International Journal of Application on Sciences, Technology and Engineering (IJASTE)
Volume 1, Issue 1, 2023. ISSN 2987-2499

Fire Dashboard Design in Bandung

Thomas Khun[1, a)], Dedi Trisnawarman[2, b)] and Tony[3, c)]

[1, 2, 3]*Information System Study Programs, Faculty of Information Technology, Tarumanagara University, Letjen S. Parman Number 1, Jakarta, 11440, Indonesia*

[a)] thomas.825180071@stu.untar.ac.id
[b)] Corresponding author: dedit@fti.untar.ac.id
[c)] tony@fti.untar.ac.id

Submitted: November-December 2022, Revised: January 2023, Accepted: February 20, 2023

Abstract. Disaster is an event that is dangerous for all living things. There are so many catastrophic events that occur in the environment such as earthquakes, landslides, floods, volcanic eruptions, and so on. One of the disaster events that often occurs in the community is fire. Fire is a disaster that occurs due to fire activity. Fires can happen anywhere. Most of the fires occur in populated areas. Information about fires can be recorded in detail according to each fire incident. Based on this information, fire data can be packaged into a visualization. The purpose of this research is to form a dashboard design that can show the visualization of fire data. The fire data used in the dashboard design is the details of fires in Bandung. The data used is data from the Bandung fires in 2018 and 2019. In addition, there is also external data, namely data on the average air temperature associated with data on fires that occurred in Bandung. The data on the average air temperature associated are also equated with the data for the year of fire, namely 2018 and 2019. The dashboard design uses the prototyping method. Then the visualized data can be used to make it easier for users to find out details and information on fires that have occurred. The result of this research is to produce a fire dashboard with a correlation between the number of fire incidents and the average air temperature in Bandung.
Keywords: fire; dashboard design; prototyping

INTRODUCTION

The development of today's technology has occurred very quickly and rapidly so that people can more easily carry out social interactions for decision making [1]. This development causes the world to feel as if it has no boundaries between one human being and another. This causes social changes in society in responding to new technologies very quickly and significantly [2].

The development of information technology that encourages the occurrence of how the state, institutions, agencies, and society in presenting a data or information. Starting from there are various data or information that can be accessed directly by everyone, one of which is open data. Open data or what is meant as open data is data that can be accessed and used by everyone freely [3].

Open data provides information about a variety of public data desired by the user [4]. Some of the data contained in open data, there is a data recapitulation, and there is also complete data. Some of the data provided by open data are: provincial data, APBD data, natural disaster data, population data, birth data, death data, flood data, fire data, and so on.

Fire is a disaster that occurs due to fire activity. Fires can happen anywhere [5]. Most of the fires occur in populated areas. Information about fires can be recorded in detail according to each fire incident. Fire data contained in open data is processed to produce new information. This data will be a visual form of information. One way to make data visual is to use a dashboard model.

Dashboard is a visual of data that is used to unify conditions and/or display a basic understanding of information [6]. The dashboard is a visual display containing important information that will be used to make it easier for users to monitor information [7].

Based on the benefits of using dashboards, this research was conducted to produce fire dashboards. This dashboard is used to make it easier for users to understand information and make decisions [8] related to fire data.

RESEARCH METHOD

The research conducted on the design of this fire dashboard is a study of the trend of fires that occur and examines whether there is a relationship between the number of fire events and the average air temperature. This fire dashboard design uses Bandung city fire data sourced from open data. The details of the fire data used are 2018 and 2019 fire data due to limited data sources provided from the open data Bandung city. Additional data collection methods used to design this fire dashboard are observation the location and interviews for data collection.

Design Method

The dashboard design method used is the prototyping method. System development using prototyping models can offers some benefit such as coordination with potential users for short engineering process [9]. According to the method, the steps in the prototyping method are as follows:

1. Listen to Customer Stage
2. Build and Revise Mock Up
3. Test and Drive Mock Up

Data Collection

The data used in the design of this fire dashboard is the details of the fire data in the city of Bandung. The detailed fire data used has information about the date, time, location of the fire, ward, sub-district, burned objects, buildings saved, cause of fire, death toll, injured, unit car on duty, PDAM water source, other water sources, estimates losses, and the area of the fire. The data was obtained from the Bandung City open data website. The details of the fire data can be seen in table 1.

