Mapping the Potential and Development of Independent Category Villages in Bogor Regency

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Abstract

Independent villages are villages that have sufficient availability and access to essential services, adequate infrastructure, accessibility/transportation that is not difficult, good public services, and an already excellent administration. However, not all independent villages are able to be independent in all aspects. The ranking of village categories is based on social, economic, and social aspects. This study aims to determine the ranking of independent category village villages on different size scales and find out which villages are superior in every social, economic, and social. This study used RapidMiner to determine the ranking of independent villages and cobwebs as a mapping of the advantages of each dimension. The results of this study were obtained from 14 villages that belong to the high-independent category. From these fourteen villages, the results of mapping using cobwebs for each dimension were obtained. The mapping results show that one village excels in two dimensions, namely Bojonggede Village, in the economic and social dimensions. Meanwhile, in the ecological dimension, Sukahati Village is a superior village. Suppose you look at the advantages of each dimension, then for the first dimension, namely the economic dimension. In that case, there are five superior villages, including Tajur, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Cibanteng, and Gunungsari Villages. The second dimension is the social dimension; one village looks superior, Bojonggede Village. Finally, in the ecological dimension, the superior village is Sukahati Village.

Keywords: Mapping, development of independent, Bogor Regency

1. Introduction

Each village reaches its level in the development process to advance the village. The development and development of the village are essential. This is because rural areas are the majority residence for the Indonesian people (Setyowati, 2019). Along with their development, rural areas will undoubtedly have various challenges and social implications for the surrounding community. The most crucial problem is poverty and guarantees for rural communities who are still leaving problems to be able to find solutions to problems (problem-solving). The village government and various agencies in it must build and increase the potential of their villages to prosper and provide good services for the village community. Assessing the potential of villages and village development can be done by increasing Village's Original Income (PADes) and referring to the instructions of the Ministry of Villages through the Building Village Index (IDM) (Sukarno, 2020). The concept of village building means that the power to build a village comes from the power possessed by the community itself (Harjo, 2017).

Each village reaches its level in the development process to advance the village. The development of villages in Indonesia experiences different fluctuations following various varied indicators. Various parameters can be used in measuring whether these villages are categorized into what kind of village group.

Based on the Village Information System issued by the Ministry of Villages, Development of Disadvantaged Villages and Transmigration of the Republic of Indonesia (2020), in 2019, in Indonesia there were 68,834 villages, while in 2020, the number of villages increased to 69,826   villages. Based on IDM status, in 2019, 3,536 villages were still significantly lagging behind (5.14%), 17,626 villages were left behind (25.61%), 38,185 villages that had developed (55.47%), 8,647 villages were developed (12.56%) and only 840 villages that were already independent (1.22%). Then in 2020, there was an increase in IDM status, where there were 2,437 villages that were still significantly lagging (3.49%), as many as 13,900 villages that were left behind (19.91%), as many as 39,847 villages

that had developed (57.07%), as many as 11,900 villages that were developed (17.04%) and as many as 1,742 villages that were already independent (2.49%) (idm.kemendesa.go.id., 2020).

Likewise with villages in Bogor Regency, out of 416 existing villages, as many as 48 villages are included in the Independent village category according to the rules of the Building Village Index (IDM) Regulation of the Minister of Villages of the Ministry of Villages of the Republic of Indonesia. The main target of grouping villages by these categories is to provide equitable distribution of development and overall village economy.

When viewed from the Regulation of the Minister of Villages, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia Number 2 of 2016 Article 1 Paragraph 11 concerning the Building Village Index states that independent villages, or can be referred to as *"sembada"* villages are developed villages that can carry out village development to improve the quality of life and life as much as possible the welfare of rural communities with social resilience, economic resilience, and ecological resilience on an ongoing basis.

To achieve the success of today's rural development goals, in general, we are faced with many challenges that are very different in nature than in the past. The first challenge relates to external conditions, such as international developments related to global investment and trade flow liberalization. While the second is internal, namely those related to changes in domestic macro and micro conditions, spatial and sectoral migration problems, food security, agricultural land availability problems, investment and capital problems, science and technology problems, human resources, the environment, and much more (Soleh, 2017). This is in line with Kennet (2006) that everyone must be in a comfortable environment to achieve survival, well-being, and happiness.

