DATA VISUALIZATION OF FOOD PRICE INFORMATION PORTAL ON THE WEBSITE DINAS PERTANIAN TANAMAN PANGAN OF WEST JAVA PROVINCE

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ABSTRACT

Trading in agricultural commodities in the era of economic globalization, led to a very strong market transparency. Addressing the condition required the availability of market information that actual and accurate. So it can be used as consideration in the marketing of agricultural products. as we know that the price in the global market turnaround is happening very quickly. If an error occurs and the delay in the presentation of information impacts occur i.e. delay of siapan and penanangan Government when the onset of the turmoil the price. The seven stage of data visualization is a method for presenting information in a visual form that aims to make the analysis to visualize the information so that it is easy to understand and read by the user. This research uses data information on horticulture and food prices that are on the market and the central character and needs the same information. To meet the needs of such information, the data will be mapped with or without certain algorithms in this study used statistical methods to get the desired information. After that the information obtained is processed into visual form in the form of maps, graphs, tables, text, and symbols that are used to implement the data. So that the system that is built can already visualize the proper data and information can be used directly as a recommendation for making price-related agricultural marketing.

Keywords: *Data Visualization, Portals, Price Information, Food Crops, Horticultural Crops*.

1. PRELIMINARY

Food Crops Department of West Java Province is a government-owned agency responsible for the presentation of accurate data and information on food crop and horticulture agriculture. The availability of information in the agricultural and trade sectors at this time is very much needed, such as the size of the land area, planting area, harvested area, productivity, and production as well as other data considered to be very important in planning and decision making. [2]

Trade in agricultural commodities in the era of economic globalization, resulting in very strong market transparency. Demands in the current trading era require efficiency in the field of production and marketing so that traded commodities can compete in the free market. In general, the scale of agricultural business in Indonesia is still relatively small, scattered, with diverse product quality. The trading chain of marketing of fresh agricultural products is still long, so on the one hand it puts pressure on consumers in the form of high and fluctuating prices, on the other hand the pressure on producers in the form of proportion of prices received is relatively low. [3]

The imbalance in supply and demand in a market often also results in price fluctuations, both at producer and consumer centers. In general, price fluctuations are also caused by supply imbalances caused by the nature of commodities which are very dependent on the season / climate. Addressing these conditions requires the availability of actual, accurate and continuous market information. So that it can be used as a material for policy making in the field of marketing of agricultural products for food crops and horticulture. [1]

Based on the results of the interview with Mr. Wandy Sandara who served in the Functional Section of the Analysis of Agricultural Products Market in the Department of Food Crops of West Java Province explained that he had difficulty in analyzing the marketing of agricultural products, because the information received was only price information in the form of a daily price table which resulted have to analyze and dig deeper information to get the information you want, as we know that the price turnover in the global market happens very fast. If there is an error in the presentation of information, it will have an impact on the delay in the handling and the government's unpreparedness when price fluctuations occur.

While the results of interviews with general users who access the website of the Department of Food Crops of West Java Province conducted on 5 respondents include traders and farmers having difficulty in obtaining price information in a certain

period which results in farmers and traders need to analyze information related to changes in prices of certain commodities in the previous period for the coming period.

From the problem, it is necessary to analyze data visualization on the food price information portal feature in presenting information on the website owned by the Food Crop Agriculture Service of West Java Province so that it is expected to help the agency to solve the problems that occur and provide the right solution to assist in presenting information and facilitate the government in monitoring the stability of food prices in West Java Province.

2. RESEARCH CONTENT

2.1 Research Methodology

The steps taken in conducting research using the Seven Stages of Visualizing Data process from Ben Fry in his book entitled "Visualizing Data" [4]. *The data visualization process can be seen in Figure 1.*

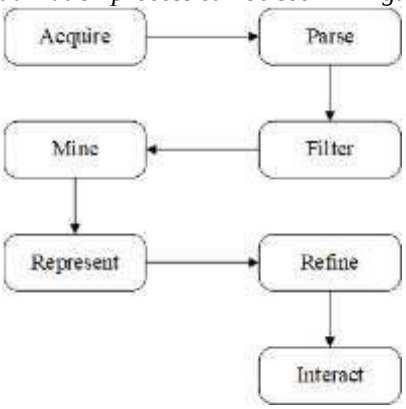


***Figure 1**. Process The Seven Stages of Visualizing Data*

With the following stages:

Acquire (Data Collection Stage)

This stage is the stage where data is collected from various sources either from files on storage or sources through the network.

