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Development of a Business Intelligence Dashboard for Analyzing Trends and the Impact of Natural Disasters in Indonesia Using Tableau

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ABSTRACT

Indonesia is one of the countries with a high incidence of natural disasters, resulting in a large volume of disaster data. However, the presentation of data, which is still predominantly in tabular form, makes the process of trend analysis and decision-making less effective. This study aims to develop a Business Intelligence dashboard to analyze trends and the impact of natural disasters in Indonesia using Tableau, supported by a data warehouse. The method used is Ralph Kimball's Nine-Step Methodology for data warehouse design, while the Extract, Transform, Load (ETL) process was performed using Pentaho Data Integration. The dataset used consists of historical disaster data from the National Disaster Management Agency (BNPB) covering the period from January 2021 to September 2025, comprising 21,986 disaster events. The research resulted in a star schema-based data warehouse consisting of three dimension tables and one fact table, followed by the development of a data mart as the data source for the Tableau dashboard. The developed dashboard is capable of presenting visualizations of incident trends, regional distribution, the impact on victims, the level of damage, the ten provinces with the greatest impact, as well as disaster impact predictions equipped with interactive filter features. The analysis results indicate that West Java Province experienced the highest disaster impact based on the number of victims and the level of damage. Thus, the developed Business Intelligence dashboard effectively supports disaster data analysis and aids the decision-making process in disaster mitigation and response.



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1. Introduction

Indonesia is an archipelago with the highest level of disaster vulnerability in the world. Indonesia's geographical location—at the intersection of several tectonic plates, such as the Eurasian, Indo-Australian, Pacific, and Philippine plates—makes the region vulnerable to various types of natural disasters [1]. These include earthquakes, tsunamis, volcanic eruptions, floods, landslides, extreme weather, droughts, and forest and land fires [2]. In addition to geological factors, global climate change has also increased the frequency and intensity of hydrometeorological disasters, which have a significant impact on people's lives, the environment, and national development [3].

According to data from the National Disaster Management Agency (BNPB), from January 2021 to September 2025, there were 21,986 recorded disaster events in Indonesia. These events resulted in numerous fatalities, injuries, and missing persons. Furthermore, these events have caused significant damage to homes and public facilities [1]. The ever-increasing volume of disaster data each year underscores the need for data management systems that can provide timely, clear, and easily understandable information [4], [5]. This data is crucial for supporting disaster mitigation, preparedness, emergency response, and the formulation of disaster management policies.

Although disaster data is available through the National Disaster Management Agency (BNPB), its presentation is still predominantly in the form of tabular reports, making the data exploration and analysis process less efficient. Consequently, the analysis process takes a considerable amount of time [4], [6]. This situation makes it difficult for users to quickly identify trends in the impact of events, the most affected areas, and the extent of casualties and damage. Furthermore, historical data has not

yet been integrated into a data warehouse that can be utilized as a source for analysis; consequently, the presentation of information to support decision-making is not yet optimal [5], [7].

Business Intelligence is an approach that can address these issues. Business Intelligence uses technology to integrate, process, analyze, and present data as information that supports the decision-making process [8], [9], [10]. In practice, Business Intelligence utilizes a data warehouse as a repository for integrated historical data to support analysis and decision-making, as well as interactive dashboards as a means of presenting information visually [11], [12]. Dashboards are one of the key outcomes of Business Intelligence implementation, capable of presenting information in the form of interactive visualizations [13], [14], [15]. With dashboards, users can monitor key indicators, identify patterns, compare conditions across regions, and analyze trends based on time, location, or disaster type [16], [17]. One of the most widely used software tools for developing Business Intelligence dashboards is Tableau, which provides various interactive visualization features, geographic mapping, dynamic filters, and forecasting capabilities that help users understand data patterns and trends based on historical information [18], [19], [20].

Based on a review of previous research, the application of Business Intelligence in the field of disaster management in Indonesia has been widely implemented using various approaches. Lessy et al. (2022) utilized Tableau to analyze earthquake data, while Sariasih (2022) used Tableau Public to visualize flood-prone areas [6], [11]. Meanwhile, Irwan and Trisnawarman (2024) developed a dashboard for earthquakes with tsunami potential using Power BI with a Business Intelligence Roadmap approach, and Abdillah et al. (2023) applied a Business Intelligence dashboard to analyze national mortality data, including causes related to disasters [7], [21]. However, these studies generally still focus on a single type of disaster or a specific field of analysis and have not yet comprehensively integrated disaster data through a data warehouse to support multidimensional analysis and interactive visualization.

Given these circumstances, this study developed a Tableau-based Business Intelligence dashboard supported by a data warehouse using Ralph Kimball's Nine-Step Methodology. The Nine-Step Methodology was chosen because it provides systematic steps for designing a dimensional model-based data warehouse, thereby enabling the structured integration of data from various types of disasters and supporting the analysis process more effectively. The resulting data warehouse is then utilized as the primary data source in the development of the Tableau dashboard to present visualizations of incident trends, the distribution of affected areas, the number of victims, the extent of damage, and predictions of disaster impacts based on historical data from January 2021 to September 2025. This study aims to build a data warehouse to support a Business Intelligence dashboard and to develop an interactive dashboard using Tableau to visualize trends and the impacts of natural disasters in Indonesia. The results of this study are expected to provide integrated, easy-to-understand disaster information that supports data-driven decision-making in disaster mitigation and response activities.

2. Research Methodology

This study applies Business Intelligence concepts to analyze trends and the impacts of natural disasters in Indonesia [22]. The data warehouse was developed using the Nine-Step Methodology, while data integration was performed through the Extract, Transform, Load (ETL) process [23], [24]. A Business Intelligence dashboard was then developed using Tableau for data visualization [25]. The research stages began with a literature review and the collection of disaster datasets from the National Disaster Management Agency (BNPB). Next, data preprocessing, data warehouse design, the ETL process, and the development of the Business Intelligence dashboard were carried out, as shown in Figure 1.

