

# Sales Analysis Using the Forecasting Method

Amesangeng P<sup>1)</sup>, Riki<sup>2)</sup>, Ariadi Saputra<sup>3)</sup>

<sup>1)</sup> Satyagama University

Jl. Kamal Raya No. 2A Cengkareng, Jakarta -Indonesia

<sup>23)</sup> Buddhi Dharma University

Jl. Imam Bonjol No. 41 Karawaci Ilir-Tangerang 15115

<sup>1)</sup> [ames@gmail.com](mailto:ames@gmail.com)

<sup>2)</sup> [riki@ubd.ac.id](mailto:riki@ubd.ac.id)

<sup>3)</sup> [ariadisaputra711@gmail.com](mailto:ariadisaputra711@gmail.com)

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## **Abstract**

Sales Analysis Using Forecasting Method aims to improve effectiveness and efficiency that facilitates companies in business transaction processes, improve the delivery of information quickly, accurately, and transaction data well and minimize errors. The method used in the presentation of this scientific work is by using a forecasting method which helps determine the approximate stock of goods to come. With 3 forecasting modules are: Moving Average, Weighted Moving Average, Trend Projection is used to perform the forecasting process of the upcoming stock of goods. Can solve problems that exist in the current system so that it can help in improving its services by calculating the stock and helping by determining the average data that has been linked to the forecasting module whose results can be concluded through reports per period. It can be concluded that the results of implementing this new system can help companies in recording each transaction that occurs becomes more efficient and effective, so that it can overcome the problems that exist in the current system. With this we can predict the current flow of goods that have been calculated based on 3 (three) modules that have connections with the system

## I. INTRODUCTION

At present the development of information technology is now developing so fast, so that it plays an important role in various aspects of the life of modern society, especially in the business world. Computer is one of the important parts in the world of information technology that is growing so rapidly. The ability of a computer to store and process information provided quickly, accurately and efficiently greatly facilitates its use to get good information from the data entered into the computer.

From information stored and processed in a computer, it can provide conclusions and accurate information about its use, one of its applications is the Point of Sales application, which is an application system consisting of hardware and software designed according to user requirements intended to help speed up transaction process, especially for companies engaged in trade.

Of the many transactions, there is no one who can manage in detail which makes the company have difficulty in recording transaction reports so that errors often occur when processing data.

Forecasting is an attempt to forecast conditions in the future through testing in the past. The use of this forecasting method helps the owner to determine the number of sales items that will come, so that the owner is easier to decide on adding or reducing stock of goods. [1]

## II. LITERATURE

Forecasting can be interpreted as a systematic approach used to analyze the pattern of historical sales data to project future demand as a basis for making long-term company planning and as a consideration for several decisions related to capacity requirements, inventory. [2] [3].

Forecast according to the time period says that forecasting is usually clarified based on the future time horizon covered. The time horizon is divided into several categories:

1. Short Term Forecasting
2. This forecast has a span of up to 1 year, but generally less than 3 months. Used for planning, purchasing, desk scheduling, workforce level, job assignment, and production level
3. Medium Term Forecasting

4. Middle or intermediate range, forecasting generally ranges from 3 months to 3 years. Useful in sales planning, production planning and budgeting, cash budgeting, and analysis of variations in operational plans.
5. Long-term forecasting
6. Generally 3 years or more in the span of time, long-term forecasting is used in planning for new production, capital expenditure, location of facilities or expansion, and research and development [2].

The demand for a product in a company is strongly influenced by various environmental factors that interact in the market that are beyond the control of the company. Where environmental factors will also affect forecasting.

The demand for a product on a company is the resultant of the various factors that interact with each other in the market. These factors are almost always a force that is beyond the control of the company. Various factors include:

1. Business Cycle  
Product sales will be influenced by the demand for the product, and the demand for a product will be influenced by economic conditions that shape the business cycle with phases, recession inflation, depression, and recovery periods.
2. Product Life Cycle  
The life cycle of a product usually follows a pattern commonly called the S curve. The curve S describes the size of the demand for time, where the life cycle of a product is divided into recognition phase, growth phase, maturity phase, and finally the decline phase. To maintain business continuity, it is necessary to carry out product innovation at the right time.
3. Other factors  
Some other factors that influence demand are backlash reactions from competitors, changing consumer behavior, and efforts made by companies themselves such as increasing quality, service, advertising budget, and credit payment policy.

### III. METHODS

The method used in this writing consists of methods of analyzing the sales process and system development methods. The analysis method consists of forecasting calculations using forecasting methods and analysis and system design through a structured approach to Data Flow Diagrams and software development using Prototyping Methods Descriptive research models with qualitative approaches.