This study aims to carry out descriptive mapping of qualitative analysis and describe various indicators and attributes of independent village measurement so that the rankings of villages with independent categories will be obtained on different size scales.

2. Literature Review

According to Law Number 6 of 2014 concerning Villages, Article 1 paragraph (1) states that villages are villages and traditional villages or referred to by other names, hereinafter referred to as Villages, are legal community units that have territorial boundaries that are authorized to regulate and manage government affairs, the interests of local communities based on community initiatives, rights of origin, and/or traditional rights that are recognized and respected in the government system of the Unitary State of the Republic of Indonesia.

According to Fauzi, Independent Village is an integrated concept-based rural development pattern starting from the input, primary production, produce processing, marketing, and support service subsystem. The objectives to be achieved by the Independent Villages Development of independent villages based in rural areas to realize the independence of rural communities to utilize and optimize the potential of economic, social, and environmental resources. Thus, in developing an independent village, several things must be done, namely:
1) Development of the economic, social, and environmental potential of the village
2) Development of business independence and entrepreneurship in the village
3) Development of human resource quality and institutional strengthening of village communities
4) Development of networks and partnerships.

Village independence is the key to success in building the village economy in realizing an independent and prosperous village program and consistently implementing the Village Law. As the rule of law, the Village Law must be a guide and guideline for implementors in carrying out the development of an area. In the Village Law, the power to build a village comes from the strength possessed by the village community itself. The village apparatus and the villagers must understand and be able to empower the potential strength of their village. For the implementation of the Prosperous Independent Village to be carried out properly, it requires the participation of all villagers. All villagers can enjoy the results of development, managing regional potential, and community empowerment (Prayogo, 2019).

Regulation of the Minister of Villages No.2 of 2016 has set the indicator of the Building Village Index (IDM), a composite index formed from 3 indices, namely the Social Resilience Index, the Economic Resilience Index, and the Ecological/Environmental Resilience Index.

The Social Resilience Index consists of the following:
1) Social Capital Dimension (indicators of social solidarity, having tolerance, sense of security of the population, Social welfare);
2) Health Dimension (indicators of health services, community empowerment, and health insurance);
3) Dimensions of Education (indicators of access to primary and secondary education, access to non-formal education, and access to knowledge);
4) Dimensions of settlements (indicators of access to clean water, access to sanitation, access to electricity, and access to information and communications).

The Economic Resilience Index consists of Economic Dimensions (indicators of the diversity of production of rural communities, available trade service centers, access to distribution/logistics, access to financial and credit institutions, economic institutions, and regional openness).

The Environmental/ Ecological Resilience Index consists of Ecological Dimensions (indicators of environmental quality and potential for disaster and disaster response).

Regarding the context of village typology, IDM classifies villages into five (5) statuses, namely: "(i) Very Disadvantaged Villages; (ii) Disadvantaged Villages; (iii) Developing Villages; (iv) Advanced Village; and (v) Independent Villages." Of the five classifications, the village strata already have several divisions used as indicators or parameters of the village. The typology of the division of IDM can be divided into several things such as: "(1) the village is very lagging behind: < 0.491; (2) underdeveloped villages: > 0.491 and < 0.599; (3) developing villages: > 0.599 and < 0.707; (4) developed villages: > 0.707 and < 0.815; and (5) independent village: > 0.815" (Suroso; Salmah 2022)

3. Materials and Methods

The research method used in the process of this research activity is qualitative. Qualitative research methods can be defined as research methods of a post-positivism nature, which are used to research natural conditions (as opposed to experiments) in which, in this activity, the researcher is a crucial instrument. In data collection techniques carried out by triangulation (combined), data analysis is inductive/qualitative, and qualitative research results emphasize meaning rather than generalization (Sugiyono, 2016)

The sampling technique in this activity is *Probability Sampling*, with the *Random Sampling Sample* technique, because the sampling of sample members of the population is carried out randomly without paying attention to the strata present in that population. The data sources used in this activity are 1) Primary sources, data sources that directly provide data to data collectors on this occasion, data obtained from stakeholders, and 2) Secondary data is obtained from other supporting sources, namely Regional Apparatus Organizations (OPD) / Agencies / Institutions in the Bogor Regency Government.

