

DATA VISUALIZATION OF COMMODITIES PRICES AND LIVESTOCK PRODUCTS IN AGRICULTURE SERVICES IN CENTRAL KUANTAN DISTRICT, RIAU PROVINCE

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ABSTRAK

The Central Kuantan District Agriculture Office has several branch offices namely the Agricultural Counseling Center (BPP) which is spread in each district. BPP has the task of making a report on the prices of commodities and livestock products. Based on interviews conducted with the coordinator of the Central Kuantan Central BPP, said they had difficulty in obtaining information relating to commodity prices and livestock products. Difficulties occur because in order to obtain information, they have more efforts to combine and analyze the prices of commodities and livestock products each week. Of these problems there needs to be visualization to facilitate and understand information because visualization explains starting from extracting information using statistics and how visualization is built up to visualization into a form that can be utilized. The results of this study are an appropriate form of visualization for the information needs requested by the Central Kuantan BPP coordinator..

Keywords: Data Visualization, Commodity Prices, Livestock Products, Statistics.

1. INTRODUCTION

Kuantan Singingi Regency Agriculture Office is an office that functions to carry out the affairs of authority and assistance tasks in the field of Agriculture and Animal Husbandry. The Kuantan Singingi District Agriculture Office has 13 branch offices of the Agricultural Counseling Center (BPP) spread out in each district. The duties and responsibilities of the BPP are to collect data on commodity prices and livestock products. Data collection on commodity prices and livestock products aims to monitor the prices of livestock products sold in the market to avoid price spikes such as a drastic increase and decrease in prices so that a stable price is obtained to focus the price plan in the following month and avoid a decline in livestock commodities. Research conducted by Nyak Ilham discusses the increase in consumption and

changes in beef commodity prices, namely beef, the rate of increase in meat consumption by 7.36% per year (DEPJEN LIVESTOCK, 1997). Beef contribution (21.27%) ranks second after poultry meat (58.02%) in meeting meat needs. In the same period beef consumption grew by 4.43%, while production, which came mostly from smallholder farms, grew only 2.33%. Without efforts to increase production, population drainage is expected [1].

Based on interviews conducted with the coordinator of the Central Kuantan Central BPP said that in getting information relating to the prices of commodities and livestock products, the BPP coordinator only looked at information based on data that was not processed, so it took a long time to get information relating to the price of commodities and livestock products. and impact on unstable prices such as drastic price increases and decreases. The information needed is information on the average price of the commodity each month, information on the total of the average price of the commodity each month, and information on the percentage of the price of the commodity each month. At present the data obtained once a week has more effort to combine and analyze prices on a weekly basis. Due to the difficulty of combining and re-analyzing prices, it causes delays in getting information from commodity prices and livestock products each month, resulting in unstable commodity prices and livestock products such as drastic increases and decreases in commodity prices. Monitoring is carried out to produce a focus on price and product stability plans. the farm the following month.

Based on this phenomenon, interviews with the Agricultural Counseling Center (BPP) coordinator at the Kuantan Singingi District Agriculture Service secretariat stated that in order to obtain information on commodity prices and livestock products, related indicators must be processed first to obtain information in accordance with the objectives of the farm. At this time, the data only shows commodity price indicators and livestock products as a whole but does not display matters relating to the information needed by those concerned..

Based on the problem above, visualization is needed to display the extraction of data into information that is easy to accept [2]. Data visualization is the right solution because data visualization can create complex information on a scale large enough so that it can be understood quickly [3]. In addition, visualization can display information efficiently and effectively in accordance with the needs of the Agricultural Extension Agency Coordinator in monitoring prices and livestock products in order to achieve the price plan focus to the following month.

1.1 Formulation of the problem

Based on the description above, it can be concluded that what kind of visualization is appropriate for visualizing data on commodity prices and livestock products for BPP Coordinator, Kuantan Tengah District.

1.2 Purpose and objectives

The purpose of this study is to conduct a visualization analysis of commodity prices and livestock products for the Coordinator of the Central Kuantan Central BPP, while the objective to be achieved from this research is to produce an appropriate data visualization and can be used by the Coordinator of the Central Kuantan Central BPP.

2. RESEARCH CONTENTS

2.1 Data Visualization

Data visualization is a study that explains how to present data in visual form. Visualization not only lies in the ease of interpretation, but in the display of trends and patterns in data that will be difficult to find if only using statistical techniques or algorithms.

