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Rethinking Strategies To Improve Economic Development In Bandung Regency

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Abstract

The success of regional development is strongly influenced by the ability to develop the regional potential. This research aimed to determine the potential and strategies of regional development, especially in Bandung Regency through an economic sector analysis approach. The method used in this research was descriptive by using an economic sector analysis approach through location quotient, Klassen typology, and shift-share analysis methods. Those were then combined with a document review of the RPJMN year 2020-2024, RPJMD of the Bandung Regency Government year 2016-2021, RTRW of the West Java Provincial Government year 2009-2029, and RTRW of the Bandung Regency Government year 2016-2036 supported by literature from journals, data, and other reports from the central and local governments relevant to the research. The results of this study are useful for the government, especially the Bandung Regency government to further develop its leading sector, namely the processing industry sector by planning the relocation and grouping of mature types and forms of industry per industrial area and developing the geothermal energy sub-sector as a form of creation and utilization of environmentally friendly renewable energy. To improve the economics of both sectors, it is necessary to collaborate them with relatively underdeveloped sectors.

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INTRODUCTION

Regional development is an effort to integrate all resources, including nature, human, and technology into harmony and balance by considering the environment's ability to accommodate (Mahi, 2016). The existence of regional development is inseparable from its relationship with economic development and regional planning (Stimson, Stough and Roberts, 2006). The development itself has the essence of being an organized effort and can be coordinated to manifest many legally valid options to the community so that they can meet their living needs and improve welfare (Mahi, 2016). The existence of regional development will trigger economic development and have an impact on economic growth characterized by an increase in people's per capita income (Zahonogo, 2017; Aditama, 2018).

Meanwhile, planning is defined formally as an effort to achieve goals by determining the most appropriate action. The creation of planning will facilitate the formulation of the most appropriate strategies and policies to achieve goals (Machsun, 2018). In its planning, the government also prepares spatial planning published in the Regional Spatial Plan (RTRW) document. The RTRW document is prepared in stages, starting from the National Spatial Plan (RTRWN), Provincial Spatial Plan (RTRWP), and RTRW regency and city. The three spatial plans collected in a development plan are used to implement sustainable development planning in every region in Indonesia. Given the importance of spatial planning in an area, preparing policy formulation must consider many aspects and involve all stakeholders so that the results are of high quality and can be appropriately implemented (Napitupulu, Hakim and Noor, 2016)

Previous researches on the analysis of the mainstay economic sector gave the result that the development of the mainstay economic sector potential is one of the efforts that can be made to develop an area, which will have a positive impact on increasing the economy in the region and the surrounding regions. In addition, there are several other impacts, such as increasing people's and local incomes, job creation, and reducing poverty (Tri Basuki and Gayatri, 2009; Aditama, 2018; Hutajulu, Nasir and Arwansyah, 2018; Darma Putra and Yuli Pratiwi, 2019; Syapsan, 2019; Rukmana et al., 2020; Kharisma et al., 2021; Mamola, Marsega and Yulianti, 2021).

Data sourced from the Statistics Indonesia (BPS) state that the area of Bandung Regency, when viewed from a geographical aspect, is at the coordinates of 107o 22' - 108o 50' East Longitude and 60 41' – 70 19' South Latitude with an altitude of 500 m to 1,800 m above sea level and a land area of 176,238.67 Ha. Bandung Regency has thirty-one (31) sub-districts, with a population density of 2,056 people per km2. The percentage of land use in Bandung Regency is 40.71% used for agricultural areas; 21.63% is used for protected areas; and the remaining 37.66% is used for cultivation areas (BPS Kabupaten Bandung, 2021).

The contribution of Bandung Regency can be seen through the Gross Regional Domestic Product (GRDP) value. GRDP can be used when measuring the level of prosperity in a region.

Figure 1. The Distribution of GRDP Based on Prevailing Prices in Major Regencies/Cities in West Java Province, 2020 (Percent)
Source: The Central Statistics Agency, 2021

Assumed from the picture of GRDP distribution based on the prevailing price in major regencies/cities in West Java Province in 2020, it is known that Bandung Regency occupied the fifth position with a percentage of

magnitude of 5.80%. Even though it ranked five, there is a reasonably far percentage difference with Karawang Regency which was ranked fourth with a value of 4.81 percent. Even, more significant difference was found when Bandung GRDP is compared to that of Bekasi Regency, which occupied the first position, namely 9.18 percent.

From the GRDP distribution image based on the prevailing price of regencies and cities in West Java province in 2020, there was a significant inequality between regencies and cities, and this occurred because of the inequality of resources distribution that caused an economic disparity, causing the concentration of economic activity to occur only in certain regions (Irawan, 2014)

The economic growth rate between Bandung Regency and the four closest regencies and cities in the 2016-2019 timeframe had almost the same growth pattern, around 5-7%. Then in 2020, the five regencies and cities faced a fairly sharp contraction in economic growth, with details: (1) Bandung City by 2.28 percent, (2) Bandung Regency by -1.87 percent, (3) West Bandung Regency by -2.41%, (4) Cimahi City by -2.26 and (5) Sumedang Regency by -1.14 percent.

To determine the ability of economic resources, shifts, and economic structure of Bandung Regency, GRDP value based on Current Prices per Business Field from year to year can be the reference. In 2016-2020 the economy of Bandung Regency had potential sectors to be developed to improve its economy, namely: (a) the processing industry sector, (b) the large trade and retail sector, car and motorcycle repairs, (c) agriculture, forestry, and fisheries, (d) construction, (e) transportation and warehousing, (f) educational services, (g) provision of accommodation and drinking food, (h) government administration, defense, and compulsory social security, (i) information and communication, (j) mining and quarrying.