Parse (Data Grouping Stage)

This stage will provide several structures to mean data, and messages into categories so that each data file can be read and can be distinguished from other data.

Filter (Data Selection Phase)

At this stage data selection will be done so that data that is not important or interesting will be deleted.

Mine (Analysis Phase of Methods and Algorithms)

At this stage, the data is applied to the method of statistical or data mining disciplines as a way to find patterns or be elaborated in a mathematical context.

Represent (Basic Visualization Stage)

At this stage the data is changed and presented in the form of basic visual models, such as bar graphs, lists, or trees. The represent phase shows the basic form of data to be taken. One of the best ways to understand large data is through visualization. Visualization presents detailed data into easily accepted information by changing a series of numbers into visual elements so that data is easier to read and understand [5].

Refine (Data Presentation Stage)

At this stage, the visual model is made clearer and more interesting. Design charts speak more at this stage. The points that are quite important in visual graphics compared to other points are distinguished so that they can be read easily.

Interact

At the interacting stage, methods for manipulating data are added, meaning that data can be displayed according to the user's will. Examples of interactions between users and data such as zoom-in, zoom-out, changing data ranges, filtering, etc. [4].

2.2 Results and Discussion

A. Data Collection Phase (Acquire)

Price data for food and horticultural commodities used are from Microsoft Excel databases and documents stored on the ministry's website. The data available on the database is data uploaded by the admin. While the data available in Microsoft Excel documents is data that is managed manually by functional officers. The data used in this study can be seen in Table 1.

***Table 1.** Data Used*

Data	***Nama***
Data 1	*Data Food Commodity*
Data 2	*Data Horticultural Commodities*
Data 3	*Data Regional Marketing*
Data 4	*Data Central / Manufacturer Level Food Commodity Prices*
Data 5	*Data Market / Retail Food Commodity Prices*
Data 6	*Data Central / Producer-level Horticulture Commodity Prices*
Data 7	*Data Horticultural Commodity Prices Market / Retail Level*

B. Data Grouping Stage (Parse)

This stage will provide several structures to mean data, and messages into categories so that each data file can be read and can be distinguished from other data. Data grouping can be seen in Table 2.

Table 2. *Grouping Data*

Data	Atribut	Type Data
1	No	Integer
	Nama Komoditas Pangan	Varchar
2	No	Integer
	Nama Komoditas Hortikultura	Varchar
3	Nama Kabupaten/Kota	Varchar
	Latitude	Varchar
	Longitude	Varchar
4,5,6, dan 7	No	Integer
	Nama Kota/Kabupaten	Varchar
	Info Harga	Double

C. *Data Selection Phase (Filter)*

At this stage data selection will be carried out by mapping information based on user needs so that data that is not important or interesting will be deleted or eliminated. Table mapping of data based on information needs can be seen in Table 3.

Table 3. *Data Mapping Based on Information*

Kebutuhan Informasi	Data
Fluctuations in food and horticulture prices every day	1, 2, 3, 4, 5, 6, dan 7
Monitor the most expensive, cheapest and average prices in certain regions	1, 2, 3, 4, 5, 6, dan 7
Differences when there is a rise, fall, and stable prices of food and horticulture	1, 2, 3, 4, 5, 6, dan 7

D. *Analysis Phase of Methods and Algorithms Algoritma (Mine)*

At this stage, the data is applied to the method of statistical or data mining disciplines as a way to find patterns or be elaborated in a mathematical context. The following is a mapping of methods and algorithms based on information needs that can be seen in Table 4.

Table 4. *Selection of Methods and Algorithms*

Kebutuhan Informasi	Pemecahan
Monitor the most expensive, cheapest and average prices in certain regions	Statistika
Differences when there is a rise, fall, and stable prices of food and horticulture	Standardization of Calculation of Agriculture Service and Bank Indonesia

Statistics are used in information needs to monitor the price of the most expensive, cheapest and average food or horticulture in certain regions using Data 1, 2, 3, 4, 5, and 7.

