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Design Of Food Price Analysis Dashboard In Jakarta

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ABSTRACT
This research discusses the fluctuation of food prices in Jakarta is a complex problem and requires accurate and real-time monitoring to support decision making by the government, traders, and consumers. This research aims to design an interactive dashboard that can effectively visualize food price data and present relevant Key Performance Indicators (KPIs). The dashboard is designed by integrating various data sources such as food prices in traditional markets, inflation rates, and price comparisons between regions in Jakarta using the Time Series Analysis method. The Time Series Analysis method is used to analyze data over time, which is a set of observation values obtained at different times with the same interval. Determining key KPIs, such as daily average price, percentage price change, and monthly fluctuation trend, is the main focus in this development. The dashboard was also designed with user experience and multi-platform accessibility in mind. The result of this research is a design that can demonstrate that the dashboard can assist stakeholders in monitoring food prices more efficiently and provide critical information needed for strategic decision-making related to price stability and food policy. With intuitive visualization and real-time data, the system is expected to be an important tool in supporting food security in Jakarta.

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INTRODUCTION

Food is a very important need for human resources in a country. Food price security can be achieved if the government can fulfill the availability of food both in terms of quality and quantity (Oni et al., 2023). Food is also a basic human need that must be available in adequate quantities, have good quality, be safe for consumption, be rich in nutrition, and be accessible to all levels of society. Adequate food availability is very important to maintain daily life and socio-economic stability of a country (K. Nisa, D. Sugiarto, and T. Siswanto). Fluctuations in food prices can affect people's purchasing power, inflation and social welfare. In the context of globalization, food prices are not only influenced by domestic factors such as production and distribution by international market dynamics including currency exchange rate movements.

Changes in currency exchange rates can have a direct impact on food prices. When currency exchange rates weaken against other currencies, food import prices will increase, which may affect food prices in the domestic market. A strengthening currency exchange rate can lower food import prices, providing a positive impact on consumers. Therefore,

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monitoring and analyzing food prices integrated with currency comparison data is necessary to understand market dynamics (Malau et al., 2023).

In Indonesia, as a country that imports food, fluctuations in the exchange rate of the rupiah against major currencies such as the United States Dollar (USD) are very influential. For example, a weakening rupee against the USD can lead to an increase in the price of imported food commodities, such as wheat, soybeans and meat. This requires careful monitoring and comprehensive analysis to understand the relationship between currency exchange rates and food prices (Hidayatullah & Saitama, 2023).

In the digital era, information system-based data management is becoming increasingly crucial to support decision making in various sectors, including the food sector. Geographic Information Systems (GIS) is a technology that has great potential in analyzing and visualizing data related to geographic locations. In the context of food prices, GIS allows the integration of spatial and attribute data to provide a more in-depth picture of banking (Widianta, RE, & Santoso, I. 2022).

Another factor that plays a role is energy conversion, where when energy prices rise, there is a tendency to convert food products into energy, which results in an increase in food prices. In addition, a country's domestic policies can also affect food prices, such as food export and import policies. In the face of the complexity of factors affecting food prices, food price analysis becomes very important. This analysis aims to determine the factors that contribute to changes in food prices and identify the effects of each of these factors. Using an in-depth understanding of these factors, appropriate policy measures can be taken to address excessive price fluctuations and achieve food price stability..

In the era of rapid data development, managing and utilizing data is a very important aspect for the success of an organization. Data warehouse is a technology that supports effective data management, enabling organizations to store, process and analyze large amounts of data from various sources. One of the main methods in building a data warehouse is dimensional modeling, which facilitates faster and more efficient data access and analysis (Few, S. 2013).

Dimensional modeling, which involves creating star schemas and snow schemas, allows organizations to organize data in a way that supports fast and intuitive analysis. With this approach, data from various operational systems can be integrated and organized in a structure that is easily accessible to end users. Kimball and Ross emphasize the importance of a deep understanding of business needs and the use of data in decision making to design appropriate data warehouse solutions.

Kimball's approach to dimensional modeling also includes techniques for overcoming common challenges in data management, such as integrating data from multiple sources, maintaining data consistency, and supporting complex analysis needs. By applying the principles explained in this book, organizations can build data warehouses that are reliable and scalable, and able to provide meaningful insights for strategic decision making (Kimball, R., & Ross, M. 2013).