To know which of the potential sectors can become the mainstay of the economy, a series of economic sector analysis approaches must be carried out. From this analysis, sectors which have high potential to become mainstay possible export sectors in supporting the economy of Bandung Regency can be revealed. In addition, to support success in the development of the sector, support needs to be given by proper regional spatial planning because mistakes in regional spatial planning will hinder the development of the empowerment of the mainstay sectors.

Regional development can be said to be an effort to harmonize various resources, including natural resources, human resources, and technology. Also, the territory development must still consider the environment ability to containerize all these resources. Regional development is carried out to reduce growth disparities and welfare gaps between regions (Mahi, Regional Development, Theory and Application, 2016).

In the development of the territory, basic principles are useful as a growth center, which is not only internalized to the territory, but also concern to the effect of distribution that can be beneficial to the surrounding region as well as national. In regional development, cooperation efforts are needed for development among regions because it is the key to support the success of regional development, where the pattern of regional development is integral, namely the result of the integration of areas covered by the region through an equality approach so that when planning regional development, market mechanism must be taken into account (Mahi, 2016).

Various studies related to regional planning, regional development, and the determination of leading sectors were found to only have partial investigation. Therefore, by referring to the important and strategic role owned by Bandung Regency as one of the economic buffer areas in West Java Province and the suboptimal contribution to the GRDP of West Java Province and seeing the possibility of combining regional spatial planning policies made by the government with the determination of the potential of leading economic sectors, the authors researched Bandung Regency

development strategies through an economic sector analysis approach".

RESEARCH METHODS

This paper presents the report of descriptive analysis research to determine the potential and strategies of regional development, especially in Bandung Regency based on quantitative approach to economic sectors by taking data from the official public database provided by Statistics Indonesia (BPS) of The West Java Provincial Government and The Bandung Regency Government, The Regional Development Planning Agency of West Java Province, The Bandung Regency Government Legal Documentation and Information Network (JDIH) website, the JDIH website of the Audit Board of the Republic of Indonesia (BPK), and other reliable sources relevant to this study.

The data taken from BPS were GRDP data based on prevailing prices per business field for the 2016-2020 period owned by the Bandung Regency Government and GRDP and data based on prevailing prices for the 2016-2020 period owned by the West Java Provincial Government. The data that have been obtained were then processed using the Location Quotient, Shift Share Analysis, and Klassen Typology methods, with a data processing intermediary in the form of Ms. Excell. The results were juxtaposed with the policies of the regional spatial plan (The RTRW which belongs to the West Java Provincial Government, and The RTRW which belongs to the Bandung Regency Government) and development planning policies (the National Mid-Term Development Plan (RPJMN) and the Regional Medium Term Development Plan (RPJMD) which belong to the Bandung Regency Government) to assess whether the two policies are appropriate and harmonized in supporting the mainstay potential sectors in the regency of Bandung.

The first step was to determine the location quotient of potential economic sectors in Bandung Regency. Location Quotient (LQ) method is a method of comparing the role of a particular sector in an area with the role of the same sector at the broader regional level (it can be provincial or national, depending on the regional level that is the initial reference) (Aditama, 2018). Its function is to determine the amount of specialization level or reliability of each sector (Khusaini, 2015).

$$LQ = (Xi/X)/(Zi/Z) \quad \ldots\ldots(1)$$

In the above equation, LQ is the location quotient value, Xi is the GRDP sector i in related regencies/cities, X is the GRDP in related regencies/cities, Zi is the GRDP sector i in related provinces, and Z is the GRDP total in related provinces.

If the LQ>1 the sector is a mainstay sector, if the LQ<1 the sector is not a mainstay sector, and if LQ=1 the relevant sector in the regency has the same level of privilege as the provincial level (Khusaini, 2015).

The determination of the pattern and structure of growth over each economic sector in each region can be measured using a typology analysis of the class. This analysis is carried out by comparing the growth rate of each sector in a particular region with the wider region and comparing its contribution to the total GRDP of a sector in a particular region with the wider region. The results of this analysis can be used to estimate future economic growth opportunities, and be considered in the formulation of regional development policies (Mukhlis et al., 2018; Hamad, Rashid and Ahmed, 2021).

After that, Klassen typology analysis was carried out. Klassen's Typological Analysis divides sectors into four quadrants. Quadrant I is for the developed and rapidly growing sector. In this quadrant, the growth rate of GRDP in the specific sector (Pi) is greater than that of in the broader regional GRDP or called as reference (P), and the value of the contribution to the GRDP (Xi) owned by the specific sector is greater than the contribution of that specific sector to the broader regional GRDP or called as reference (X). The coat of arms for this classification is Pi > P and Xi > X.

Quadrant II is for the advanced but depressed sector. In this quadrant, the growth rate of the specific sector in the GRDP (Pi) is

lower than the growth rate of specific sector in the broader regional GRDP that is the reference (P), but has a sector contribution value to the GRDP (Xi) greater than the contribution of the sector to the broader regional GRDP that is the reference (X). The coat of arms for this classification is Pi < P and Xi > X.

Quadrant III is for the potential or developing sector. In this case, the specific sector has a greater growth rate of GRDP (Pi) than a specific sector in the broader area which is the reference (P). However, this particular sector has a smaller contribution to the GRDP (Xi) than another sector contribution to the GRDP of the wider region to which it refers (X). The coats of arms for this classification are Pi > P and Xi < X.

