

INVENTORY SYSTEM DEVELOPMENT WITH TREND MOMENT METHOD FOR OPTIMIZATION WAREHOUSE INVENTORY USING RFID TECHNOLOGY (CASE STUDY AT PT. JANSEN INDONESIA)

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INVENTORY SYSTEM DEVELOPMENT WITH TREND MOMENT METHOD FOR OPTIMIZATION WAREHOUSE INVENTORY USING RFID TECHNOLOGY (CASE STUDY AT PT. JANSEN INDONESIA)

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Abstract

Abstract - In warehouse department or warehouse in the company including PT. Jansen Indonesia has system service still available Not yet maximizing development technology moment this is the medium one develop fast . Including in system inventory Frequent warehouse happen No make it available stock And Excessive stock . This matter cause function inventory on warehouse No Work in a way maximum. From problem said , PT. Jansen Indonesia requires exists optimization stock with use Trend Moment Method with web- based and use RFID technology . System This covers control supply on warehouse For purchase so that reduce stock excessive nor less so supplies stock controlled , as well as a data input process that utilizes RFID so that speed up time in the data input process. On system This use Language PHP and MYSQL programming as databases as well utilizing the PHP Framework , namely Codeigniter in creation of this website . With exists system web based , makes it easy employee in data processing with appropriate time .

Keywords: Inventory , PHP, RFID, Trend Moment Method .

INTRODUCTION

Technology today has developed a lot in society. As time goes by, there has been a lot of research carried out by researchers on every problem in existing technology. The use of technology by humans began with simple tools made by humans. Several years ago, for example, the application of identification technology such as barcodes which were used in retail and warehousing. Barcodes are now considered by ordinary people. However, in the past few years this technology has been the most innovative technology in identifying goods. Today's technology is still developing rapidly and creating the latest innovations and works. One of them is *Radio Frequency Identification* (RFID) technology. RFID is the latest identification technology which has many advantages in identifying goods and inputting goods data which can be applied to retail, warehouses, and so on.

In the warehouse department in several companies, including PT. Jansen Indonesia has a service system that has not yet maximized current technological developments which are developing rapidly. This includes warehouse inventory where there is often no stock and excessive stock. This causes the inventory function in the warehouse to not work optimally. This problem can have a big impact on the production process being hampered because there are components that are lacking in warehouse stock, in addition to increasing expenditure costs due to irregularity in ordering excessive components. In other problems, when goods

arrive in large quantities, it makes it difficult to identify the number of goods, which takes quite a long time.

In November 2017, in the warehouse department at PT. Jansen Indonesia, there are several problems that cause production to be hampered, namely the unavailability of component stock in the warehouse. In this case production cannot run because there are products that must use these components. And there are several components that are excessive in quantity, this causes the space to not be able to accommodate the large number of components in the warehouse, besides resulting in a greater risk of goods expiring because there are too many components. In another aspect, the irregular number of component ordering costs creates quite large losses for the company.

PT. Jansen Indonesia is a company that has been operating in the furniture and home furnishings sector since 1981. This industry processes components into various shapes or models until they become finished products (*Finished Good Products*) that are ready for export. The company is characterized by the production of furniture and decoration derived from antiques and inspired by classic styles. This company's products, such as tables, cupboards, sofas and so on, use various inspiring carvings that combine all cultures and backgrounds from each region. PT. Jansen Indonesia has developed into an international company with wholly owned factories in Asia and sales presence in Europe, Canada, the United States and Hong Kong.

In To control warehousing to function optimally, it is necessary to carry out analysis. There are several methods that can be used, such as *the Semi Average Method, Trend Moment Method, and Least Square Method*. In this research, the analysis method used is *the Trend Moment Method*. *The Trend Moment method* is considered to have advantages compared to other methods, namely the use of parameter X or historical data. This is because the values in parameter

By utilizing technology that is currently developing, such as websites as technology or media that can control a system properly, such as sending, receiving and reporting with access that saves more time. From these problems, PT. Jansen Indonesia requires optimization of warehouse inventory using the web-based Trend Moment Method and using RFID technology. This system includes stock control in the warehouse for purchasing components so that stock inventory is controlled, as well as a data identification process that utilizes RFID to shorten the time in the data input process. With a web-based system, it makes it easier for employees to process data in a timely manner.