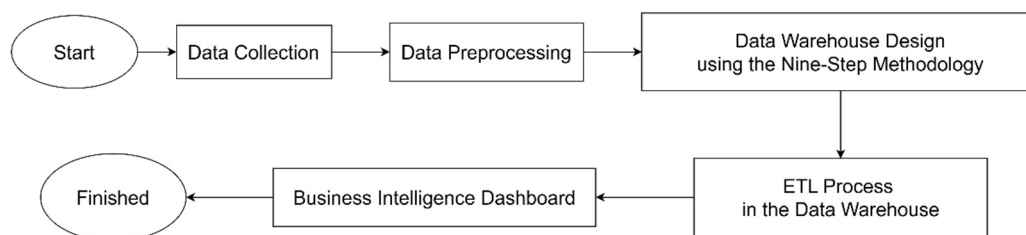


Figure 1. Research Flowchart

a. Data Collection

The dataset used consists of historical data on natural disasters in Indonesia obtained from the official website of the National Disaster Management Agency (BNPB). This dataset covers the period from January 2021 to September 2025, with a total of 21,986 disaster events across various provinces in Indonesia. The data includes information on the date of the incident, type of disaster, location, number of victims, and the resulting damage. This dataset was selected because it provides information on disaster patterns, trends, and impacts during the study period.

b. Data Preprocessing

Before the ETL process was carried out, the dataset underwent a preprocessing stage using Pentaho Data Integration. This stage included cleaning duplicate data, handling missing values, standardizing attributes such as region names and disaster types, and adjusting data types.

c. Data Warehouse Design

The data warehouse was designed using Ralph Kimball's Nine-Step Methodology as the basis for developing the Business Intelligence dashboard [26]. The data warehouse design, using the Nine-Step Methodology, produces an integrated data storage structure that serves as the foundation for developing Business Intelligence dashboards. The application of this methodology supports the management of historical data on natural disasters in Indonesia from January 2021 to September 2025, enabling

the analysis process to be conducted more quickly, in a structured manner, and consistently. The steps of the methodology applied in this study include:

1) Choose the Process

The first step involves identifying the business process to be analyzed in this study. The selected business process is the analysis of natural disaster data in Indonesia based on disaster type, location of the incident, time, and the impact of the disaster in terms of casualties and damage. The selection of this process aims to produce a Business Intelligence dashboard capable of displaying information interactively, thereby making it easier for users to understand disaster conditions in Indonesia.

2) Choose the Grain

This stage is conducted to determine the level of data detail to be stored in the fact table. The "grain" is defined based on each disaster event occurring at a specific time and location. Each data record represents a single disaster event containing information on the date of the event, province, type of disaster, number of casualties, and extent of damage. Determining the grain is crucial because it influences the structure of the fact table and the level of detail in the dashboard analysis.

3) Identify and Define the Dimensions

This stage involves identifying the dimension tables used in the data warehouse. Based on the dashboard's requirements, this study uses several dimension tables, namely the time dimension, location dimension, and disaster dimension, as shown in Table 1.

Table 1. Dimension Table

No	Dimension Table	Description
1	Dim_waktu	Dimensions based on the time of the disaster
2	Dim_lokasi	Dimension based on the region where the disaster occurred
3	Dim_bencana	Dimension based on disaster category

4) Choose the Fact

This step is performed to determine the fact table used in the data warehouse. The fact table used is fact_disaster, which contains key numerical data such as fatalities, missing persons, injuries, damaged homes, flooded homes, and damaged public facilities.

5) Store Pre-Calculations in the Fact Table

This step is performed to determine the calculation results stored in the fact table. In this study, there are several aggregated data points used to support the dashboard analysis process, such as total casualties and total damage.

6) Round Out the Dimensions Table

This stage involves completing the attributes in each of the designed dimension tables. These attributes are tailored to the needs of disaster data analysis and will be used as references in the fact table. The attribute structures for each dimension table are shown in the following tables.

Table 2. Attributes of the Dimension Tables

No	Dimension	Attribute	Description
1	Dim_waktu	Waktu_id	Primary key generated by PostgreSQL as an auto-increment, not null
		Tanggal	Not null
		Tahun	Not null
		Bulan	Not null
		Nama_bulan	Not null
2	Dim_lokasi	Lokasi_id	Primary key generated by PostgreSQL as an auto-increment, not null
		Provinsi	Not null
		Kabupaten	Not null
3	Dim_bencana	Bencana_id	Primary key generated by PostgreSQL as an auto-increment, not null
		Kejadian	Not null

7) Choose the Database Duration

This step is performed to determine the time range of the data used in the study. In this study, the data used is a dataset on natural disasters in Indonesia from January 2021 to September 2025.

8) Track Slowly Changing Dimensions

This step is performed to determine how to manage data changes in the dimension tables. In this study, changes in dimension data are relatively minor, so Type 1 Slowly Changing Dimensions (SCD) are used. This is done by updating old data with the latest data without storing the history of previous changes. Additionally, the study focuses more on analyzing current data rather than storing the history of changes in dimension data.