Quadrant IV is for the underdeveloped sector. In this quadrant, a specific sector has a smaller growth rate of GRDP (Pi) than the growth rate of a sector in the broader regional GRDP (P) and has a sector contribution value to GRDP (Xi) which is also smaller than the contribution of that specific sector to the broader regional GRDP that is the reference (X). This classification is denoted by Pi < P and Xi < X

Table 1. Classification of GRDP Sector According to Typology Klassen

Quadrant I A sector that is advancing and growing rapidly (developed sector) Pi > P dan Xi > X	Quadrant II Developed but depressed sector (stagnant sector) Pi < P and Xi > X
Quadrant III Potential sectors (developing sector) Pi > P and Xi < X	Quadrant IV Sectors that are relatively lagging behind (underdeveloped sector) Pi < P and Xi < X

Source: Mukhlis et al (2018), Hamad, Rashid and Ahmed (2021)

In the third step, a shift-share analysis was carried out. A shift-share analysis is an analytical method to determine the growth of sectors that have the potential to become mainstay sectors for the economy in an area within a certain period (Mamola, Marsega and Yulianti, 2021). A shift-share analysis is widely used in analyzing regional economy (Knudsen, 2000). It breaks down the level of growth levels into structural components and competitive components (Khusaini, 2015). The mathematical equation for the shift-share is:

$$SS = Nij + Mij + Cij \quad (2)$$

In the above equation (a) Nij has a positive weight or Nij > 0 if sector i experiences faster growth, while Nij has a negative weight or Nij < 0 if sector i experiences slower growth, (b) Mij has a positive weight or Mij > 0 if sector i has a faster-growing mix, while Mij has a negative weight or Mij < 0 if sector i has a slower growing mix, and (c) Cij has a positive weight or Cij > 0 if sector i is competitive while Cij has a negative weight or Cij < 0 if sector i is not competitive.

In addition to analyzing the economic sectors in Bandung Regency, as a final step, the authors reviewed the relationship between the results of the LQ calculation, Klassen typology, and shift-share analysis with the implementation of regional spatial policies and regional development planning policies that have been prepared by the local government, to obtain a more reliable picture so that it can provide further strategies in the development of the mainstay sector.

RESULTS AND DISCUSSION

The calculation of the mainstay economic sector in The Bandung Regency was carried out using Location Quotient (LQ) Analysis, Klassen Typology Analysis, and Shift-Share Analysis. These three analysis tools are quite easy to implement and can provide quite comprehensive results.

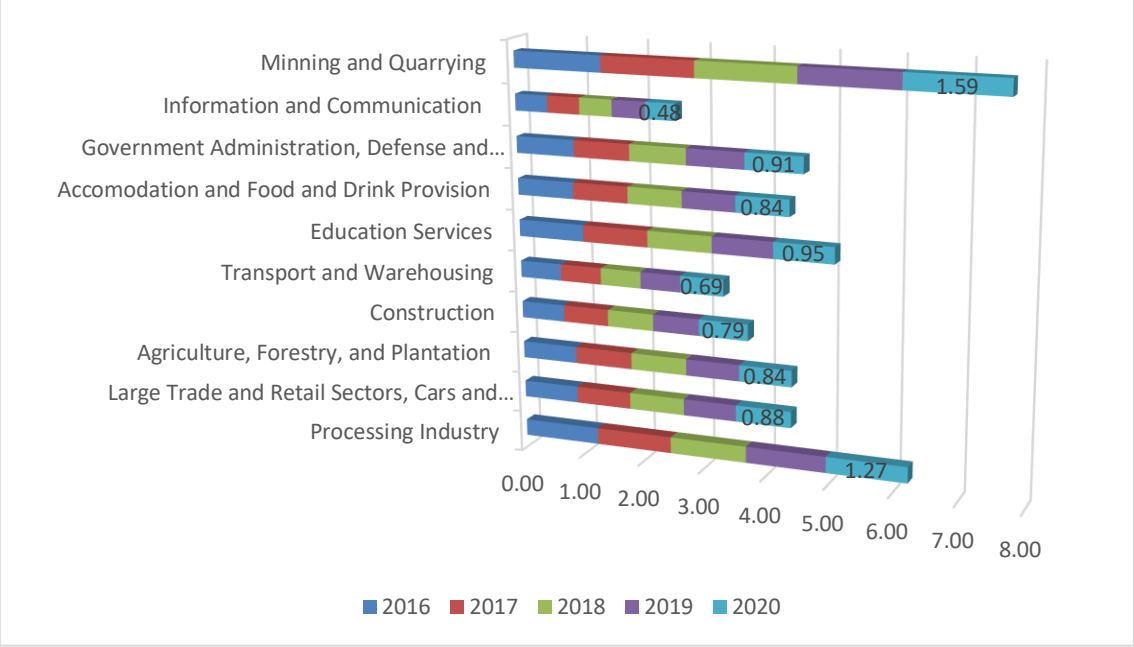

Figure 2. Results of Location Quotient Analysis of Mainstay Sector Bandung Regency in 2016-2020
Source: Data Processed, 2021

The results of the LQ analysis of the ten mainstay sectors of Bandung Regency showed that only the processing industry sector and the mining and quarrying sector consistently obtained LQ>1 in the period 2016 to 2020. For the education services sector, in the 2016-2018 period it got LQ>1, but in the 2019-2020 period it decreased to an LQ value of <1, while other sectors in the 2016-2020 period tended to consistently have LQ values <1. By referring to the consistency of the LQ values, the possible mainstay sectors are the manufacturing sector and the mining and quarrying sector due to their strong influence on economic growth in Bandung Regency.

