

# Geographic Information System for Industrial Mapping in Deli Serdang District

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**Abstract:- Geographic Information Systems (GIS) have become important tools in mapping and spatial analysis. In the industrial context, GIS can be used to identify and visualize the distribution of industries in an area. This study aims to develop a Geographic Information System for Industrial Mapping in Deli Serdang district. The research methods used include field surveys, industrial data collection, spatial modeling, data analysis, and data development. The purpose of this study is to support industrial layouts that are suitable or not suitable for use as industrial land. The results of this study are expected to provide useful information for decision making related to industrial development in the area.**

**Keywords:-** *Geographic Information System, Land use, Industry.*

## I. INTRODUCTION

The Deli Serdang area is one of the areas that has great industrial potential in Indonesia[1]. However, in industrial development, information related to location, type of industry, and economic sector is often scattered and difficult to access. Therefore, the use of Geographic Information Systems (GIS) can be an effective solution in mapping the industry in this area[2][3].

GIS is a combination of geographic data and attribute data packaged in the form of digital maps. By using GIS, we can view information related to location visually, thus facilitating decision making and analysis[4][5]. In the context of industrial mapping, GIS can assist in identifying industrial potential, determining strategic locations, and understanding the relationship between industry and geographical factors, such as access to transportation and supply of raw materials.[6][7].

With the geographic information system mapping the industry, users will be able to easily access information about existing industries in the Deli Serdang area. They can see industrial locations visually through interactive maps, as well as obtain information regarding the type of industry, production capacity, and related economic sectors[8][9].

Local governments and related stakeholders will also benefit from using this system. They can use the data available in the system to carry out industry analysis, monitor the growth of certain sectors, and identify areas that have potential for further development[10]. This information can be used in making strategic decisions related to infrastructure development, increasing industrial competitiveness, and resource allocation[11].

In addition, this industrial mapping geographic information system will also be useful for investors and potential business partners who are interested in the industrial sector in the Deli Serdang Region.[12]. They can use this system to obtain information about market potential, strategic location, and industrial profile in the region. This can help them in making investment decisions and developing business partnerships[13].

## II. RESEARCH METHODOLOGY

The method in this study uses descriptive qualitative methods and field observations, namely investigations carried out to obtain factual data regarding the distribution of industrial factories in Deli Serdang district.[14]. The method used is a questionnaire to find out what obstacles are experienced and how many industries exist in Deli Serdang district, and the method of analysis for each of the existing indicators and components of the pattern of handling scattered industrial areas[15].

The methods used in this research are :

*A. Field Survey*

A field survey was conducted to identify industrial locations and collect related data such as the type of industry, production scale, and number of workers.

*B. Industry Data Collection*

Industry data is obtained through collaboration with relevant agencies and government agencies responsible for industrial licensing.

*C. Spatial Modeling*

The collected industrial data will be entered into the GIS system using GIS software. Spatial modeling is carried out to relate industrial data to their geographical location.

*D. Data analysis*

Spatial data analysis was carried out to identify patterns of industry distribution, industrial clusters, and relationships between industries and other factors such as infrastructure and accessibility.

*E. Map Development*

Based on the data analysis, an informative and easy-to-understand map of the industry will be created using GIS software[16][17].

**III. RESULTS AND DISCUSSION**

Deli Serdang is one of the regencies that has a lot of garden land, as well as rice fields that are still developing, due to the income of the people who still expect from farming, farming and similar things.[18]. Deli Serdang is also an area that is used as an industrial place, there are lots of factories in this area because it is a strategic place for industry and rice fields, as well as fields[19]. Deli Serdang Regency 2497.72 Km2 has an area of about 46.79 Km2. In this discussion, there are several things needed to be able to make a mapping of paddy fields in Deli Serdang Regency. There are several types of industrial factories in Deli Serdang Regency, including Tapioca Factory, PT.Eramas Coconut Industry, PT.Mega Plastic, Tanima Soap Industry, PT. Universal Gloves, PT. Prabu Jaya, PT. Cahaya Bintang Medan, Yakult Medan 2, PT. Alfo Citra Abadi, Asia Sakti

Wahid Foods Manufactur, and other industries. The use of geographic information system mapping using the QGIS application is as a guide for the layout of industries in Deli Serdang Regency [20].

