The Potential for Green-Industrial Development (Case Study: Ujungjaya Industrial Estate, Sumedang)

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Abstract. Based on the Sumedang Regional Spatial Plan, the Ujungjaya Area is planned to become an Industrial estate. The planned types of industries are the manufacturing industry, textile industry, textile products and industrial engineering to support Kertajati Aerocity. Industrial development provides changes that have an impact on the socio-economy of the community, but on the other hand, it also brings changes that have negative impacts, including pollution to the environment around industrial estates. To prevent this, it is necessary to apply the green industrial concept, which in the production process prioritizes efficiency and effectiveness in the use of resources in a sustainable manner. Therefore it is necessary to study the potential for developing green industries in the Ujungjaya industrial estate. This research was conducted using a qualitative approach. The analysis method used is the quantitative SWOT analysis. The results showed that Ujungjaya Industrial estate is in a Turn Around Position in developing the green industrial estate. So the Ujungjaya Eco-industrial development strategy is related to how to overcome weaknesses to attain opportunities.

Keywords : industrial estate, sustainable, green industry, quantitative SWOT

1. Introduction

The development of Industrial Estates is intended to encourage the growth of the industrial sector to be more focused, integrated, and to provide optimal results for areas where industrial estates are located. The growth of individual industries has a big impact on environmental sustainability because it is difficult to control pollution by industries that grow individually. The concept of industrial estate development supports the overall improvement of the regional environmental quality. By grouping industrial activities in one management location, it will be easier to provide waste treatment facilities and also control the waste. Over the past 30 years, environmental degradation has been considered as a major focus in industrial sectors [1].

To prevent environmental damage from industrial development, it is necessary to develop a green industry. The green industry is one that is environmentally friendly in all aspects [1]. This industry is not as harmful to the environment as traditional industries. A green industry does not put industrial production above and all at the expense of the natural environment and human health [1]. The green industry can make big improvements in a country’s socio-economic development and provides a favorable condition for a sustainable industrial development [2]. Cities in Indonesia are currently experiencing environmental degradation due to urban development which emphasizes the economy more than ecology [3]. In Indonesia, mindset towards Green Growth is necessary for a harmonious balance between economic growth and sustainable environment, to switch from the principle of Grow First, Clean up Later [4].
Based on Regional Spatial Plan of Sumedang Regency, Ujungjaya and Tomo Districts are included in the Strategic Economic Zone of Sumedang Regency which is planned to become an Industrial Estate. Industrial Estate Planning is carried out to increase investment and improve the economy of the Sumedang people. Ujungjaya and Tomo Districts have a strategic role in the development of Sumedang Regency. Some of the potentials of Ujungjaya and Tomo districts are the availability of sufficient land for industrial development and in terms of location it can provide benefits for industrial activities. The types of industries planned in the Ujungjaya Industrial Estate are the manufacturing industry, the textile industry, and the textile products that support Kertajati’s Aerocity. The area planned to become an industrial estate is 1.523 hectares.

If the Ujungjaya Industrial Estate is not planned comprehensively, it is feared that it will have environmental impacts and spatial problems such as what happened in the Cimanggung Industrial Estate, Sumedang. Environmental impacts occur from the presence of the Cimanggung Industry in Sumedang, such as pollution and flooding. So, it is necessary to study the potential for developing a Green Industry in the Ujungjaya industrial estate so that it can have a positive impact on the economy and also the environment. The purposes of this study is to identify the potential for developing green-industrial estate in Ujungjaya District, Sumedang Regency. The benefits obtained from this research are recommendations for the government of Sumedang Regency, especially in the effort to prevent environmental impacts and spatial problems that will be caused by the existence of the Ujungjaya Industrial Estate.

2. Method

This research uses a quantitative approach. Quantitative research is a ‘deductivist, objectivist, and positivist’ method of research that involves numbers and quantification in collecting and analyzing data [5]. What constitutes a quantitative research method involves a numeric or statistical approach to research design [6]. The method used in this research is SWOT with a quantitative approach. There are two approaches to SWOT analysis (qualitative approach and quantitative approach). A review of past documents on SWOT analysis reveals that most presented a literal description of the analysis and few conducted the quantified analysis. As planning processes are often complicated by numerous criteria and interdependencies, it may be that the utilization of SWOT is insufficient [7]. SWOT Analysis is a tool used for strategic planning and strategic management in organizations. It can be used effectively to build organizational strategy and competitive strategy. SWOT Analysis is an analysis method used to evaluate the ‘strengths’, ‘weaknesses’, ‘opportunities’ and ‘threats’ involved in an organization, a plan, a project, a person or a business activity [8].

