 are experiencing the deepest contractions in Indonesia.

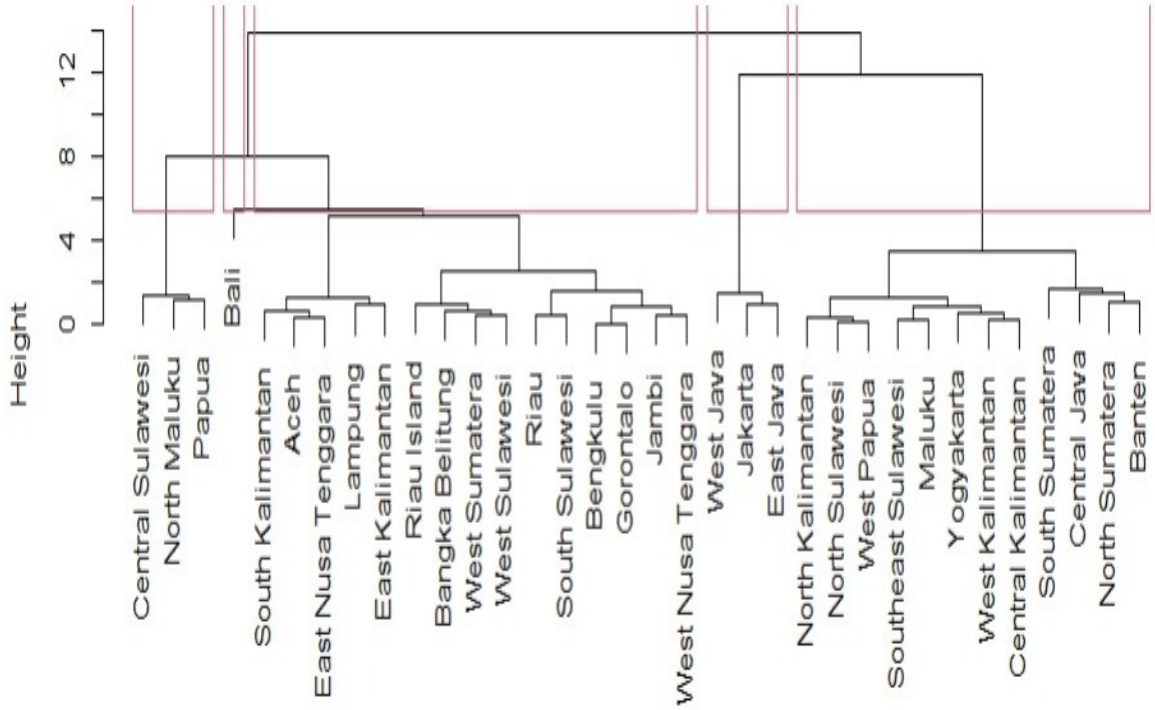

Figure 5. Ward Method Clustering Results
Source: BPS (2021), data processed.

Table 1. Cluster Characteristics

Cluster	Province	Average Economic Growth Quarter III 2021 (%)	Contribution to GDP in 2021	Average Economic Shock Index	Number of Base Sectors			
					A	B	C	I
1	Central Sulawesi, North Maluku, Papua	2.229	-0.473	-0.455	2	3	2	0
2	Bali	-3.398	-0.357	-0.237	1	0	0	1
3	South Kalimantan, Aceh, East Nusa Tenggara, Lampung, East Kalimantan, Riau Island, Bangka Belitung, West Sumatera, West Sulawesi, Riau, South Sulawesi, Bengkulu, Gorontalo, Jambi, West Nusa Tenggara,	-0.052	-0.322	-0.757	13	7	4	2
4	West Java, Jakarta, East Java	-0.483	2.86	0.092	0	0	2	3
5	North Kalimantan, North Sulawesi, West Papua, Southeast Sulawesi, Maluku, Special Region of Yogyakarta, West Kalimantan, Central Kalimantan, South Sumatera, Central Java, North Sumatera, Banten	-0.089	-0.165	-1.057	9	4	3	3

Source: BPS (2021), data processed.
Where A is agriculture, forestry and fisheries, B is mining and excavation, C is manufacturing industry and C is provider of accommodation and provision of food and drink.

Cluster 1 (growing), consisting of several provinces, namely Central Sulawesi, North Maluku, and Papua, experienced positive economic growth. The characteristics of provinces belonging to this cluster are the highest economic growth compared to other clusters, damaging but not too low economic contribution, and adverse economic shocks or relatively not shaken by Covid-19. These provinces are provinces with mining and quarrying base sectors. This is because the mining and quarrying sector grows during the Covid-19 pandemic.

Cluster 2 (intense contraction), consisting of only one province, namely Bali, experienced an intense contraction. The characteristics of this cluster include the lowest (negative) economic growth, negative economic contributions, and adverse shocks due to Covid-19. The province of Bali has a leading sector/base for providing accommodation and food and drink. Providing accommodation and food and drink in Bali contributed the highest to Bali's GRDP at 16.13%. However, the growth rate of the accommodation and food and drink sector in Bali contracted very profoundly at a rate of -8.47% (YoY) (Badan Pusat Statistik Bali, 2021).