Data collection techniques will be implemented by:

1) Interview
2) Data Collection
3) Data Processing and Tabulation
4) Data Analysis

Furthermore, the results of primary and secondary data collected from the field will be processed using gap analysis tools using the cobweb method and RapidMiner software.

RapidMiner is a science data software platform developed by the company of the same name, which provides a unified environment for machine learning, deep learning, text mining, and predictive analytics. It is used for business and commercial applications, research, education, training, rapid prototyping, and application development. It supports all steps of the machine learning process, including data preparation, visualization of results, validation, and optimization. RapidMiner was developed with an open-core model (Rizqifaluthi & Yakin, 2019).

4. Results and Discussion

4.1 Grouping Independent Villages Using RapidMiner

Based on the data cleaning process obtained, there are 42 villages classified as independent villages with index values in 2021. Of the 42 villages, it is known that the lowest index value is 0.8159, owned by Cipenjo Village, and the highest index is owned by Pondok Udik Village, with a value of 0.9778. Based on the results of the analysis using RapidMiner, results were obtained in the form of a decision tree model. The entire Independent Village is divided into three groups according to the objectives, namely Low-Independent Villages, Medium-Independent Villages, and High-Independent Villages following the 2021 IDM values, as shown in Figure 1.
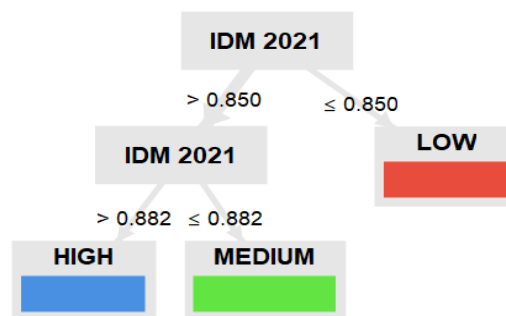

Figure 1: Independent Village Group Decision Tree

In the three groups formed, there are 14 villages classified as High-Independent with an index value of >0.882, 14 villages classified as Medium-Independent with an index value of ≤0.882, and 14 villages classified as Low-Independent with an index value of ≤ 0.850. The scope of each Village's IDM values is attached to Table 1.

Table 1: IDM Value Coverage of Independent Village Groups

Categories of Independent Villages	
Low	0.8159 - 0.8495
Medium	0.8511 - 0.881
High	0.8825 - 0.9778

4.2 Mapping of High-Self-Sustaining Villages Using Cobwebs

Fourteen villages classified as High-Independent Villages in Bogor Regency are mapped according to three existing dimensions: economic, social, and ecological, using cobweb mapping. Cobwebs are used to read processed data more quickly. In the form of mapping with lines connected in the cobweb and will look more inclined to each point/parameter according to the existing data. *Cobweb analysis is a simple quantitative analysis method used to map the comparison of various variables or assessment parameters in a graphic form like a spider web* (Andria, 2016). The result of mapping using cobwebs is three lines representing these three dimensions. The yellow line representing the economic dimension is prominent in Tajur Village and Bojonggede Village. The orange line representing the social dimension is prominent in Cileungsi Village, Bojonggede Village. Meanwhile, the green line representing the ecological dimension looks superior in Sukahati Village.