9) Determine Query Priorities and Query Modes

The final stage involves determining query priorities and data access requirements for the dashboard. The data warehouse is designed to support analytical queries on the Business Intelligence dashboard using Tableau, allowing users to filter data, drill down by region, analyze time trends, and assess the impact of disasters interactively. The star schema structure used helps improve query performance and simplifies the data visualization process on the Business Intelligence dashboard.

d. ETL Process

The extract, transform, load (ETL) process is performed using Pentaho Data Integration to design the data warehouse. The extract phase is used to retrieve preprocessed data, the transform phase is used to align the data structure with the star schema, and the load phase is used to load the data into the dimension and fact tables in the PostgreSQL database.

e. Business Intelligence Dashboard development

The next step involves developing a Business Intelligence Dashboard using Tableau to present interactive visualizations of disaster data through various visualization components. The dashboard displays key indicators, a map showing the distribution of disaster impacts, bar charts, and trend line charts with forecasting features. Additionally, the dashboard is equipped with filter features so that users can perform analyses based on year, region, and disaster type as needed. The dashboard also provides a “Pilih Dampak” parameter that allows users to choose the impact categories to be analyzed, namely casualties—which include the number of fatalities, injuries, and missing persons—and damage—which includes damaged homes, flooded homes, and damaged public facilities. With this parameter, all visualizations on the dashboard will dynamically adjust based on the selected impact categories, enabling a more flexible and in-depth analysis.

3. Results and Discussion

a. Data Preprocessing Results

The preprocessing stage produced a disaster dataset that has been cleaned and adjusted so that it is ready for use in the data warehouse design process. This process was carried out using Pentaho Data Integration through the stages of attribute selection, data value standardization, valid data filtering, handling of missing values, and adjustment of attribute names and data types before being stored in the database. The preprocessing workflow is shown in Figure 2.

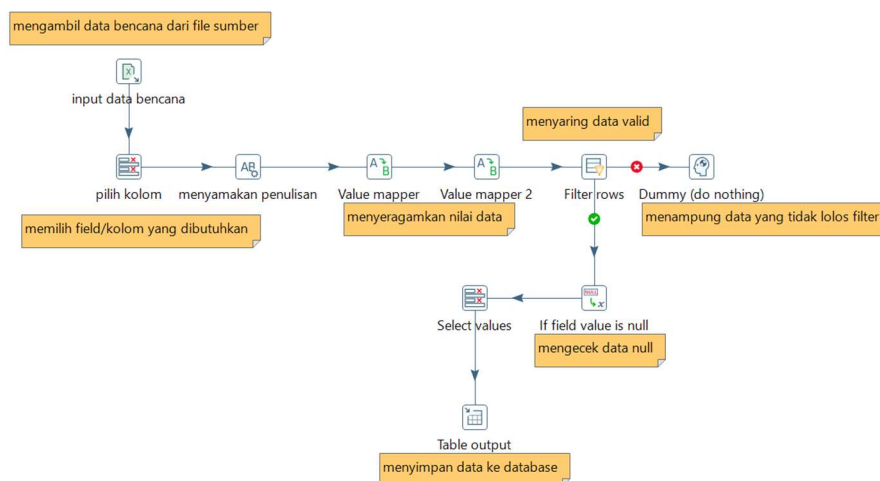


Figure 2. Data Preprocessing

The preprocessing results in a dataset with ten main attributes. These attributes are retained because they represent the key information needed for analyzing disaster trends and impacts and serve as the foundation for building the data warehouse and developing Business Intelligence dashboards. The metadata from the preprocessing is shown in Table 1.

Table 3. Metadata from Preprocessing

No	Attribute Name	Data Type	Description
1	Tanggal_kejadian	Date	The date the disaster occurred, normalized to a date format
2	Kejadian	Varchar	The type of disaster that has been cleaned and standardized
3	Kabupaten	Varchar	The names of regencies/cities that have been standardized
4	Provinsi	Varchar	Standardized province name
5	Korban_meninggal	Integer	Number of fatalities
6	Korban_hilang	Integer	Number of missing persons
7	Korban_terluka	Integer	Number of injured victims
8	Rumah_rusak	Integer	Number of damaged houses
9	Rumah_terendam	Integer	Number of homes flooded as a result of the disaster
10	Fasum_rusak	Integer	Number of public facilities that sustained

b. Results of the ETL Process in the Data Warehouse

1) Star Schema

The data warehouse design utilizes a star schema model consisting of one fact table, namely `fact\_bencana`, and three dimension tables: `dim\_bencana`, `dim\_lokasi`, and `dim\_waktu`. The fact table is at the center of the schema and is connected to the dimension tables via foreign keys. The fact table is used to store primary data related to the impact of disasters, such as the number of fatalities, missing persons, injured victims, damaged homes, flooded homes, damaged public facilities, total number of victims, and total damage. Meanwhile, the dimension tables are used to provide supporting information in the form of disaster type, incident location, and time of occurrence, as shown in Figure 3.

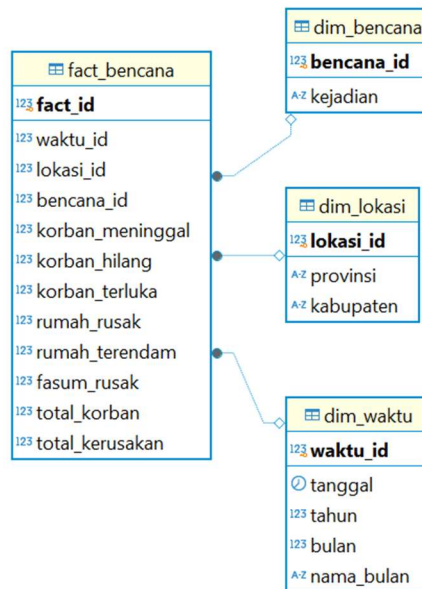


Figure 3. Star Schema of a Data Warehouse

2) Dimension Tables

The `dim_bencana` table was created to store disaster category information as descriptive data that supports analysis on the Business Intelligence dashboard. This table consists of the `bencana_id` attribute as the primary key and the `kejadian` attribute, which represents the type of disaster. The table creation process was carried out through ETL stages using Pentaho Data Integration so that each disaster category was successfully integrated into the data warehouse consistently without data duplication. The results of the transformation to create the `dim_bencana` table are shown in Figure 4.