The data sample used is the center-level medium-level commodity commodity price data on April 2, 2018. Data samples can be seen in Table 5.

Table 5. *Sample Production Center Level Medium Rice Commodity Price Data April 2, 2018*

Regency Name / City	Beras Medium	Latitude	Longitude
Kab. Bogor	9300	-6.55178	106.62913
Kab. Sukabumi	9800	-6.86492	106.95357
Kab. Cianjur	9600	-7.35798	107.19572
Kab. Garut	11000	-7.50122	107.76362
Kab. Tasikmalaya	11000	-7.65133	108.14287
Kab. Ciamis	9000	-7.33208	108.34925
Kab. Kuningan	9000	-7.01381	108.57006
Kab. Majalengka	10000	-6.77906	108.28521
Kab. Subang	9800	-6.34876	107.76362
Kab. Purwakarta	9000	-6.56492	107.43219
Kab. Karawang	10000	-6.32273	107.33758
Kab. Bekasi	9500	-6.24745	107.14845
Termurah	9000		
Termahal	11000		

To determine the average value, the following formula is used:

$$Rata - rata = \frac{\sum x}{n} \quad [6]$$

The results of the calculation of the average value of the price of food medium rice commodity at the center of production on April 2, 2018 are as follows:

$$Rata - rata = \frac{121832}{13} = 9371$$

The Department of Agriculture and Bank Indonesia have special standards in calculating differences in rising, falling and stable prices of food and horticulture with samples of food price data at the production center level on April 4, 2018 and April 5 2018 which can be seen in Table 6.

Table 6. *Sample Production Center Level Food Price Data April 4 2018 and April 5 2018*

Commodity Name	***4/4/2018***	***5/4/2018***
Beras Medium	*10000*	*10000*
Beras Premium	*11000*	*10500*
Gabah Kering Giling	*5500*	*5600*
Gabah Kering Panen	*4600*	*4600*
Jagung Pipilan Kering	*3700*	*3800*

To determine the up, down, and stable conditions, the following formula is used:

$$Komoditas = Harga\ Terbaru - Harga\ Sebelumnya$$

Results if they occur when prices rise
Gabah Kering Giling = 5600 – 5500=100 (Naik Rp.100)
Jagung Pipilan Kering = 3800 – 3700 = 100 (Rise Rp.100)

Results if it happens if the price drops
Beras Premium = 10500 – 11000 = -500 (Drops Rp.500)

Results if it happens if the price is stable
Beras Medium = 10000 – 10000 = 0 (Stable Rp.0)
Gabah Kering Panen = 4600 – 4600 = 0 (Stable Rp.0)

E. Basic Visualization Stage (Represent)

The most important main step is to know the reasons and objectives in the chosen type of visual [7]. *At this stage the data is changed and presented in the form of basic visual models, such as bar graphs, lists, or trees. The represent phase shows the basic form of data to be taken. At this stage information will be presented in the form of graphs, dandiagram folders. Basic visualization mapping can be seen in Table 5.*

Table 5. *Selection of Data Visualization*

Information Needs	***Diagrams***
Fluctuations in food and horticulture prices every day	*Line Chart*
Monitor the most expensive, cheapest and average prices in certain regions	*Geograpich Map and Symbol*
Differences when there is a rise, fall, and stable prices of food and horticulture	*Heatmap*
Information on food and horticulture data (commodities)	*Table Commodity*
Information on marketing area data	*Table Territory*

Line Chart

The information needs needed are fluctuations in food and horticulture prices every day. Using Line Chart because it is easy to read, create, and suitable for displaying data for a certain period of time [4]. *The following are the basic visual results of the Price Fluctuation Line Chart which can be seen in Figure 2.*

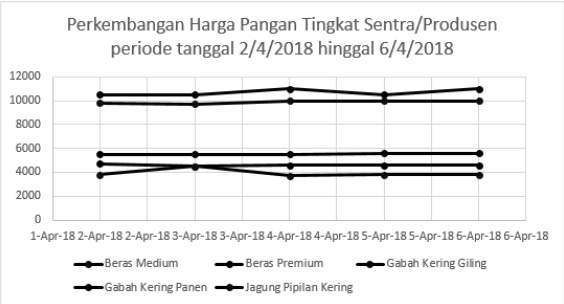


Figure 2*. Visual Basic Price Fluctuations*

Geograpich Map and Symbol

The information needs needed are monitoring the most expensive, cheapest and average prices in certain regions. Geographical maps and symbols are used because they make it easier for users to see one information with different data [7]. *The following are the basic visual results of the Geographic Map to show the highest, cheapest and average prices which can be seen in Figure 3.*