RESEARCH METHODS

1. RnD (Research and Development)

In this research the author used the *Research and Development development procedure*, namely the research method used to produce products and test the effectiveness of these products. Research and development Research and Development is a research method used to produce analytical products and test the effectiveness of these products (Borg and Gall, 1983).

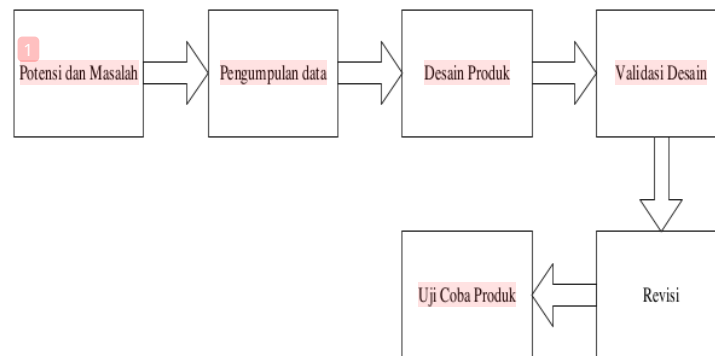


Figure 1. Development Model

Research and Development development method procedure, these 10 steps must be implemented correctly before producing a new product that will be created. Of the ten research and development steps, only steps one to six are needed to fulfill the requirements for a strata-1 thesis, namely:

A. Potential Problems

At this research stage, there was a problem that emerged at PT. Jansen Indonesia. PT. Jansen Indonesia is an international company that has many markets including the Netherlands, England, America and others. This increases factory productivity. However, as there are more and more customers, there is often a shortage of stock in warehouse inventory.

B. Gathering Information (*Research and Information*)

After the potential and problems have been identified, it is then necessary to collect various data and information that can be used as material for product planning to overcome these problems. As for data collection in this research, the author took the following steps:

a) Field Study (Observation)

Observations were carried out directly to research and survey the scope of the problems that will be raised in this research. Survey conducted at PT. Jansen Indonesia, is guided directly by the management, namely the PPIC section. By making these observations, the author can see directly the existing problems and get realistic data.

b) Interview (Interview)

Interviews were carried out in stages, with the director, deputy director, warehouse department and PPIC taking into account the right time and situation. This is done so that the data obtained is detailed and complete. Because the company does not have much time to answer the questions asked by the author.

c) Study of literature

Data was collected by taking it from books and journals related to the problems in this research. From collecting data from various sources, the method used to solve problems in this research is the Trend Moment Method.

The Trend Moment method is a way of predicting data, such as predicting the number of orders, sales and so on. One of them is based on historical data from one variable, namely from data on the number of orders over several historical periods. The following is an explanation of the Trend Moment Method formula:

Y = Trend value or variable to be predicted

a = Constant number

b = Trend line coefficient

X = Time index (starting from 0,1,2,...)

The basic formula used: $Y = a+b(X)$

Equation (i): $\sum Y = na + b.\sum X$

Equation (ii): $\sum XY = a.\sum X + b.\sum X^2$

$\sum Y$ = Number of Trend Values or variables to be predicted

n = Number of data/period taken (distance from start to end period)

$\sum X$ = Number of time indices

$\sum XY$ = The sum of the results of multiplying X and Y

C. Product Design (*Develop Preliminary Form Of Product*)

Create product designs and develop the initial form of the product that will be produced. In this step the author carries out and designs a product where the design

is still conceptual and will be realized in the form of a chart or image so that it can be used as a guide in assessing and creating a program.

D. Design Validation (*Preliminary Field Testing*)

Carrying out initial trials on product designs, namely validating them with a team of experts. At this stage, the finished product design is submitted to a team of experts to test the feasibility of the system, whether it is feasible or not, and used as an Inventory System to determine future warehouse needs.

E. Design Improvements (*Main Product Revision*)

In the design improvement stage, it is carried out after being validated by experts or experts who then hold discussions to discuss whether there are any deficiencies in the product. Evaluation is carried out if the product has deficiencies according to the results of validation carried out by experts or experts.

F. Product Trial (*Main Field Testing*)

Wider field trials after validating and revising the product. By validating the user or users of this inventory system. In this research, the user in question is the Warehouse Admin. Admins are asked to use this system, to find out whether the implementation of this system can effectively help in warehouse optimization .