The analysis procedures used following steps, firstly to list the factors presumed to be affect green industry, secondly to identify the factors into SWOT matrix based on internal factor (consisting strength and weaknesses) and external factors (consisting opportunity and threats), thirdly to Analyze by using IFAS and EFAS [9]. The variables used in this study are the four elements of the Green Industry including the Green Plan, Green Process, Green Management, and Green Policy. The research stages are:

1. Preparation Phase, which includes team consolidation, survey preparation such as data requirements, survey instrument, etc.
2. Data Collection Phase, including detailed survey activities and literature review.
3. Analysis Phase, including data processing and analysis using SWOT method.
4. Final Phase, conclude and provide recommendations.

3. Result and Discussion

3.1 Ujungjaya Industrial Estate Policy

Industrial estate development requires a thorough and comprehensive preparation stage so that it can provide optimal benefits for economic growth, community welfare, and environmental sustainability. Based on regulation of the Minister of Industry concerning Technical Guidelines for Industrial Estate Development, planning documents that must be prepared include:
1. Location Feasibility documents
2. Master Plan of Industrial Estate
3. Environmental Impact Analysis documents (AMDAL)
4. Traffic Impact Analysis document (ANDALALIN)

So far, the planning documents owned by Sumedang district is only Location Feasibility Document and in the document, it is stated that the development concept that must be developed is sustainability based. Local governments should invest in a sustainable development policy to satisfy citizens and benefit companies and act with companies as partners to increase resilience and sustainability [10]. The industrial estate development plan is strengthened by the Sumedang Regional Spatial Plan (RTRW) which states that an Industrial Estate will be built, one of which is in Ujungjaya. The absence of a Master Plan for Industrial Estates has resulted in Sumedang governments being unable to formulate detailed and technical policies regarding Green Industry operations. In fact, this policy is the key to the successful implementation of the green industry. Hence, the nature of industrial specialization will determine which knowledge, innovation, and industrial dynamics should be supported by policy [11].

3.2 The Condition of the Ujungjaya Industrial Estate Plan

3.2.1 Location Advantage

Ujungjaya and Tomo districts have advantages in terms of location that will provide benefits for industrial activities, including:

1. Ujungjaya and Tomo sub-districts are located in the Eastern part of Sumedang Regency and are one of the gates of Sumedang Regency from the direction of Indramayu Regency with the main road network connecting Tomo with Indramayu.

2. Located between two National Activity Centers (PKN), PKN Bandung on the west and PKN Cirebon on the east. This can mean that the location of the study area has easy access to service facilities, both infrastructure and facilities as well as marketing aspects. Besides, Ujungjaya District and Tomo District are relatively close to the Kadipaten Regional Activity Center.

3. Ujungjaya and Tomo districts are flanked by two main regional road networks, the Cisumdawu toll road and the arterial road network that connects Bandung City and Cirebon City. So that it has high accessibility, both in terms of providing raw materials and marketing of production products.

4. Ujungjaya and Tomo districts have a road that is close to West Java International Airport in Kertajati (BIJB). This is beneficial in the mobilization of raw materials and industrial products using the cargo at the airport. Besides, with the existence of this airport, the development of industrial activities in the study area can be oriented towards industries that produce exported goods.

5. Ujungjaya and Tomo districts located between the golden triangle of West Java.
3.2.2 The Existing Condition of the Industrial Estate Location Plan.

The land area which is planned to be the Ujungjaya industrial area is 1,523 ha. This area is dominated by undeveloped land such as rice fields and production forest areas. Land status is dominated by property rights and some are not registered. Several villages that are planned to become industrial areas are located in areas prone to flooding, namely Palabuan, Keboncau, Cipelang, Sukamulya, Sakurjaya, and Ujungjaya, which are located in Ujungjaya District. Meanwhile, Tomo District is dominated by high flood disaster areas, to be precise in Marongge, Tolengas, Tomo, and Karyamukti Villages.