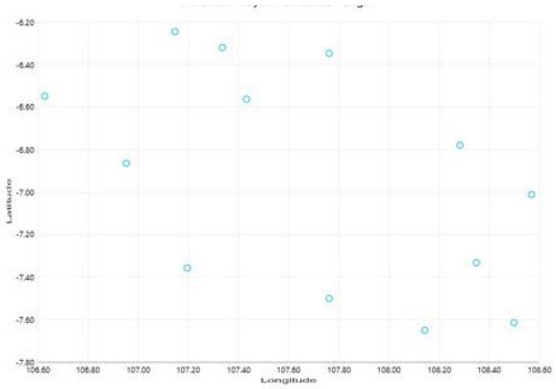


***Figure 3**. Basic Visual Geographic Maps*

The symbol used can be seen in Figure 4.



***Gambar 4**. Basic Visual Symbols for the Cheapest and Most Expensive Prices*

Heatmap

The information needed is a differentiator if there is a rise, fall and stable prices of food and horticulture. The following are the basic visual results of the heatmap which can be seen in Figure 5.

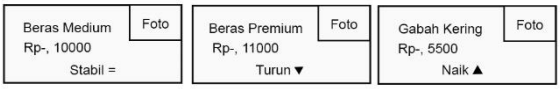


***Figure 5**. Basic Visual Heatmap*

With the symbol statement symbolizing rising, turn and stabilizing prices can be seen in Figure 6.



***Figure 6**. Basic Visuals Rise, Fall and Stable Price*

Commodity Table

The information needs needed are information on food and horticulture (commodity) data. The following are the basic visual results from the commodity table which can be seen in Figure 7.

id_komoditi	nama
1	Beras Medium
2	Beras Premium
3	Kentang
5	Kacang Tanah
6	Ubi Kayu
7	Ubi Jalar
8	Tomat

***Figure 7**. Visual Basic Commodity Tables*

Tabel Teritory

The information needed is the marketing area. The following are the basic visual results from the region table which can be seen in Figure 8.

Id Daerah	Nama Daerah	Latitude	Longitude
1	Lembang	-6.815099	107.623052
2	Cianjur	-6.815839	107.141193
3	Ciwidey	-7.084580	107.443392
4	Cikajang	-7.387013	107.805662

***Figure 8**. Visual Basic Marketing Area Tables*

F. Refine (Data Presentation Stage)

At this stage, the visual model is made clearer and more interesting. Design charts speak more at this stage. The points that are quite important in visual graphics compared to other points are distinguished so that they can be read easily.

Line Chart

The visual end result for the information needs needed to see the fluctuations in food and horticulture prices every day can be seen in Figure 9.

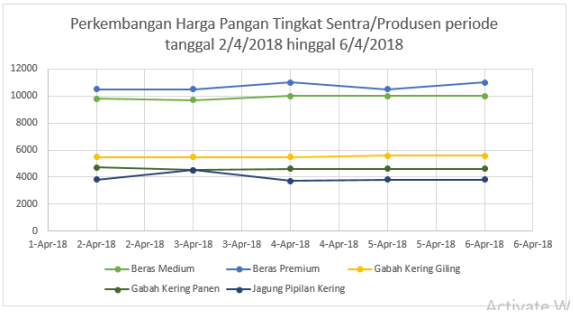


***Figure 9**. Visual Price Fluctuation Results*

Geographic Maps and Symbols

Visual outcomes for the information needs needed to monitor the most expensive, cheapest, and average prices in certain regions can be seen in Figure 10.

