Efficient Vol 7 (1) (2024): 55-63 DOI: https://doi.org/10.15294/p115hn89

EFFICIENT

Indonesian Journal of Development Economics

https://journal.unnes.ac.id/sju/index.php/efficient

Grouping the Number of Foreign Tourist Visits and Analysis of Tourism Competitiveness in East Java

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Permalink/DOI: https://doi.org/10.15294/p115hn89

Received: July 2023 ; Accepted: October 2023 ; Published: January 2024

Abstract

Tourist attractions for international visitors are created by foreign tourists. However, East Java Province has failed to attract international tourists to its tourism attractions, resulting in the lowest number of foreign tourist visits to Java Island. East Java Province has the second-fewest foreign tourist visitation in Java after Banten Province. K-Means clustering, and competitiveness monitor analysis are utilized for quantitative research. The K-Means algorithm was used to classify the number of international tourists to East Java Province based on regions and cities that are divided into two clusters: the high cluster (C1), which includes Banyuwangi Regency, Malang Regency, and Surabaya City, and the remaining 35 regions and cities in the low cluster (C2). According to the Competitiveness Monitor (CM), the tourism competitiveness index on the seven indicators is good. It is only that the 0.35-point OI Indicator has not shown good competitiveness. Tourism in East Java Province can compete with international trade with the local government's focus on controlling tourism to earn revenue.

Keywords: Clustering, K-Means, foreign tourists, competitiveness, competitiveness monitor

How to Cite: Grouping the Number of Foreign Tourist Visits and Analysis of Tourism Competitiveness in East Java. (2024). Efficient: Indonesian Journal of Development Economics, 7(1), 55-63. https://doi.org/10.15294/p115hn89

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INTRODUCTION

Tourism according to RI Law Number 10 of 2009 concerning tourism is a trip undertaken by a person or group of people in a short visit to a tourist destination to have fun, develop themselves, or explore the uniqueness of a tourist destination, supported by various facilities. and services from communities, businesses, and local government.

The growth of the tourism industry has made it one of the most developed in the world, where tourist visits are increasing, and the

income of these tourists can provide foreign exchange for the country, regional income, regional development, as well as investment and employment. Various tourism destinations in Indonesia can be used to boost the regional economy.

Developments in this field will have a significant impact on related industries such as hotels, restaurants, travel agencies and small businesses in tourist areas, because they can produce and sell souvenirs. This is evidenced by tourism export revenues reaching US$1.7 trillion in 2019, making it the third largest export after fuel and chemicals by contributing 7.4% of global trade in 2019 and directly or indirectly producing 1 in 10 workers, work and supply provide livelihoods for millions of people in developed and developing countries (World Travel & Tourism Council, 2021).

The development of a tourism business in an area requires policies that vary between Provinces, Regencies and Districts in each region. Tourist attraction according to the Regulation of the Minister of Tourism of the Republic of Indonesia Number 10 of 2016 is everything that has originality, beauty and value in the form of natural, cultural and man-made wealth for tourists to visit.

Each region will have its own characteristics of potential tourist attraction. Therefore, in tourism development it is necessary to consider the various existing potentials to support this development (Fajarin, 2020). The existence of differences in tourist attractiveness will be the basis for grouping tourism potential to determine competitiveness in each region.

Every existence of a tourist object shows a certain potential and attractiveness. The development of tourist attractions refers to the process of designing and creating more attractive tourist objects for those who want to visit tourist objects in the area, because the potential for various tourist attractions can be a driving factor for planning efforts to build more attractive tourist attractions for people who want to visit. tourist attraction in an area.

The potential and attractiveness of existing tourist objects can depend on the conditions, which can be natural tourist objects or artificial tourist objects (Prapsilo et al., 2013). Based on the report of the World Economic Forum (2021) entitled "Travel and Tourism Competitiveness Report 2021" Indonesia's tourism competitiveness has increased from rank 40 in 2019 to rank 32 in 2021.

In this report WEF assesses the impact of a number of variables and policies that drive growth sustainable development in the tourism industry, which will later become a benchmark for development and national competitiveness. However, Indonesia is still lagging behind three neighboring countries, namely Singapore, Malaysia and Thailand.

