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Regional Tourism Development in Nusa Tenggara Barat: Maximizing Local Economic Development

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Abstract: Regional Tourism Development in Nusa Tenggara Barat: Maximizing Local Economic Development

The diversity of each region causes different potentials in each region. The potential of the village can map how rich the area is, the advantages of the area, and the population and welfare. Tourism is one of them; this sector is potential for the area because it can lift its economy if it is adequately managed. Good management is born from the policies/regulations of the local government. Nusa Tenggara Barat is a province with many tourist attractions. However, from an economic and socio-cultural perspective, Nusa Tenggara Barat has yet to be able to compete with other major provinces in Indonesia, such as the Special Region of Yogyakarta (DIY). The 2018 Village Potential Data by BPS can assist the government in compiling efforts for the village's progress. In the process of data processing, especially big data, in-depth exploration is needed to produce meaningful insight. Clustering is one of the exploration techniques that can map areas in Nusa Tenggara Barat based on the tourism potential in each village. K-Prototypes are used in cases with mixed variables (numeric and categorical). Determination of the best number of clusters is using the silhouette index. It produced 5 clusters with their respective diversity. There are five clusters in Nusa Tenggara Barat by the villages based on tourism aspects and factors that support tourism. Cluster 3 is an ideal cluster, meaning tourism development in that cluster is complete. Cluster 5 has considerable potential in tourism because the supporting factors are analytically good. There are villages dispersed across Sumbawa Barat, Sumbawa, Lombok Tengah, Lombok Barat, Dompu, and Bima that are part of cluster 1. In Sumbawa Barat and Lombok Tengah, cluster 1 predominates numbers. The settlements in cluster 2 are then more prevalent in Sumbawa and Bima. Furthermore, Sumbawa, Dompu, and Bima have the highest concentrations of cluster 4.

Unlike clusters 3 and 5, special attention should be paid to clusters 1, 2, and 4 in tourism development. Implications of this research are the government could take toward each cluster to increase the GDP-oriented service product, namely tourism; whether it is an improvement or reconstruction, clustering analysis works its role in learning the data to make the policy more focused.

Keywords: Village Potentials; Nusa Tenggara Barat; Tourism; K-Prototypes; Silhouette Index

INTRODUCTION

Tourism is a part of the Government's Sustainable Development Goals. Tourism can be a sector that supports economic growth in Indonesia and the world through the creation of sustainable livelihoods and poverty reduction. When consumer preferences shifted toward recreation, tourism is now the most suitable product to sell. According to The United Nations World Trade Organization (UNWTO), the world tourism organization, international tourists will reach 1.8 billion by 2030, and growth in world tourist arrivals will reach 3.3 percent per year (United Nations, 2017). This is good news for the world of tourism and is increasingly tempting to be used as the economy's foundation. Tourism is predicted to create many jobs, increase business income, and become a driving force for the government to strengthen infrastructures.

Seeing the open opportunities, the Indonesian government has launched several leading tourist areas. One of which exists in Nusa Tenggara Barat, namely the Mandalika Special Economic Zone, located in Lombok Tengah Regency. Various infrastructure projects are being rolled out to beautify the area, hopefully attracting more local and foreign tourists. Nusa Tenggara Barat has many other potential tourist areas besides the Mandalika, such as 2 Provincial Strategic Areas (KSP), which include 1. Strategic Areas for the sake of economic growth; 2. Strategic Areas from the interests of environmental functions and carrying capacity, 13 Regional Tourism Destination Areas (KPSD) consisting of Cultural Tourism, Religion, Culinary, Shopping, MICE, Beaches, Underwater, Marine-based Sports, Agro, Mountains, and Mining, and 5 National Tourism Strategic Areas established by the Republic of Indonesia government regulation concerning the National Tourism Development Master Plan (RIPPARNAS) (Bhayu Rhama, 2020). All existing provisions are set with the hope that each area can become a unique attraction for tourists. Tourism is a potential sector in Nusa Tenggara Barat because this sector provides a high contribution to the economy, and this sector is increasing rapidly every year. The categories supporting tourism in Nusa Tenggara Barat are Transportation and Warehousing, Real estate, and Services. Other categories may be encouraged to improve the economy of Nusa Tenggara Barat, such as the Provision of Accommodation, Food and Beverage, Construction, and Trade

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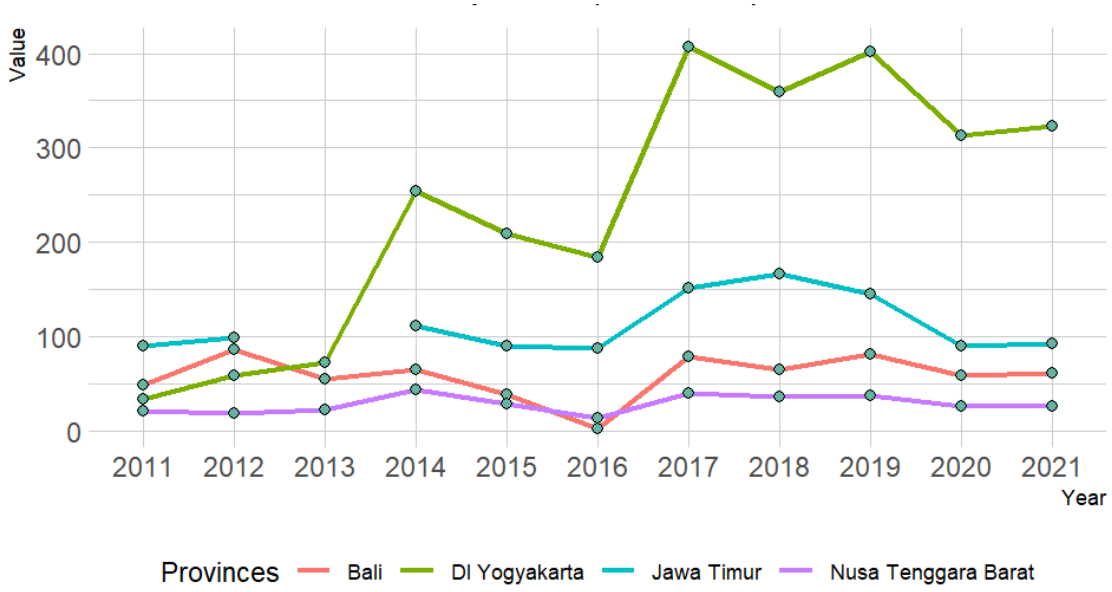
(Islamy, 2019).

