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The use of Geographical Information System in Visual Fishery Information in East Java

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Abstract: This article presents considerations made to show how important it is to use current information to help make a decision. We are currently faced with major social and technological challenges. The main purpose of this discussion is to gain knowledge about the level of use of information technology to create geographic information systems or visual maps of fishery potential in East Java and advantages of GIS in fishing industry. Studies are based on the idea of the need to implement measures aimed at the development and enhancement of fishery potential. The methodological basis for the discussion is an analysis of the literature and case studies. The results showed that the division of four (4) clusters, namely: clusters A, B, C and Cluster D, showed quite good results, where the distribution of clusters corresponds to the grouping of data.

Keywords: GIS, visual map, fishery

INTRODUCTION

The fisheries sector has an important role for business actors in Indonesia. Data from the National BPS states that the percentage of capture fisheries production in Indonesia increased from 2016 to 2019 by 17.35%, namely from 6,580,191 tons to 7,071,453 tons in 2017, 7,361,116 tons in 2018, and 7,722. 095 tons in 2019. The rapid development of technology and easy access to information requires easy access to information and data in order to help make decisions, so it is necessary to map potential and business strategies in the fisheries sector based on current technology.

The Geographic Information System (GIS) is present as a new innovation that is considered capable of being a solution to this problem, which utilizes a computerized system to be able to store, manage, process and analyze geographic and non-geographical data related to business analysis which is formed based on fishery clusters for each area that has been previously mapped use accurate variables. GIS is expected to be able to direct business actors in the fisheries sector to be more selective and adaptive in conducting market analysis and implementing sustainable business as well as achieving value added as a business orientation. Based on previous research by Yuniati, Rachman and Basuki [2016], a Visual Cluster with a Web-based Integrated Clustering System was developed in the form of a Geographic Information System (GIS) as part of the ongoing research phase on a national scale in stages during the current research period.

This system is used to obtain comprehensive and detailed information about the potential for capture fisheries in Indonesia which is spread over each district/city in each province which is made in stages. This application can be easily implemented and used widely via smartphones which can be accessed from various regions in Indonesia. This Geographical Information System (GIS) Based Geographical Information System (GIS) Visual Cluster Map is specifically designed to Support Business Actors in the Fishery Sector to Achieve Economic Independence [Lucie Vankova, 2022]. The main goal is to produce a geographic information system that can provide accurate information regarding the potential of the fisheries business in Indonesia.

GIS is defined as "a set of tools and is universally applicable to capture, transform, manage, analyze and present information especially in spatial data" [Biadacz and Biadacz, 2016] [Wan-Mohamad and Abdul-Ghani, 2011]. In addition, the use of GIS technology to analyze and demonstrate makes data visualization real. Visual display data allows users to better understand compared to analytical, statistical or reporting products. This paper, presents three important uses of GIS discussed such as data integration, data visualization and data presentation [Chen, et al, 2021] [Yaning An, et al 2023].

1. Data Integration

There are various data found such as in reports, books, photos and others and integrating them will give better results. When integrating data from multiple sources, it will take less time to retrieve data and data will be more systematic and organized.

2. Data Visualization

Integrated geotechnical data will be useful and easily understood by users as the data is represented in the map view. Typically, a site model will be created from the integrated data and the model is represented in a map view. Typically, a site model will be created from the integrated data and that model will be used to visualize and analyze the site model. Models are made by multiple layers and superimposed. Thus, the combined data layer can be turned on and off as needed. In addition, data can be represented with symbols to show relationships with features and others.

3. Data presentation

Presentation of data is the last step when storing data in GIS format. Typically, data is represented in layouts and can be created for use in reports, papers, posters, and more. Information such as scales, labels, symbols, north arrow, and text can be added to create meaningful maps and information. Well presented data, complete with meaningful information and well edited and printed maps will satisfy clients and consultants alike.

METHODOLOGY

The procedures of this study can be summarized according to the following chart.