In order to support the analysis of food prices, the creation of dashboards is one way of presenting issues on food prices in a visual and practical way. Dashboard is a visual display

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of data used to monitor conditions and facilitate a basic understanding. Dashboard is also a form of visual display representation containing important information that is useful to facilitate users in monitoring information (Horeb, 2023). Key performance indicator (KPI) is a measurement tool used to evaluate how effective an organization, team, individual is in achieving their strategic goals. KPIs provide a quantitative overview of performance and assist in decision-making by providing relevant and measurable data (Marr, 2024).

The dashboard is able to present information concisely and clearly, so that users can easily understand important data comparisons. With a dashboard visualization, it will be easier to analyze and find out other factors that may have an impact on food, namely a decrease in food prices or an increase in food prices or sudden changes in fluctuations in food prices.

In the midst of an increasingly rapid information era, the ability to process and present data effectively becomes very important. Today's organizations not only need accurate data, but also efficient ways to monitor and analyze it. One tool that is particularly useful in this context is an information dashboard. These dashboards allow users to quickly view and understand data, providing a comprehensive picture of performance and relevant trends.

The food price dashboard can provide an accurate illustration of the food price situation. With this dashboard, users can monitor and analyze changes in food prices and identify the impact of influencing factors. This is important for making the right decisions for managing food supply and formulating policies that are synchronized with specific conditions. With a good understanding of the factors affecting food prices and the support of the food price dashboard, effective policies can be implemented on managing food supply and maintaining food price stability. accurate and relevant issues obtained through the dashboard will assist stakeholders in making the right decisions. thus, creating the desired food price stability and ensuring the welfare of the people.

Dashboards are one of Tableau's main features that allow users to combine various visualizations into one comprehensive view. A well-designed dashboard is able to present complex information concisely and clearly, making it easier for users to understand and utilize data for decision making (Perangkat Lunak Tableau. (2020). Praktik Terbaik untuk Dasbor yang Efektif). However, creating an effective dashboard is a challenge in itself. A deep understanding of visual design principles, user interactions, and the context of the data to be displayed is required. Best practices in creating dashboards include various aspects such as choosing the right visualization, strategically arranging dashboard elements, and presenting data in an attractive and easy-to-understand manner (Few, 2006).

METHODS

The method used in Figure 1 in this design is to use the Waterfall method. The waterfall method is useful for designing information systems because the process is more organized from one stage to the next. The waterfall method is also a method that provides a sequential or sequential software lifecycle approach (Yurinda, 2017).

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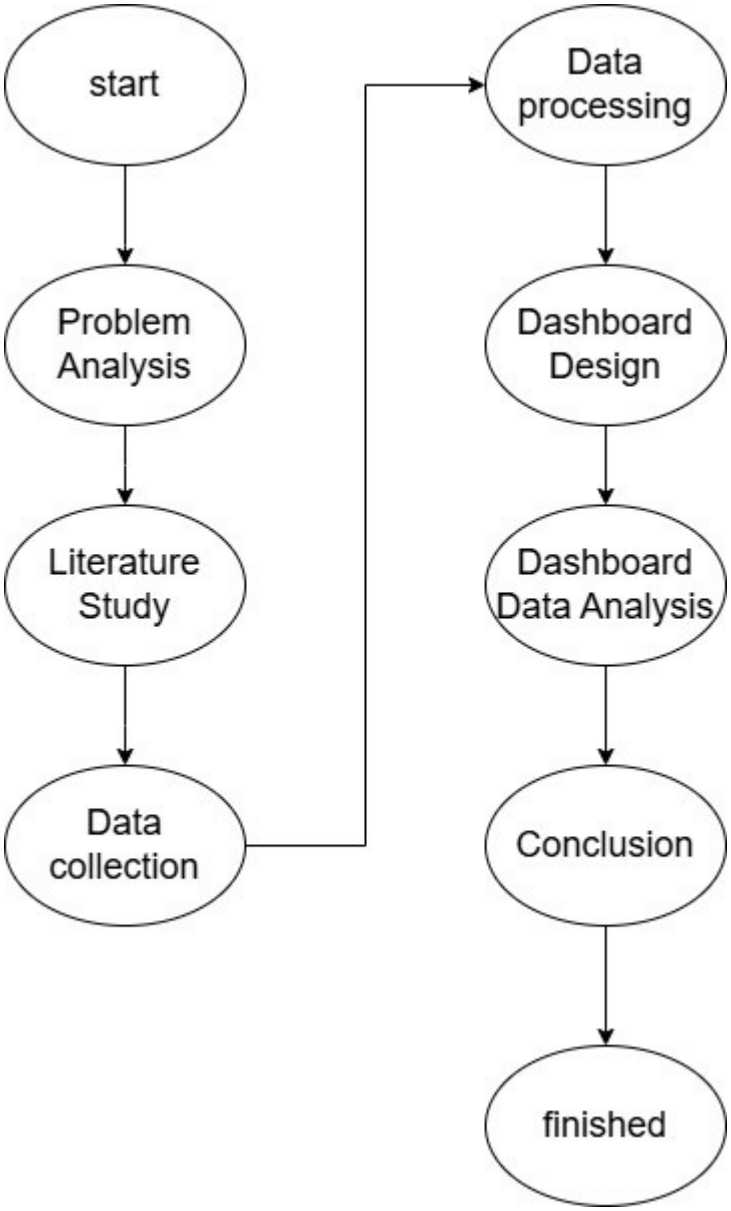