However, based on data on Regional Expenditures in the Tourism and Culture sector Indonesian Database for Policy and Economic Research, (2021) during 2011-2021 (Figure 1), the value issued by the Nusa Tenggara Barat Government tends to stagnate, even when compared year on year in 2011 and 2021, there is almost no difference. A significant difference is shown in the data from the Daerah Istimewa Yogyakarta (DIY) province, which shows a significant increase every year.

Figure 1. Tourism And Culture Function Expenditure (in trillion IDR) 2011-2021



Source: Indonesian Database for Policy and Economic Research, 2021

Important factors supporting the tourism sector's development are Transportation, Accommodation, and the Economy. One of the main functions of transportation is accessibility, where the frequency of use and the speed of transportation modes can make it easier for tourists to move from one place to another and help travel cost efficiency for tourists. In both rented private and public transportation, quality is one of the main supporting factors for this mode of transportation. Accommodation is a provider of lodging and restaurant services for tourist trips at rates that are adjusted to the tourist destination. Quality management and service improvement are certainly needed for the convenience of tourists (Mathew & Abdulla, 2021). Equally important, economic factors also support tourism, one of which is the availability of financial facilities such as banks and ATMs in tourist spots.

In terms of mapping the Nusa Tenggara Barat tourist area, the 2018 Village Potential data is used. The Statistics Indonesia (BPS), a government agency tasked with providing data

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needs for the government and communities, has been collecting Podes data since 1980. Collecting data is carried out through a census of all districts/cities, sub-districts, and the lowest administrative areas at the village level. The result is in the form of data collection on the availability of infrastructure and social and economic potential owned by the administration at the village, sub-district, and district/city levels throughout Indonesia. The Village Potential results can be used as material for regional analysis related to the potential for economic, social, and regional facilities/infrastructure. In addition, it can also be used in program evaluation and in formulating regional-based policies/strategies (BPS, 2019).

Figure 2. Map of Nusa Tenggara Barat by District/City

Source: (BPS, 2022).

At least until this paper is written, there is no research data exploring how developing villages like Nusa Tenggara Barat can improve their economies based on the potential(s) of each. Thus, this study aims to explore the Village Potential Data in Nusa Tenggara Barat to determine solutions suggestable for the government. It is necessary to apply cluster analysis to obtain an overview of the potential and characteristics of villages in Nusa Tenggara Barat. Therefore, this study applies cluster analysis with the K-Prototypes algorithm to classify villages in Nusa Tenggara Barat based on BPS village potential data. It is not a new method, but it has never been applied to village potential analysis in Nusa Tenggara Barat. Village potential results can be used for regional analysis related to regional economic, social, and facilities/infrastructure potentials, program evaluation, and regional-based policy/strategy formulation.

LITERATURE REVIEW

Gross Domestic Product (GDP) is the value of a country's final goods and services, measuring the economy of a country in a given year. The products of a country that affect GDP can be categorized into five: durable goods, non-durable goods, services, structures, and inventory changes. Each category consists of several products contributing to economic

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development. One of the service products that can increase the Gross Domestic Product is the tourism sector. For certain regions, tourism development, as one of the economic development factors, occupies a higher priority than industry and trade in the real sector. Tourism development is multidimensional because it has a relatively significant multiplier effect (Sharpley, 2009). The tourism sector can support to contribute to state and regional revenue receipts. Therefore, tourism development must be carried out sustainably to provide direct benefits for the community's welfare.

Nusa Tenggara Barat is an area considered to have the tourism sector as a development priority. The charm of natural beauty and the unique culture of Nusa Tenggara Barat have tourism potential that is in demand by both foreign and domestic tourists. It can be seen from the development of tourism infrastructure and facilities in Nusa Tenggara Barat, which has gradually increased along with various tourism-related activities on both national and international scales. This is also reflected in the number of tourists visiting tourist attractions in Nusa Tenggara Barat, which is increasing yearly (Rizki et al., 2022). A healthy climate for growth in Gross Domestic Product per capita consists of improvements in human capital, physical capital, and technology, in a market-oriented environment with supportive public policies and institutions (Greenlaw et al., 2018). Consequently, an increase in the number of tourists visiting Nusa Tenggara Barat requires the local government to be serious about managing and developing their tourism so that tourists who come back to visit Nusa Tenggara Barat for the economic growth of the community will continue to increase.

In a market-oriented economy with a democratic government, the economic and governmental choices will involve a mixture of decisions by individuals, firms, and the government (Greenlaw et al., 2018). The market-oriented economy must bring a more significant benefit with the decentralization of state officials---for instance, provincial autonomy in Indonesia---because the policies must be expectedly oriented and based on the strengths and weaknesses of each region. This is called Local Economic Development (LED). Local Economic Development is one of the most well-known approaches in economic development that has been implemented in real terms both nationally and internationally. The International Labor Organization (ILO), an international organization under the United Nations that oversees workers, also has a Local Economic Development work area. Local Economic Development is a participatory process that encourages partnerships between the private sector, communities, and stakeholders in certain areas to carry out joint development by utilizing local resources to create jobs and stimulate economic activity. Local Economic Development is believed to be able to

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develop a region's economy based on each region's potential (Mensah, 2021).