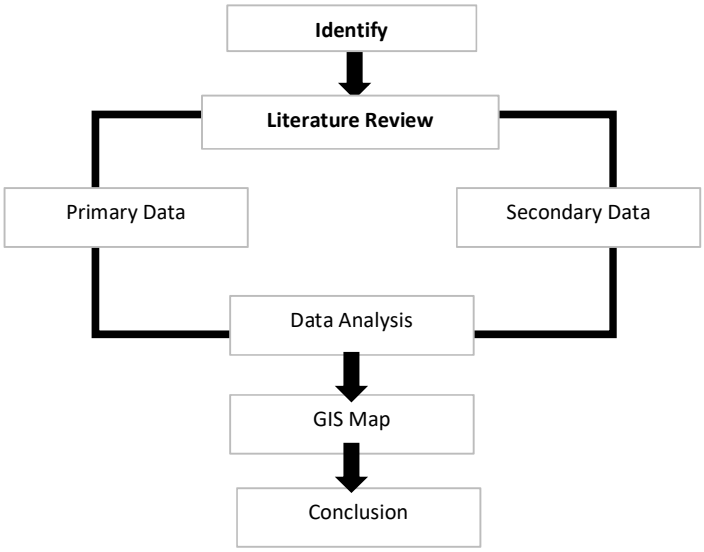

Figure 1. Structure of the research

RESULTS AND DISCUSSION

Data related to these seven (7) variables were taken from several areas in East Java, namely Banyuwangi, Lamongan, Bangkalan, Sumenep, Probolinggo, Pasuruan, Tuban, Sampang, Pamekasan, Pacitan, Tulungagung, Malang, Situbondo, Sidoarjo, Gresik, Probolingg, Surabaya, Trenggalek, Blitar, Lumajang, Jember, and Pasuruan. The results of the analysis produce regional potential clusters. Clusters are divided into 4 namely clusters A, B, C and Cluster D. where cluster A is Banyuwangi, Lamongan, Bangkalan, and Sumenep. Cluster B is Probolinggo, Pasuruan, Tuban, Sampang and Pamekasan. Cluster C is Pacitan, Tulungagung, Malang, Situbondo, Sidoarjo, Gresik, Probolinggo and Surabaya. Cluster D is Trenggalek, Blitar, Lumajang, Jember and Pasuruan.

The results of the clustering process are as shown in the following figure 2.

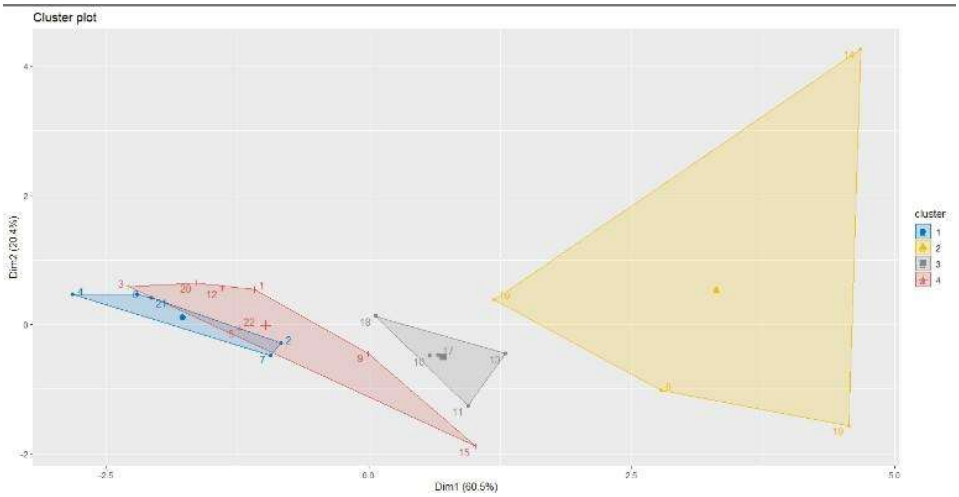

Figure 2. Cauterization

In addition to the clustering process, a SWOT analysis process is also carried out on fishery potential. The feasibility study process has been carried out. All cluster data and SWOT analysis as well as the results of the feasibility study are displayed visually in a GIS-based information system which can be accessed on the page https://www.petavisualperikanan.com/ (figure 3)

a. Multi-Variable East Java Sea Fisheries Clustering Map

This display is the front view of the web. The following fishery cluster results are the results of Fuzzy K-Means Clustering.