Manufacturing sector deserved to be the mainstay given its contribution to the GRDP of Bandung Regency that always dominated at around 50 percent of the total GRDP of Bandung Regency. Surprisingly, as a growing sector, the mining and minerals sector kept making progress although the amount of its contribution to GRDP was not very large when compared to other sectors, such as the wholesale and retail trade sector, car and motorcycle repair, or the agriculture, forestry, and fisheries sectors. This indicates that the mining and quarrying sector in Bandung Regency actually held enormous economic potential, but has not been optimally developed by the Bandung Regency Government.

The previous results were reinforced by the results of the Klassen typology analysis on ten sectors: (1) the processing industry sector, (2) the large trade and retail sector, car, and motorcycle repairs sector, (3) agriculture, forestry, and fisheries sector, (4) construction sector, (5) transportation, and warehousing sector, (6) educational services sector, (7) accommodation, and food and drink provision sector, (8) government administration, defense, and compulsory social security sector, (9) information and communication sector, (10) mining and quarrying sector by comparing the rate of GRDP with the sector's contribution to the total GRDP as presented in the following table:

Table 2. Classification of the GRDP Sector of Bandung Regency in 2016-2020 based on Klassen Typology

Quadrant I	Quadrant II
A sector that is advancing and growing with rapid • Processing industry sector • Mining and quarrying sector	Developed but depressed sector • Education services sector
Quadrant III	**Quadrant IV**
Fast growing sector • Large trade and retail sector, car and motorcycle repairs • Construction sector • Transport and warehousing sector	Sectors that are relatively lagging behind • Agriculture, forestry, and fisheries sector • Accommodation and food and drink provision sector • Government administration, defense, and compulsory social security sector • Information and communication sector

Source: Data Processed, 2021

Based on the Klassen Typology classification, the advancing and growing rapidly sectors in quadrant II were the processing industry sector and the mining and quarrying sector. Quadrant II, as a developed but depressed area, was only filled by the education service sector. Quadrant III, as a fast-growing area, was filled by the large trade and retail sector, car and motorcycle repair, construction sector, and transportation and warehousing sector. In addition, a large number of sectors were in quadrant IV, relatively lagging sectors, namely the agriculture, forestry, and fisheries sector, the accommodation, eating and drinking supply sector, the government administration sector, defense and compulsory social security, and the information and communication sector.

After the previous classification, the shift-share analysis was performed to The GRDP of Bandung Regency and The GRDP of West Java Province based on valid prices from 2016 to 2020. It obtained 10 potential sectors with positive economic growth in Bandung Regency. The total value of regional economic growth (Nij) was 1,141.31 (positive) as well as sectoral, so it can be said that because economic growth in West Java Province has been running positively, the value of sectoral economic growth in Bandung Regency also had a positive value. The highest Nij was achieved by the mining and quarrying sector (226,72), while the lowest Nij belonged to the information and communication sector (52,84), while the manufacturing sector was ranked sixth (96,90

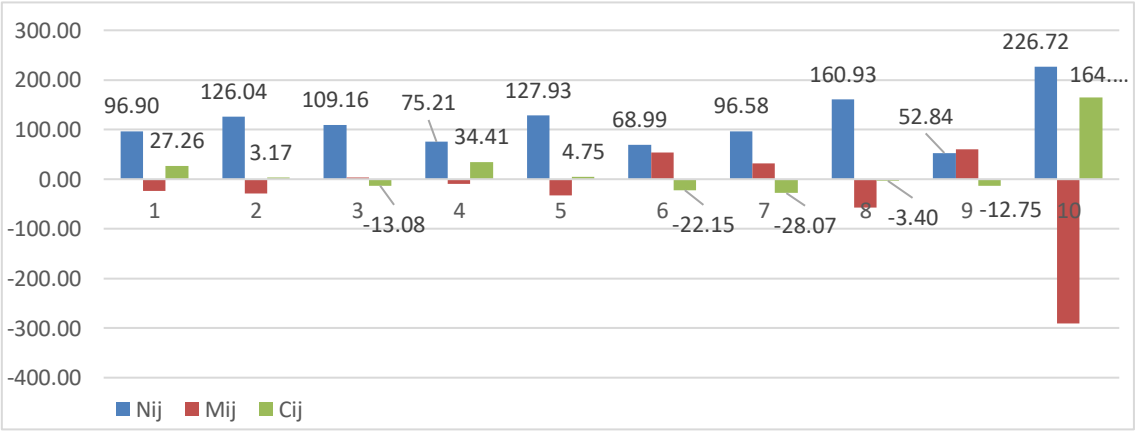

Figure 3. The Results Mainstay Sector Shift Share Analysis of Bandung Regency in 2016-2020
Source: Processed Data, 2021

The the industrial mix (Mij) showed a total negative value of (-296,02), indicating a number of sectors had a negative effect on the industrial mix, namely the manufacturing industry sector (-24,16), the large trade and retail sector (-29,21), the construction sector (-9,63), the transportation and warehousing sector (-32,69), the government administration sector, defense and compulsory social security (-57,53), and the mining and quarrying sector (-291,30),. Here, there found only four sectors remained positive. Meanwhile, the overall influence of competitive advantage (Cij) was positive (154,72). However, when viewed sectorally some sectors had a negative Cij value, namely the agriculture, forestry, and fisheries sector (-13,08), the education service sector (-22,15), the accommodation and drinking provision sector (-28,07), the government administration sector, defense and compulsory social security (-3,40), and the information and communication sector (-12,75). Lastly, the highest value of the influence of competitive advantage was obtained by the mining and quarrying sector.

