

Comparison of Single Moving Average and Single Exponential Smoothing Methods in Estimating Jotun Brand Paint Inventory at Toko Cat Warna Baru

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Abstract

The research objective is to analyze comparison of single moving average and single exponential smoothing methods in estimating Jotun brand paint inventory at Toko Cat Warna Baru. This research uses qualitative research. This research is conducted at Toko Cat Warna Baru which is located at Jalan Sisingamangaraja Number 241, East Kisaran District, Asahan Regency. The data collection techniques used in this study used field research and library research. The framework in this research is problem identification, data collection, system analysis, system design, system implementation, and system testing. The results show that the lowest mean absolute percentage error error value in the single moving average method is 15.27% while the lowest mean absolute percentage error error value in the single exponential smoothing method is 12.11%. So, it can be concluded that the single exponential smoothing method is better than the single moving average method because it has a very small error value.

Keywords

single moving average; single exponential smoothing; jotun



I. Introduction

Advances in various fields of technology, especially advances in information technology and computers, encourage the emergence of various new innovations in the presentation of information to meet information needs. Utilization of technology as a human computer tool also has advantages including speed, accuracy, accuracy and efficiency of data processing compared to manual systems. Competition in the business world has created intense competition between one institution and another. The increasingly rapid economic development is currently marked by the emergence of various companies that produce goods and services in the field of production which in turn spurs the marketing sector. One of the products offered by the business world today is Jotun brand paint, which today is hyper competitive, which is a big challenge for every company, so companies must be more responsive in responding to the current developing conditions. The economic condition of the population is a condition that describes human life that has economic score (Shah et al, 2020). Economic growth is still an important goal in a country's economy, especially for developing countries like Indonesia (Magdalena and Suhatman, 2020). In a competitive market, the company's marketing activities are faced with many things that are uncertain and difficult to control, such as competition, economic situation, people's tastes, and so on, all of which will influence the company concerned in marketing its products.

Likewise, the sale of Jotun brand paint at Toko Cat Warna Baru. Toko Cat Warna Baru is a trading business engaged in the sale of Jotun brand paint. This shop sells several

paints such as Jotun brand paint. There are different types of Jotun paint and there are many types, such as for Jotun exterior paint there are 8 types, Jotun interior paint there are 5 types, and oil paint there are 2 types. The problem that occurs at Toko Cat Warna Baru is the number of sales that are fluctuating so that the company does not know the estimated supply of Jotun brand paint in the following year and there is no system that can predict the supply of Jotun brand paint at Toko Cat Warna Baru.

Forecasting or prediction is a projection or estimation of an uncertain level of events so that it takes time to draw a conclusion in the future which includes the needs in terms of quantity, quality, time and location needed in order to meet the demand for goods or services and can minimize data errors for the future. Forecasting is a way to predict future conditions through testing past conditions. According to Heizer (2015) forecasting is the science and art of predicting or predicting the future. This can be done by involving taking past data and placing it in the future with a form of mathematical model. According to Sinaga and Irawati (2019), forecasting is a calculation analysis technique that is carried out with a qualitative and quantitative approach to predict future events by using reference data in the past to minimize the influence of uncertainty. Forecasting made is always strived to minimize the influence of this uncertainty on a problem. By making the right predictions then the future policy making. The method used in this study is a single moving average and single exponential smoothing method.

The research objective is to analyze comparison of single moving average and single exponential smoothing methods in estimating Jotun brand paint inventory at Toko Cat Warna Baru.

II. Research Method

This research uses qualitative research. Qualitative research is a way to determine the aspect of deep understanding of a problem (Pandiangan et al., 2022; Tobing et al., 2018). The purpose of this method is a broad and in-depth understanding of a problem that is being studied or will be studied (Asyraini et al., 2022; Octiva, 2018; Pandiangan, 2015).

The scope of research has a definition as a method of limiting the problem and also the science to be studied. If it is related to the process of making research, then the scope means the limitation of the subject that we will examine. This research is conducted at Toko Cat Warna Baru which is located at Jalan Sisingamangaraja Number 241, East Kisaran District, Asahan Regency.

The data collection techniques used in this study used field research and library research. Field research, namely by direct data collection, direct visits to the research object (Octiva et al., 2018; Pandiangan, 2018). Library research is research conducted to obtain theoretical data. In this case it must be noted that the subject under study is a discussion whose contents are related to the problem to be discussed (Octiva et al., 2021; Pandiangan et al., 2021; Pandia et al., 2018).

The framework is a reference for the steps in doing research by making the stages of the research methodology so that there is no confusion during research work and the results achieved are maximized (Jibril et al., 2022; Pandiangan et al., 2018; Pandiangan, 2022). The framework in this research is problem identification, data collection, system analysis, system design, system implementation, and system testing.