Figure 1. Flow Chart

Problem Analysis

This stage involves identifying and deeply understanding the problem to be solved, i.e., food price fluctuations and the factors that influence them. This analysis can help in formulating the objectives and limitations of the analysis.

Literature Study

This stage involves research and study of literature related to food prices, and dashboard users in analyzing food prices. The literature study helps to understand the concepts, theories and approaches that have been used in previous research.

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Data Collection

In the data collection stage, food price data is collected from official sources in a systematic and structured manner. The data is used to design and build a data warehouse using a star schema.

Data Processing

The next data processing is to perform the ETL (Extract, Transform, Load) process. ETL is a process for cleaning, transforming, and loading data into a data warehouse.

Dashboard Design

At this stage, designing and creating a food price dashboard includes selecting the appropriate type of visualization, with an easy-to-understand layout, and interactive features that make it easy for users to explore data.

Dashboard Analysis

This stage involves analyzing the data using the dashboard that has been created. Users can explore the data, filter, and analyze the relationship with food price changes.

Conclusioins

Conclusions can be drawn based on the results of the data analysis conducted using the dashboard. Conclusions include key findings on factors affecting food prices, the relationship between these factors and price changes, and the impact of policies that can be taken to manage food price stability.

RESULTS AND DISCUSSION

The design results that have been implemented in Figure 2 in the stages of forming a food price dashboard are as follows:

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Designing Use Case Diagrams

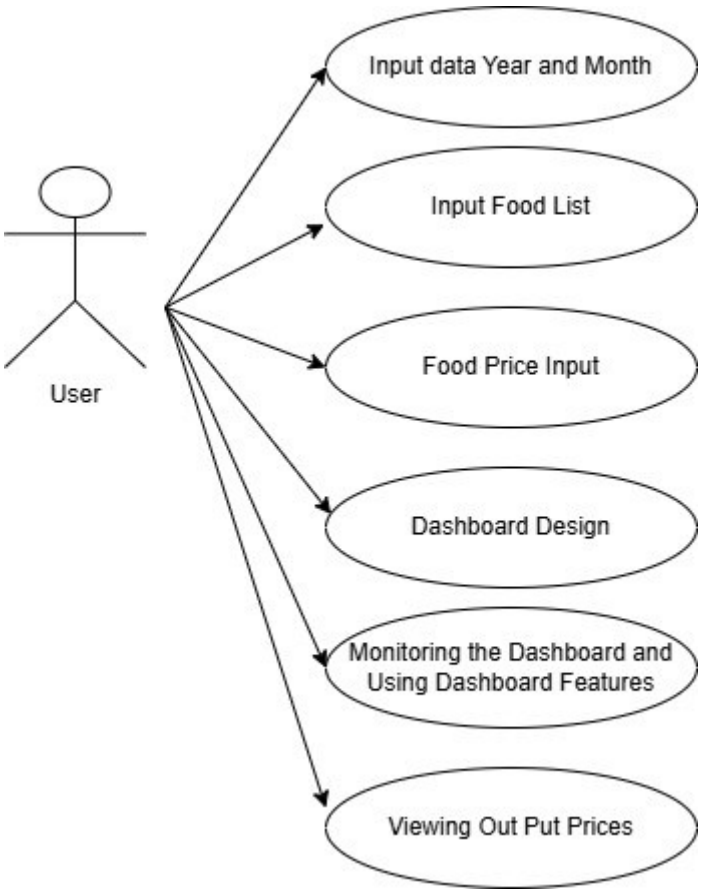

Figure 2. Use Case Diagram

Star Schema Design

Star Schema design in Figure 3 of this study uses a star schema diagram with fact and dimension tables, fact tables or facts have connections to dimension tables of time, food prices, regions, and exchange rates. Star schema is a data schema model in data warehousing consisting of a fact table that contains facts such as sales and transactions, and a dimension table that contains attributes that describe the dimensions or characteristics of these facts. In the star schema structure, the fact table is at the center, the dimension table spreads around it resembling a star schema, so it is called a “star schema”.

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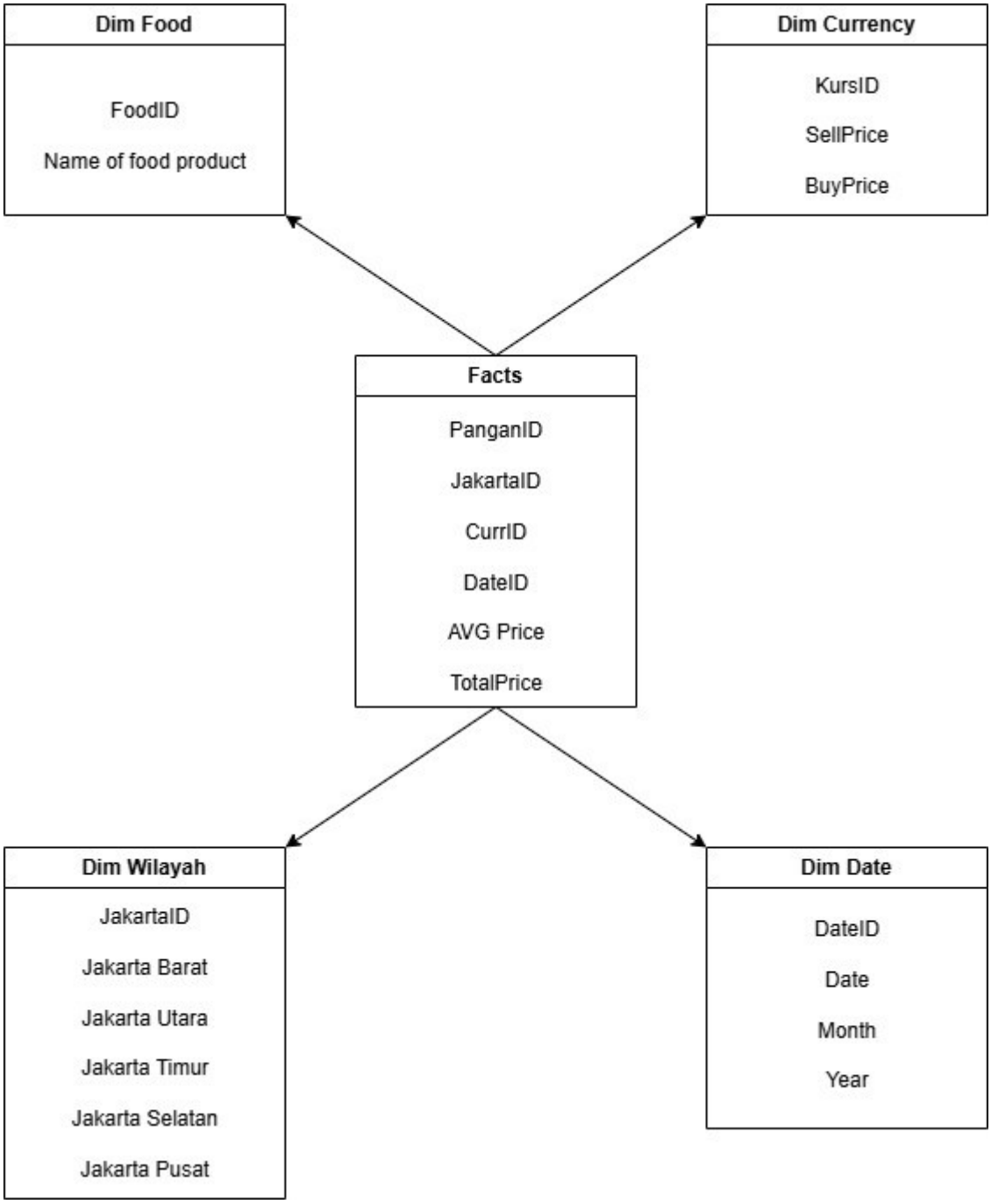

Figure 3. Star Schema

ETL Process (Extract, Transform, Load)

In Figure 4. ETL (Extract, Transform, Load) is a process needed to retrieve data from various official sources, transform it into a format that can be understood and used, and load it into a data warehouse or other data storage system. The ETL process aims to clean up the data and combine it into one database so that it becomes suitable data.