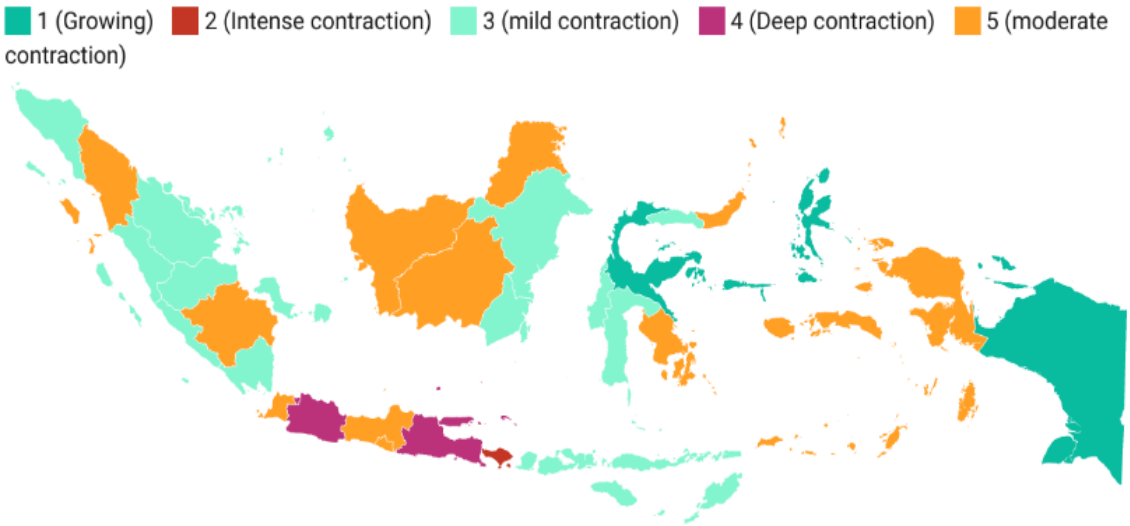

Figure 6. Cluster distribution

Source: BPS (2021), data processed.

Cluster 3 (mild contraction) consists of 15 provinces. This cluster has the characteristics of average economic growth, average economic contribution, and adverse economic shocks. This indicates that the province's cluster members experienced a mild contraction. Most of the provinces in this cluster have a leading sector of agriculture. In addition, economic shocks due to Covid-19 are also low, as can be seen from the lower number of positive confirmed cases compared to other provinces. The agricultural sector is a lifesaver during the pandemic. This is because the agriculture, forestry, and fisheries sectors grew by 1.31% in the third quarter of 2021 (YoY) (Badan Pusat Statistik Maluku, 2021).

Cluster 4 (deep contraction) consists of three provinces on the island of Java, namely West Java, DKI Jakarta, and East Java. These provinces have negative economic growth, positive (highest) economic contributions, and positive economic shocks to Covid-19. Provinces in this cluster contracted intensely because, in general, the base sector of these provinces is the sector of providing accommodation and food and drink but is still supported by the manufacturing sector, which grew in Quarter III-2021.

Cluster 5 (moderate contraction) consists of 12 provinces experiencing moderate contraction. The characteristics of cluster 5 are negative economic growth, negative economic contribution, and a tremendous economic shock due to Covid-19. In general, the basic sector of the provinces that are members of this cluster is the agricultural sector which continues to grow. However, the provinces in cluster 5 have a high number of positive cases of Covid-19, such as Banten, Central Java, and Special region of Yogyakarta.

Provinces with mining and quarrying base sectors have relatively good economic growth compared to other provinces. This is due to the effect of the increase in production and commodity prices since the beginning of the year, starting from metal ore, coal, lignite, and others (Putri, 2021). Meanwhile, provinces contracted the most based on the accommodation and food and drink sector. This is due to the PPKM policy (Enforcement of Restrictions on Community Activities), which harms business. Hotels and restaurants so that the sector's contribution is getting worse in Quarter III-2021 (Purnama, 2021).

CONCLUSION AND RECOMMENDATION

Based on the above review, it can be concluded that the basic sector of the province that experienced economic growth in Quarter III-2021 was the mining and quarrying sector. On the other hand, provinces experiencing deep economic contractions have basic sectors of providing accommodation and food and drink. This is due to the closure of tourism places due to Covid-19, so income from hotels and restaurants has decreased.

Local governments can restore the economy starting from the base sector of each province. Meanwhile, the central government can focus on growing and contracting sectors. The central government can optimize the mining and quarrying sector in provinces with mining resources to further increase economic growth. On the other hand, the government also needs to pay attention to the accommodation and food and drink sector to bounce back. In addition, the contraction in economic growth is also related to the shocks caused by Covid-19. Therefore, the central and regional governments need to consider handling Covid-19 cases to reduce economic shocks due to Covid-19.

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