Indonesia occupies the fourth position in terms of tourism competitiveness in Southeast Asia. According to Porter & Schwab (2009), a more competitive economy is one that is likely to grow faster in the medium to long term. According to Dwyer et al. (2000) competitiveness is a broad term that includes such things as price differentials and changes in exchange rates, productivity levels of various components of the tourism industry, and the qualitative factors that influence how attractive a place is. It can be seen from the many tourist destinations that continue to grow from year to year. This invites many domestic and foreign tourists to visit Indonesia, especially the island of Java.

Figure 1. Number of Arrivals of International Tourists in Java Island 2016-2020 (People)
Source: Badan Pusat Statistik (BPS), 2022

Based on figure 1 for the number of foreign tourist visits, when viewed from the average foreign tourist visits five years ago, West Java ranks first with an average of 2,390,282 people per year. In the last sequence of foreign tourists visiting the island of Java are East Java Province with an average of 401,678 people per year, followed by Banten Province with an average of 251,637 people per year. Meanwhile, the number of domestic visits on the island of Java can be seen in figure 1.

Figure 2. Number of Visits by Domestic Tourists in Java Island in 2016-2020 (People)
Source: Badan Pusat Statistik (BPS), 2022

The figure shows that the average number of domestic tourist visits to Java over the last five years from 2016 to 2020, West Java ranks first with an average of 51,732,185 people per year, followed by East Java with an average an average of 49,167,362 people per year, followed by

Central Java, DKI Jakarta, Banten and DIY. With the number of visits of foreign tourists and domestic tourists will have a positive impact on the economy of the regional tourism sector. The contribution of the tourism sector to the economy can be identified through tourist activity.

Tourists who come spend a certain amount of money ranging from transportation expenses to buying products/services at tourist destinations, such as accommodation, food and drinks, souvenirs, recreational activities, and so on (Lestari, 2019). On the average number of foreign tourist arrivals on the island of Java, East Java occupies the lowest position.

When viewed from the number of tourist objects sourced from BPS, the average number of tourist objects in East Java from 2016 to 2020 is 831 tourist objects per year, which means that they are still superior compared to Banten Province with 586 tourist objects per year, Central Java with 783 tourist objects per year and the Special Region of Yogyakarta 191 tourist objects annually.

Meanwhile, the average visit of domestic tourists from 2016 to 2020 is inversely proportional to foreign tourists, where East Java occupies the second position after West Java, namely 49,167,362 people per year. Domestic tourists play an important role in the growth and development of tourist attractions designed to attract international visitors.

But in reality foreign tourists in East Java are still in the second lowest position on the island of Java even though the number of visits by domestic tourists occupies the second position on the island of Java. Despite the position of East Java Province as the largest province on Java Island and the second largest number of domestic tourists on Java Island, East Java Province has not been able to attract foreign tourists to East Java Province even though it has more tourist objects when compared to other provinces on Java Island.

With the priority destinations for East Java Province, namely Bromo Tengger Semeru (BTS) Destinations, Ijen Crater, and others, it should be able to increase foreign tourist visits. Based on this background, researchers want to know how the tourism sector is grouped and tourism competitiveness in East Java Province causes the number of foreign tourist visits to this province to be the least in Java after Banten Province.

RESEARCH METHODS

This research is research conducted using quantitative research methods. In this study, the technique used is the data mining method with K-Means Clustering analysis and analysis of tourism competitiveness Competitiveness Monitor.

This study uses secondary data sourced from the East Java Central Bureau of Statistics (BPS), the East Java Tourism and Culture Office, the Regional Financial and Asset Management Agency, and the East Java Bina Marga Public Works Office.

The data used includes, among others, the number of foreign tourist visits, total population, average length of stay of foreign tourists, length of paved roads, length of good quality roads, area area and Regional Original Income (PAD) of the tourism sector using the 2016-2020 period. The location used in this research is East Java Province along with 38 regencies in East Java.

The process of determining the K-means algorithm can use several steps (Larose, D & Larose C, 2014): Determine the number of clusters that you want to form from a data set, where the value of k is the number of clusters /

number of clusters. Determine the cluster center or centroid randomly.