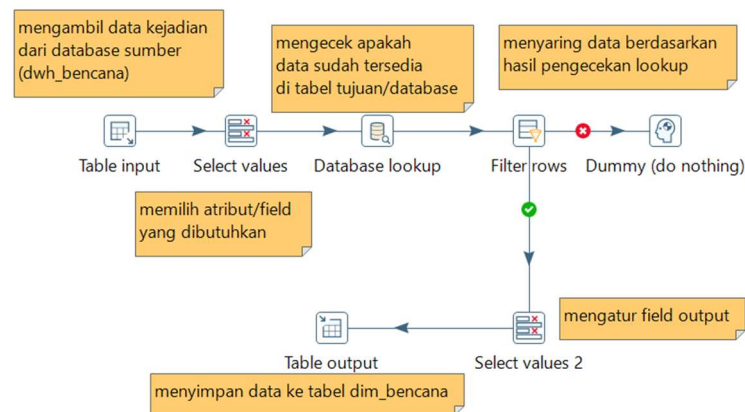


Figure 4. Disaster Dimension ETL Process

The `dim_lokasi` table was created to store information on the locations of disaster events based on province and regency/city as descriptive data in the data warehouse. This table consists of the `lokasi_id` attribute as the primary key, along with the `province` and `regency` attributes. The ETL process using Pentaho Data Integration successfully integrated location data into the `dim_lokasi` table consistently while avoiding data duplication. The results of the `dim_lokasi` table creation are shown in Figure 5.

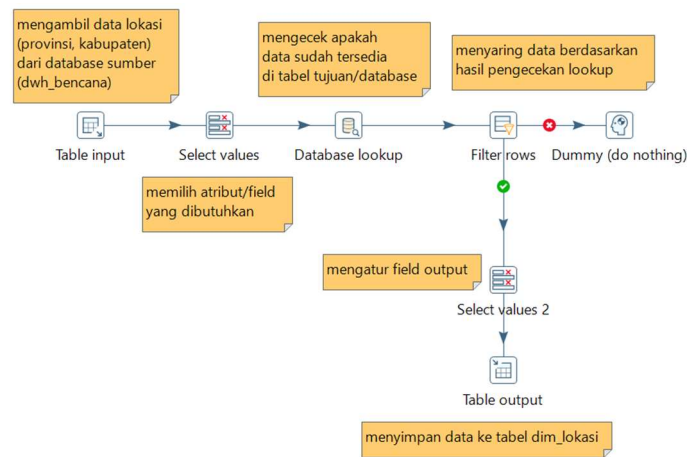


Figure 5. Location Dimension ETL Process

The `dim_waktu` table was created to store information on the timing of disaster events as the basis for temporal analysis on the Business Intelligence dashboard. This table consists of the `waktu_id` attribute as the primary key, along with date, year, month, and month_name. The ETL process using Pentaho Data Integration successfully integrated the time data into the `dim_waktu` table consistently while avoiding data duplication, thereby supporting disaster trend analysis based on time periods. The results of the transformation to create the `dim_waktu` table are shown in Figure 6.

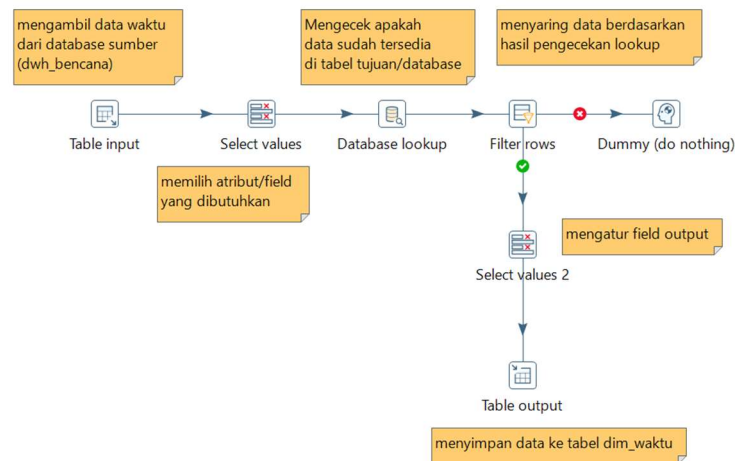


Figure 6. Time Dimension ETL Process

3) Fact Table

The `fact_bencana` table was built as a central repository for numerical data to support analysis on the Business Intelligence dashboard. This table links the `dim_waktu`, `dim_lokasi`, and `dim_bencana` tables via foreign key attributes and stores data on fatalities, missing persons, injuries, damaged homes, flooded homes, damaged public facilities, `total_korban`, and `total_kerusakan`. The ETL process using Pentaho Data Integration successfully integrated data from all dimension tables and created a fact table ready for multidimensional analysis. Additionally, the total_victims and total_damage values were calculated during the transformation process to improve query efficiency and visualization on the dashboard. The results of the transformation to create the `fact_disaster` table are shown in Figure 7.

