# *DEVELOPMENT OF INVENTORY MANAGEMENT INFORMATION SYSTEM IN PT. MECOINDO-ITRON*

Risa Romandini[1], Tati Harihayati M [2]

[1,2] *Informatics Engineering* - Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
E-mail : risaromandini@yahoo.co.id[1], tati.harihayati@email.unikom.ac.id[2]

## *ABSTRACT*

*PT. Metering company* Indonesia *(Mecoindo)-Itron, company manufactur is engaged in the electric meter. PT. Mecoindo-Itron based on the results of interviews with Manager Logistic problems that often happen that is the manager of logistic difficulties in determining the amount of raw materials list, because the booking process the raw materials planning done in accordacewith the number of procurement of products but often occurs at the time of the failed product production process so that the impact on the number of stock shortages of raw materials, the manager of logistic difficulties in conducting monitor of of raw materials because it is still a manual that is using a card stock hang on warehouse raw materials storage location problems that often occur, where the amount of the stoctof materials in warehouses are at a minimum status requires that the Manager of logistic of booking, then often do not satisfy stock opname raw materials which resulted in the suspension of the production process.Based on problems occurred in the department of Logistics, PT. Mecoindo-Itron solution, namely how to build inventory management information system for dealing with the problem of procurement planning the number of products using a Single Moving Average forecasting method, the amount of raw materials to suppliers, as well facilitating the Logistic Manager in monitor raw materials. Base on the results of black box testing and beta testing has done, it can be concluded that the system had already passed test functionality in problems accurred at Departement Logisting in PT. Mecoindo-Itron*

*Keyword : Management information system (SIM), forecasting, Single Moving Average, Monitoring.*

## 1. *PRELIMINARY*

*PT. Metering Company Indonesia (Mecoindo) Itron is a manufacturing company engaged in electricity meter product, produced are Electromechanic Meter Single Phase, Electromechanic Meter Three Phase, Electronic Meter Single Phase and Electronic Meter Three Phase. PT. Mecoindo-Itron has eleven units department of logistic The general task of the logistics department is to manage and support the operational activities of raw materials and finished products before the distribution process consumers, the management include the procurement planning of the number of products to be produced, the ordering of raw materials, the acceptance of raw materials from the suppliers, the demand for raw materials in accordance with the needs of the production process, product acceptance from production staff, product expenditure in accordance with consumer orders, monitoring of raw materials and stock opnam for production processes, it takes inventory management concepts to facilitate inventory movement since raw material arrivals from suppliers to demand for product expenditure in accordance with consumer demand.*

*The result of interviews with logitstic manager, that is logistic manager difficulties in determining amount of raw material ordering to the supplier because the procces of buying raw materials is closely related to the planning of the procurement amount of product that must be available in the finish good product warehouse, for the next process to which then will have an impact on the amount of raw material stock which can't complycated the production needs then the production process will be stopped and the number of products not in accordance with the target.*

*Based on interviews with logistic manager, the process of monitoring the stock of raw materials is still manual that is using a stock card that is hung on the location of each raw material that has been provided in raw materials warehouse and on the logistics department board so the problem that often happens is where the amount of material stock the raw material in the warehouse is at the minimum (unsecured) status requiring the logistics manager to re-order the raw materials to the supplier, other that that often the non-fulfillment of raw material stock, the arrival of raw materials from the supplier is calculated no later than three days after ordering the raw materials by logistics manager, so that raw materials monitoring fault have a major impact on the cessation of the production process until the arrival of subsequent raw materials from suppliers which then result in not achieving the product targets that must be available for further processing.*

*Based on the problems that have been described previously, the logistics manager at PT. Mecoindo Itron needs aplication that can facilitate*

*logistics managers in managing the number of raw material order and monitor raw material inventory as outlined in a thesis research entitled Inventory Management Information System at PT. Mecoindo-Itron.*

*Based on the problems that have been explained then the purpose of the construction of inventory management information system at PT. Medoindo-Itron aims to :*

1. *Facilitate the Logistics Manager in determining the amount of raw material ordering to the supplier in accordance with the needs of the products that must be made available to the next process to the consumer.*
2. *Facilitate the Logistics Manager in monitoring the amount of raw material inventory in the warehouse so as not to experience a shortage of raw materials during the production process.*