TABLE 1. Details of the fire data in Bandung city

Date	Time	Ward	District	Burning Thing	Saved Building
2018-01-03	05:30-06:50+0700	Bojongloa Kidul	Bojongloa Kidul	A car...	-
2018-01-04	12:45-13:50+0700	Neglasari	Cibeunying	A gauge…	A house
2018-01-05	04:05-04:30+0700	-	Kaler	A car…	-
2018-01-05	04:05-05:00+0700	Kebon Jeruk	-	5 stand…	Stand…
2018-01-05	08:52-09:10+0700	Cipadung Kulon	Andir	A Cable…	Stand...

Then there is external data, namely data on the average air temperature in Bandung which is separated by month. The average temperature data was obtained from the Bandung City open data website. The average air temperature data is reprocessed and linked to fire data in the city of Bandung.

Identification Key Performance Indicator

Identification Key Performance Indicators (KPIs) is carried out to determine user needs and determine the purpose of dashboard design [10]. KPIs also is a type of performance indicator for measure or evaluate success of services [11]. Needs identification is done by conducting a short interview with the nearest fire department to determine what visual points of information will be displayed on the fire dashboard. The results of the visual details of the information can be seen in table 2.

TABLE 2. Visual details of the information.

No	Visual Information	Description
1.	Date of fire incident	Units of measurement: date
2.	Number of fires	Units of measurement: number
3.	The village where the fire occurred	Units of measurement: number
4	District where the fire occurred	Units of measurement: number
5.	The burned area	Units of measurement: m^2
6.	The number of fatalities	Units of measurement: number
7.	The number of injured	Units of measurement: number
8.	The cost of the loss incurred	Units of measurement: Rp.
9.	Cause of fire	Units of measurement: number

VISUAL DISPLAY

The results of the fire dashboard design in Bandung produce some visual information that can be used as an information provider to produce a decision.

Identification Key Performance Indicator

Data that has been processed and processed in Extract Transform Load (ETL), is converted into a visual display. Making a visual dashboard display is done using the PowerBI Desktop tools. The fire dashboard display can be seen in figure 1.

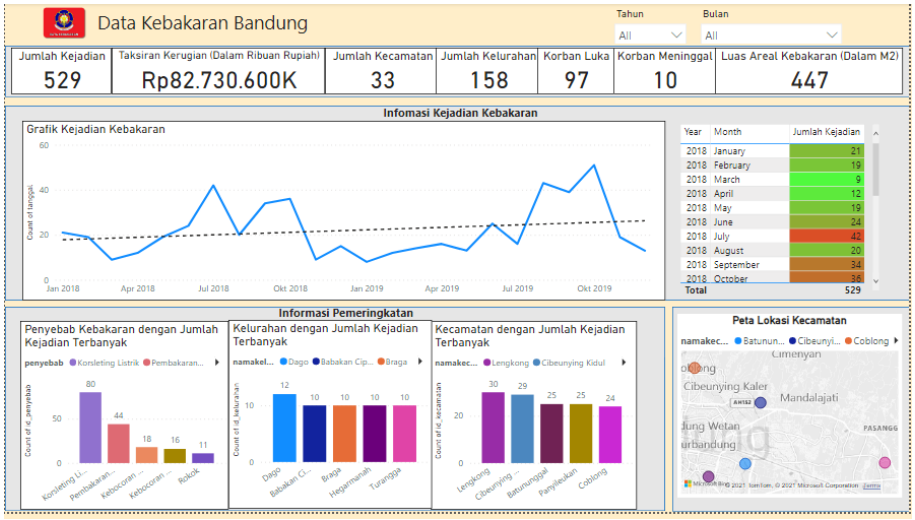

FIGURE 1. Fire dashboard display.

Based on the fire dashboard display, there are visual points that can be divided into 5 areas. Each fire data information area, separated by gray. In area 1, there is a time filter selection. This time filter is used to adjust the fire data to be accessed. The time filter is divided into filters by year and month. The visual display of area 1 can be seen in figure 2.

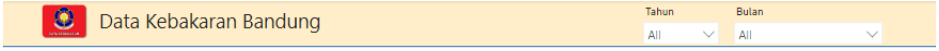

FIGURE 2. Area 1 fire dashboard.

Then under Area 1, there are data values from the number of incidents, estimated losses, the number of sub-districts, the number of urban villages, the injured, the dead, and the area of the fire. The values in this display inform the number or estimated value contained in the fire data in Bandung. All values in visual Area 2 will change according to the time filter selection in Area 1. The visual display of Area 2 can be seen in figure 3.