Local Economic Development determines economic development needs and opportunities, decides what can and should be done to improve the economic condition in that community, and then moves to achieve agreed-upon economic goals and objectives (Shaffer et al., 2004). Local Actions are taken by an organization to improve the economic situation of local residents (income and assets) and local businesses (profitability and growth); and enhance the community's quality of life as a whole (appearance, safety, gathering places, and sense of positive momentum (Temali, 2002).

"The Impact of Local Economic Development through Community-Based Tourism on the Economic Welfare of the Community in Tamansari Village, Banyuwangi, East Java, Indonesia" (Novandi & Adi, 2021) concluded that Local Economic Development through community-based tourism on the economic welfare of the community has a positive impact. An improvement in the economic mindset, the addition of new livelihoods, an increase in income and financial management, and the ways and behavior of work are all positive impacts. In particular, this study also sees that the tourism sector's contribution is one of the most extensive supports in the economic movement of the research area.

Local Economic Development has also become one of the approaches used in dealing with rural development problems and various experiences of government project failures because it can synergize between rural development and increasing competitiveness that can empower the local economy. Economic Development works to align their community's human and natural resources to match global and regional markets. They can also strive to create new jobs that fit the people and the place (Blakely & Bradshaw, 2002). The Development is more likely to be successful if initiated at the community and local level than elsewhere. With this approach, it is hoped that there will be a synergy between comprehensive rural development and able to increase village competitiveness. (Wijijayanti et al., 2020). In addition to growth, the success of a country's economic development is measured through the dimension of equity. Development that solely pursues growth is believed to result in various gaps or inequalities, both in the form of gaps in the welfare of individual people (between the rich and the poor) and regional disparities or regional inequalities. In this regard, according to Sumitro Djojohadikusumo, two of Indonesia's three long-term development problems are related to the problem of inequality or inequality, namely the imbalance in the balance of power between community groups and economic imbalances between regions.

The theory of the polarization effect proposed by Karl Gunnar Myrdal tries to explain the

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occurrence of imbalance gaps. This theory explains the tendency of increasing disparities due to the flow of production factors from underdeveloped regions to developed regions. In contrast, the trickling-down effect theory explains the tendency of smaller gaps due to the movement of resources to underdeveloped regions due to the inefficient economy in the region. In another concept, the phenomenon of the widening of the gap is said to be the result of the backwash effect, while the phenomenon of narrowing the gap results from the spread effect. The optimistic view is represented by Hirschman, who argues that at some point, the trickling-down effect will work more robustly than the polarization effect (so that the gap will decrease). In contrast, Myrdal represents a more pessimistic view because, according to him, the backwash effect will always be greater than the spread effect (which means the gap will tend to get bigger).

Disparities in economic development are necessary, both at the level between countries and regions. However, the tendency of increasing disparities (divergence) must be avoided, and the narrowing of gaps (convergence) is a common goal. Another important thing is efficiency in terms of improving the economy. Allocative efficiency means producers supply the quantity of each product that consumers demand. Through this paper, we will try to classify the village's potential with the Clustering method based on the tourism potential of the village. Each Cluster will produce unique characteristics that are certainly different from one another. Based on this Cluster, it will be apparent that the gaps between villages in Nusa Tenggara Barat are visible. This, of course, can be considered in the future for the local government to build the village economy through tourism potential with Local Economic Development Techniques by avoiding an enormous gap.

In the tourism book written by Karyono in 1997 and the book on tourism economics by Vanhove in 2017, it is stated that several important factors in tourism can be measured in terms of supply, demand, trends, and impacts. This study extracts research variables from the tourism supply side. Factors supporting tourism include finance, accommodation, transportation, and policy. Therefore, the selected research variables are based on these four aspects (Karyono, 1997; Vanhove, 2017).

METHODS

The data used in this study is secondary data from the 2018 Village Potential data collection (Podes) collected by the Statistics Indonesia (BPS). Village Potential data is collected three times in ten years. The following data was collected in 2021, but until this paper was written, the data was still not published. The units of observation in this study were all villages and sub-districts

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in Nusa Tenggara Barat, totaling 1,143 villages. The variables used were 11 mixed variables (4 numerical variables and 7 categorical variables). These 11 changes describe the condition of tourism and aspects related to tourism, namely finance, accommodation, transportation, and policy.

The method used is clustering analysis. Cluster analysis is a multiple-variable technique whose main goal is to group a set of observed objects. Characteristics of objects in a particular cluster will have a high degree of similarity, while the characteristics between objects in one cluster with other clusters will have a low degree of similarity. Thus, the diversity within a cluster is minimum while the diversity between clusters formed as a result of the application of this analysis is maximum (Oktarina et al., 2020).

Table 1. List of Used Variables

Variable Names	**Types**	**Desc**
The existence of marine areas and used as marine tourism	Categorical	Exist None
The existence of river areas and used as commercial tourism	Categorical	Exist None
Existence of reservoir/lake area and used as commercial tourism	Categorical	Exist None
Number of hotel and lodging accommodation	Numerical	-
Distance to the nearest hotel and lodging accommodation	Numerical	-
Distance to nearest ATM	Numerical	-
Easy access to ATM	Categorical	Easy Difficult
The existence of roads that can be passed by 4-wheeled vehicles throughout the year	Categorical	Yes No
The existence of public transportation	Categorical	Yes No
Distance to city center	Numerical	-
Recreation and tourism development program	Categorical	Yes No

The steps of data analysis carried out in this study were started by checking data completeness from the 2018 Village Potential data collection (Podes) in Nusa Tenggara Barat. Clustering villages using the K-Proyotypes algorithm because it uses mixed numerical and categorical data. First of all, standardization of all numerical variables is carried out and then followed by the following steps (Yin et al., 2021):

a. Determine initials clusters (k), namely $Z_1, Z_2, \cdots$, and Z_k as the center of each cluster.
b. Calculate the distance of all observation data in the dataset to the initials of the initial cluster. The distance measure used is a mixed distance measure:

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$$d_2(X,Y) = \sum_{j=1}^{p} (x_j - y_j)^2 + \gamma \sum_{j=p+1}^{m} \delta(x_j = y_j)$$