## *2. RESEARCH CONTENTS*

### 2.1. *Management Information System*

*Management information system is an that serves to support the company operational processes, decision-making system in which there is input, process and output. Management information systems should be able to provide information needed by management and must be interconnected with other information.* [1]

### 2.2 *Inventory*

*In principle inventory is an idle resource whose existence awaits further processing. Further process here can be production activities as found in manufacturing systems. As an idle resource the existence of inventory can be viewed as a waste and this means the burden for a business unit in the form of a higher cost. But on the other hand if the inventory is not available or available in very small quantities and insufficient opportunities for inventory shortages in times of need will be greater. As a result, the usage needs can not be fulfilled so that there will be dissatisfaction on the side of the user. This means that it will result in losses from both the manager and the dissatisfied user.* [2]

### *2.3 Method Plan, Do, Check, Act (PDCA)*

*PDCA is resume from PLAN, DO, CHECK and ACT which is a continuous or continuous process improvement cycle like an endless cycle. The concept of the PDCA cycle (Plan, Do, Check and Act) was first introduced by a quality management expert from the United States named Dr. William Edwards Deming. The following is a brief explanation of the PDCA cycle :*

1. *Plan is the stage to set the Target or Target to be achieved in improving the process or problem to be solved, then determine the method that will be used to achieve the Target or Target that has been set.*
2. *Do is the stage of implementing or executing all that has been planned at the plam stage including running its processes, producing and collecting data which will then be used for the check and act stage.*
3. *Check is the examination and review stage as well as studying the results of the implementation at the stage of do.*
4. *Act is the stage to take the necessary action to the results of the check stage*. [5]

### *2.4 Forecasting*

*Peramalan (Forecasting) is an activity that attempts to estimate sales and use of the product so that the products can be made in the right quantity or quantity.* [4]

#### *2.4.1 Method Single Moving Average*

*Single moving averages use some of the actual data of new requests that produce the forecasting values that will be used in the future. This method will be effectively applied if we can assume that the demand for the product will remain stable over time. This method has two special properties that is to make forecasts require data.semakin historical moving averages data will result in a moving average that the more smooth, systematic moving average can be calculated by equation 2.1*

$$S_{t+1} = \frac{xt + xt-1 + \cdots + xt - n + 1}{n} \quad \text{.....(2.1)}$$

*Description*:

$S_{t+1}$ = *Forecast for period to* t+1.

$X_t$ = *Data in period t.*

N = *Time period moving Averages* [4]

#### **2.4.2** *Mean Squared Error (***MSE)**

*Measurement of forecasting errors can use Mean Absolute Error ie the mean of forecasting errors squared and can be seen in equation 2.2.*

$$MSE = \frac{\Sigma(xt - Ft)}{n} \quad \text{..... (2.2)}$$

Description:

$X_t$= *Actual data in period t*

$F_t$= *Forecast data of the model used on period t*

$n$ = *The amount of data forecasting results* [4]

### *2.5 Safety Stock*

*The risk of uncertainty of both the quantity of raw material and the product of inventory analysis input through many variables Safety stock or inventory is an extra supply that continues to be handled that serves to protect errors in predicting demand during Lead Time. Lead Time is the time required between ordered products to arrive at the company. Here is a formula in determining Safety stock can be seen in equation 2.3*

*SS = average amount of previous period* X LT (2.3)

*Description* :

SS = *Safety Stock*
*LT = Lead Time* [4]

### *2.6 Inventory Management Information System Analysis*

*Analysis of inventory management information system used is using PDCA method where the procedure is implemented in the development of inventory management information system at PT. Mecoindo-Itron. Inventory management includes the procurement planning process of the number of products, ordering of raw materials, acceptance of raw materials, raw material expenditure, product acceptance and product expenditure.*

#### *2.6.1 Procurement Planning Process Number of Products*

*PDCA analysis of product procurement plann- ing process on Inventory Management Information System at PT. Mecoindo-Itrondapat seen in Figure 1*