2. UML (Unified Modeling Language)

A. Use Cases

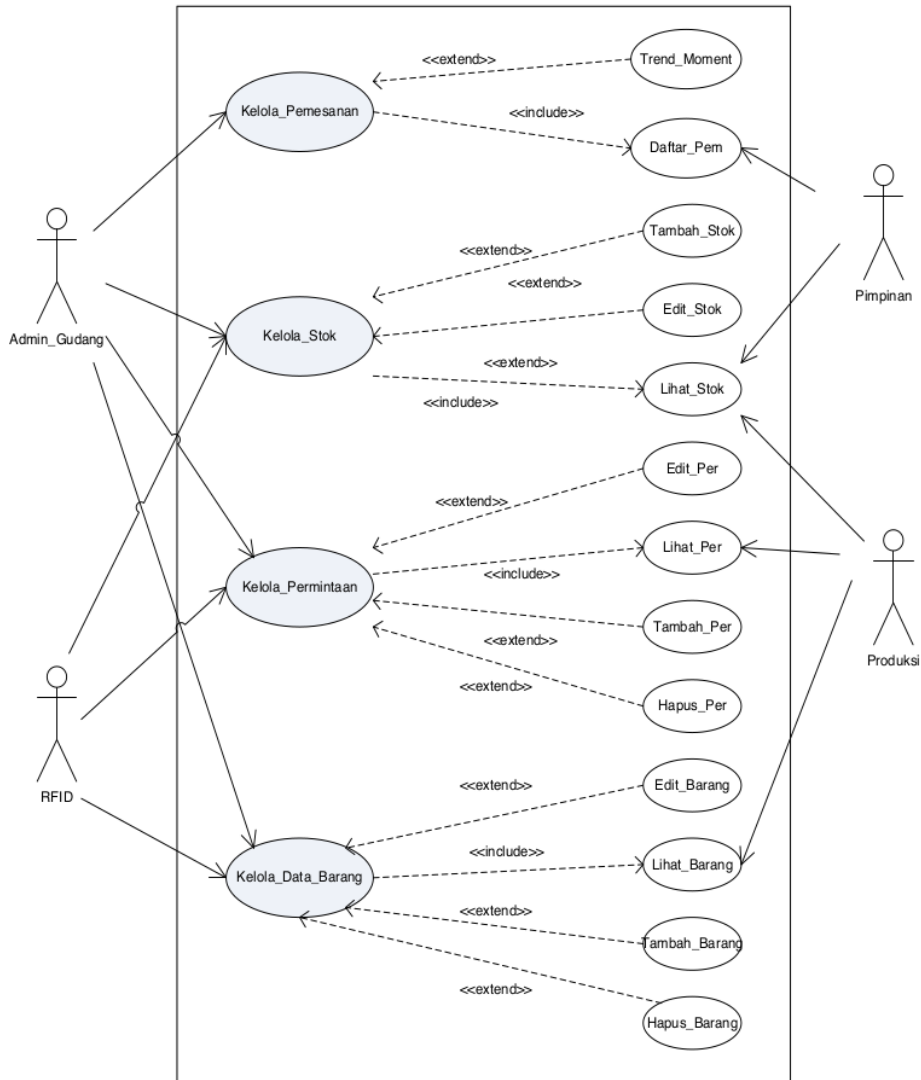


Figure 3. Use Case

B. Activity Diagrams

1) Warehouse Admin Manage Requests

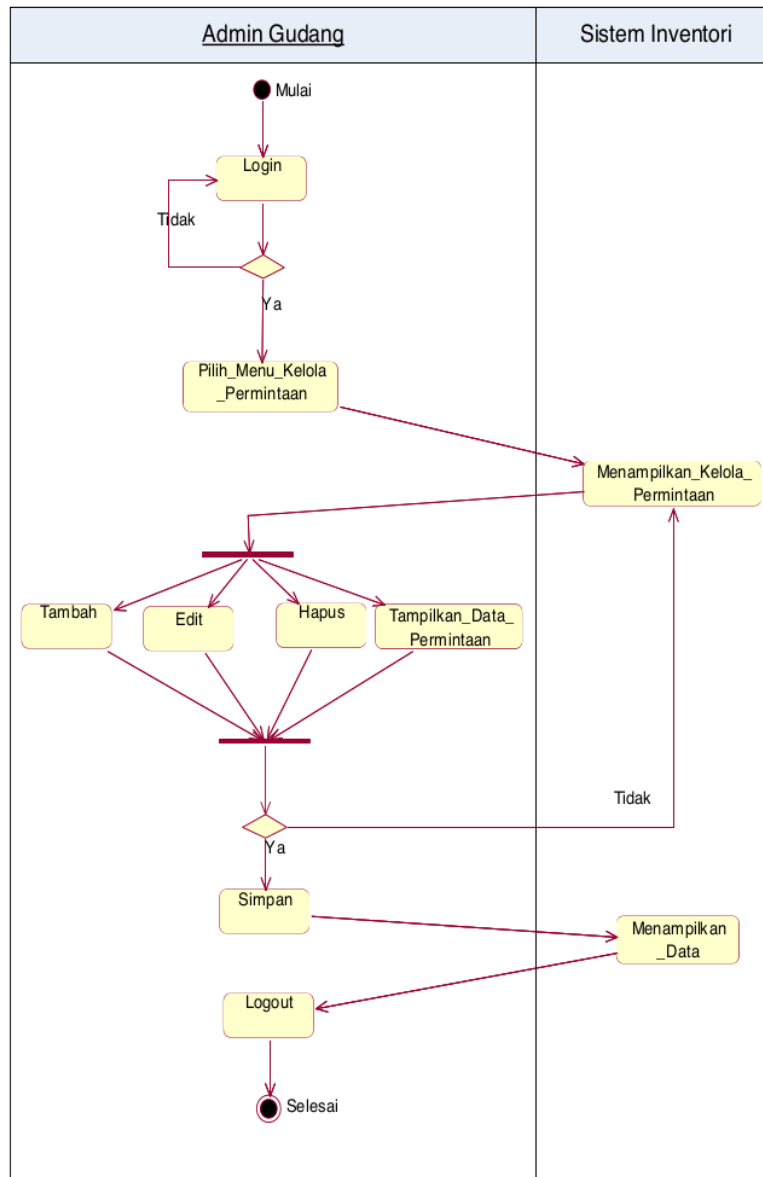


Figure 4. Warehouse Admin Activity Diagram Manage Requests

2) Warehouse Admin Activity Diagram Manage Goods Data

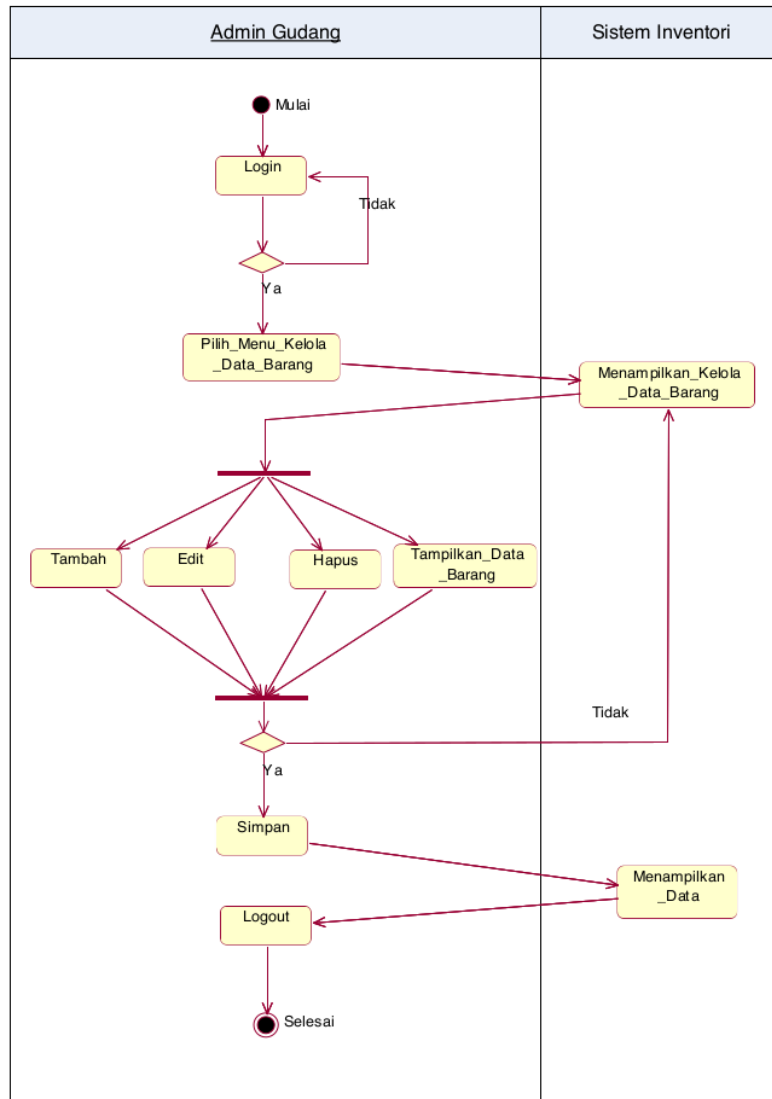


Figure 5. Warehouse Admin Activity Diagram Manage Goods Data

3) Activity Diagram Warehouse Admin Manage Stock

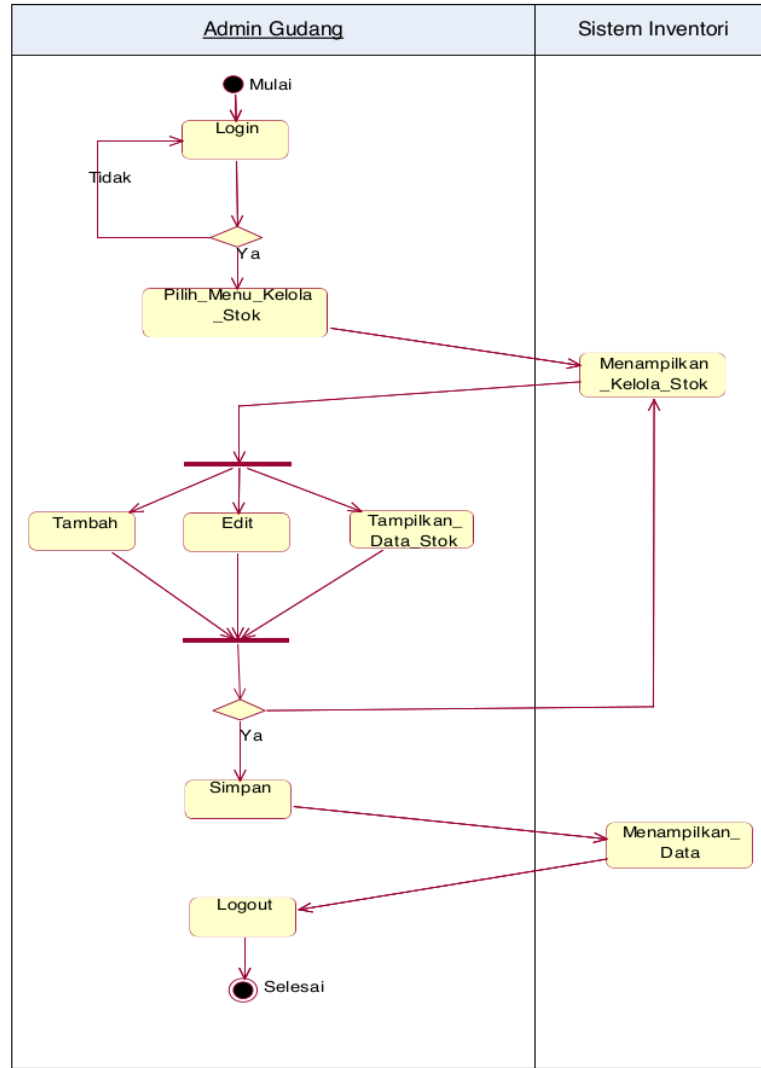


Figure 6. Warehouse Admin Activity Diagram Manage Goods Data

4) Warehouse Admin Activity Diagram Manage Orders

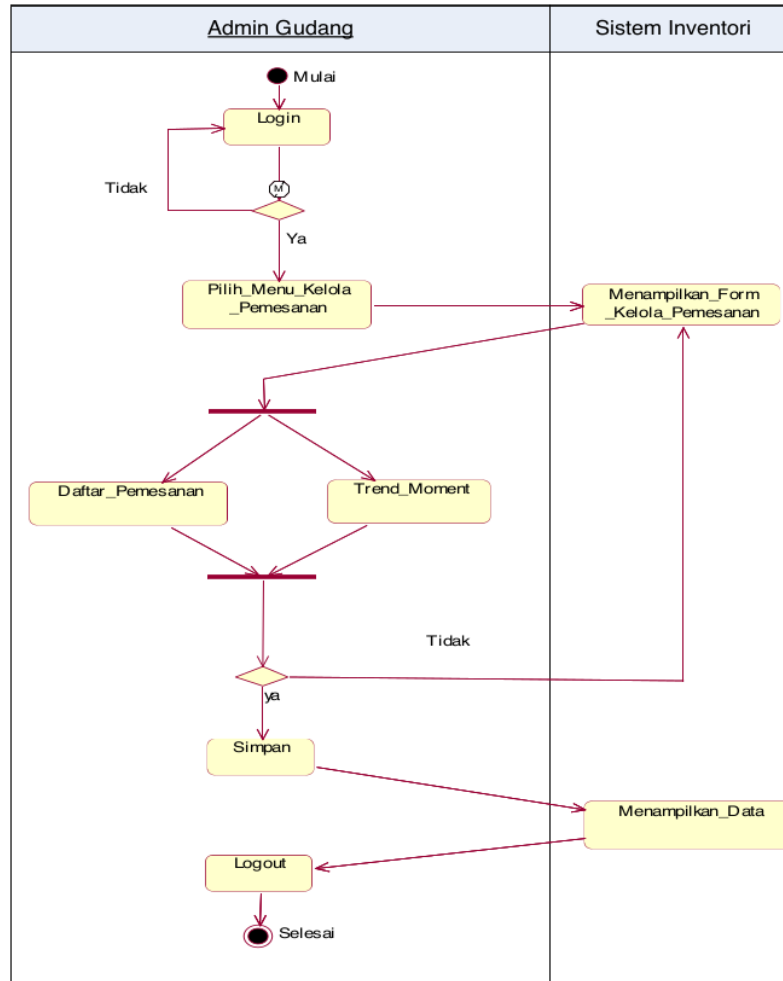