Based on the LQ analysis of Sumedang Regency, it is known that for Tomo District, which is the sub-district base sector is the agricultural sector, the mining/quarrying sector, the financial sector, leasing, and corporate services. Meanwhile, the base sector for the Ujungjaya district is the agricultural sector. This illustrates that the primary sector (the existence of its natural resources) is still a sector that contributes greatly to the economy of the two districts. This is evident from the dominance of rice fields, gardens, and forests in the two sub-districts. However, there is a tendency to shift from the primary sector to the secondary sector in the form of the processing industry.
The community strongly supports the development of Industrial Estates, especially those in villages adjacent to the Majalengka Industrial Area, with the hope of improving the community's economy. However, the community also hopes that the developed industry will not have an impact on the environment so that they strongly support the green industry concept. Meanwhile, concerning the quality of human resources, Sumedang Regency does not yet have an institution that is engaged in education and training as well as industrial research and development. Sumedang Regency Government in carrying out the development of industrial players (community) in collaboration with the Dinas Tenaga Kerja dan Transmigrasi (Disnakertrans) in the region. This cooperation is carried out in the form of ideas and coaching capital. However, Sumedang Regency does not yet have educational and training institutions to develop green industrial estate.

Regarding the availability of natural resources in the industrial sector in Tomo District, in general, it can be fulfilled, especially from the non-metal mineral mining sector and sand. Meanwhile, in the Ujungjaya & Tomo districts, there are forest sector natural resources that can be utilized for the industry. There is also the potential for raw materials in the form of sweet potatoes, salak, coffee, and livestock. Concerning infrastructure, external transportation has been supported by various modes of transportation to transport raw materials and industrial commodities. For internal road infrastructure, it is necessary to increase the width of the road because in existing conditions the average road width is 4 meters, while the criteria require a minimum of 7 meters.

Industrial estate development requires adequate industrial infrastructure support. The availability of infrastructure must be able to meet the needs of industrial activities in terms of availability, quality, quantity, and certainty of supply. Some of the supporting infrastructure conditions for the Ujungjaya Industrial Estate are as follows:

1. Currently, the electricity supply in Sumedang Regency is obtained from the State Electricity Company (PT. PLN). During 2016, the amount of electricity generated by PT. PLN Sumedang area. Meanwhile, the electricity infrastructure development plan listed in the RTRW Sumedang includes renewable energy development plans, one of which is the energy self-sufficient village in Ujungjaya and Tomo districts, as well as the construction of an extra-high voltage airline network.
2. Ujungjaya Industrial Estate is 30 kilometers from Jatigede Reservoir. However, it is not recommended to use a water source from the Jatigede Reservoir due to water depreciation in 2019. Besides, it is not easy to drain water using a piping system as far as 30 kilometers. So there are plans to provide sustainable water infrastructure in the form of Water Treatment Plant.
3. For telecommunication infrastructure, Ujungjaya Industrial Estate has been served by the internet network very well. There are 20 Telecommunication Towers, and in Tomo District as many as 11 towers.
4. Based on the the Sumedang Regional Spatial Plan, for the wastewater infrastructure development plan, it is stated that an integrated Wastewater Treatment Plant will be developed.

3.3 SWOT Analysis Results

After identifying the Ujungjaya Industrial Estate development plan, the next step is to conduct a SWOT analysis of the related variables. Based on the analysis, the following results were obtained.

| No. | Critical Success Internal Factor                                                                 | Skor (Si) | Weight (Wi) | Total (Si x Wi) |
|-----|-------------------------------------------------------------------------------------------------|-----------|-------------|-----------------|
| A.  | **Strength (S)**                                                                               |           |             |                 |
| 1.  | Based on Regional Spatial Plan of Sumedang Regency, here is already a green-industrial development concept as stated in one of the plan documents (location feasibility document) . | 4         | 0.07        | 0.29            |
| 2.  | The community strongly supports the development of green - industrial Estates.                  | 4         | 0.07        | 0.29            |
### Table 2. IFAS (Weakness)

| No. | Critical Success Internal Factor                                                                 | Skor (Si) | Weight (Wi) | Total (Si x Wi) |
|-----|-------------------------------------------------------------------------------------------------|-----------|-------------|-----------------|
| 3.  | The land feasible for industrial estate development is 1.523 ha. This area is dominated by undeveloped land so that land use can be ideally planned. | 5         | 0.09        | 0.45            |
| 4.  | There is renewable energy development plan, one of the locations is in Ujungjaya and Tomo Districts (the energy self-sufficient village). | 3         | 0.05        | 0.16            |
| 5.  | There is a plan for a flood control network system through the development of reservoirs and water filtration system to collect rainwater and simultaneously control floods. | 3         | 0.05        | 0.16            |
| 6.  | There is a plan for the management of wastewater and hazardous and toxic waste by developing an integrated Wastewater Treatment Plant in Ujungjaya District. | 3         | 0.05        | 0.16            |
| 7.  | There is a plan to develop a temporary storage area for hazardous and toxic waste materials in the Ujungjaya Industrial Estate. | 3         | 0.05        | 0.16            |