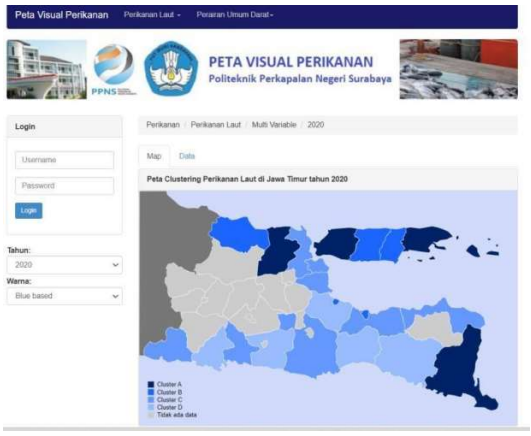

Figure 3. GIS Web Front View

b. Table of Fishermen / Fish Farmers Data Display

This display is a database of marine fisheries and public waters for 38 districts/cities of East Java from 2016 to 2020.

Table 1. Database of marine fisheries

Map | Data

Tabel Data Nelayan/ Petani Ikan Perikanan Laut di Jawa Timur tahun 2020

Show 10 entries Search:

No	Kabupaten/Kota	Nilai	Satuan
1	Kab. Pacitan	3999	Orang
2	Kab. Trenggalek	9788	Orang
3	Kab. Tulungagung	1548	Orang
4	Kab. Blitar	1242	Orang
5	Kab. Malang	4035	Orang
6	Kab. Lumajang	955	Orang
7	Kab. Jember	12386	Orang
8	Kab. Banyuwangi	27226	Orang
9	Kab. Situbondo	15326	Orang
10	Kab. Probolinggo	11875	Orang

Showing 1 to 10 of 38 entries Previous 1 2 3 4 Next

Data Perikanan Laut tahun 2020 single variable. Dikelompokkan (clustering) menggunakan less-more 10% dari nilai rata-rata.

c. Example of Multi-Variable Marine Fisheries Clustering Results for Pacitan District

This display is an example of the profile of Pacitan district which is a cluster C D. User app Privileges / Benefits (SWOT Analysis) to strengthen the results of this visual map, GIS-based information system products have received

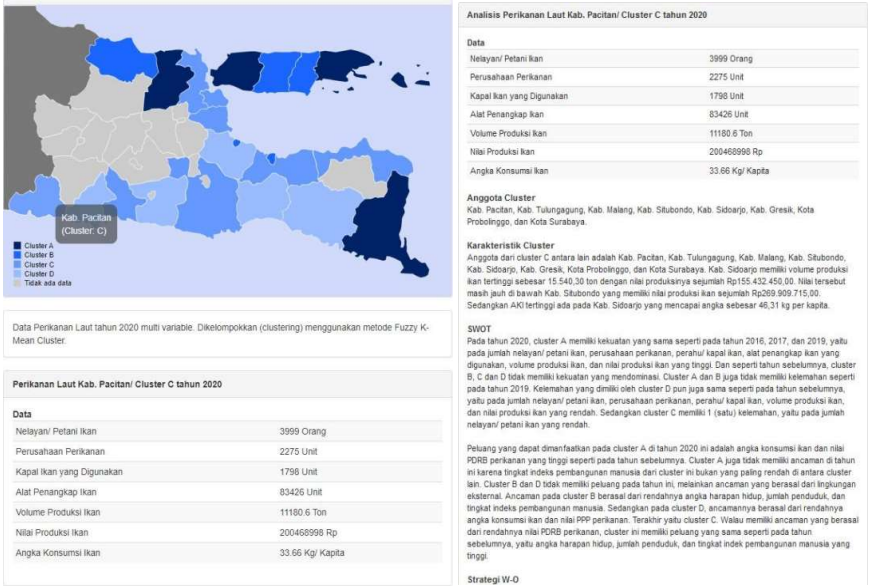

Figure 4. Cluster C Profile

CONCLUSIONS

Geographic-based information systems (GIS) provide easy information for fisheries data users. On the visual map displayed on the web, it is clear that the grouping is based on the grouping data. Groupings are marked with different colors to make it easier to read the data visually.

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Conflicts of Interest
The authors declare that they do not have any competing interests or personal relationships influence the work reported in this paper.

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