$d_2(X,Y)$: the measure of distance between X and Y (mixed data attribute)

$\sum_{j=1}^{p} (x_j - y_j)^2$: distance measure for a data attribute of numerical type

$\gamma \sum_{j=p+1}^{m} \delta(x_j = y_j)$: distance measure for a data attribute of categorical type

γ : weighing parameters

c. allocate all observations into groups with the closest prototype distance to the measured object.
d. performs a new cluster center point calculation after all objects have been allocated. Next, reallocate all the observation data in the dataset to the new prototype.
e. If the center point of the cluster does not change or has converged, the algorithm process stops. However, if the center point changes significantly, the process returns from stages (b) to (e) until the maximum iteration is reached. In other words, there is no more object displacement.
f. Perform the clustering process of this algorithm on another size k. In this study, the size of k used in clustering K-Prototypes is $k = 3$ to $k = 10$.
g. The optimal cluster in the K-Prototypes algorithm is the cluster with the smallest diversity ratio of k used in this study.

The clustering results were evaluated by a silhouette approach. Best cluster is characterized by the largest silhouette value for all variables. Finally, visualize and interpret the characteristics of the best clusters in classifying villages based on poverty indicators. Visualization using chat radar and bar charts. Radar chart is a visualization of clustering results for numerical variables by calculating the average value of all variables in each cluster. Bar chart is a visualization of clustering results for categorical variables which are cross-tabulated to each cluster and describe the distribution of each cluster based on city/district areas in Nusa Tenggara Barat.

RESULT AND DISCUSSION

A boxplot is used to determine the central tendency and dispersion of data from numerical variables, as shown in Figure 2. The figure shows that all numerical variables have a negative distribution pattern because the data on these variables are collected at low values. All numerical variables have an outlier of the upper outlier type. The outlier value for each variable

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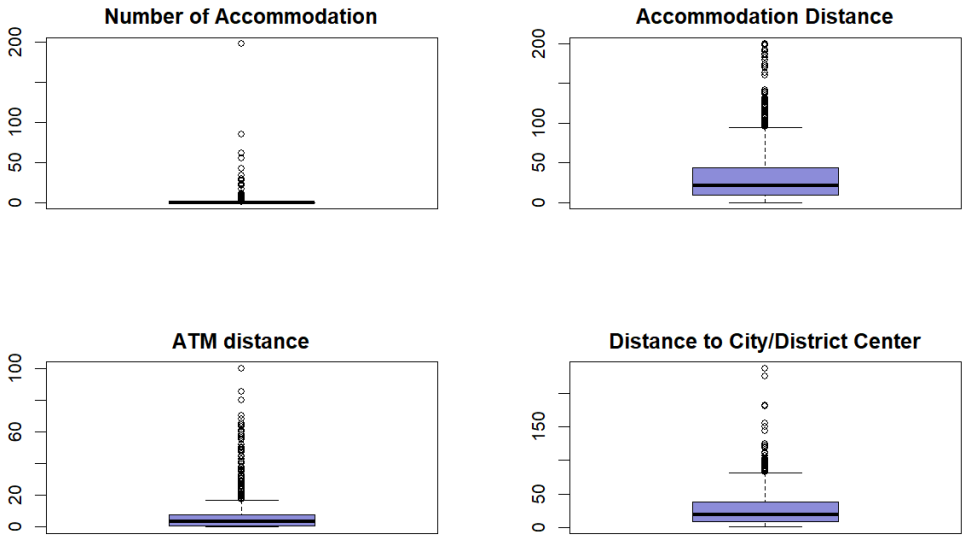
is called a univariate outlier.

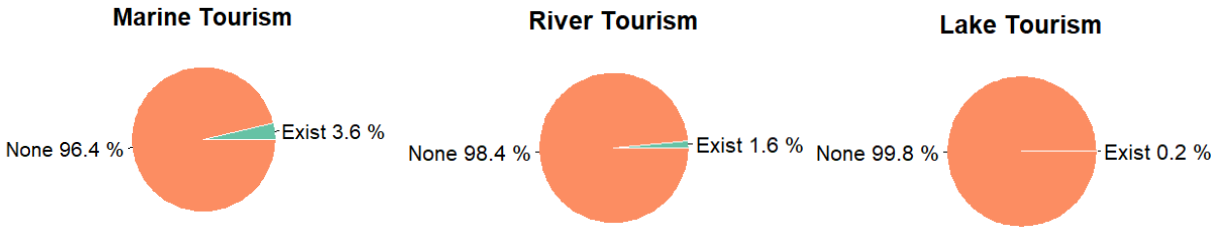
There is no accommodation, namely hotels and inns, in most villages in Nusa Tenggara Barat. Villages with hotels or inns are usually located in city centers or near tourist attractions. When viewed from the distance to the nearest accommodation, all villages are, on average, no more than 30 km. However, some villages are still very far from the hotel or inn. The same thing happened to the distance variable to the city center. This confirms that hotels or inns are usually located in city centers or near tourist attractions. Finally, village access to the nearest ATM shows that most villages in Nusa Tenggara Barat are not difficult to access an ATM, but there are still villages that have to travel more than 50 km to access an ATM.