❖ *Industry Concepts and Definitions*

*A. Processing industry*

The processing industry is an economic activity that carries out activities to change basic goods mechanically, chemically, or by hand so that they become finished or semi-finished goods, and/or goods of less value into goods of higher value, and are closer in nature to the end user. Included in this activity are industrial or tolling services and assembly work.[21][22].

*B. Industrial Services*

Industrial services are industrial activities that serve the needs of other parties. In this activity, raw materials are provided by other parties, while the processors only process them in return for a sum of money or goods as remuneration (makloon wages), for example a rice mill company that carries out morning grinding activities or grain farmers with a certain fee [23].

*C. Company or Industrial Business*

Company or Industrial Business is a business unit (unit) that carries out economic activities, aims to produce goods or services, is located in a certain building or location, and has its own administrative record regarding production and cost structure and there is one or more people who are responsible for the business the[24].

Processing Industry Companies are divided into 4 groups namely[25]:

- Large Industry (number of workers 100 people or more)
- Medium Industry (number of workers 20-99 people)
- Small Industry (number of workers 5-19 people)
- Home Industry (number of workers 1-4 people)

The following is the number of industrial companies operating in Deli Serdang Regency including:

Table 1 of Number of Industrial Companies in Deli Serdang Regency

Industry Classification	Number of Companies According to Industry Classification
	2015
Food and Drink	80.00
Tobacco Processing	-
textiles	1.00
Apparel	4.00
Leather and Leather Goods	4.00
Wood, wooden goods (excluding furniture) and wicker goods	33.00
Paper and leather goods	11.00
Publishing, Printing and Reproduction of Recorded Media	-
Coal, Petroleum refinery etc	1.00
Chemicals and Chemical Goods, Soap	17.00
Non-Metal Minerals	28.00

Base Metal	7.00
Metal goods except Machinery and Equipment	18.00
Radio, Television and Communication Equipment Medical Equipment Industry, Measurement tools etc	2.00
Electrical Machines, and Others	5.00
Machinery and equipment ktr, accounting & Data Processing, Construction	9.00
Medical equipment, measuring instruments etc	2.00
4 Wheel Motorized Vehicles or more	1.00
2 and 3 wheel motorbikes	26.00
Furniture and other processing industries (wood materials)	320.00
Rubber and Rubber Products, RT Equipment	71.00

From the results of the industrial company data above, it is explained that there are many types of industrial factories spread across the Deli Serdang district which started the sector in many fields. The distribution of industrial map layouts is based on the following points[26].

Fig 1 Distribution of Industrial maps based on the slope of the land

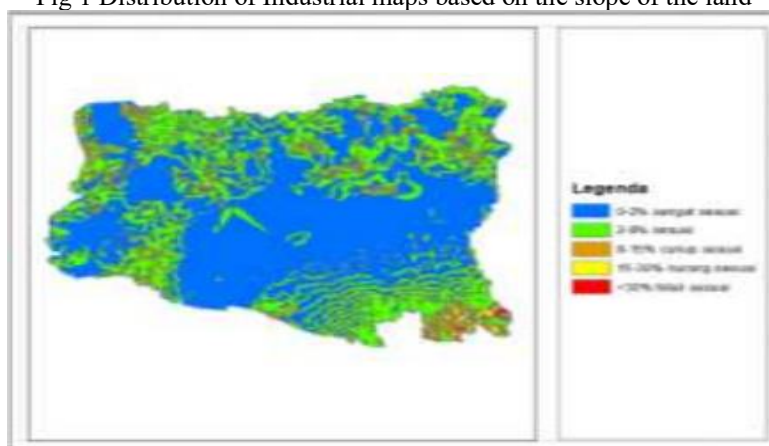


Table 2 Several classifications of land slope[27]:

No	Class	Identification	Wide	Presentation
1	0%-2%	Perfect fit	57095,184	57,495
2	2%-8%	In accordance	35865,426	36,117
3	8%-15%	Quite appropriate	4646,2525	4,679
4	15%-30%	Not suitable	1522,579	1,533
5	>30%	It is not in accordance with	174,712	0.176
Amount			99304,156	100