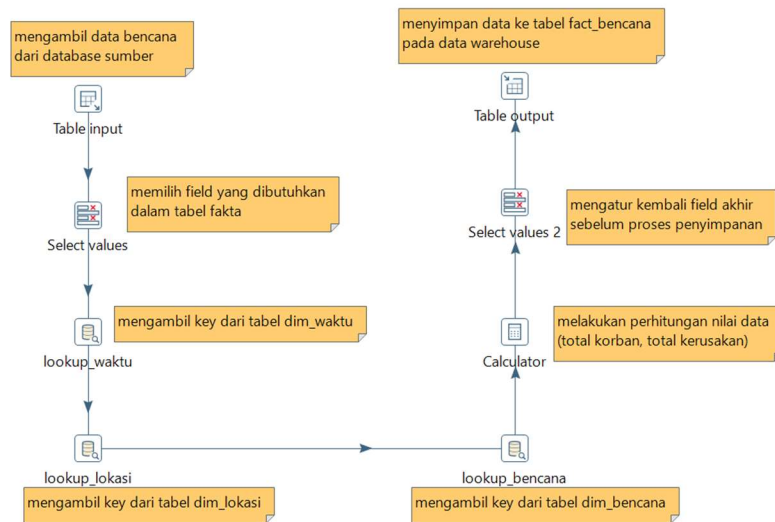


Figure 7. Fact Table ETL Process

4) Dashboard Data Mart

After the fact table and dimension tables were successfully built, a data mart was created as the data source for the Business Intelligence dashboard. This process integrated the `fact\_bencana` table with the `dim\_waktu`, `dim\_lokasi`, and `dim\_bencana` tables through an ETL process using Pentaho Data Integration. The integration resulted in a dataset containing information on time, location, disaster type, and impact data within a single structure ready for visualization. The datamart was then exported to Microsoft Excel as a data source for Tableau. The integrated data structure enables faster visualization and supports interactive data analysis. The result of the data mart creation is shown in Figure 8.

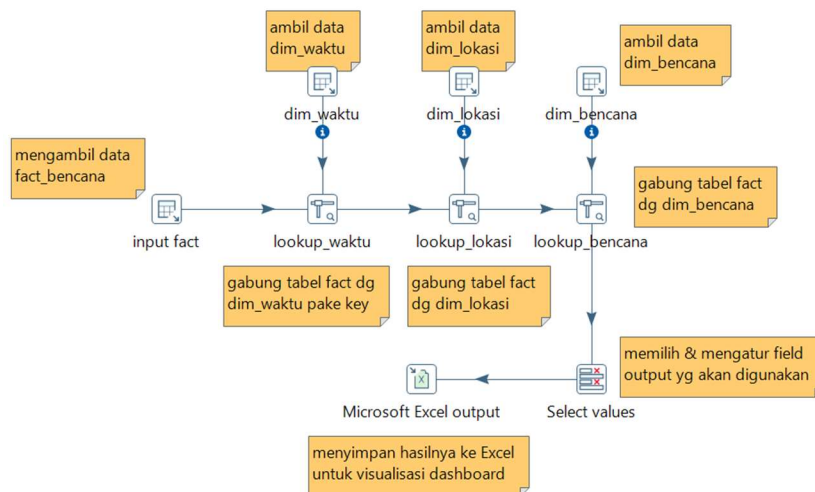


Figure 8. Data Mart Transformation Process for the Dashboard

c. Results of Bussiness Intelligence Dashboard Creation

The dashboard was created using the Tableau application with data sourced from the disaster datamart resulting from the ETL process and data warehouse design. The dashboard is designed to interactively display information regarding trends, regional distribution, the impact on victims, damage, and predictions of the impact of natural disasters in Indonesia for the period from 2021 through September 2025.

1) Total Disasters

The visualization of total disasters is used to show the overall number of disaster events that occurred during the period from 2021 to September 2025. This data on total disasters provides insight into how frequently disasters occur in Indonesia. According to the visualization results, the total number of disaster events in Indonesia reached 21,986.

TOTAL BENCANA

21,986
Kejadian

Figure 9. Visualization of Total Disasters

2) Total Casualties

The total casualties visualization is used to show the total number of casualties resulting from disasters. Total casualties are calculated based on the number of people who died, were injured, and went missing. This visualization helps users understand the magnitude of the impact of disasters on the community. According to the visualization results, the total number of casualties reached 44,552 people.

TOTAL KORBAN
44,552
Meninggal + Terluka + Hilang

Figure 10. Visualization of Total Casualties

3) Fatalities

The visualization of fatalities shows the total number of people who died as a result of natural disasters. This data is used to understand the mortality rate caused by natural disasters. According to the visualization, 2,752 people lost their lives.

KORBAN MENINGGAL
2,752
Jiwa

Figure 11. Visualization of Fatalities

4) Total Damage

The visualization of total damage shows the total damage caused by the disaster, including damaged homes, flooded homes, and damaged public facilities. The visualization results indicate that total damage reached 5,905,009 units. This figure indicates that natural disasters have caused significant damage to infrastructure between 2021 and September 2025.

TOTAL KERUSAKAN
5,905,009
Rumah Rusak + Terendam
+ Fasum Rusak

Figure 12. Visualization of Total Damage

5) Damaged Homes

The visualization of damaged homes shows the total number of homes damaged by natural disasters. The results indicate that a total of 410,698 homes were damaged. This figure illustrates the extent of the disaster's impact on people's homes.

RUMAH RUSAK
410,698
Unit

Figure 13. Visualization of Damaged Homes

6) Visualization of the Disaster Impact Distribution Map

The distribution map is used to display the impact of disasters that have occurred in various provinces across Indonesia. This map was created using Tableau's geographic visualization features, with different colors indicating the severity of the impact in each region. The darker the color, the greater the impact of the disaster in that area. This visualization includes a "Pilih Dampak" parameter that allows users to choose the type of impact they wish to view; the parameters include casualties and damage.