Table 1. District and City Data in East Java Province

No	Regional Name	No	Regional Name
1	Pacitan	20	Magetan
2	Ponorogo	21	Ngawi
3	Trenggalek	22	Bojonegoro
4	Tulungagung	23	Tuban
5	Blitar	24	Lamongan
6	Kediri	25	Gresik
7	Malang	26	Bangkalan
8	Lumajang	27	Sampang
9	Jember	28	Pamekasan
10	Banyuwangi	29	Sumenep
11	Bondowoso	30	Kediri
12	Situbondo	31	Blitar
13	Probolinggo	32	Malang
14	Pasuruan	33	Probolinggo
15	Sidoarjo	34	Pasuruan
16	Mojokerto	35	Mojokerto
17	Jombang	36	Madiun
18	Nganjuk	37	Surabaya
19	Madiun	38	Batu

Source: Dinas Komunikasi dan Informasi East Java Province, 2022

Determines all data or objects to the closest cluster determined by the distance between the data and the center of the cluster using the Euclidean Distance formula.

$$d(x,y) = \sqrt{\sum_{i=1}^{n}(X_I - Y_j)^2}$$

Where d(x,y) is the distance of the x-th data to the center of the y cluster, Xi is the ith data in the nth data column andYj is the jth data in the nth data column. The new cluster center based on the members of each cluster determined as :

$$C_k = (\frac{1}{n_k})\sum d_i$$

Repeat step 3 to step 5 until the cluster center does not change anymore, the clustering process is complete. The loop stops when no data is transferred. Competitiveness variable measurement uses eight indicators of competitiveness (Competitiveness Monitor) introduced by the World Travel and Tourism Council (2008).

However, in this study only used 7 indicators. The reason for using only 7 indicators is due to limited data owned by the East Java Province Culture and Tourism Office regarding the average hotel rates in East Java Province.

RESULTS AND DISCUSSION

This research is based on data received from the Central Bureau of Statistics (BPS) of East Java Province and the East Java Province Culture Office, which is used as an alternative with five criteria, namely from 2016 to 2020.

The midpoint or centroid value is obtained from the data collected when the K-Means method is used, considering that the desired clusterization is 2. The process of determining this cluster point involves selecting the highest (maximum) value for cluster height (C1) and selecting the lowest (minimum) value for cluster (C2).

The cluster data obtained can be split into two clusters using centroids. The cluster process is carried out by calculating the shortest distance from each piece of data that is processed.

Classify each piece of information according to how close it is to the center of the sample (shortest distance). If the largest value is

found in cluster 1 (C1), then it is placed in cluster 1; if not, placed in cluster 1 group.

The K-Means procedure will continue to perform literacy until the data grouping is exactly the same as the literacy data grouping from the previous iteration. The following is the calculation of the distance between each piece of data in the first cluster (C1):

D (1,1) = √((121.780,80-166,40)^2) = 121.614,40
D (1,2) = √((121.780,80-121.780,80)^2) = 0
D (1,2) = √((121.780,80-823,80)^2) = 120.957
Up to D (1.38)

In other words, the literacy process will continue until the latest literacy data is identical to the previous literacy data. Finding the shortest distance is the next step in the process after determining the centroid value or the middle of the distribution. Calculation of the distance between each data point in the second cluster (C2):

D (1,1) = √((121.780,80-166,40)^2) = 121.614,40
D (1,2) = √((121.780,80-121.780,80)^2) = 0
D (1,2) = √((121.780,80-823,80)^2) = 120.957
Up to D (2.38)

After obtaining a new cluster center point (centroid), the next step is to recalculate the distance between each data set for the number of foreign tourists by district or city and the appropriate cluster center. Calculation of the distance between each data point in the first cluster (C1):

E (1,1) = √((85.962,87-166,40)^2) = 85.796,47
E (1,2) = √((85.962,87-121.780,80)^2) = 35.817,93
E (1,3) = √((85.962,87-823,80)^2) = 85.139,07
Up to E (1.38)

After getting the results for literacy 2, compare them with the results for literacy 1. If there is no difference between the two sets of results, the process is over. Calculation of the distance between each data point in the second cluster (C2):

E (2,1) = √((4.313,88-166,40)^2) = 4.147,48
E (2,2) = √((4.313,88-121.780,80)^2) = 117.466,92
E (2,1) = √((4.313,88-823,80)^2) = 3.490,08
Up to E (2,38)

However, if there is a change, the procedure will restart until the two result sets are identical. The final results of literacy 2 are the same as literacy 1, namely C1=3 and C2=35, this is based on calculations that have been made on data on the number of foreign tourists visiting East Java Province by Regency/City. As a result, the position in literacy 2 does not change, then the process stops.