Figure 3. Boxplot of Numerical Variables



Source: Secondary data output after processing, 2022; (Dessy, 2022)

Figure 4. Pie Chart of Categorical Variables



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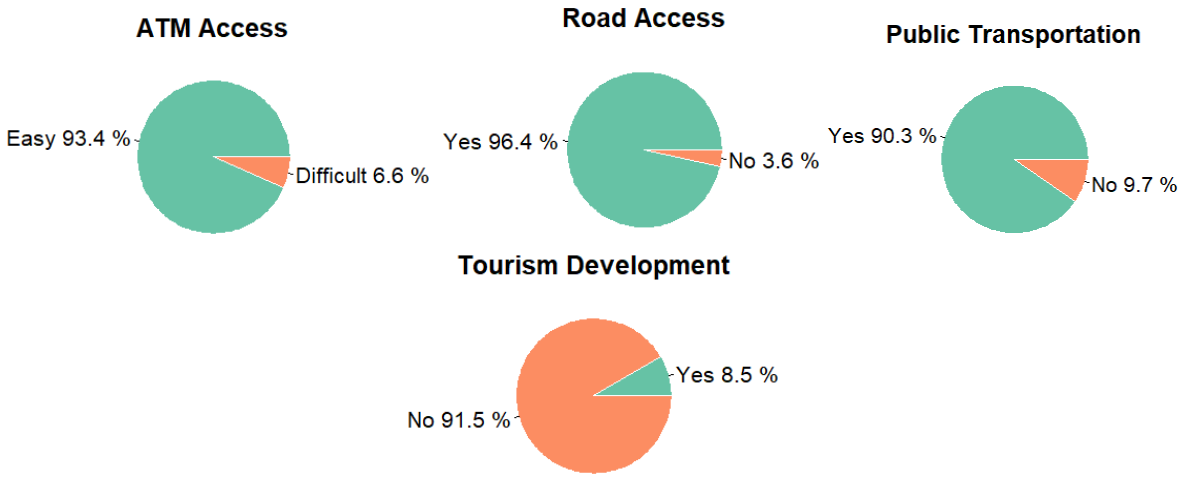

Source: Secondary data output after processing, 2022; (Dessy, 2022)

There is no marine/river/lake tourism in most villages in Nusa Tenggara Barat. Villages with marine tourism are only 3.6%; river tourism is 1.6%; lake tourism is only 0.2%. Judging from financial access, namely the existence of ATMs as facilities that show banking transactions, most villages in Nusa Tenggara Barat (93.4%) are easy to access ATMs. This is in line with the data on the closest distance to an ATM spread negatively with low values. In terms of transportation, roads in most villages in Nusa Tenggara Barat can be passed by motorized vehicles with four or more wheels throughout the year. The existence of public transportation is also easily accessible in almost every village. Unfortunately, development programs for recreation and tourism have not been intensified. Only 8.5% of villages in Nusa Tenggara Barat have development programs for recreation and tourism.

K-Prototypes Clustering

Clustering is one of the techniques that help researchers explore data, especially big data. This technique divided the data into some groups with entities in each group comparatively more similar to entities of that group than those of the other groups. There are some Clustering Methods that can be used. This study is using the K-Prototypes algorithm due to the mixed variables used. The first step in applying this algorithm is determining the number of clusters (k) to be formed. In this study, the number of clusters processed using the K-Prototypes algorithm was from k=3 to k=10. The optimal number of clusters of the K-Prototypes algorithm is determined using a silhouette approach. The best number for clustering is the highest silhouette index for all variables (Shutaywi & Kachouie, 2021).

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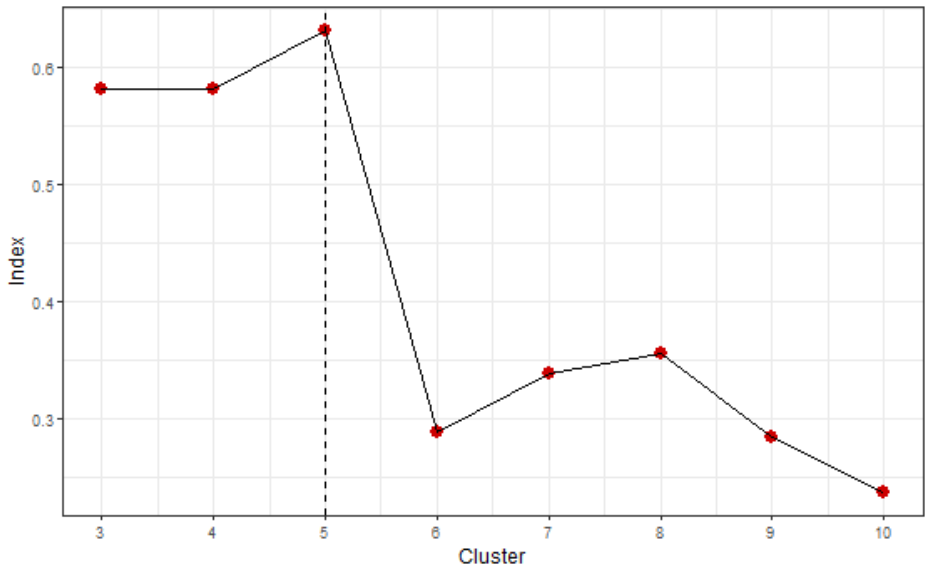
Figure 5. K-Prototypes Swarming Silhouette Index



Source: Secondary data output after processing, 2022; (Dessy, 2022)

Based on the results of the silhouette calculation, the optimal cluster generated by the K-Prototypes algorithm is at k=5. The silhouette index value in this cluster is the largest compared to other clusters (Figure 3). Therefore, the clusters will be formed in this study are 5 clusters that will be discussed in section e.

Results of Best Cluster by Radar Chart

The numerical variables resulting from the best clustering are shown as a Radar Chart. The values in the Radar Chart are standardized values for each variable. Standardization was carried out to overcome differences in measurement scale on all numerical variables used in this study. The application of standardized values makes comparisons of variables within clusters and between clusters possible.

The characteristics of cluster 1 show that the cluster is filled with villages close to the city center, distance to ATMs, and distance to accommodation. Nevertheless, the number of accommodations in the form of hotels and inns is still not much. Furthermore, cluster 2 has quite different characteristics. The villages in cluster 2 are far from the city center, distance to ATMs, and a distance to reach an accommodation. The number of accommodations is also very small in this group. These clusters are probably self-help villages, namely villages whose areas are isolated from other areas, the community adheres to customs, and technology is still low (Sunandi et al., 2021).