This mapping shows that one village excels in two dimensions, namely Bojonggede Village, with an IDM score of 0.9089, which is superior in the economic and sociological dimensions. The mapping of each village in each dimension (Figure 2) shows that Bojonggede Village is also superior in mapping the economic and sociological dimensions. Meanwhile, in its own ecological dimension, Sukahati Village is the only superior village.
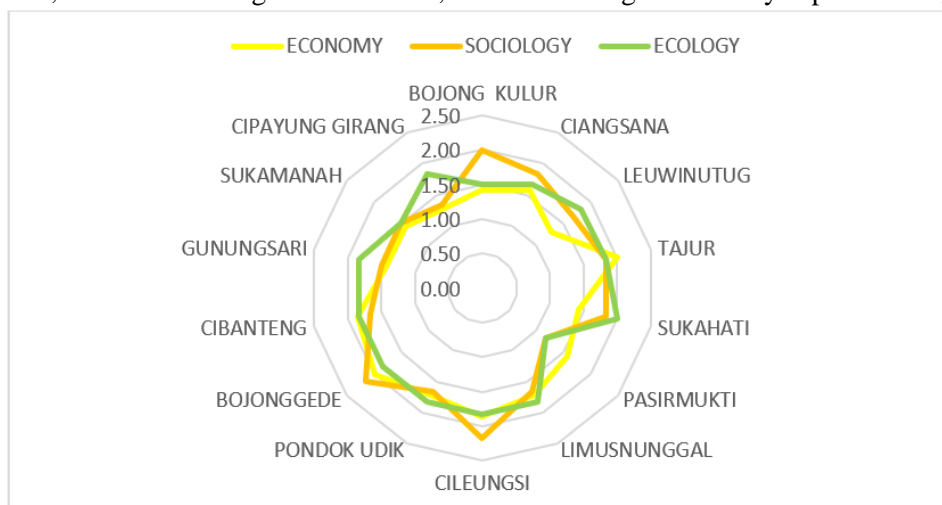

Figure 2: High-Independent Village Cobweb Mapping Based on Economic, Social, and Ecological Dimensions.

Each dimension has its attributes so that the results of this process find a conclusion as to how the Villages can excel or meet existing values. Figure 3 clearly shows the dimensions and attributes possessed by each village classified as High-Independent. With the current information, through the processing stage, the data is coded into nominal data. So that data about this High-Independent Village can be processed into information/knowledge that can be useful in the future.

The next stage of the process is carried out in more detail, namely looking at the potential of each village in each attribute in the three dimensions. The economic dimension consists of seven attributes: small micro-enterprises, medium enterprises, hotels, posts, government banks, private banks, and road quality.
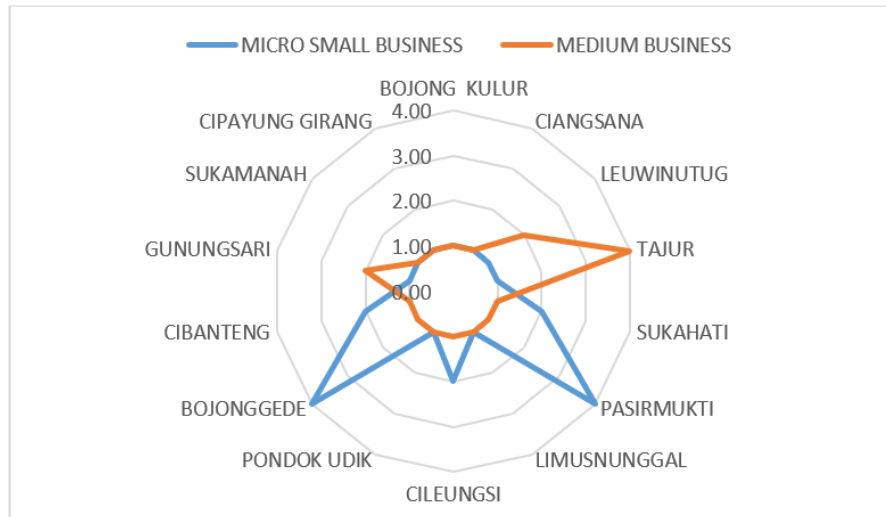
Figure 3: Mapping the Cobwebs of High-Independent Villages Attributes of Micro Small Business (MSBs) and Medium Business (MBs) on the Economic Dimension