III. Result and Discussion

3.1 System Analysis

The analysis of the ongoing system in determining the forecasting of the amount of Jotun brand paint inventory, where the Jotun brand of paint inventory at Toko Cat Warna Baru has not been carried out to predict the amount of Jotun brand paint inventory for the next 1 year, the amount of Jotun brand paint inventory that is changing so that it cannot be estimated the exact amount of Jotun brand paint supplies for the following year which causes ineffective planning and has not been equipped with technology that can predict Jotun brand paint supplies at Toko Cat Warna Baru.

The current system analysis at Toko Cat Warna Baru can be described in detail in the following information:

1. From the data on the supply of Jotun brand paint, the administration makes a report on the amount of Jotun brand paint inventory.
2. Reports are made in duplicate. 1 copy for the leadership and 1 copy again as a legacy for the administration.
3. From the report on the amount of Jotun brand paint inventory, the administration determines the estimated amount of Jotun brand paint inventory for the next period.
4. The administration reports on the results of the estimated number of Jotun brand paint supplies for the next period in 2 copies.
5. Report on the estimation of the amount of Jotun brand paint inventory 1 duplicate for the leadership and 1 copy again as a leave for the administration.

The analysis of the proposed system at Toko Cat Warna Baru can be described in detail in the following information:

1. From the Jotun brand paint inventory data, the administration makes a report on the amount sold.
2. Reports are made in duplicate. 1 copy for the leadership and 1 copy again as a legacy for the administration.
3. From the report on the amount sold, the administration enters the data type, period, and performs calculations and then saves it into the database.
4. Then the Administration prints the results of the single moving average and single exponential smoothing calculations.
5. The administration reports on the results of the estimated number of Jotun brand paint supplies for the next period in 2 copies.
6. Report on the estimation of the amount of Jotun brand paint inventory 1 duplicate for the leadership and 1 copy as a left for the administration.

3.2 Problem Analysis

The performance, information, economy, control, efficiency, and service (PIECES) methods of the current system are as follows:

1. Performance analysis, because it has not used a forecasting system, a system is needed that can predict the supply of Jotun brand paint in the following year.
2. Information analysis, in the process of predicting the amount of Jotun brand paint inventory, it has not been carried out for the next 1 year. If you use a system/program, you can predict for the next year.
3. Economic analysis, in terms of economy, the income of at Toko Cat Warna Baru is smaller if the supply of Jotun brand paint is less.

4. Control analysis, with a manual system, controlling the amount of Jotun brand paint inventory is carried out because each Jotun brand paint inventory is based on the number of sales each year.
5. Efficient analysis, the amount of Jotun brand paint inventory is variable so it can't be estimated the exact amount of Jotun brand paint inventory for the next year which causes the planning that has been made to be ineffective.
6. Service analysis, service of unfulfilled Jotun brand paint supplies can affect sales of Jotun brand paint for the future.

3.3 Data Needs Analysis

1.Data Analysis (Input and Output Data)

Analysis of input needs, namely data on the supply of Jotun brand paint every year which is entered into the system to be processed in forecasting the supply of Jotun brand paint for the following year. The output data produced is a forecast of the amount of Jotun brand paint inventory for the following year.

2.Process Analysis Using Single Moving Average Method and Single Exponential Smoothing Methods

a. Jotun Jotashield Extreme Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the amount of paint inventory for the Jotun Jotashield Extreme brand in 2022 was 293 gallons. In the single exponential smoothing test stage, it was found that the forecast for the amount of paint supply for the Jotun Jotashield Extreme brand in 2022 was 350 gallons.

b. Jotun Ultra Clean Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the amount of Jotun Ultra Clean paint inventory in 2022 was 248 gallons. In the single exponential smoothing test stage, it was found that the forecast for the number of Jotun Ultra Clean paint supplies in 2022 was 283 gallons.

c.Jotun Jotadshield Antifade Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the amount of paint inventory for the Jotun Jotadshield Antifade brand in 2022 was 308 gallons. In the single exponential smoothing test stage, it was found that the forecast for the number of paint supplies for the Jotun Jotadshield Antifade brand in 2022 was 404 gallons.

d.Jotun Jotarroof Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the number of Jotun Jotarroof brand paint supplies in 2022 was 264 gallons. In the single exponential smoothing test stage, it was found that the forecast for the number of Jotun Jotarroof brand paint supplies in 2022 was 326 gallons.

e. Jotun Essense Tought Shield Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the amount of paint supply for the Jotun Essense Tought Shield brand in 2022 was 292 Gallons. In the single exponential smoothing test stage, it was found that the forecast for the amount of paint supply for the Jotun Essense Tought Shield brand in 2022 was 299 gallons.