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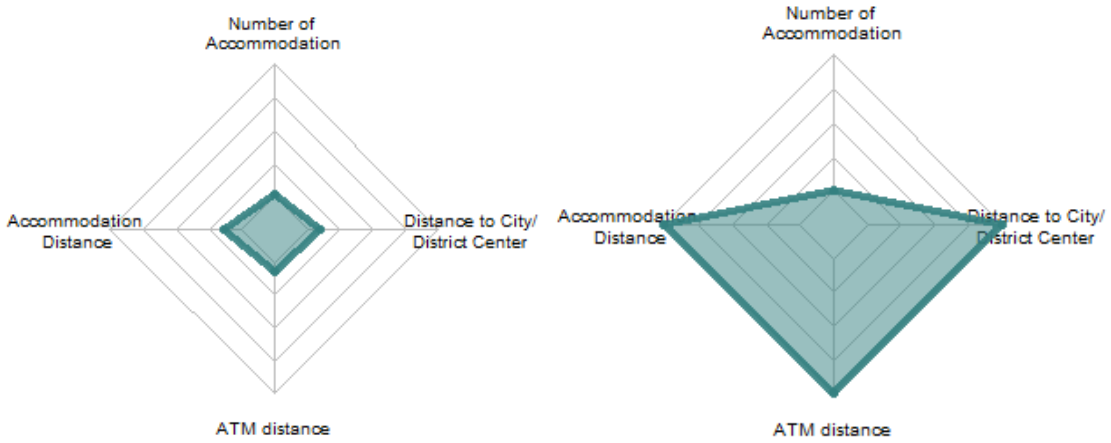
Figure 6. Radar Chart of Cluster 1 & Cluster 2.



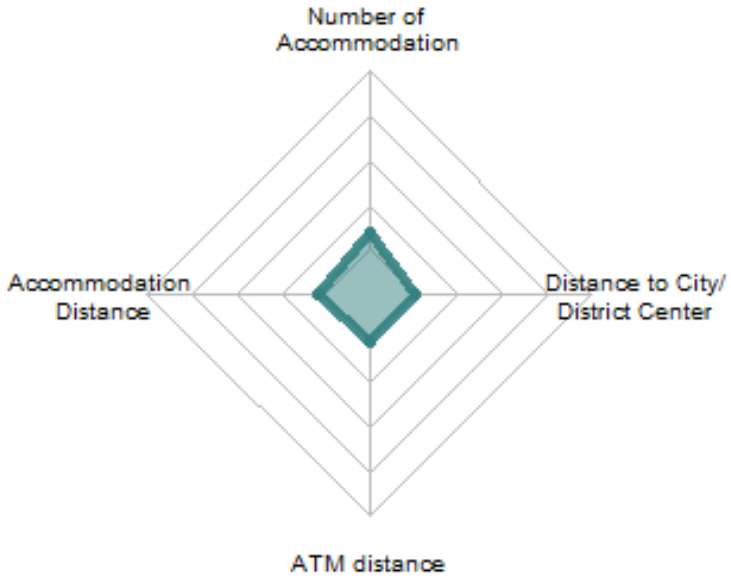
Source: Secondary data output after processing, 2022; (Dessy, 2022)

The characteristics of villages in cluster 3 are the opposite of cluster 2. In cluster 3, each village is close to the city center, distance to ATMs, and a distance to accommodation. Even the number of hotel accommodations and inns in cluster 3 is already a lot. This is a characteristic of self-sufficient villages, primarily located in sub-district capitals and densely populated (Utaminingsih et al., 2021) Then, cluster 4 is similar to cluster 2; the distance to the city center and the nearest accommodation is quite far, but the distance to the ATM is not too far.

Figure 7. Radar Chart of Cluster 3 & Cluster 4.

Source: Secondary data output after processing, 2022; (Dessy, 2022)

Figure 8. Radar Chart of Cluster 5.



Source: Secondary data output after processing, 2022; (Dessy, 2022).

Meanwhile, the characteristics of cluster 5 are similar to cluster 1. The distance to the city center, distance to ATMs, and distance to accommodation are considered close. However, there are not many hotel and lodging accommodations. Cluster 5 is characteristic of the majority of villages in Nusa Tenggara Barat. The number of villages in cluster 5 reached 801 villages. While in cluster 1, there are 104 villages, cluster 2 is 58 villages, cluster 3 is 82 villages, and cluster 4 is 98 villages.

Results of Best Cluster by Bar Chart

The best clustering categorical variables can be shown as a Bar Chart. A bar chart consists of the proportion of the number of villages based on categorical variables for each cluster. In the tourism aspect, the results are similar to the results of the descriptive analysis; there is no marine/river/lake tourism in most villages in Nusa Tenggara Barat in all clusters. Its presence in cluster 3 has the highest proportion of marine tourism compared to other clusters. Meanwhile, for river and lake tourism, there are no significant characteristics or proportions for each group.

On the financial aspect, clusters 1, 3, 4, and 5 easily access ATMs. Meanwhile, in cluster 2, access to ATMs is quite a hassle. Then in the aspect of transportation, there are still many villages in cluster 2 that cannot be passed by four or more wheeled motorized vehicles throughout the year. This further shows that the characteristics of cluster 2 are included in the classification of self-help villages. Meanwhile, regarding the existence of public transportation, what needs attention is cluster 1, where there are still many villages that do not have public