Analysis of the tourism competitiveness index was carried out with the aim of getting an overview of the state of tourism competitiveness in East Java Province in 2016-2020. The results of this study have implications for policies that can be implemented by the Provincial Government of East Java to improve the tourism sector by taking into account the characteristics that determine the level of competitiveness of a region.

This is important because by paying attention to the indicators that determine tourism competitiveness, it is possible to analyze the advantages and disadvantages of various regions as part of the process of developing the tourism industry as a potential source of PAD. Given that East Java Province is one of the national tourism destinations. Based on the results of the research and discussion on the

development of the competitiveness of the Province of East Java during the 2016-2020 period, it can be seen from the level of tourism competitiveness of the Province of East Java that it is calculated using the following formula:

$$Z^c = \sum W_k Y_k^c$$

Where Z^c is Tourism competitiveness, $\sum W_k$ is Calculation of the sum of each indicator and Y_k^c is Composite Index.

Table 2. East Java Province Tourism Competitiveness Index for 2016-2020

Indicator	Competitiveness Index Tourist
Human Tourism Indicator (HTI)	1,72
Infrastructure Development Indicator (IDI)	0,70
Technology Advancement Indicator (TAI)	0,88
Environment Indicator (EI)	0,65
Human Resources Indicator (HRI)	0,95
Social Development Indicator (SDI)	1,73
Openess Indicator (OI)	0,35

Source: Processed secondary data, 2022

The research results can be seen in table 2. The results of the analysis of tourism competitiveness in East Java Province using the Competitiveness Monitor (CM) method show that the tourism competitiveness index on the six indicators is on a good competitiveness scale, namely the Human Tourism Indicator (HTI), Infrastructure Development Indicator (IDI), Technology Advancement Indicator (TAI), Environment Indicator (EI), Human Resources Indicator (HRI), and Social Development Indicator (SDI). Meanwhile, the Openness Indicator (OI) does not show a good level of competitiveness.

Competitiveness theory plays a role in expanding in promoting the image and international perception of a country externally and influencing complementary domestic policies. This span of influence and interests creates challenges in measuring tourism competitiveness. The tourism industry is an important contributor to the national economy, providing employment and tax revenues that contribute to economic growth and prosperity.

This research is in line with research (Damanik & Purba, 2020) where the Openness Indicator (OI) is still weak, which means the level of tourism openness in Simalungun Regency is low so it does not invite foreign tourists. The role of the tourism sector in the economy of Simalungun Regency can also be seen from its contribution to the formation of Regional Original Income. The contribution of the tourism industry can be seen through regional fees, hotel taxes, restaurant taxes and entertainment taxes.

CONCLUSION

Based on the results of calculations carried out using the K-Means algorithm to classify the Number of Visits of International Tourists who come to East Java Province based on Regency/City, which is divided into 2 clusters, namely the high cluster (C1) and the low cluster (C2), an assessment is obtained 3 Regencies/Cities are in the high cluster (C1), and the remaining 35 Regencies/Cities are in the low cluster (C2). The 3 Regencies/Cities include: Banyuwangi Regency, Malang Regency, and Surabaya City.

Based on the results of the Competitiveness Monitor (CM) analysis, it

shows that the tourism competitiveness index on the six indicators is on a good competitiveness scale. The Human Tourism Indicator (HTI) indicates a value of 1.72 points, the Infrastructure Development Indicator (IDI) indicates a value of 0.70 points, the Technology Advancement Indicator (TAI) indicates a value of 0.88 points, the Environment Indicator (EI) indicates a value of 0.65 points, the Human Resources Indicator (HRI) indicates a value of 0.95 points, and the Social Development Indicator (SDI) indicates a value of 1.73 points.

The highest tourism competitiveness index is found in the Human Tourism Indicator (HTI) indicator of 1.72 which is caused by the number of foreign tourists visiting East Java, as well as in the Social Development Indicator (SDI) indicator of 1.73 which is influenced by the length of time live foreign tourists.

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