For the number of MSBs and MBs in the economic dimension, the amount of data is categorized into four ranges so that the cobweb mapping chart on this indicator is separated from indicators on other economic dimensions. In the cobweb mapping above (Figure 9), it can be seen that the highest number of MSBs is held by Pasirmukti Village, with 1204 MSBs, and Bojonggede Village, with 1269 MSBs. As for the number of MBs, the highest number is held by Tajur Village, amounting to 278 MBs.
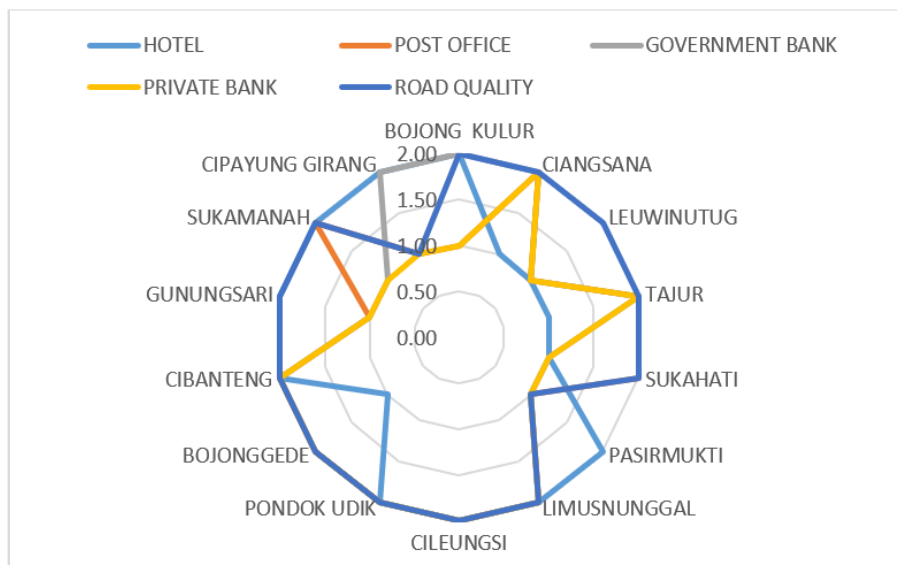

Figure 4: Cobweb Mapping High-Independent Villages Attributes of Economic Dimensions

Then for other attributes in the Economic Dimension, such as the availability of hotels already owned by the villages of Bojong Kulur, Pasirmukti, Limusnunggal, Cileungsi, Pondok Udik, Cibanteng, Gunungsari, Sukamanah, and Cipayung Girang. For the availability of POS already owned by the villages of Ciangsana, Tajur, Sukahati, Limusnunggal, Cileungsi, Pondok, Udik, Bojonggede, Cibanteng, and Sukamanah. Government Banks are already available in Cipayung Girang, Bojongkulur, Ciangsana, Tajur, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, and Cibanteng Villages. Meanwhile, private banks are available in Ciangsana, Tajur, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, and Cibanteng villages. The availability of facilities in these villages certainly adds value and convenience to each village in developing its villages and advancing its communities. The good thing is that all villages already have good road access, except the Pasirmukti and Cipayung Girang villages (Figure 10). The economic dimension has several villages that look superior in five attributes: Tajur, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Cibanteng, and Gunungsari villages. These five villages have good potential to be driven by an inclusive green economy.

The second dimension is the social dimension; this dimension has six determining indicators. There is data on the number of households that have houses and do not have houses in each High-Independent Village in Bogor Regency.