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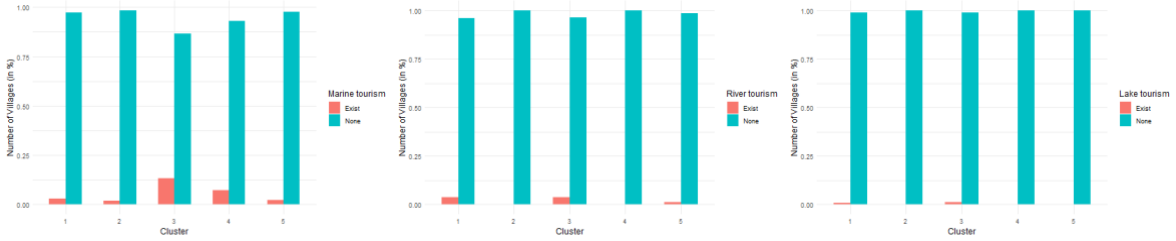
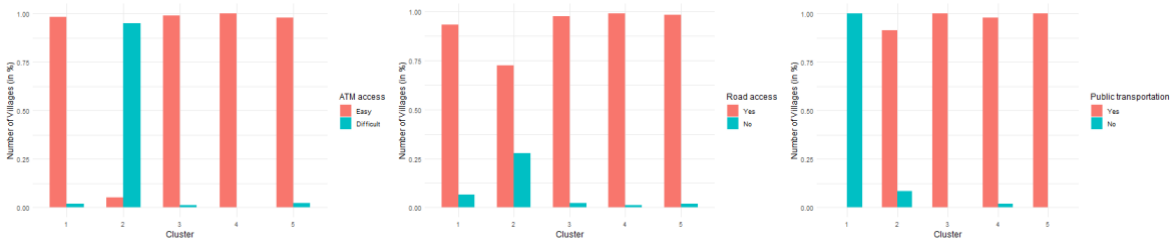
transportation at all. While in other groups, the majority of them already have public transportation.

Figure 9. Bar Chart of Tourism Aspect (Marine, River, and Lake).



Source: Secondary data output after processing, 2022; (Dessy, 2022).

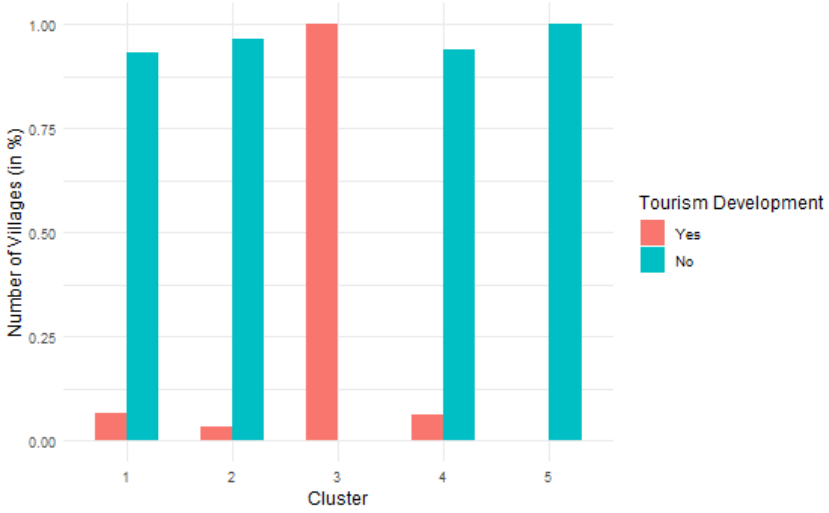
Figure 10. Bar Chart of Financial Aspect (ATM Access, Road Access, Public Transportation).



Source: Secondary data output after processing, 2022; (Dessy, 2022).

The last aspect that is quite important is the existence of a village development program for recreation and tourism. The villages in cluster 3 all have village development programs for recreation and tourism. Cluster 3 can be classified as a tourist village.

Figure 11. Bar Chart of Tourism Development Programs.



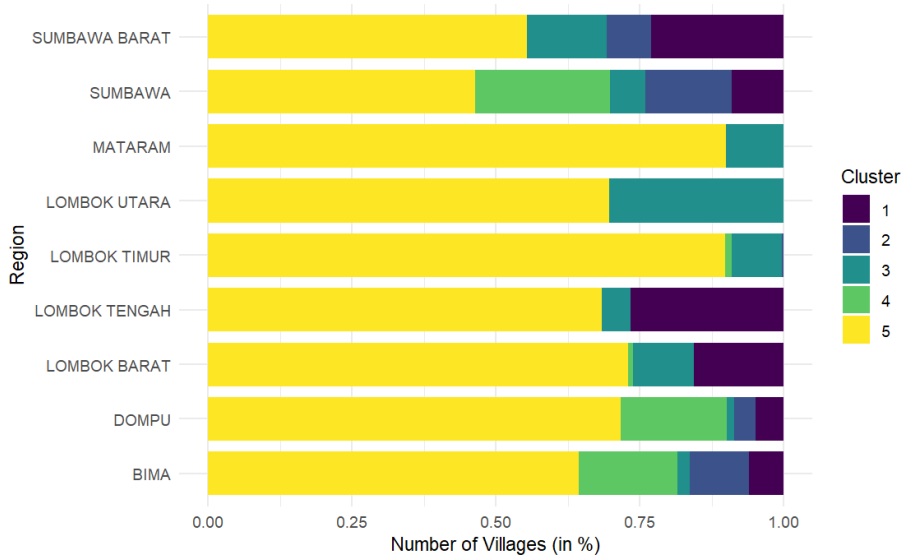
Source: Secondary data output after processing, 2022; (Dessy, 2022).

In Cluster 5, there completely is no village that has a tourism development program. In

clusters 1, 2, and 4, only a small number of villages have tourism development programs.

The best clustering results when plotted by city/district are as follows. Villages included in cluster 1 (in purple) are spread over Sumbawa Barat, Sumbawa, Lombok Tengah, Lombok Barat, Dompu, and Bima. The dominant number of cluster 1 is in Sumbawa Barat and Lombok Tengah. Then, the villages that are included in cluster 2 (in blue) are more dominant in Sumbawa and Bima.

Figure 12. Distribution of Village's Cluster by District/City.



Source: Secondary data output after processing, 2022; (Dessy, 2022).

Meanwhile, cluster 3 (in dark green) was dominant in Lombok Utara and a small part in Mataram, Lombok Timur, Sumbawa, Barat, and Lombok Barat. Furthermore, cluster 4 (in light green) was most dominantly distributed in Sumbawa, Dompu, and Bima. Finally, cluster 5 (in yellow) spreads evenly throughout the area in Nusa Tenggara Barat.