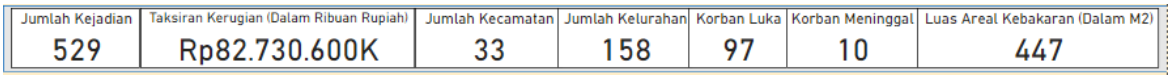

FIGURE 3. Area 2 fire dashboard.

Then at the bottom of Area 2, there is Area 3 which contains line graphs and data tables. This line graph is a visual information that shows the trend of fire occurrence. The line graph display also includes predictions of trends that occur in fire events, which are displayed with a dotted line. It can be seen that the data on fires in Bandung in 2018 and 2019 experienced an increasing trend. Then next to the line graph display, there is a table that contains information on the number of fire incidents that occur every month as shown on the line graph. The green color in the table data shows when the number of fires is small, while the red color in the table data shows that there are many fires in that month. The visual display of area 3 can be seen in figure 4.

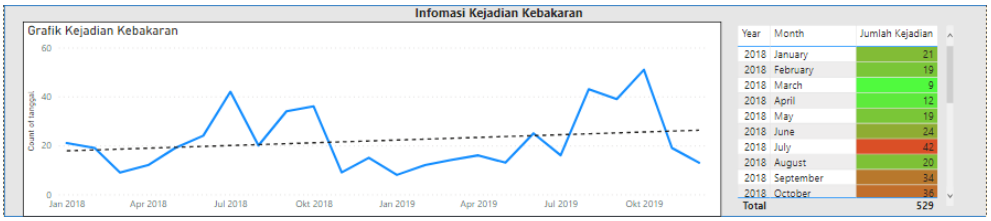

FIGURE 4. Area 3 fire dashboard.

Below the graph of fire occurrences and tables, there is a visual display of Area 4. The visual display of Area 3 contains a bar chart showing the most common causes of fires, ward with the highest number of incidents, and sub-districts with the highest number of incidents. The information in each of these bar graphs is sorted from the data with the highest value. The display of Area 4 can be seen in figure 5.

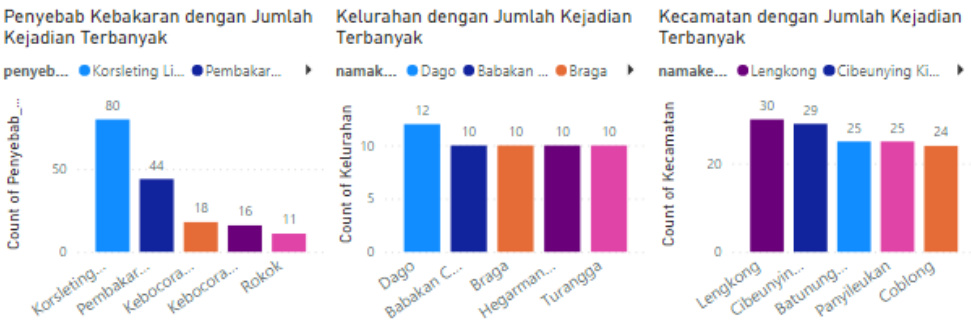

FIGURE 5. Area 4 fire dashboard.

Then to the right of the Area 4 bar graph, there is a map display which is a visual display of Area 5. This map display will show the location of the sub-district with the highest number of fire incidents. This map displays the location points of the sub-districts based on the name of the sub-district that appears on the bar graph Area 4, which is the sub-district graph with the highest number of occurrences. The display of Area 5 can be seen in figure 6.

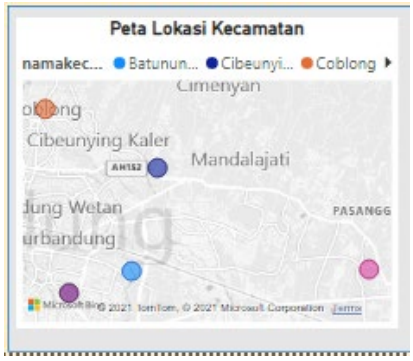

FIGURE 6. Area 5 fire dashboard.

Relationship with Air Temperature

Then on the fire dashboard page, there is a second page that explains the relationship between the number of fire data and the average air temperature in Bandung. The average air temperature data is data on the average air temperature in Bandung in 2018 and 2019. The data is in accordance with the data on the number of fires used in the design of the fire dashboard. The display of the relationship page between the average air temperature and the number of fire incidents can be seen in figure 7.