Data visualization has the aim to facilitate understanding and interpreting large and complex collections of information by relying on human visual abilities [3].

2.2 Data Visualization Process

To achieve good visualization, there are several steps used in the data visualization process [4], while the process is Acquire, Parse, Filter, Mine, Representative, Refine, Interact.

Acquire is the process of collecting data. Obtaining data from various sources, can be from very large files and the results from the internet. Parse is making data adjustments to the specified format. Data is classified into several categories so you can easily find out the type. Filter is selecting the data needed then delete data that is not needed in processing. Mine is the application of data mining or statistical science to determine the pattern of existing data. At this stage it is optional if the information obtained cannot be directly mapped in the visualization. However, if the data is in accordance

with the information needs, there is no need to process mining. Represent is data that has been analyzed and then resubmitted in the form of basic visual models such as graphs, diagrams, and others. This stage is an important stage for the process of making data visualization. Refine is to make the results of the represent process into a form that is more convenient to see .. Interact is to make the data controllable what you want to visualize, meaning that the data can be displayed according to the user's wishes.

2.3 Data Presentation

Visualization aims at how to represent data using an approach that emphasizes more visual than traditional presentation. Two popular types of visualization are dashboards and infographics [5].

In general, data visualization consists of 3 forms, namely simple text, tables and graphics. Text or simple text is used if the information to be conveyed is in the form of a number or two numbers. The table is used when the user will see several different sizes. Charts are used if you want to map dimensions into visuals. To determine the choice of diagrams there are 4 categories that must be considered according to Chart Suggestions [6], namely relationship, comparison, distribution or distribution and composition.

2.4 Form of Data Visualization

There are several types of visualization that are commonly used to present information. Utilization of visual graphic forms can be divided into: Tables, line diagrams, bar charts, pie charts.

Tables interact with the verbal system, meaning that readings are needed to see the information. One approach to combining the details of existing information and forms of data visualization is a heatmap [7]. Heatmap is a way to visualize data in tabular format through various colors Line charts are used to illustrate the relationship of time series with continuous data. Line charts are usually used to see trends and things that change. Bar charts can be used to illustrate changes in value over time and compare different categories. Making variations of the bar chart can be changed according to the case at hand. Pie diagrams or pie charts are diagrams that show a comprehensive comparison between data by dividing the circle with the center angle corresponding to the comparison. This pie chart can be used to present data in the form of degrees (°) or percent (%).

2.5 Data

Data is a representation of facts, concepts or instructions by compiling appropriate for communication, interpretation, or processing by humans or by automated means [8]. Data can be classified into structured data and unstructured data.

Structured data is data that is sorted into the table method structure in which each row represents a single observation and the column represents the observational characteristics. Structured data can be presented in a clear scheme so that it is easy to analyze and integrate with other structured data. An example is scientific observation.

Unstructured data is data in the form of free entities such as text, audio, images, and signals that must be deciphered first to make it an organized data. An example is a tweet in the form of writing on Twitter.

2.6 Livestock Commodity Prices

Animal husbandry commodities are very important needs for the community. As for some important things in the price of livestock commodities, namely getting the development of livestock commodity prices, including calculating the increase and decrease in prices, Calculate the average price, Calculate the percentage of prices.

In getting the results of the calculation of increase and decrease, of course, it takes at least two different values. The method used to calculate the increase and decrease in prices is as shown in Figure 1.

$$\text{Selisih harga} = \text{Harga Baru} - \text{Harga Lama}$$

Figure 1. Price Difference

To get the average price of certain items to get the overall price of an item, the method shown in Figure 2 is used.

$$\text{Rata-rata} = \frac{\text{Jumlah seluruh data}}{\text{Banyak data}}$$

Figure 2. Average

The price percentage is needed to find out in more detail whether the price is up or down. The method used to calculate the increase and decrease in prices is as shown in Figure 3.

$$\text{Persentase Kenaikan} = \frac{(\text{Harga Baru} - \text{Harga Lama})}{\text{Harga Lama}} \times 100$$

Figure 3. Percentage

2.7 Usability Testing

Usability Testing is a way to evaluate a product or service by testing it with potential users. This test is carried out to ensure that every functionality that is executed is easily understood by the user. This can be done by seeing the users doing the tasks assigned, finding their difficulties, and improving the design according to the user's difficulties [9]. The purpose of usability testing is to look for problems related to usability, to collect qualitative and quantitative data, and to determine user satisfaction with the product.