Figure 7. Warehouse Admin Activity Diagram Manage Orders

RESULTS AND DISCUSSION

1. Forecasts can be calculated manually using data from one of the items, namely the bookcase , obtained from research results. The following is a manual calculation:

Table 1. Research Data

Year	Expenditure (Y)	Time (X)	X*Y	X ²
January 2016	120	0	0	0
February 2016	140	1	140	1
March 2016	259	2	518	4
April 2016	270	3	810	9
May 2016	200	4	800	16
June 2016	211	5	1055	25
July 2016	100	6	600	36
August 2016	257	7	1799	49
September 2016	212	8	1696	64
October 2016	129	9	1161	81
November 2016	115	10	1150	100
December 2016	100	11	1100	121
January 2017	70	12	840	144
February 2017	94	13	1222	169
March 2017	180	14	2520	196
April 2017	230	15	3450	225
May 2017	270	16	4320	256
June 2017	300	17	5100	289
July 2017	332	18	5976	324
August 2017	259	19	4921	361
September 2017	270	20	5400	400
October 2017	200	21	4200	441
November 2017	211	22	4642	484
December 2017	100	23	2300	529
January 2018	257	24	6168	576
February 2018	266	25	6650	625
March 2018	235	26	6110	676
April 2018	334	27	9018	729
May 2018	332	28	9296	784
June 2018	260	29	7540	841
July 2018	280	30	8400	900
August 2018	270	31	8370	961
September 2018	300	32	9600	1024
	ΣY	ΣX	ΣXY	ΣX^2
AMOUNT	7163	528	126872	11440
AVERAGE	217.06			

A. Find the values of a and b

The first step is to look for the values of a and b to determine the trend moment pattern.

$$\sum Y = an + bX$$

$$\sum XY = aX + bX^2$$

$$7163 = 33a + 528b$$

$$126872 = 528a + 11440b$$

$$b = ((33 \times 126872) - (7163 \times 528) / (33 \times 11440) - (528 \times 528))$$

$$b = (4186776 - 3782064) / (377520 - 278784)$$

$$b = 404712 / 98736$$

$$b = 4,098$$

$$a = ((7163 \times 11440) - (528 \times 126872) / (33 \times 11440) - (528 \times 528))$$

$$a = (81944720 - 66988416) / (377520 - 278784)$$

$$a = 14956304 / 98736$$

$$a = 151.477$$

B. Calculating the forecast for October 2018

The next step is to look for Y, which is the result of forecasting for October which has not been influenced by the seasonal index.