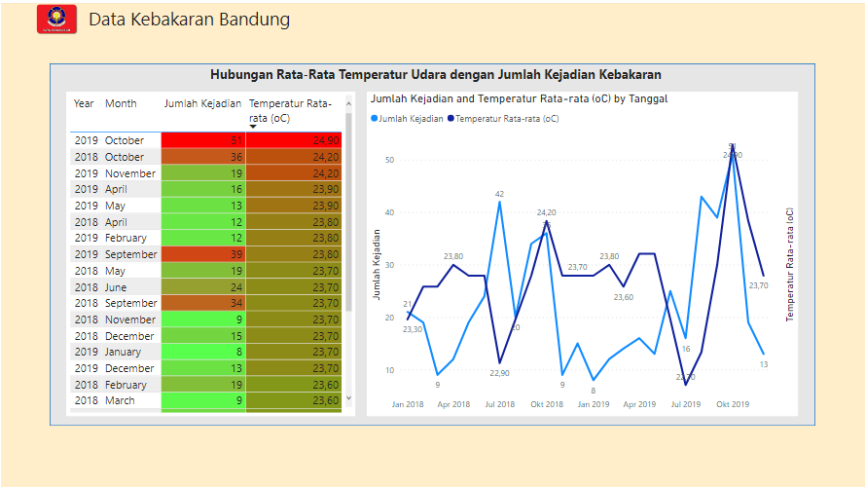

Figure 7. The visual relationship between the average air temperature and the number of fire incidents.

In Figure 10, there is a table that contains the number of events and the average temperature based on each month and there is a line graph that describes the data values in the table. There is a color indicator in the table which explains that the greener the color of the data indicates a low value, while the redder the color of the data indicates a high value.

CONCLUSION

Based on the design of the fire dashboard in Bandung, the following conclusions can be drawn:

1. The trend of fire incidents that occurred in 2018 and 2019 showed an upward trend.
2. During the 2 years in October, there were many fire incidents.
3. The most common cause of fires is an electric short circuit.
4. The village with the highest number of fire incidents is Dago.
5. The district with the highest number of fire incidents is Lengkong.
6. The average air temperature affects the number of fire incidents.

7. In October 2018 and 2019, it can be seen that the average air temperature looks very high and in accordance with the number of fire incidents in October 2018 and 2019.

The fire dashboard that is designed will be more complete if the author can get detailed fire data for the most recent year. So that this fire dashboard can produce more information.

REFERENCES

1. F. Moulaert and A. Mehmood, Towards a social innovation (SI) based epistemology in local development analysis: lessons from twenty years of EU research. European Planning Studies **28**(3), 434–453 (2020).
2. D. A. Sprenger and A. Schwaninger, Technology acceptance of four digital learning technologies (classroom response system, classroom chat, e-lectures, and mobile virtual reality) after three months' usage. International Journal of Educational Technology in Higher Education **18**(1) (2021).
3. Y. Demchenko, W. Los and C. de Laat, Data as economic goods: Definitions, properties, challenges, enabling technologies for future data markets. ITU Journal: ICT Discoveries **2**(23) (2018).
4. J. K. Lee, H. D. Rha, J. T. Kim, H. H. Jang and G. Y. Gim, A study on public open data service using linked open data (Lod) technology 1. International Journal of Advanced Science and Technology **119**, 1-12 (2018).
5. Castellnou, Marc, et al. Empowering strategic decision-making for wildfire management: Avoiding the fear trap and creating a resilient landscape. Fire Ecology **15**(1), 1-17 (2019).
6. S. Wexler, J. Shaffer and A. Cotgreave, *The Big Book of Dashboards Visualizing Your Data Using Real-World Business Scenarios* (John Wiley & Sons, 2017).
7. M. I. S. Assaqty, Y. Gao, X. Hu, Z. Ning, V. C. Leung, Q. Wen and Y. F. Chen, Private-Blockchain-Based Industrial IoT for Material and Product Tracking in Smart Manufacturing. IEEE Network **34**(5), 91-97 (2020).
8. L. Agnihotri and A. F. Ott, Building a student at-risk model: An end-to-end perspective from user to data scientist. In Educational Data Mining (2014).
9. P. Beesley, Dissipative prototyping methods: A manifesto. Journal of the British Interplanetary Society **67**, 338-345 (2014).
10. T. E. Oyigbo and O. O. F. Ugwu, Appraisal of key performance indicators on road infrastructure financed by public-private partnership in Nigeria. Nigerian Journal of Technology **36**(4), 1049-1058 (2017).
11. M. Eshtaiwi, I. Badi, A. Abdulshahed and T. E. Erkan, Determination of key performance indicators for measuring airport success: A case study in Libya. Journal of Air Transport Management **68**, 28-34 (2018).