2.8 Object Oriented Analysis and Design

Object-oriented analysis and design is a way to describe a process model that occurs in the system. In object-oriented programming emphasizes various concepts such as: Class, Object, Abstract, Encapsulation, Polymorphism, Inheritance and UML (Unified Modeling Language) [10].

2.9 Data Visualization Analysis

Data visualization analysis is an explanation of the analysis of information needs, analysis of data sources, analysis of data mapping and analysis of types of extraction methods for information needs.

2.9.1 Analysis of Information Needs Based on Duties and Responsibilities.

Information needs analysis is needed to find out overall what data is used in the problem taken. Analysis of information needs was carried out by interviewing with the part of the Agriculture Office namely the Coordinator of the Agricultural Extension Center (BPP) of Central Kuantan District.

The following are the duties and responsibilities of the BPP Coordinator in Central Kuantan District and the information needed can be found in table 1.

Table 1. Analysis of the BPP Coordinator's Task, Responsibilities and Information Needs

Position	Duties and responsibilities	Information Needs
BPP Coordinator	Make reports on commodity prices and livestock products every week.	Information on commodity prices and livestock products.
	Carry out control of commodity prices and livestock products.	Information on the average price of commodities and livestock products at each price level every week of the month
	Comparing the prices of commodities and livestock products to achieve price stability	Total information about the average price of commodities and livestock products in each commodity every month. Percentage information changes in the prices of commodities and livestock products in each commodity every month.

From the above table then mapped into a table of information needs. This table will be used in the next step of the research phase. The following is a table of information needs that can be seen in Table 2.

Table 2. Information Needs

Position	Information Needs
BPP Coordinator	Information on the highest and lowest prices of the average price of commodities and livestock products at each price level every week of the month.
	Information on the highest and lowest total prices of the average price of commodities and livestock products in each commodity every month.
	Percentage information changes in the prices of commodities and livestock products in each commodity every month.

2.9.2 Data Source Analysis

The data to be analyzed in this study were sourced from the Agricultural Extension Center (BPP), Central Kuantan District. The data format obtained in the form of Hard File / Paper and excel format. The data to be used in this study are, Data on Average Commodity Prices and Livestock Products, Total Data from Average Prices of Each Livestock Commodity, Data on Percentage Changes in Livestock Commodities can be seen in the following table 3.

Table 3. Average Data on Commodity Prices and Livestock Products

Attribute	Explanation
Commodity Type	Contains data on types of livestock commodities.
Prices at each level every week for one month.	Contains price data from the level of Breeder / Producer, Trader and Consumer.
Average Price	Contains data on average commodity prices for one month.
Date	Contains data on the date the report was made.

Table 4. Total Data from Average Commodity Prices and Livestock Products

Attribute	Explanation
Commodity Type	Contains data on types of livestock commodities.
Commodity	Contains commodity data (Animal Prices, Animal Prices, Poultry Feed Prices, Processed Prices).
Average price of each commodity in each price level.	Contains data on average commodity prices at each price level.

Average Total on each Commodity.	Contains total data on average prices for each commodity.
Month	Contains the month data made report.

Table 5. Percentage Data Changes in Commodity Prices and Animal Products

Attribute	Explanation
Commodity	Contains commodity data (Animal Prices, Animal Prices, Poultry Feed Prices, Processed Prices).
Percentage Change	Contains data about the results of changes in each commodity in the form of percent.
Explanation	Berisi tentang naik atau turunnya persaingan. Jika Persen positif berarti naik, jika persen negatif berarti naik..

2.9.3 Data Mapping Analysis of Information Needs

Data mapping analysis is done by listing data related to the problem to be solved and also the information needs. For information on the highest and lowest average prices of commodities and livestock products at each price level every week in a month, refer to the Average Commodity and Livestock Price Data. For information on the highest and lowest total prices of the average price of commodities and livestock products in each commodity each month, refer to the Total Data of the Average Price of each Livestock Commodity. For information on the percentage change in commodity prices and livestock products in each commodity every month, refer to the Percentage Data Changes in Livestock Commodity Prices.

2.9.4 Analysis of Types of Extraction Methods for Information Needs

Analysis of the type of extraction method is carried out to meet predetermined information needs. To extract information from existing data, statistical calculations or using data mining methods can be seen in Table 6.