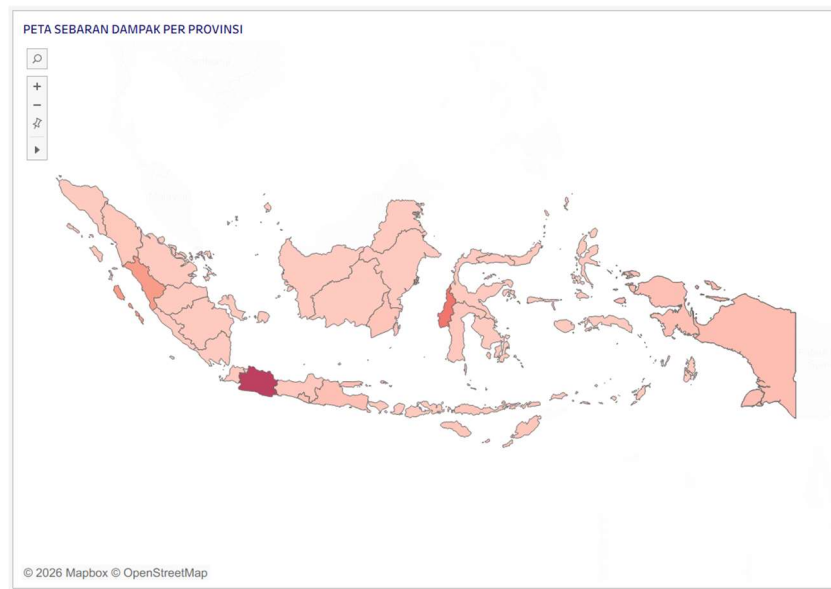


Figure 14. Visualization of a Map Based on Casualty Parameters

Figure 14 shows the distribution of disaster impacts based on the casualty parameter, revealing that West Java Province has the highest level of casualty impact, indicated by the darkest red color. Additionally, West Sulawesi Province and West Sumatra Province also exhibit relatively high impact levels compared to other provinces. Meanwhile, provinces shown in lighter colors indicate that the number of casualties resulting from disasters falls into a lower category. This visualization indicates that the impact of disaster casualties is not evenly distributed and tends to be concentrated in certain areas with high levels of vulnerability.

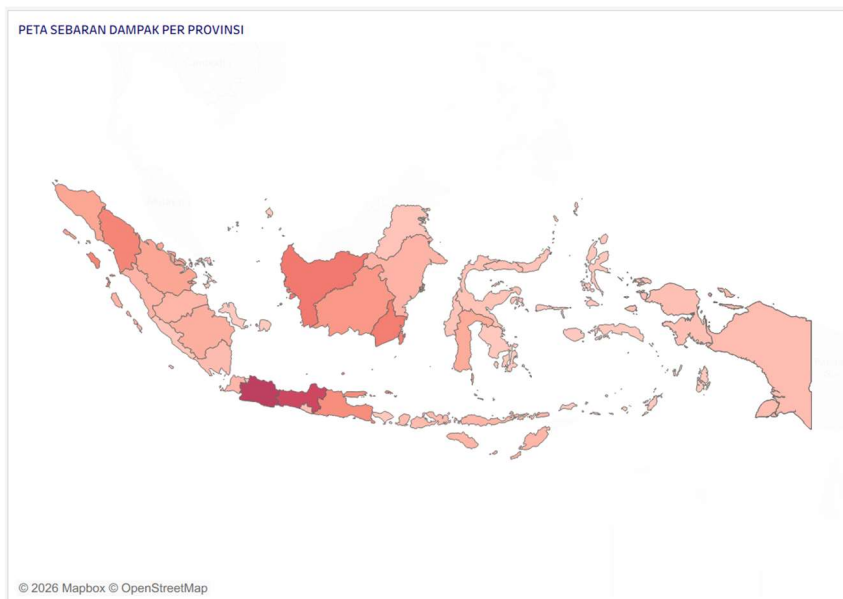


Figure 15. Visualization of a Map Based on Damage Parameters

Figure 15 displays a map of disaster impact distribution based on damage parameters, showing that West Java Province is the region with the highest level of damage, indicated by the darkest red color. In addition, other parts of Java also show relatively high levels of damage, with more intense colors compared to other provinces. Meanwhile, most provinces in Eastern Indonesia have relatively lower levels of damage compared to other regions, as indicated by the lightest colors. The visualization results show differences in damage levels among provinces in Indonesia.

7) Graphical Visualization of the Top 10 Provinces with the Greatest Impact

The bar chart is used to display the 10 provinces most severely affected by disasters, based on the parameters selected on the dashboard. The bar chart makes it easier for users to compare the extent of the impact across provinces, allowing the most severely affected areas to be identified more easily. The longer the bar, the greater the level of impact on that province.

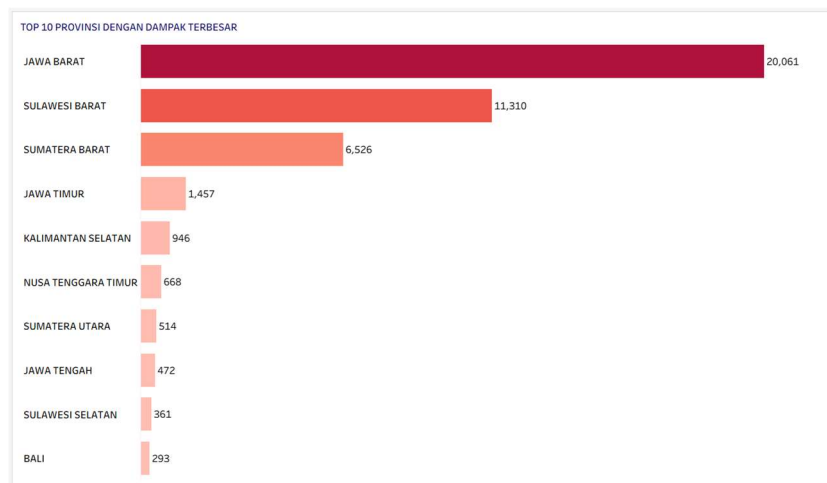


Figure 16. Visualization of a Bar Chart Based on the Casualty Parameters

Figure 16 shows the visualization of the top 10 provinces with the greatest impact based on the casualty parameter, indicating that West Java Province has the highest number of casualties, totaling 20,061. It is followed by West Sulawesi with 11,310 and West Sumatra with 6,526. This visualization reveals that the impact on casualties caused by disasters is more concentrated in certain provinces.