**Total Strength**

1.82

### Table 3. EFAS (Opportunity)

| No. | Critical Success External Factor                                                                 | Skor (Si) | Weight (Wi) | Total (Si x Wi) |
|-----|-------------------------------------------------------------------------------------------------|-----------|-------------|-----------------|
| 1.  | There are green industry standards aimed at increasing the competitiveness of national industries in global competition. | 4         | 0.11        | 0.44            |
| 2.  | There is a financial assistance program for the industry to purchase new environmentally friendly machines. | 4         | 0.11        | 0.44            |

**Total (X axis)**

-0.28
No. | Critical Success External Factor                                                                 | Skor (Si) | Weight (Wi) | Total (Si x Wi) |
--- |------------------------------------------------------------------------------------------------|----------|-------------|----------------|
3.  | The Ministry of Industry has encouraged industrial players to implement clean production. Among the programs that have been carried out are compiling technical guidelines for clean production for several industrial commodities and providing technical assistance. | 5        | 0.14        | 0.69           |
4.  | Location is supported by high external accessibility.                                           | 5        | 0.14        | 0.69           |

**Total Opportunity** 18 0.5 2.28

Table 4. EFAS (Threats)

No. | Critical Success External Factor                                                                 | Skor (Si) | Weight (Wi) | Total (Si x Wi) |
--- |------------------------------------------------------------------------------------------------|----------|-------------|----------------|
D.  | **Threats (T)**                                                                                      |          |             |                |
1.  | The industry is still very dependent on fossil fuels. The industry’s share in national energy consumption reaches 49.4%. The use of renewable energy only reaches 5% of total use. | 5        | 0.19        | 0.96           |
2.  | The green industry certification institution has not been established.                             | 3        | 0.12        | 0.35           |
3.  | There are no incentives (fiscal and nonfiscal) for industry players to encourage an investment climate for the development of the green industry. | 4        | 0.15        | 0.62           |

**Total Strength** 12 0.5 1.92

**Total (y axis)** 0,36

Based on the results of this analysis, it is known that the position for developing the Ujungjaya green-industrial estate is in quadrant III (Turn Around) with an x-axis (-0.28) and a y-axis (0.36). So, the strategies that must be developed are related to how to overcome weaknesses to attain opportunities.

![Figure 3. SWOT Analysis Result for developing the Ujungjaya green-industrial estate](image)

**4. Conclusion**

Based on the results and discussion, it can be concluded that:
1. The potential for developing the Ujungjaya green-industrial estate is weak but has opportunities. Opportunities come from the existence of central government policies that support green-industrial development. However, regional strength have not been able to attain these opportunities.
2. The Green Plan variable is included in the strengths of green-Industrial Estate development. In the Regional Spatial Plan of Sumedang, there are plans for green industrial infrastructure. However, the detailed plan document (Master Plan The Industrial Estate has not been arranged.
3. The Green Process variable is included in the strengths of green-industrial Estate development. The land feasible for industrial estate development is 1.523 ha. This area is dominated by undeveloped land so that land use can be ideally planned to be green-Industrial Estate.
4. The Green Management variable is included in the weakness of green-Industrial Estate development. Authorized manager in carrying out industrial estate management activities have not been established. Green community to support an green-industrial estate has not been formulated.
5. The Green Policy variable is include in the weakness of Green-Industrial Estate development. The industrial Estate Master Plan document has not been arranged so that the Sumedang Government has not yet set a Regional Regulation that regulates the technicalities of green-industrial operation. Meanwhile, the green policy is the key to implementing eco-industrial estates.

Recommendation for this research:
1. To attain the existing opportunities, the Sumedang Government must correct its weaknesses. The industrial Estate Master Plan document must be arranged so that the Sumedang Government can set a Regional Regulation that regulates the technicalities of green-Industrial operation. Because Green Policy is the key to implementing green industrial estates.
2. An authorized manager in carrying out industrial estate management activities must be established.

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