Table 6. Analysis of Extraction Methods for Information Needs

Position	Information Needs	Types of Information Needs	Method Type
BPP Coordinator	Information on the average of the highest and lowest prices of commodities and livestock products at each level (levels of producers, collectors, consumers) prices every week of the month.	Eksplosoratory	Statistics
	Information on the highest and lowest total prices of the average price of commodities and livestock products in each commodity every month.	Eksplosoratory	Statistics
	Percentage information changes in the prices of commodities and livestock products in each commodity every month.	Eksplosoratory	Statistics

2.10 Data Visualization Design

At this stage the visualization of the data obtained from the results of the selection is done in several forms. In the design, there are several stages that are carried out, namely understanding the context, choosing the form of visualization, minimizing clutter, providing attention and understanding tests.

For the first information is information on the highest and lowest average prices of commodities and livestock products at each price level every week of the month. The first step is understanding the context. In understanding the context of information needs, a description of the context is carried out, namely what is conveyed (what) and how to convey (how) as in table 7.

Table 7. Context Descriptions of Information Needs First

Context	Description
What	Knowing the highest and lowest average prices of livestock commodities at each level in a month.
How	Shows a visualization of average commodity prices at each level in a month.

The selected form of visualization is simple text. Because simple text is suitable for presenting some information. For the resulting visualization, it must be free of clutter to make it easier to understand the information. Which can be seen in table 8.

Table 8. Clutter free information

Clutter	Clutter free description
Alignment	Use left align for titles and content
White Space	Used as a separator between title and content.
Border	There is no border
Similarity	The use of color in the same content

Attention is given because of the focus on information that is the average price of a commodity so that it is colored in the price information. The explanation of the above stages obtained visualization display as shown below. (Data for January 2018).



Figure 4. Initial Visualization of Average Livestock Prices at Producer Level

Then what is done is to distinguish the font size and color to focus on the information needed.



Figure 5. Results of Average Visualization of Animal Prices at Producer Level

For the second information is information on the highest and lowest total prices of the average price of commodities and livestock products in each commodity every month. The first step is understanding the context. In understanding the context of information needs, a description of the context is carried out namely what is conveyed (what) and how to convey (how) as in table 9.

**Table 9. Context Descriptions
Second Information Needs**

Context	Description
What	Know the highest and lowest total prices of the average price of livestock commodities at each level in a month.
How	Displays a total visualization of average commodity prices at each level in a month.

The selected form of visualization is simple text. Because simple text is suitable for presenting some information. For the resulting visualization, it must be free of clutter to make it easier to understand the information. Which can be seen in table 10.

Table 10. Clutter free information

Clutter	Clutter free description
Alignment	Use left align for titles and content
White Space	Used as a separator between title and content.
Similarity	The use of color in the same content

Attention is given because of the focus on information that is the average price of a commodity so that it is colored in the price information. The explanation of the above stages obtained visualization display as shown below. (Data for January 2018).



**Figure 6. Initial visualization of Total Average
Producer Level Livestock Prices**

Then what is done is to distinguish the font size and color to focus on the information needed.



**Figure 7. Total Visualization Results from
Average Livestock Prices at Producer Level**

For the third information is information on the highest and lowest total prices of the average price of commodities and livestock products in each commodity every month. The first step is understanding the context. In understanding the context of information needs, a description of the context is carried out, namely what is conveyed (what) and how to convey (how) as in table 11.

**Table 11. Context Description of Information
Needs Third**

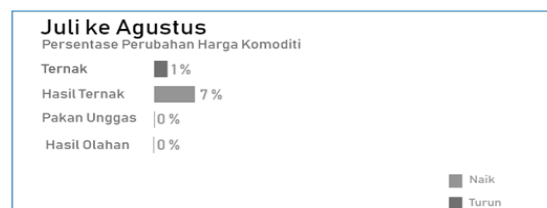
Context	Description
What	Know the percentage change in prices in each livestock commodity from the previous month
How	Displays a visualization of the percentage change in prices in each livestock commodity.

The selected form of visualization is in the form of a table. Because it is suitable for presenting information displays as a whole. For the visualization produced, it must be free of clutter to make it easier to understand the information. Which can be seen in table 12.

Table 12. Clutter free information

Clutter	Clutter free description
Alignment	Use the left average for commodities, the middle average for percentages, and the left average for information.
Border	The use of color in the same content.

Attention is given because of the focus on information that is the price of a percentage so that it is given color to the results of the percentage. As for the explanation of the above stages obtained visualization displays such as Figure 8 and Figure 9 (Data from July to August 2018).



**Figure 8. Initial Visualization of Percentage of
Livestock Commodities**

Then what is done is to distinguish the font size and color on the bar so that it is focused on the information needed.