$$Y = a + bX$$

$$Y = 151,477 + (4,098 \times 33)$$

$$Y = 151.477 + 135.264$$

$$Y = 286,741$$

With the results of the equation above, it is predicted that the need for goods for October 2018 will be 286.7

2. Counting forecasting booking automatically use the application.

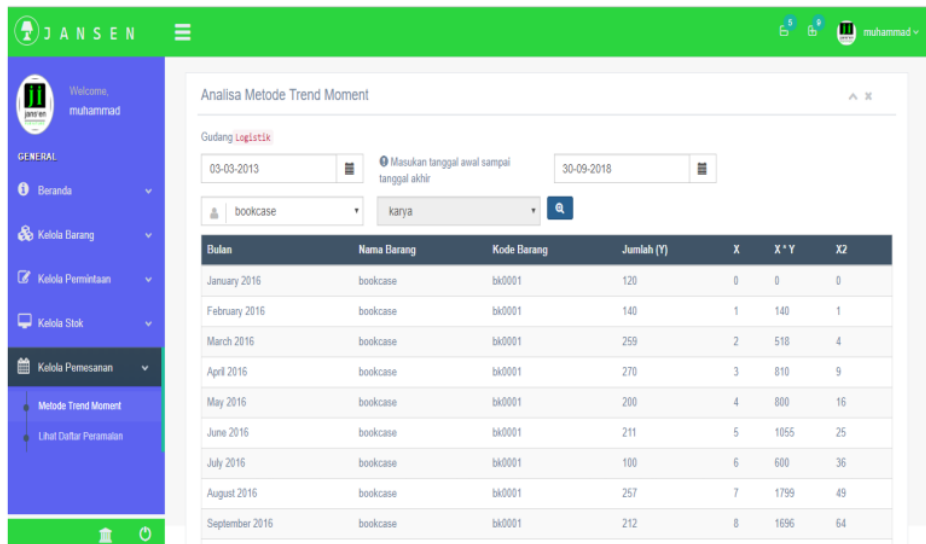


Figure 8. Forecasting for October Using Applications

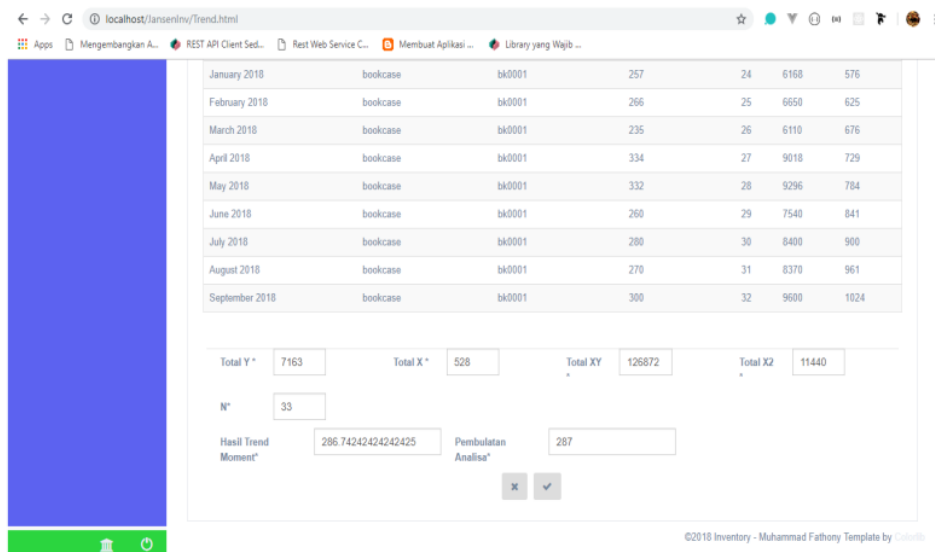


Figure 9. Forecasting Results for October

The forecast for orders for items called bookcases is October 2018, namely 287 pcs. The actual usage in October 2018 was 306, so there is a difference of 19 pcs.