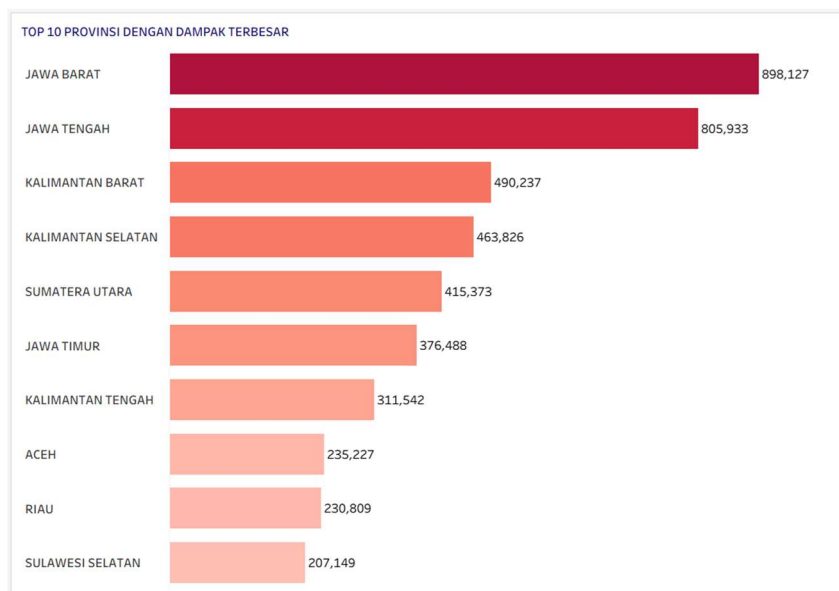


Figure 17. Visualization of a Bar Chart Based on the Damage Parameters

Figure 17 presents a visualization of the top 10 provinces with the greatest impact based on the damage parameter, showing that West Java Province has the highest level of damage, with 898,127 units of damage, followed by Central Java with 805,933 units of damage. This visualization indicates that the level of damage caused by disasters varies across provinces and tends to be higher in certain regions.

8) Visualization of Casualty Impacts by Disaster Type

A stacked bar chart is used to show a comparison of the impact on casualties by disaster type. The casualty components analyzed consist of fatalities, missing persons, and injuries. The chart shows that disasters such as earthquakes and floods have the highest number of casualties compared to other disaster types. Meanwhile, disasters such as tsunamis and droughts show relatively lower casualty numbers. The use of a stacked bar chart helps users see the comparison of casualty proportions for each type of disaster more clearly.

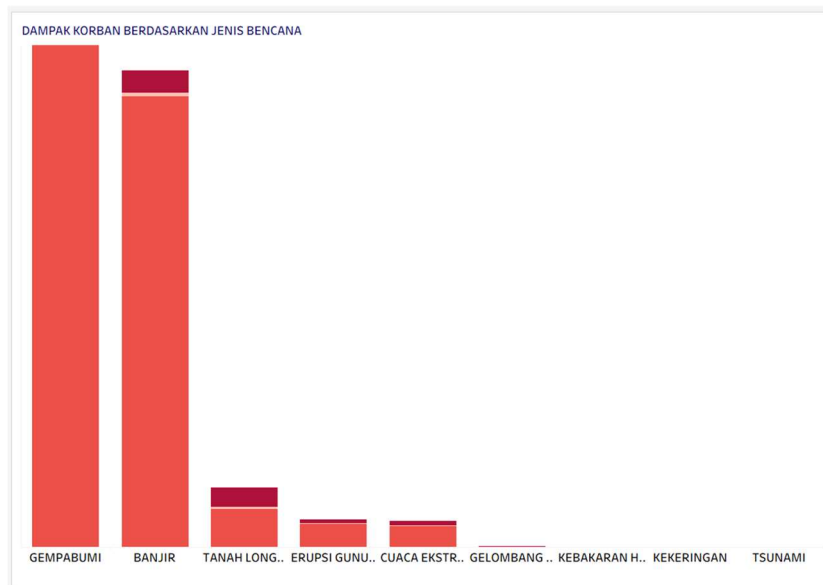


Figure 18. Visualization of a Stacked Bar Chart

9) Visualization of Disaster Impact Trends and Predictions

Visualizations of disaster impact trends and predictions are used to display the development of disaster impacts from year to year and to provide an overview of conditions in the next period based on prediction results. The visualizations are created using line charts with the forecasting feature in Tableau. Line charts enables users to observe changes in disaster impact patterns from both actual data and prediction results, thereby serving as a tool to support planning and decision-making processes.



Figure 19. Visualization of Trends and Predictions Based on Casualty Parameters

Figure 19 shows the visualization of trends and disaster impacts based on casualty parameters, indicating that the number of casualties in the actual data decreased from 2021 until reaching a low point in 2023, then increased again in 2024 with a total impact of 12,134 victims. The prediction results indicate that the number of victims is projected to decrease from 6,416 victims in 2025 to 5,656 victims in 2026. This indicates a downward trend in the number of victims during the forecast period.