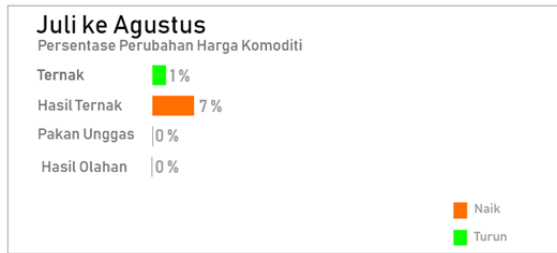
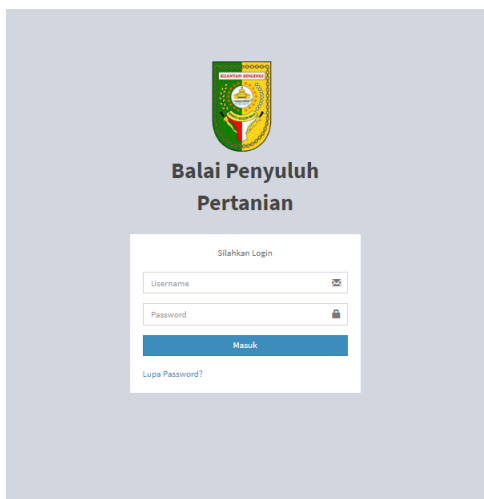


Figure 9. Visualization Results of Percentage of Livestock Commodities

2.11 Interface Implementation

1. Login Interface

To log in have 2 users, the first as an admin who can do all access such as edit, delete, add and see. Whereas for ordinary users can only see the results of visualization.



2. Commodity Data Interface

For the commodity data interface to display data that has already been filled in, and to add, edit, delete data, this is also done in this interface.

Figure 11. Commodity Data Interfaces

3. Commodity Average Visualization Results Interface

Showing the visualization results of average commodities and livestock products.

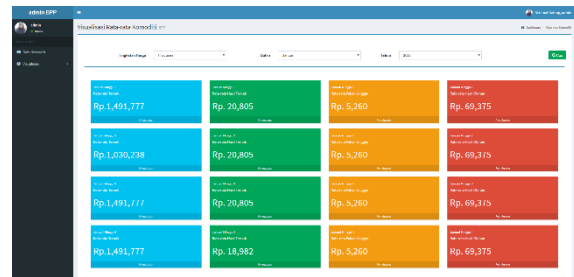


Figure 12. Visualization Interface

Average Commodities and Livestock Products

4. Interface of Total Visualization Results from Average Commodities and Livestock Products Showing the visualization results of average commodities and livestock products.

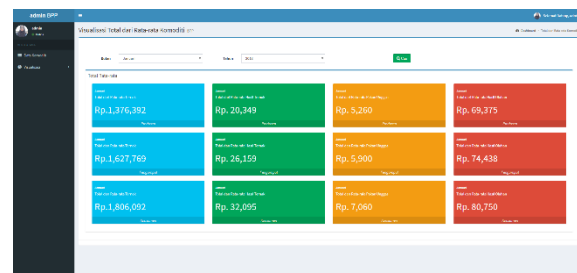


Figure 13. Visualization Interface

Average Total Commodities and Livestock Products

5. Interface Visualization Results Percentage of Commodities and Livestock Products

Showing the results of the visualization of the percentage change in commodities and livestock products from the previous month to the next month.

Figure 14. Visualization Interface Percentage change in Commodity Prices and Animal Products

3. CLOSING

3.1 Conclusion

Based on the results of the implementation and testing conducted on the system of data visualization of commodity prices and livestock products in the agricultural service in the Kuantan Tengah District of Riau Province, it was concluded that the visualization of the data contained in the prototype is the right visualization to meet the information needs of the Agricultural Counseling Center coordinator (BPP) Middle Kuantan.

The purpose of this visualization is to facilitate the BPP coordinator in understanding information about commodity prices and livestock products, namely the average commodity price, the total of the average commodity price and the percentage change in commodity prices. The information understood can be used to see the development of commodity prices and livestock products in the future.

3.2 Suggestion

Some suggestions from the authors for this research are:

1. Making visualization results far better based on information needs because there are still shortages in the visualization results section.
2. This research only focuses on one data from BPP namely the price of commodities and livestock products so that the information for the results of visualization feels lacking, it would be better there are other data relating to commodity prices or other data that requires a lot of information..

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