f. Jotashiled Primary Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the amount of Jotashiled Primer brand paint inventory in 2022 was 296

gallons. In the single exponential smoothing test stage, it was found that the forecast for the amount of Jotashiled Primer brand paint inventory in 2022 was 348 gallons.

g. Majestic Perfect Baeuty & Care Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the number of paint supplies for the Majestic Perfect Baeuty & Care brand in 2022 was 320 gallons. In the single exponential smoothing test stage, it was found that the forecast for the supply of Majestic Perfect Baeuty & Care paint in 2022 was 355 gallons.

h. Majestic True Beauty Sheen Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the amount of paint supply for the Majestic True Beauty Sheen brand in 2022 was 272 gallons. In the single exponential smoothing test stage, it was found that the forecast for the amount of Majestic True Beauty Sheen brand paint in 2022 was 307 gallons.

i. Majestic True Beauty Matt Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the amount of Majestic True Beauty Matt brand paint in 2022 was 224 gallons. In the single exponential smoothing test stage, it was found that the forecast for the supply of Majestic True Beauty Matt brand paint in 2022 was 298 gallons.

j. Essense Cover Plus Sheen Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the amount of paint supply for the Essense Cover Plus Sheen brand in 2022 was 256 gallons. In the single exponential smoothing test stage, it was found that the forecast for the amount of paint supply for the Essense Cover Plus Sheen brand in 2022 was 365 gallons.

k. Jotun Jotaplast Inventory Data

In the test phase of the calculation of the single moving average method, it was found that the forecast for the number of Jotun Jotaplast brand paint supplies in 2022 was 288 gallons. At the single exponential smoothing test stage, it was found that the forecast for the number of Jotun Jotaplast brand paint supplies in 2022 was 370 gallons.

l. Jotun Gardex Premium Gloss Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the number of paint supplies for the Jotun Gardex Premium Gloss brand in 2022 was 280 cans. In the single exponential smoothing test stage, it was found that the forecast for the number of paint supplies for the Jotun Gardex Premium Gloss brand in 2022 was 329 cans.

m. Jotun Higloss Inventory Data

At the test stage of the calculation of the single moving average method, it was found that the forecast for the number of Jotun Higloss brand paint supplies in 2022 was 311 cans. In the single exponential smoothing test stage, it was found that the forecast for the number of Jotun Higloss brand paint supplies in 2022 was 3,290 cans.

From the calculation of forecasting the supply of Jotun brand paint in 2022 using the single moving average and single exponential smoothing methods, it is continued to calculate the error value where the smallest error value is better. The result of the lowest mean absolute percentage error error value in the single moving average method is 15.27% while the lowest mean absolute percentage error error value in the single exponential smoothing method is 12.11%. So, it can be concluded that the single exponential smoothing method is better than the single moving average method because it has a very small error value.

3.4 User Analysis

Users or parties who use this system or application are the administration at Toko Cat Warna Baru. The purpose of its use is to facilitate administration in predicting the amount of Jotun brand paint supplies quickly so that it does not take longer. The system strategy that is carried out so that it can be used properly by users is to maintain the system.

3.5 Cost Analysis

The cost analysis in the design of Jotun brand paint inventory forecasting system at Toko Cat Warna Baru is as follows:

Table 1. Cost Analysis

Material	Justification for Usage	Quantity	Unit Price (Rp)	Total Price (Rp)
Laptop	System Interface with User	1 Unit	5,700,000	5,700,000
Epson L3110 Series	Printing Tools	1 Unit	2,200,000	2,200,000
Application	Software	1 Package	1,000,000	1,000,000
Printer Ink	Printing Ink	1 Set	27,000	27,000
SIDU A4 Paper	Print Report	5 Rim	40,500	220,000
Folder	For Guidance	2 Pieces	15,000	15,000
Unforeseen Expenses	-	-	1,000,000	1,000,000
Subtotal (Rp)				9,762,000

IV. Conclusion

The results show that the lowest mean absolute percentage error error value in the single moving average method is 15.27% while the lowest mean absolute percentage error error value in the single exponential smoothing method is 12.11%. So it can be concluded that the single exponential smoothing method is better than the single moving average method because it has a very small error value.

To get optimal results as for the suggestions that the author wants to convey after making observations by describing the data obtained, the authors have several suggestions:

- 1.To implement a sales forecasting system at Toko Cat Warna Baru, administrative staff are needed who are knowledgeable about computer technology and information technology so that this system can run well and efficiently.
- 2.To implement this system at Toko Cat Warna Baru should provide computer-based training so that all administrative parties can use this application.
- 3.To avoid things or errors that are not desirable for security and data loss, it is necessary to make a backup or copy files or data.

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