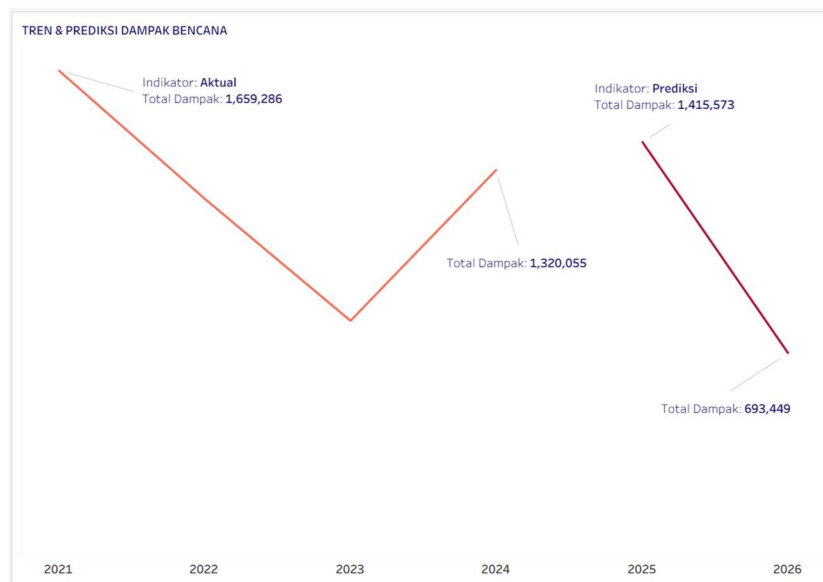


Figure 20. Visualization of Trends and Predictions Based on Damage Parameters

Figure 20 presents a visualization of disaster impact trends and predictions based on damage parameters, showing that the level of damage in the actual data decreased through 2023 and then increased again in 2024, with a total of 1,320,055 units damaged. Meanwhile, the prediction results indicate that the damage level is projected to decrease from 1,415,573 units in 2025 to 693,449 units in 2026. These results indicate a downward trend in the damage level for the coming period.

10) Business Intelligence Dashboard

The Business Intelligence Dashboard that was developed successfully presents information on the impact of natural disasters in Indonesia in an interactive manner. The dashboard is equipped with filtering features based on year, event type, province, and impact parameters, allowing users to conduct analyses according to their needs. The information presented includes the total number of disaster events, the total number of victims, the number of fatalities, the total damage, the number of damaged homes, a map showing the distribution of impacts by province, a graph of the ten provinces with the greatest impact, trends and predictions regarding disaster impacts, and the impact on victims by disaster type.

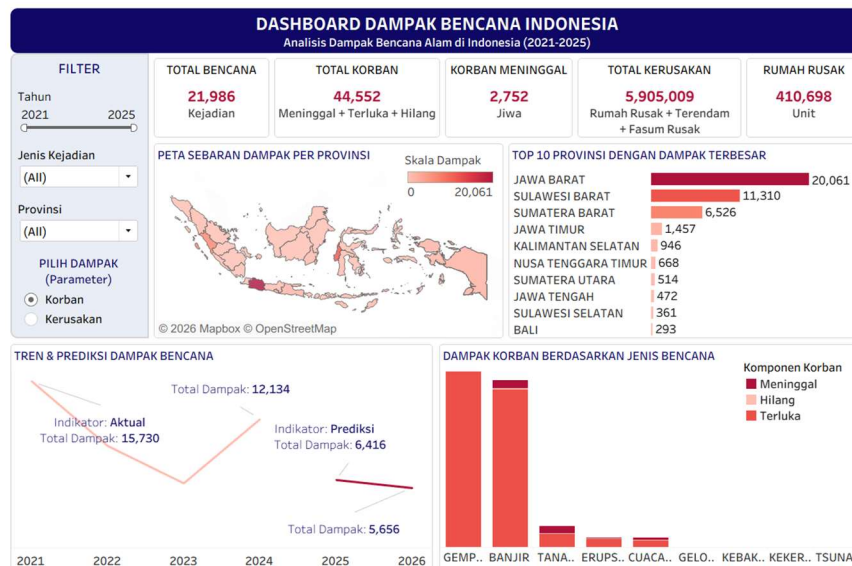


Figure 21. Business Intelligence Dashboard View

Based on the visualization results, the dashboard demonstrates that the impact of disasters in Indonesia is not evenly distributed. West Java Province is the region with the greatest impact, both in terms of the number of victims and the level of damage. Additionally, floods and earthquakes contribute significantly to the overall impact compared to other types of disasters. The prediction feature also provides an overview of trends in disaster impact for the coming period. Overall, the Business Intelligence dashboard developed has effectively supported the disaster data analysis process and made it easier for users to obtain information to support decision-making regarding disaster mitigation and response. The Business Intelligence dashboard developed in this study has been published on Tableau Public and can be accessed via the following link: [Tableau Public Business Intelligence Dashboard](#).

4. Conclusion

This study successfully built a data warehouse on natural disasters in Indonesia covering the period from January 2021 to September 2025 using the Nine-Step Methodology to support the development of a Business Intelligence dashboard, and developed an interactive dashboard using Tableau for analyzing trends and the impacts of natural disasters. The application of the Nine-Step Methodology, implemented through the Extract, Transform, Load (ETL) process using Pentaho Data Integration, resulted in a data warehouse with a star schema model consisting of one fact table (fact_bencana) and three dimension tables (dim_waktu, dim_lokasi, and dim_bencana), thereby enabling the structured integration of disaster data as a source for analysis. The developed Business Intelligence dashboard successfully presents information interactively through visualizations of the total number of disaster incidents, the number of victims, the level of damage, the distribution of affected areas, impacts by disaster type, incident trends, and disaster impact predictions. The research results show that the integration of a data warehouse and interactive visualization using Tableau can improve the effectiveness of disaster data management, analysis, and presentation, thereby supporting decision-making in disaster mitigation and response activities. Future research could develop more comprehensive prediction models using machine learning or time series methods and integrate data from various sources in real time to improve the accuracy of analysis and the quality of the information produced.

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