Characteristics of Each Cluster and Policy Implications

Cluster 1 has many tasks that must be improved to develop as a tourism area. In terms of accommodation, although the number of accommodations is not large, the distance to the nearest accommodation is not that far. Regarding transportation, what needs to be a concern is the existence of public transportation as a public facility and infrastructure. There is no public transportation at all in cluster 1. On the financial aspect, the distance to ATMs is quite close, and access is relatively easy. On the tourism side, in cluster 1, there are not many villages with tourism objects and recreational and tourism development programs.

Cluster 2 has characteristics similar to those of self-help villages (Sunandi et al., 2021). The accommodation and financial aspects are still low. Accommodation is quite remote, and

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ATMs are difficult to access. Even though there is public transportation, many villages have not been accessed by four or more wheeled motorized vehicles. There is no tourism development program in cluster 2. There is a need to improve accommodation and financial facilities, and infrastructure to support tourism activities.

The villages in clusters 1 and 2 are characterized as suburban villages. These areas are often still very limited in terms of transportation and accommodation. There is still a lot to improve but it still has the potential to be developed into a tourist village as tourist demand for rural areas has increased in recent years. Learning from the country of Asustria, the development of tourist villages in the suburbs can be built on the available local resources and potential. For example, the restaurant sector that prioritizes local atmosphere and seasonal and local specialties, new profiles that focus on a particular theme (e.g. health, culture) or groups (e.g. family, active elderly) natural and cultural environments that are refined and presented in an attractive way, and agro-tourism as a general solution to sustain an agriculture-based society (Andéhn & L'Espoir Decosta, 2021; Hummelbrunner & Miglbauer, 2009).

Cluster 3 is the most ideal but towards a saturation situation. All aspects that support tourism activities have been met. Accommodation, transportation, finance, and the existence of recreational and tourism development programs are adequate. Cluster 3 is categorized as a tourist village and must be defended. It is said to be saturated because its tourism potential has been worked out quite well. Villages that are members of cluster 3 are mostly found in Lombok Timur. The tourism industry in Lombok Utara has over the past five years grown to almost three times its size in 2016, based on the number of tourist arrivals. In 2021, there were more than three million foreign tourists, while there had previously been only one million visitors, and recreation was the most dominant figure for motivational visits (Badan Pusat Statistik Lombok Utara, 2022).

Cluster 4 has similar characteristics to cluster 2 but is better than cluster 2 in the financial aspect. Distance and ease of accessing ATMs are already in the category of easy to access. Others are similar to cluster 2; the accommodation aspect needs to be improved to support tourism activities. While that cluster 5 is a cluster and has good potential for tourism development. The villages in cluster 5 are adequate in terms of accommodation, transportation, and finance. What is still lacking is the existence of recreation and tourism development programs by the village government. Furthermore, the government and related parties can explore the potential or an opportunity in the villages in cluster 5, which can be used as tourist attractions.

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The first step that can be taken to develop the potential of tourism villages in cluster 5 is to socialize an inventory of village potentials in the context of village spatial plans. Potential inventory is one of the important things in sustainable village development. Potential inventory is the first step before making a village spatial plan (Istiyanti, 2020). Each village has different characteristics or characteristics of village potential. The reasons for the importance of taking an inventory of village potential are for better changes, different regional resources, and limited development funds so that they are focused on important things first, so that later they will find common ground for policy makers' plans and strengthen planning. Potential inventory activities are activities that contain data collection of all potentials, both natural resources and human resources in it. From the potential inventory activity, both village administrators and the community can focus more on what things need to be improved in their village so that they can develop for the better. Not all villages can be forced to become tourist villages even though they are adequate in terms of accommodation, transportation, and finance, so there is a need for potential inventory activities.

The collaboration of broad stakeholders from the central government, regional governments, tourism associations, the private sector, and villages is very much needed to achieve long-term sustainable tourism development. The tourism village development scheme must be included in the RPJMDes village planning activity program. This needs to be done to bind the commitment of the Village Government to develop tourist villages, increasing the village's original income, and ensuring that the community is aware of village programs so that they can oversee their implementation. The most important economic feature of activities related to the tourism sector is that they contribute to three high-priority goals of developing countries: the generation of income, employment, and foreign-exchange earnings (Amir et al., 2020).

CONCLUSION

The cluster analysis exercised in this study to obtain an overview of the potential and characteristics of villages in Nusa Tenggara Barat has gone well with some insights. There are five clusters in Nusa Tenggara Barat by the villages based on tourism aspects and factors that support tourism. Cluster 3 is an ideal cluster, meaning tourism development in that cluster is complete. Cluster 5 has considerable potential in tourism because the supporting factors are analytically good. There are villages dispersed across Sumbawa Barat, Sumbawa, Lombok Tengah, Lombok Barat, Dompu, and Bima that are part of cluster 1. In Sumbawa Barat and Lombok Tengah, cluster 1 predominates numbers. The settlements in cluster 2 are then more prevalent in Sumbawa and Bima. Furthermore, Sumbawa, Dompu, and Bima have the highest

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concentrations of cluster 4. Unlike clusters 3 and 5, special attention should be paid to clusters 1, 2, and 4 in tourism development.

The government can carry out more focused village development based on clustering results. For example, the villages in cluster 1 need improvement in transportation and accommodation. These two aspects are essential in supporting the mobility of tourists. Meanwhile, clusters 2 and 4—although some areas already have tourist areas that are classified as good—accommodation for tourists in both clusters have not been well catered for. Access to finance, such as ATMs, has not been facilitated, so it is necessary to cooperate with financial institutions in providing financial access. Whatever action plans the government could take toward each cluster to increase the GDP-oriented service product, namely tourism; whether it is an improvement or reconstruction, clustering analysis works its role in learning the data to make the policy more focused.

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