After looking at the results of the analysis of 10 potential economic sectors in Bandung Regency, it was found that the sectors that obtained the best LQ and Klassen Typology analysis results were the manufacturing sector and the mining and quarrying sector, while the highest Shift Share value was obtained by the mining and quarrying sector. Interestingly, there was a significant difference between the two sectors in terms of contribution to the Gross Regional Domestic Product, namely the manufacturing sector has always dominated, while the mining and quarrying sector has not. This shows that the mining and quarrying sector has not developed its economic potential well enough even though the sector had promising economic potential. Therefore, further discussions will be focused on the processing industry sector and the mining and quarrying sector.

To maximize the development of these two sectors in moving the wheels of the Bandung regency economy, it is necessary to review the alignment between spatial planning policies and development planning policies. In this study, it was limited to the National Medium-Term Development Plan (RPJMN) Policy and the Bandung Regency Government's Regional Medium-Term Development Plan (RPJMD) Policy with the West Java Provincial Spatial Plan Policy and the Bandung Regency Regional Spatial Plan. The alignment will facilitatee the implementation and evaluation of policies for the achievement of economic development goals.

The first sector to discuss is the manufacturing industry sector. The existence of industrial activities carried out in an area cannot be denied that they impact the community members and the surrounding environment. These impacts can be both positive and negative. The positive impact obtained is an increase in welfare and prosperity due to increased income and opening up a fairly high number of job opportunities; exporting products from overseas processing industries can help increase the country's foreign exchange and create comparative reliability both for the region and for the country (Kilavuz and Topcu, 2012; Adeusi and Aluko, 2015; Shikher, 2017; Nwosa, 2018). Meanwhile, the negative impact often afflicts the natural environment sustainability due to industrial waste disposal, the intensive use of raw material resources and energy, a decrease in air quality, and land subsidence (Oláh et al., 2020; Abdurrahman et al., 2022)

BPS states that the processing industry itself is defined as an industry that is active in converting basic goods, either through mechanical, chemical, or manual methods, into finished/semi-finished goods and/or goods that previously had less value into goods with more value and is closer to the end-user. Examples of processing industries are the textile industry, the paper industry, the processed food, and beverage industry, the pharmaceutical industry, and so on.

Industrial potential in Bandung Regency consists of small, medium, and large industries covering formal and non-formal settings. For Bandung Regency, the processing industry is dominated by the textile industry, with the largest and oldest textile industry center (since 1950) located in Majalaya Sub-district.

Table 3. The Non-Agro Industry Sector for Fiscal 2020

Type	Total Units	Total Investment	Total Labor
TPT & Aneka	3.576	5.820.158.282.303	165.317
IKE	1.251	164.518.682.783	7.273
ILMAT	119	1.083.521.303.967	3.149
Amount	4.946	7.068.198.269.053	175.739

Source: Bandung Regency Industry and Trade Office in LHP BPK, 2021

From the table above, we know that the number of businesses in the non-agricultural industry in 2020 were 4,946 business units with a total investment of IDR 7,068,198,269,053 and able to absorb 175,739 workers.

Table 4. Data for the Agro and Packaging Industry for Fiscal 2020

Type	Total Business Unit IKM	Total Investment	Total Labor
Food and Drinks	7.322	65.406.339.500	20.291
Pharmaceutical Chemistry & Traditional Medicine	135	298.400.000.000	264
Garden Forest Products and Building Materials	343	9.504.250.000	992
Amount	7.800	373.310.589.500	21.547

Data Source: Bandung Regency Industry and Trade Office in LHP BPK, 2021

As for the agricultural industry, the number of IKM businesses in the non-agricultural industry in 2020 were 7,322 business units, with a total investment of Rp. 373,310,589,500 and able to absorb 21,547 workers

Even though the manufacturing industry was the mainstay sector in terms of its contribution to the economy of Bandung Regency, the Development Direction of The RPJMN 2020-2024 does not mention the manufacturing industry as the mainstay sector of West Java Province as listed in The RPJMN 2020, even the mainstay sectors are in the agriculture, forestry, and fisheries sector which in fact these sectors are relatively lagging.

While the RPJMD of the Bandung Regency Government for 2016-2021 states that following the objectives of the spatial planning of the Bandung Regency RTRW, the development of a competitive area is based on natural and human resources that have insight into the environment, such as the development of small industries/home industries developed in urban and rural settlement areas by adjusting the potential for regional development in the form of clusters of thematic areas, such as jeans village, strawberry village, shoe village and so on.

In the RTRW of the West Java Provincial Government, the development of the mainstay sectors of the manufacturing industry can be carried out in (1) WP Sukabumi, (2) WP Purwasuka covering the Cikampek-Cikopo PKW area, Purwakarta Regency, Subang Regency, and Karawang Regency, and (3) East Priangan Regency-Pangandaran which include the City of Tasikmalaya, Tasikmalaya Regency, Garut Regency, Ciamis Regency, and Banjar City. Referring to the RTRW of West Java Province for 2009-2029, the direction of development for Bandung Regency is non-polluting industry, agro-industry, nature tourism, agriculture, and plantations.