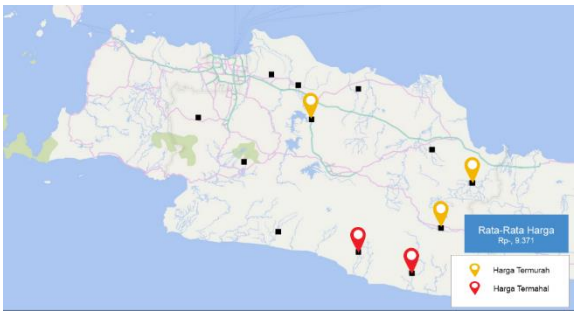


***Figure 10**. Visual Results of Geographic Maps to See the Most Expensive, Cheapest and Average Prices*

The symbol used can be seen in Figure 11.

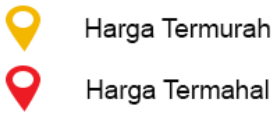


***Figure 11**. The Results of Visual Symbols The Cheapest and Most Expensive Prices*

Heatmap

Visual end result for the information needs needed to see the difference if there is a rise, fall and stable prices of food and horticulture. The following are the basic visual results of the heatmap which can be seen in Figure 12.

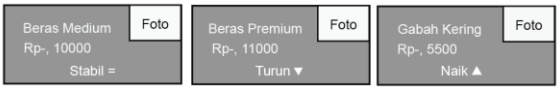


***Figure 12**. Visual Heatmap Results*

With the symbol statement symbolizing rising, turn and stabilizing prices can be seen in Figure 13.



***Gambar 13**. Visual Results to Increase, Fall and Stable Price*

Commodity Table

Visual end result for information needs needed to see food and horticulture commodities. The following are the basic visual results of the heatmap which can be seen in Figure 14.

NO	NAMA KOMODITAS
1	Beras Medium
2	Beras Premium
3	Jagung Pipil Kering
4	Kedelai Lokal
5	Kedelai Import
6	Kacang Tanah Lokal

***Figure 14**. Visual Results of Commodity Tables*

Regional Table

Visual end result for information needs needed to see food and horticulture commodities. The following are the visual results of the basis of the heatmap which can be seen in Figure 15.

NO	NAMA DAERAH	LATITUDE	LONGITUDE
1	Kabupaten Bogor	-6.595038	106.816635
2	Kabupaten Sukabumi	-6.923700	106.928726
3	kabupaten Cianjur	-6.820762	107.142960
4	Kabupaten Garut	-7.227906	107.908699
5	Kabupaten Tasikmalaya	-7.319563	108.202972
6	kabupaten Ciamis	-7.3320773	108.3492543

***Figure 15**. Results of Visual Marketing Area Tables*

G. Interaction Phase (Interact)

At the interacting stage, methods for manipulating data are added, meaning that data can be displayed according to the user's will. Examples of interactions between users and data such as zoom-in, zoom-out, changing data ranges, filtering, and so on.

The use of zoom in interaction can be seen in Figure 16.



***Figure 16**. Zoom In interaction*

The use of zoom out interactions can be seen in Figure 17.



***Figure 17**. The interaction of Zoom Out*

The use of date range selection interactions can be seen in Figure 18.



***Figure 18**. Date Range Selection Interaction*

The use of interaction of commodity and region selection can be seen in Figure 19.



***Figure 19**. Interaction of Commodity and Regional Selection*

Non-functional Needs Analysis

Is the analysis needed to determine the system requirements specification. This specification includes what components are needed in the system to be built until the system is implemented.

Analysis of the hardware requirements used can be seen in Table 6.

***Table 6**. Hardware Requirements*

Perangkat Keras	***Spesifikasi***
Processor	*1.8 GHz minimal speed*
Memori	*RAM 512 GB*
Monitor	*Resolustion 1024 x 768 Pixel*
Harddisk	*Minimal 100 GB*
Keyboard	*Standard*
Mouse	*Standard*
Jaringan	*Internet connection*
Processor	*1.8 GHz minimal speed*

Analysis of software requirements used can be seen in Table 7.

***Tabel 7**. Software Requirements*

Sofftware	***Spesification***
System Operation	*Windows XP*
Web Browser	*Internet Explorer, Mozila Firefox, dan Google Chrome*

Functional Needs Analysis

Is an analysis that explains the flow of data or information which includes depiction, planning, and sketching or arrangement of several elements that are separated into a single unit that is complete and functions in the process of making the software to be built.