3. The Inventory System provides information about insufficient stock and stock that is below the minimum stock

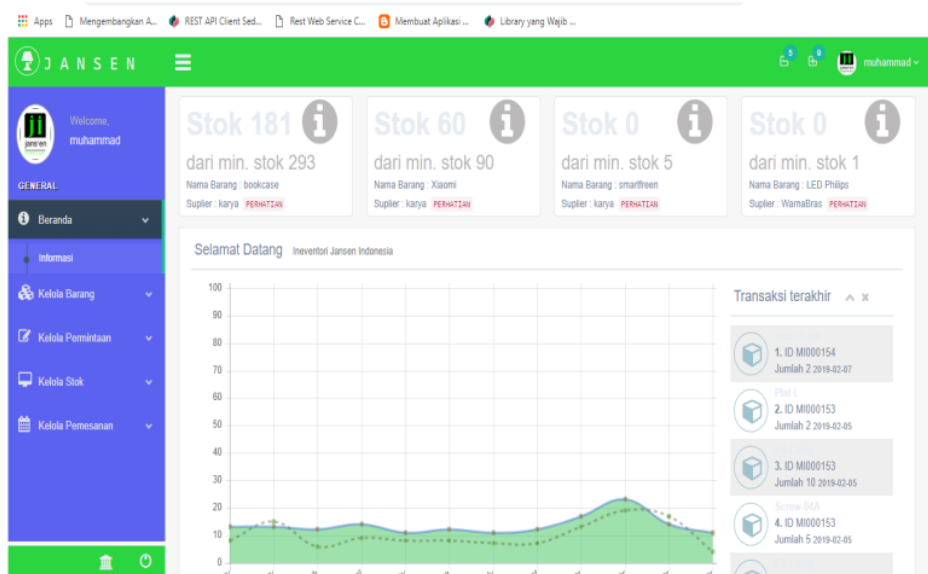


Figure 10. Display of out-of-stock information

The Inventory System provides information about stock that is out of stock or below the minimum stock which will then be followed up by the admin to bring in goods based on goods and forecasting results using the Trend Moment Method.

4. RFID identifies goods on system inventory

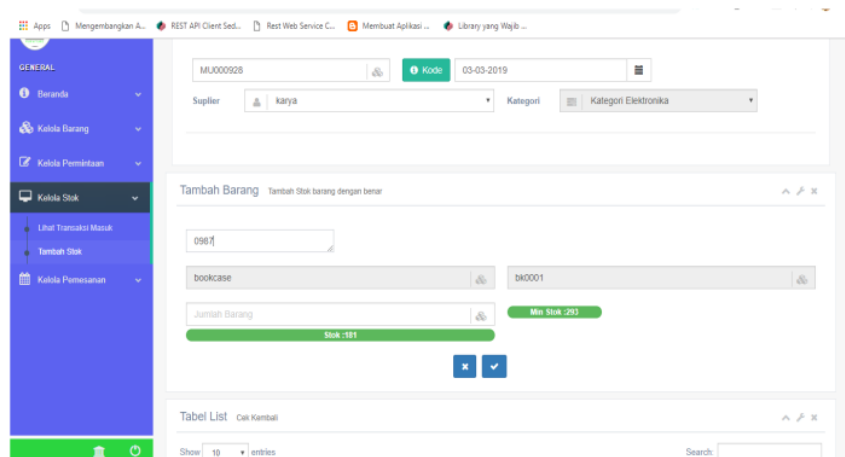


Figure 11. Identification of goods using RFID

CONCLUSIONS AND SUGGESTIONS

1. Conclusion

Based on the analysis and results of this system design, it can be concluded as follows:

- A. Based on the results of manual forecasting and automatic forecasting using the application, the same results were obtained, namely 287 pcs for ordering bookcase goods in October 2018 and actual usage in October 2018, namely 306 . Inventory System Application Using the Trend Moment Method can manage component orders for warehouse inventory.
- B. In testing the Inventory System Using the Trend Moment Method to Optimize Goods Inventory Using RFID Technology to identify goods, it has provided results that are in accordance with item information such as stock, supplier names and others which can be seen in Figure 11 . This inventory system utilizes RFID to automate item identification and can provide stock information on items that are out of stock or approaching minimum stock.

2. Suggestion

Considering the various limitations experienced by the author, from the conclusions above and the system that has been created, several suggestions can be put forward for consideration for further development, namely as follows:

- A. The Trend Moment Method can be used if you have data that is trend analysis or long-term with a minimum of 12 months or 1 year of data. So applications can be developed using other methods without having to have long-term data history.
- B. Inventory System Using the Trend Moment Method for Optimizing Warehouse Inventory Using RFID Technology to read items with RFID one by one. It is necessary to develop tools for RFID readers that can read items simultaneously in one place.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17