#### Types of Forecasting Method

##### 1. Moving Average

Moving Averages is a value smoothing forecasting method by taking a group of observational values which are then searched for averages, then use these averages as predictions for the given period. The forecasting formula with the moving average method is:

$$\begin{aligned} \text{moving average} &= \frac{\sum \text{the amount of data in the previous period}}{n} \\ &= \frac{At \sim 1 + At \sim 2 + At \sim 3 \dots At \sim n}{n} \end{aligned}$$

Information:

FT= Forecast for the future period

n= Number of moving aver-age forecasting periods

At ~ 1= Actual data for one period before planning

At ~ 2= Actual data for two periods before forecasting

At ~ 3= Actual data for three periods before planning

At ~ n= Actual data one n before forecasting

##### 2. Weighted moving average

Is a forecasting method that is carried out by giving weight to the latest period data rather than the weight in the previous period. This method has the weight used in each price change with the aim of getting a faster response to changes in demand. The forecasting formula with the Weighted moving average method is:

$$FT = \frac{\sum \text{weights for periods } n(\text{demand in period } n)}{\text{weight}}$$

$$FT = \sum \frac{W1At - t + W2At - t + W3At - t \dots WnAt - t}{Wi}$$

Information:

Ft= Forecast value for the next period

Wi= Weight value

At-1= The actual value of the previous period's request

n= Number of periods used

### 3. Trend Projection

This forecasting method with trend projection is to match the trend line to a series of historical data points then project the line to the future with a medium and long time horizon. The projection method in this study looks at trends in a straight line. The right approach for linear trends is the least square method. The forecasting formula with the Trend Projection method is:

$$\hat{y} = a + bx$$

y= variable that will be predicted

a= Constant

b= slope of the regression line

x= independent variable (time)

With the least squares method obtained:

$$b = \frac{\sum xy - nxy}{\sum x^2n^2}$$

While the price of *a* is obtained from the intersection with the \$ axis, i.e.

$$a = y - bx$$

## IV. RESULTS AND DISCUSSION

It is known that sales in the previous period are as follows:

Table 1. Sales

Months	Sales (unit)
month 1	16
month 2	20
month 3	25
month 4	20
month 5	15
month 6	15
month 7	18
month 8	?

Using the moving average method, Weight moving average and trend projection

**Moving Average:**

$$FBulan8 \frac{15 + 15 + 18}{3} = 16$$

**Weighted Moving Average:**

First of all, we must sort the weight into (3:2:1)

So that is obtained:

$$Fbulan ke 8 \frac{3x15 + 2x15 + 1x25}{3 + 2 + 1} = 16.666667$$

**Trend Projection:**

bulan (x)	Penjualan (y)	x <sup>2</sup>	Xy
1	16	1	16
2	20	4	40
3	25	9	75
4	20	16	80
5	15	25	75
6	15	36	90
7	18	49	126
$\Sigma x = 28$	$\Sigma y = 129$	$\Sigma x^2 = 140$	$\Sigma xy = 502$

$$x \frac{\Sigma x}{n} = \frac{28}{7} = 4 \quad y \frac{\Sigma y}{n} = \frac{129}{7} = 18.4$$

$$b \frac{\Sigma xy - nxy}{\Sigma x^2 - nx^2} = \frac{502 - (7)(4)(18.4)}{140 - (7)(4^2)} = \frac{-13.76}{28} = -0.49$$

$$a = \bar{y} - \bar{b}x = 18.4 - -0.4(4) = 16.8$$

So the small square trend equation is  $y = 16.8 + -0.49x$  to project demand in the following month  $x=8$   
Request within months  $8 = 16.8 + -0.49 = 16.31$  or 16

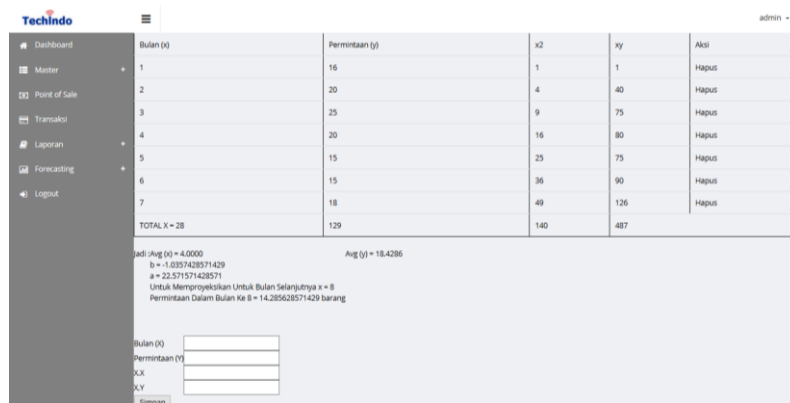


Fig 1. Result Trend Projection

Fig. 1 is a Forecasting (trend projection) where on this page users who have access can enter the Forecasting method page to minimize the calculation of stock items that will be sold in the future by taking into account the small square.

**V. CONCLUSIONS**

Based on the results of research and analysis of the system that runs, then conclusions can be taken as follows:

1. With the program using forecasting methods on the system helps the owner to determine the amount of sales of goods to come, so that the owner is easier to decide to add or reduce excessive stock of goods.
2. With the Point Of Sale application using forecasting methods can help owners in storing inventory transaction data, selling goods structurally, neatly and stored in a database

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