Interface Implementation

The following is the interface display that was built on the Visualization of Food Price Information Portal Data of the Food Crops Department of West Java Province:

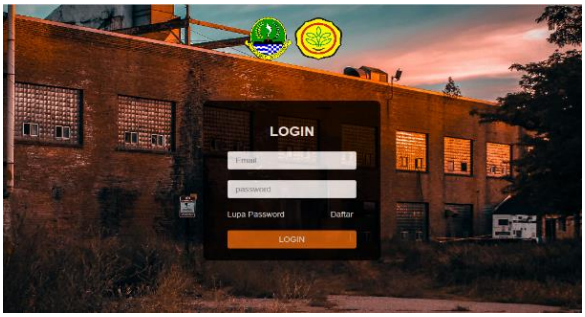


***Figure 21.** Login interface*



Figure 22. *Dashboard Interface*

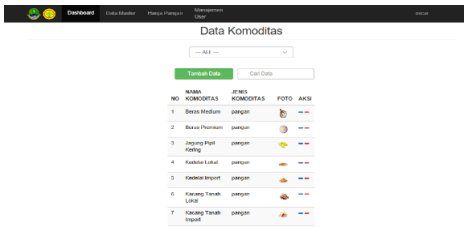


Figure 23*. Interface Manage Commodity Data*

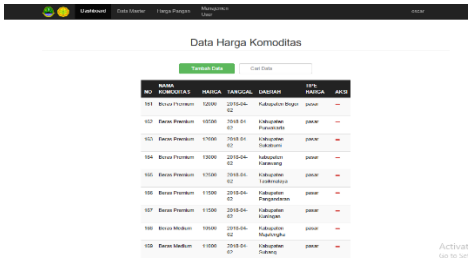


Figure 24. *Interface of Food and Horticulture Prices*

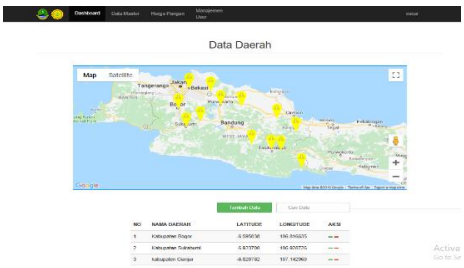


Figure 25. *Regional Data Interface*

Beta testing

This beta test is done by testing directly in the place of research using interview techniques for each user.

The test results on the admin user type can be seen in Table 8.

Table 8. *Test Results Against Admin*

Question	***Answear***
Can this system help you manage commodity and regional data ?	*Yes, of course.*
Does this system help you manage food and horticulture prices?	*Yes, of course. With features now it is easier for me to control and manage existing data.*
How do you think about the vocabulary and the language used in the system is easy to understand?	*Vocabulary and writing language are easy to understand.*
Do you feel difficulties when using this system?	*Of course not, because the features that are made are very easy to understand.*
How do you think about the interface on this system?	*The appearance is interesting, the combination of features and colors looks more interactive.*

The test results on the type of user functional part of the market analysis of agricultural products can be seen in Table 9.

Table 8. *Test Results Against Admin*

Question	***Answear***
Can this system help you see the fluctuations in food and horticulture prices?	*Yes, it is very helpful in seeing fluctuations in both food and horti as a policy material to overcome price fluctuations in the market.*
Has this system been able to help you see the price of the most expensive, cheapest and average commodity in each region?	*Yes, it will make it easier for farmers to market their harvested products.*
Has this system helped you to see the difference in the case of rising, falling and stable prices?	*Yes, this system is very helpful for information on business people in agriculture.*
Do you have difficulty using it?	*There is no problem, the application is easy to use.*
What do you think of the vocabulary and language used in the system?	*It's good and easy to understand.*
How do you think about the interface on this system?	*It's good to be a website in our agency.*

3. CONCLUSION

Based on the results of testing the website application information visualization of food price information on the Department of Food Crops of West Java Province, it can be concluded that the system built can make it easier for users to manage data and obtain information as policy material and

process of analysis of agricultural markets, and able to assist the government in monitor changes in prices in the field.

The concept of data visualization in this study still has obstacles that can be encountered. suggestions for the development of application development are indeed web-based, but do not rule out the possibility that if a mobile version of the application will be built, data can be fanned by one source without having to change hands to another party and the need to provide an API (Application Programing Interface) to make it easier for developers and users to do data utilization.

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