Fig 2 Distribution of Industrial Maps on Land Use

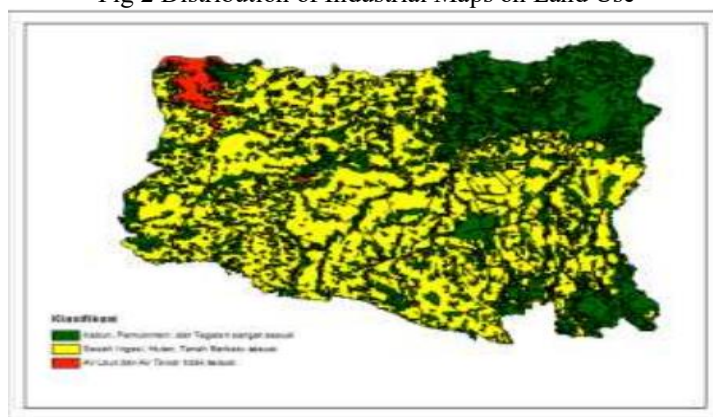


Table 3 Several land use classifications[28]:

No	Class	Identification	Wide	Percentage
1	Big industry	Perfect fit	44542,926	44,788
2	Medium industry	Quite appropriate	52146,991	52,434
3	Small industry	It is not in accordance with	2762,084	2,777
Amount			99452,001	100

Fig 3 Distribution of Industrial Maps to Distances on Main Streets

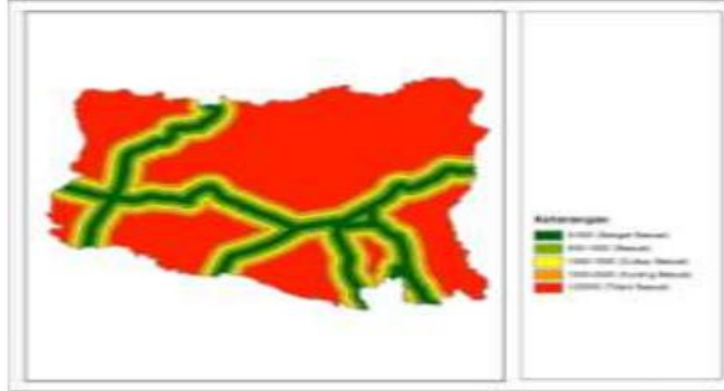


Table 4 Several classifications of distances on the main road[29]:

No	Class	Identification	Wide	Presentation
1	0-500	Perfect fit	11202,685	11.265
2	500-1000	In accordance	10085,906	10.142
3	1000-1500	Quite appropriate	9362,043	9,414
4	1500-2000	Not suitable	8575255	8,625
5	>2000	It is not in accordance with	60217,221	60,554
Amount			99444,11	100

Fig 4 Map division by Distance to River

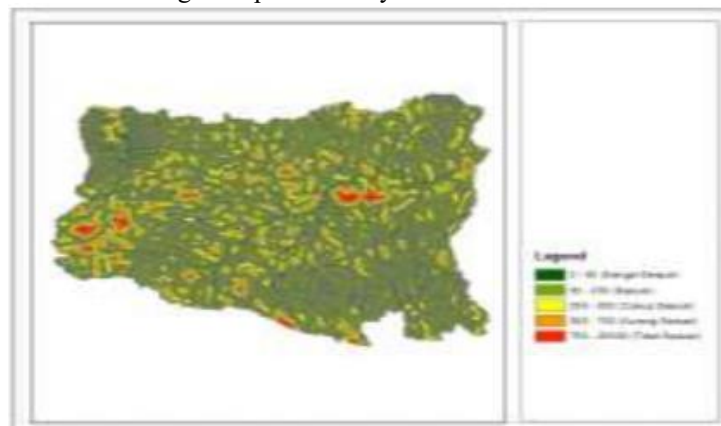


Table 5 Several classifications of distances on rivers[30]:

No	Class	Identification	Wide	Presentation
1	0-50	Perfect fit	22288,418	22,413
2	50-250	In accordance	54853,446	55,160
3	250-500	Quite appropriate	18343,521	18,446
4	500-750	Not suitable	3183,544	3.205
5	>750	It is not in accordance with	775,183	0.776
Amount			99444,11	100

#### IV. CONCLUSION

The Development of a Geographical Information System for Mapping Industries in the Deli Serdang Region provides significant benefits in understanding and managing industries in the region. By utilizing spatial data and GIS analysis, decisions can be made more efficiently and precisely in developing industries, increasing competitiveness, and creating jobs. Geographic information systems are also useful for determining the type of land to be used which can be identified with the data obtained whether the land is suitable for use as industrial land or not.

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