These two indicators have different charts from the other four indicators, just like Figure 9; these two indicators also have four ranges due to the high amount of data and look lame when combined with the other four indicators, namely the availability of garbage disposal flows, waste temporary shelter, websites, as well as other information channels.
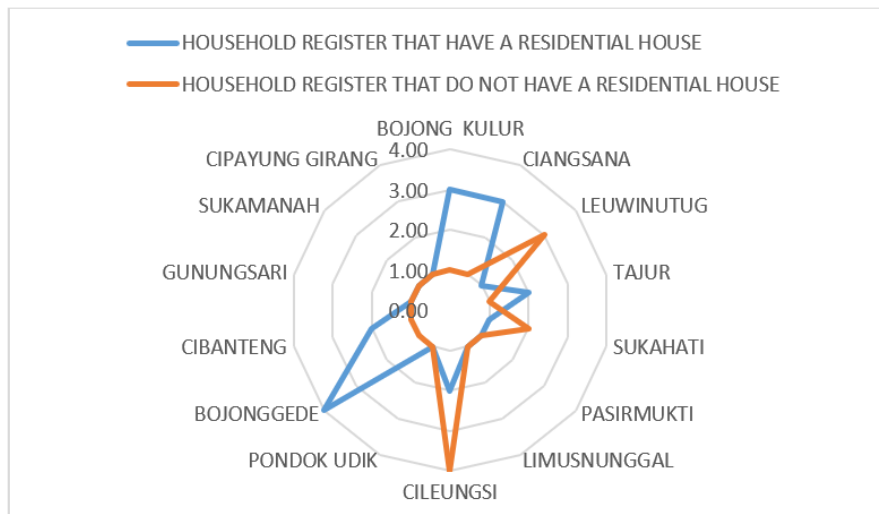

Figure 5: Mapping the Cobwebs of High-Independent Villages Attributes of the Number of Households that Have and Do Not Having a House on the Social Dimension

The indicator of the number of households owning a house is outperformed by Bojonggede Village, with 12,972 families. This means many families in Bojonggede Village have been registered on the population census to have permanent residences. In contrast, Cileungsi Village has 4312 registered families who do not have permanent residences at the population census. With these two indicators, the fact is that there are still quite a lot of people in Bogor Regency who have not comfortably occupied their current residences.
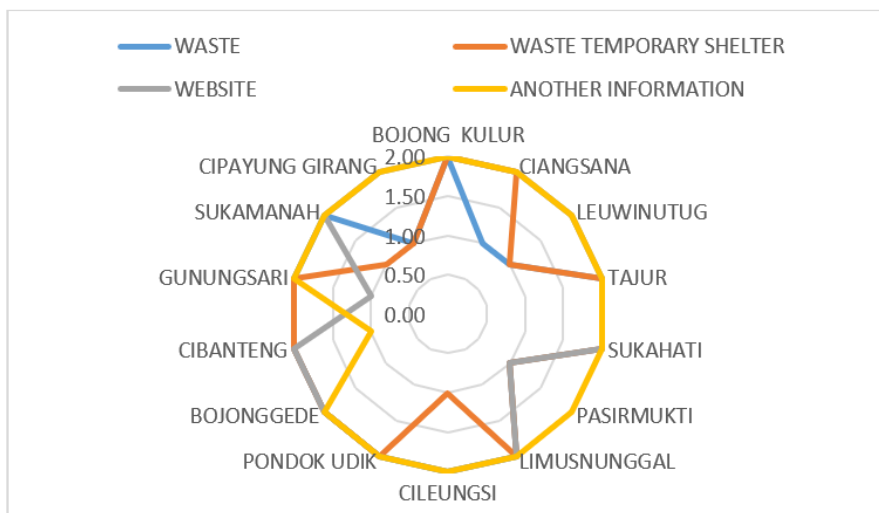

Figure 6: Cobweb Mapping High-Independent Villages Attributes of Ecological Dimensions

For waste indicators, it is outperformed by the villages of Bojongkulur, Tajur, Sukahati, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Cibanteng, Gunungsari, and Sukamanah. Meaning that these villages have managed their waste disposal flow well. People in these villages tend to throw their waste into the trash can and then be transported by cleaners. As for the availability of waste temporary shelter itself, it is already owned by the villages of Bojongkulur, Ciangsana, Tajur, Sukahati, Limusnunggal, Pondok Udik, Bojonggede, Cibanteng, and Gunungsari. For the website indicators owned by villages classified as High-Independent, it turns out that only a few villages already have their own websites, namely Bojongkulur, Ciangsana, Leuwinutug, Tajur, Sukahati, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Cibanteng, Sukamanah, and Cipayung Girang Villages. As for the availability of other information, it is owned by the villages of Bojongkulur, Ciangsana, Leuwinutug, Tajur, Sukahati, Pasirmukti, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Gunungsari, Sukamanah, and Cipayung Girang. This means that the information in the Villages has its information channels, both through social media and deliberations carried out by the villagers. In total (fourteen) villages are classified as High-Independent Villages. In the social dimension,

one village looks superior in 5 out of all 6 indicators, so it can be encouraged to be applied to become an inclusive green economy village, namely Bojonggede Village.