While optimizing the development of industrial estates, the government placed more emphasis on existing industrial areas and indeed contributes significantly to the GRDP of West Java Province, namely: (1) MM2100 Industrial Estates, EJIP Industrial Estates (NEGAI), Bekasi International Industrial Estates, Industrial Estates Jababeka, Lippo Cikarang Industrial Estate, Patria Manunggal Jaya Industrial Estate,

Marunda International Standard Industrial and Warehousing Area Center in Bekasi Regency, and (2) Sentul Industrial Estate and Cibinong Industrial Estate Center in Bogor Regency.

From the explanation of the RTRW of the Provincial Government for 2009-2029, it appears that Bandung Regency is not a mainstay development area (WP) for the manufacturing industry; according to the author is a separate obstacle to the further development of the processing industry, and the Rancaekek Industrial Estate is also not a priority for the development of optimizing industrial estates. In the Sixth Part concerning the WP KK of the Bandung Basin, paragraph 3 regarding the regional infrastructure development plan in the WP KK of the Bandung Basin, point (f) only states that the development of the Rancaekek Industrial Estate is located in Sumedang Regency and Bandung Regency.

Based on the RTRW of the Bandung Regency Government (Regional Regulation or Perda No. 27 of 2016), industrial areas in Bandung Regency have been divided into three parts, namely: (1) Large Industrial Estates, which are spread over several sub-districts (Katapang, Banjaran, Pamengpeuk, Baleendah, Dayeuhkolot, Majalaya, Ciparay, Rancaekek, Cicalengka, Cikancung, and Solokanjeruk), (2) Medium Industrial Estates located in several sub-districts (Arjasari, Cimaung, Ibun, Pacet, and Margaasih) and (3) Small and Micro Industrial Estates, which spread throughout the regencies. In the development of the small and medium industrial center area, it is equipped with adequate waste management facilities, especially for the washing industry, in the form of Combined Wastewater Disposal Installation (IPAL) located in Kutawaringin and Rancaekek Sub-districts. In addition, for the industry in WP Baleendah and WP Majalaya, restrictions have been placed on the burden of water pollution. The Bandung Regency Government has also built and developed centralized .

Industrial wastewater treatment plants (WWTPs) are for groups of other industrial areas, while for industrial areas that are scattered, the construction of WWTPs is carried out individually.

Reviewing article 13 of Perda No. 27 of 2016 concerning the Bandung Regency RTRW, the system of activity centers (Local Activity Centers/PKL, Local Promotional Activity Centers/PKLP, Regional Service Centers/PPK, Environmental Service Centers/PPL) in each region is still plural, meaning it contains many activities/activity, but has no specificity yet. In a provincial region (article 15), it functions for many areas (for example, WP Cileunyi – Rancaekek is not only a service and trade area, but also functions as an industrial, housing, settlement, and conservation area. Functions as a service and trade area can still be in line with the industrial function, but contradictory to the function as a residential area, settlements, let alone conservation).

Until now, Bandung Regency has no integrated industrial area although the existence of industrial estates offers efficiency in production activities due to the availability of supporting facilities integrated with the area, such as factory equipment, research, and laboratories that serve as development facilities, office buildings, banks, social and public facilities (The Republik of Indonesia, 2015; Budiman, 2021).

The results of the review of project data in Bandung Regency from 2021 to 2022 collected by the One-Stop Integrated Investment and Licensing Office showed that the types of processing industries carried out in one sub-district were varied, such as textile industries, apparel, rubber industry, rubber and plastic goods, processed food and cuisine, chemicals and goods from chemicals, leather, leather goods and footwear, paper, paper goods and the like, and electrical appliances with various types of locations, and even some are close to the same, adjacent to not the same or far apart, indicating that clustering has not fully gone well

These industries need to be united in one or two adjacent areas to form a cluster so that they can support each other's emergence of comparative advantages for the region. Marshall (1920) in Sonobe and Otsuka (2014) states that

the existence of a cluster of industries brings three advantages, namely (1) obtaining much information, (2) giving rise to the classification and specialization of labor according to expertise among companies that produce spare- parts, components, and final products, and (3) creating development in the skilled labor market. Further research by Sonobe and Otsuka in 2006 found that in addition to the three advantages mentioned by Marshall in 1920, industrial clusters could reduce transaction costs because traders and manufacturing companies can meet and conduct market transactions directly. Clusters are also able to stimulate the growth of innovation (Sonobe and Otsuka, 2014).

In Bandung Regency, clustering for the processing industry can be done based on the volume of business and types of industrial products. For example, a textile industry as a sub-sector of the processing industry. It can be started from mapping the area according to the type of industry, whether large, medium, or small industries. Then, the government determines the location for clustering by taking into account the need for the land area to cluster the textile industry, by which if it is not possible to accommodate it in one sub-district, it is necessary to consider the location of the nearest sub-district and the number of old factories that already exist in the previous area. The government also needs to think about the need for the development of an integrated industrial area.

The development of the manufacturing sector can be done by collaborating with other sectors included in the criteria of relatively underdeveloped sectors. Bandung Regency is rich in agricultural products, but has not been well developed, so efforts are needed to improve the economic quality of processed agricultural products originating from agriculture, fisheries, and livestock. Raw materials from the agricultural sector are renewable and reproducible, so if developed, those will greatly support sustainable development.