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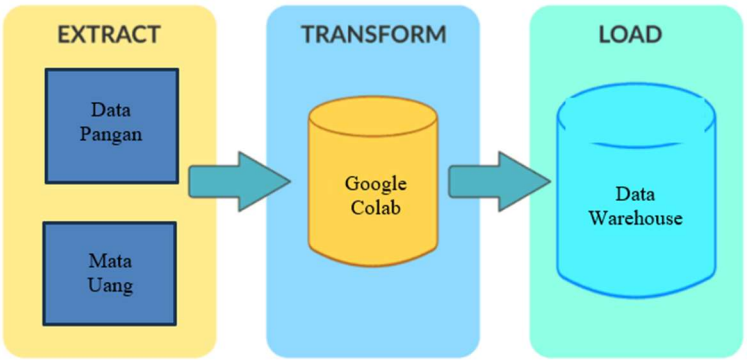

Figure 4. ETL Process

Extract

The process of retrieving data from various operational data sources needed to be a useful format for transformation processes in the form of

a. Relational database
b. Legacy system
c. Data from the cloud
d. Flat files (such as CSV or Excel)
e. APIs from other applications

The purpose of this stage is to collect the raw data needed for further analysis. The extracted data can be structured or unstructured data.

Transform

Transform, the process of changing the extracted data to suit the needs of the analysis. This transformation includes data cleaning, merging data from various sources, data format conversion, and data calculation and aggregation.

a. Data cleaning by removing errors and duplicates in the data
b. Standardization to Change the format of the data for consistency.
c. Aggregation by Calculating the total or average value of the data
d. Data Enrichment to add additional information from other sources to improve data quality.

Transformation is essential to ensure that the data to be loaded into the destination system is accurate and relevant.

Load

Load is the process of loading transformed data into the data warehouse. The loaded data must be optimized to support analytical queries and reporting.

a. Full Load to Load all the data at once, usually done at the beginning of the process.
b. Incremental Load Loads only data that is new or has been changed since the last load, which is more efficient in terms of time and resources.

This loading process ensures that the data available for analysis is the latest and most relevant.

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Dashboard View

In the display of Figure 5, the dashboard can be seen, the visualization of which has features to be used according to user needs to see the price of the food list within a period of months and years.

Figure 5. Dashboard Visualization Display

Table 1. Key Performance Indicator

No	Key Performance Indicators	Key Performance Indicators	Target
1	Food Inflation	Food Inflation	20%
2	Food Quality	Food Quality	10%
3	Monthly Sales Growth	Monthly Sales Growth	25%
4	Sales Opportunities	Sales Opportunities	50%

In Table 1. The first row shows food inflation by showing the unit of measurement in the form of a number given the number 20% as the normal limit required by entrepreneurs. The second line displays a unit of measurement of 10% as a minimum size limit of the quality of food available, in line 3 shows the KPI of sales development for the month period with a KPI limit of 25% as a normal limit that must be achieved. The fourth line displays the sales percentages to provide the latest information with a target of 50%.

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CONCLUSION

This research succeeded in designing an interactive dashboard to analyze food prices in Jakarta using the Time Series Analysis method and dimensional modeling approach. This dashboard is designed to visualize food price data and real-time transmission, by integrating data from various sources, such as food prices in traditional markets, inflation rates, and price comparisons between regions.The use of key performance indicators (KPI), such as daily average prices, price percentage changes, and monthly peak trends, allows users to understand food price patterns and make more informed strategic decisions. In addition, the ETL (Extract, Transform, Load) process implemented ensures data integration and cleanliness so that the data presented on the dashboard is reliable.The research results show that this dashboard can help stakeholders, including the government, traders and consumers, in aggregating food prices more efficiently. The dashboard also supports the formulation of strategic policies to maintain food price stability and ensure community welfare, especially in preventing winter resistance to food prices.

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