The last dimension used as a standard for IDM assessment in Villages in Bogor Regency is the ecological dimension. This assessment looks at how the Villages cope with or complement their Villages in terms of their environment. There are six fundamental indicators of value in this dimension, namely; the presence of polluted water as well as river waste in these villages, also see what impact the water contamination has, land changes, and also see the availability of safety equipment and evacuation routes which are critical basic things in these villages.
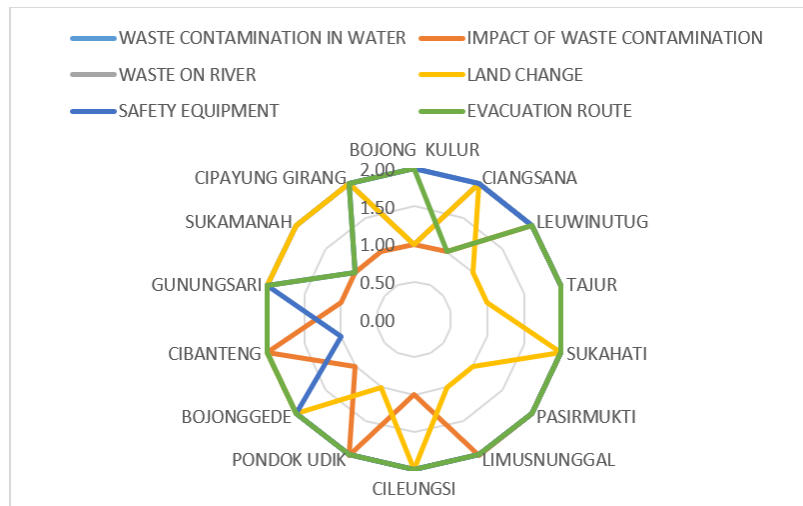

Figure 7: Cobweb Mapping High-Independent Villages Attributes Ecological Dimensions

The first indicator on the ecological dimension, namely water contamination, is seen to have the same good score distribution in these fourteen villages, which means that out of the fourteen villages, there is no water contamination to worry about. Meanwhile, the impact of pollution on Leuwinutug, Tajur, Sukahati, Pasirmukti, Limusnunggal, Pondok Udik, and Cibanteng Villages was found not to cause health problems. Fourteen High-Independent Category Villages were found to have no waste in their rivers except in the Bojong Kulur Village river. Ciangsana, Sukahati, Cileungsi, Bojonggede, Cibanteng, Gunungsari, Sukamanah, and Cipayung Girang Villages experienced land changes. Safety equipment in each village has been owned by 12 villages except Cibanteng Village and Sukamanah Village. All villages except Ciangsana Village and Sukamanah Village also own the evacuation route in the village. The six attributes this ecological dimension possesses look very well owned by Sukahati Village.

5. Conclusion

Mapping independent category villages in Bogor Regency using RapidMiner divides 42 villages into three independent IDM categories: high IDM, medium IDM, and low IDM. The results of the RapidMiner analysis obtained fourteen villages classified as High-Independent Villages. These fourteen villages are mapped using cobweb mapping based on three dimensions, namely the economic, social, and ecological. The mapping results show that one village excels in two dimensions, namely Bojonggede Village, in the economic and social dimensions. Meanwhile, in the ecological dimension, Sukahati Village is a superior village. Suppose you look at the advantages of each dimension, then for the first dimension, namely the economic dimension. In that case, there are five superior villages, including Tajur, Limusnunggal, Cileungsi, Pondok Udik, Bojonggede, Cibanteng, and Gunungsari Villages. The second dimension is the social dimension; one village looks superior, Bojonggede Village. Finally, in the ecological dimension, the superior village is Sukahati Village. Villages that excel in each of these dimensions are expected to be able to become villages based on the Green Inclusive Economy.

Acknowledgments

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