Previous researches state that an agricultural processing industry is important because it can increase the effectiveness of the use of food technology, increase the nutritional value of food, support efforts to improve food security, increase export opportunities, and expand the creation of employment opportunities in rural areas (Owoo and Lambon-Quayefio, 2018). In terms of exports, through the agricultural processing industry, we can reduce or stop exporting only raw goods into finished goods or finished goods that have a higher selling value. In addition, the development of the agricultural sector will also provide multiplier effects for the food and beverage sector due to the diversification of processed food products that have been packaged with qualified technology.

The next discussion is about the mining and quarrying sector. According to Perda No. 27 of 2016, mining is a part or all of the stages of activities in the context of research, management, and exploitation of minerals, coal, and geothermal which includes general investigation, exploration, feasibility studies, construction, mining, processing and refining, transportation and sales, as well as post-mining activities. Natural resources obtained from the mining and quarrying sector are from the natural wealth of Bandung Regency which surely can be used as capital for economic development in Bandung Regency. The potential of the mining and quarrying sector in Bandung Regency is obtained from geothermal mining, metal minerals, rocks, and oil and gas.

According to the Development Direction of the 2020-2024 RPJMN, the mainstay sectors of West Java Province are pepper, nutmeg, cloves, coffee, coconut, sugar cane, gold, salt, and capture fisheries and aquaculture. Hence, the type of mining listed is gold mining, and if carefully observed at the RTRW of Bandung Regency, it is known that the mining is located in Kutawaringin Sub-district in relatively small quantities. Meanwhile, in the 2016-2021 Bandung Regency Government RPJMD, it is known that the mining potential in Bandung Regency was geothermal and rock, with a focus on developing new, renewable energy that is environmentally friendly. According to Perda No. 22 of 2010, geothermal, water potential, solar, wind, and bioenergy are included in developing renewable energy.

In Article 50 paragraph 3 of the RTRW of Bandung Regency 2016-2036, it is stated that the development of geothermal potential in an area can be developed after a study and study of the feasibility of business activities carried out economically, environmentally, and are based on applicable laws and regulations. Whereas in article 4, it is stated that the exploitation of the potential for metal, rock and oil, and gas minerals can be done as long as it is carried out by good principles and under the provisions of the applicable legislation.

Other mining areas are (1) gold medal mining located in Kutawaringin Sub-district and (2) rock and sand mining (andesite, kaolin, backfill, tras, obsidian, sand, sandstone, and clay) spread in almost all sub-districts in Bandung Regency. For mining areas located in the North Bandung area, those must comply with the licensing regulations for the North Bandung area.

The geothermal resource potential of West Java Province in 2022 was recorded at 4,763 megawatts (MW), spread across 42 points and has an installed capacity of only 1193.8 megawatts (MW), with a development plan of 755 MW. Geothermal energy management areas are located in 11 Geothermal Working Areas (WKP) of West Java Province with 7 Working Areas with total resources of 1,268. MWs are located in Bandung Regency, as shown in table 4. The development of geothermal energy in Bandung Regency is managed by PT Star Energy Geothermal Wayang Windu LTD and PT Geo Dipa Energi, PT Pertamina Geothermal Energy, PT Star Energy Geothermal Darajat II Limited, PT Teknosatria Energi Geotherm, PT Indonesia Power, and PT Chevron Geothermal Indonesia Ltd.

Table 5. Geothermal Potential in Bandung Regency

No.	Area	Regency/ City	Resources (MWe)						Region status
			Spec	Hipo	Reserves			Total	
					Poss	Prob	Prov		
1	Kawah Cibuni	Bandung	-	-	140	-	-	140	WKP Cibuni
2	G. Patuha	Bandung	-	-	-	-	240	464	WKP Pangalengan
3	K. Ciwidey	Bandung	-	84	140	-	-		
4	Kamojang	Garut & Bandung	-	-	-	-	235	667	WKP Kamojang Darajat
5	Darajat	Garut & Bandung	-	-	64	8	291		
6	G. Wayang - Windu	Bandung	-	-	332	-	287	619	WKP Pangalengan
7	Malabar	Bandung	45	-	-	-	-	45	Open Area
T O T A L			**45**	**84**	**676**	**8**	**1935**	**1268**	

Source: The Ministry of Energy and Mineral Resources, 2021

In line with the RTRW of West Java Province, the Bandung Regency Government, through Perda No. 27 of 2016 concerning the RTRW of Bandung Regency Article 28, has planned to build an energy or electricity infrastructure network system which the aim of increasing the power generation capacity through increasing the capacity of substations, security and arrangement of high voltage air lines and extra high voltage air lines in Java – Bali – Nusa Tenggara of 500 kV, developing new power plant infrastructure with alternative energy sources, including utilization of geothermal energy through the Cibuni Geothermal Power Plant, Wayang-Windu Geothermal Power Plant, Kamojang Geothermal Power Plant, Darajat Geothermal Power Plant (cross sub-districts), development of Hydroelectric Power Plants, utilization of waste as an energy source for Waste Power Plants, development of energy independent villages based on local potentials in the form of water, wind, solar, biogas, and others

in 11 sub-districts, namely Pasirjambu, Pangalengan, Cilengkrang, Cangkuang, Paperari, Pacet, Arjasari, Paseh, Cikancung Rajawali, and Ciwidey, and controlling potential geothermal waste with environmentally friendly management so as not to pollute the environment, especially rivers and improvement of electricity distribution network implemented to support industrial activities in the main activity centers in 17 sub-districts, namely Majalaya, Dayeuhkolot, Bojongsoang, Rancaekek, Cileunyi, Baleendah, Cicalengka, Margaasih, Katapang, Arjasari, Pamengpeuk, Paseh, Solokanjeruk, Cikancung, Banjaran, Kutawaringin, Ibun and other electrified areas.

Based on the Strategic Plan of the Ministry of Energy and Mineral Resources for 2020-2024 in Gunawan, Windarta & Harmoko (2021), it is known that the Central Government has a target to increase the energy mix and utilization of new and renewable energy (EBT) to 23 percent, including increasing the mix of Geothermal Power Plants. The government has prepared 20 new Geothermal Working Areas (WKP) with an energy power of 683 MW which have been ascertained through the Geoscience Survey - GGG and government exploration drilling on thin holes in 20 prospects by the Geological Agency. Two of the 20 WKPs are located in the Bandung Regency area, namely (1) the Tampomas WKP with 100 MW resources and a 45 MW development plan, and (2) the Papandayan WKP with 195 MW resources and a 40 MW development plan. According to ESDM data in 2017, there still found geothermal areas in Bandung Regency that have not received a WKP determination, namely (1) Ciarinem Potential with speculative potential of 25 MW with an area around Mount Papandayan and (2) Cilayu Potential with speculative potential of 100 MW covering areas located in the Wayang Windu area (Gunawan, Windarta and Harmoko, 2021)

The above description shows that spatial planning policies, development planning and policies of the Ministry of Energy and Mineral Resources have been aligned and showed support for the development of geothermal resources, but their use of geothermal energy in Indonesia especially in Bandung Regency is still not optimal and only focused on electricity production with an installed capacity much smaller than its potential resources, but the used price tends to be higher when compared to fossil energy. This caused the minimum contribution of the mining and quarrying sector to the GRDP of Bandung Regency.

Based on the results of this research, processing industry became the most dominant sector in Bandung Regency, so if geothermal energy can be included in the processing industry activities, it will be able to improve the economics of geothermal energy itself. Previous researches on the use of geothermal energy conclude that geothermal energy can still be developed directly in the processing industry for activities that require medium to low-temperature fluids (below 150 degrees Celsius), such as textile washing and dyeing, chemical production, heating processing, space heating, industrial space cooling, paper and pulp processing, food processing, food and fish drying, pasteurizing milk and sterilizing produce and others (Jóhannesson and Chatenay, 2014; Lund and Boyd, 2016; Limberger et al., 2018; Think Geoenergy, 2021). The use of geothermal energy in food processing in the manufacturing industry will automatically have a multiplier effect on the food and beverage sector.

Geothermal energy also plays an important role in the sustainability of the agricultural sector. In the open-field and greenhouse agriculture, geothermal fluids in the temperature range of 40 to 75 degrees Celsius can be used to heat crops in winter (Nguyen et al., 2015). The use of geothermal energy in greenhouses can cut 35 percent of production costs (Jóhannesson and Chatenay, 2014). Geothermal energy can also be used in the irrigation process on dry land through underground piping systems (Nguyen et al., 2015).

To develop the utilization of the geothermal energy sub-sector, the government needs to improve the quality of geothermal data and information by obtaining geoscience data

and geothermal exploration drilling, optimizing data sources in WKP, improving the economy of heat projects to be more competitive, providing incentives such as tax incentive, price certainty, ease of licensing, and funding support to increase investor interest in investing their capital in the EBT sector, increasing collaboration efforts between development companies and surrounding communities facilitated by local governments, preparation of academic studies related to the prospects for the utilization and development of geothermal energy both in terms of electrical energy use in the processing industry and agriculture, and disseminating policies and programs to the public to create a climate that can support national development.

CONCLUSION

Research on Regional Development Strategies for Bandung Regency through an economic sector analysis approach was conducted to determine the possible mainstay sectors to develop in Bandung Regency to improve the economy and Gross Regional Domestic Income in Bandung Regency. An economic analysis approach was carried out through location analysis, Klassen typology, and shift-share. The findings showed the sectors that obtained the best LQ and Klassen Typology analysis results were the manufacturing sector and the mining and quarrying sector, while the highest shift share value was obtained by the mining and quarrying sector.

In developing the mainstay sector of the manufacturing industry, the strategy that can be carried out is to relocate and cluster according to the type and form of industry in the industrial area that the Bandung Regency government has provided. This industrial clustering will increase efficiency, innovation, and competitiveness, strengthen cooperation ties and reduce the industry's negative environmental impact, such as waste problems and reduced groundwater discharge. In addition, the development of the manufacturing sector can be done by collaborating with other sectors that fall under the criteria of relatively lagging sectors, e.g. collaboration with the agriculture sectors by developing an agro-processing industry.

Furthermore, the development of the mainstay mining and quarrying sector is best carried out in the geothermal energy sub-sector to create and use environmentally friendly renewable energy. The strategy can be done by strengthening government performance through the improvement of the quality of geothermal data and information by obtaining geoscience data and geothermal exploration drilling, optimizing data sources in WKP that are already in production, improving the economy of heat projects to be more competitive, providing incentives such as tax incentive, price certainty, ease of licensing, and funding support to increase investor interest in investing their capital in the EBT sector, increasing collaboration efforts between development companies and surrounding communities facilitated by local governments, preparation of academic studies related to the prospects for the utilization and development of geothermal energy, both in terms of electrical energy, use in the processing industry and agriculture, and disseminating policies and programs to the public to create a climate that can support national development.

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