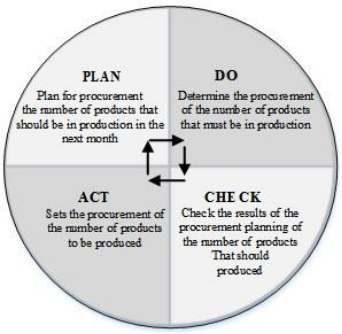



*Figure 1 Procurement Procedure Number of Products*

### 1. *Plan*

*At this stage is done to identify the problem of planning the procurement of the number of products that must be available for the period of the next month as for the data to be taken as a sample of product sales data in March to August 2017 which can be seen in table 1*

*Table 1 Product Expenditure Data*

| Product Name | Data Pengeluaran Produk | | | | | | Total Spend 6 Months (Unit) |
|---|---|---|---|---|---|---|---|
| | Maret | April | Mei | Juni | Juli | Agustus | |
| Marroco 5(20)A TCM14/17 | 800 | 500 | 700 | 950 | 650 | 420 | 4020 |
| Marroco 10(30)A TCM14/17 | 450 | 600 | 580 | 900 | 760 | 350 | 3640 |
| Niger 10(40)A | 450 | 720 | 630 | 820 | 460 | 670 | 3750 |
| Java V.1 | 1200 | 950 | 1500 | 1250 | 1050 | 1140 | 7090 |
| Nias DC Meter | 500 | 850 | 260 | 470 | 570 | 600 | 3250 |
| Nias CT Meter | 350 | 700 | 650 | 510 | 480 | 820 | 3510 |
| C114GR1 ST 5(20)A | 750 | 430 | 200 | 370 | 450 | 690 | 2890 |
| C114GR1 ST 20(60)A | 550 | 470 | 650 | 350 | 750 | 540 | 3310 |
| C116 X/5 A ST | 600 | 730 | 480 | 390 | 640 | 740 | 3580 |
| Centian 3 ERITRIA | 820 | 400 | 470 | 320 | 760 | 450 | 3220 |
| Centian 1 ERITRIA | 580 | 480 | 640 | 720 | 280 | 540 | 3240 |
| Total Sales of All Products Monthly | 7050 | 6830 | 6760 | 7050 | 6850 | 6960 | 41500 |

*Based on product expenditure data from March to August 2017 at table1, it can be seen that Java V-1 type meter product is the most product out in accordance with the needs of consumers in every month compared with other meter type products. Therefore, the authors will make the output data of Java V-1 type meter products as a reference in the analysis of planning the number of procurement of products that must be available for the next process ordered to consumers As for data on Java V-1 product expenditure in March to August 2017 seen in table 2*

*Table 2 Product Expenditure Data Java V-1 March to August 2017*

| month | Number of Java V-1 product launches | unit |
|---|---|---|
| Maret | 1200 | Unit |
| April | 950 | Unit |
| Mei | 1500 | Unit |
| Juni | 1250 | Unit |
| Juli | 1050 | Unit |
| Agustus | 1140 | Unit |

*Based on table 2 the number of product expenditures Java V-1 produces a graph to know the pattern of product production data, graph data production product produktipe meter Java V-1 can be seen in Figure 3*

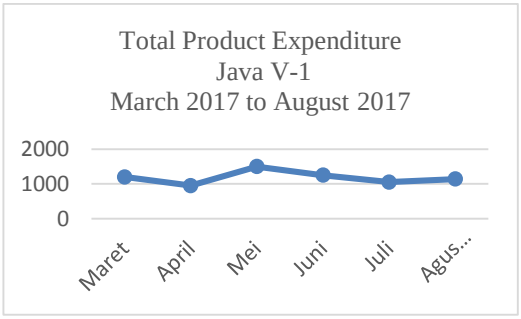



*Figure 2 Product Expenditure Graph Java V-1*

### 2. *Do*

*This stage is to do the forecasting using Single Moving Average forecasting method based on data in Table 3.2*

a. *Duration in forecasting calculation of Java V-1 product expenditure data in 3 month and 5 month period. The variables used are the number of production of Java V-1 type meter product. Based on the data, it can be calculated forecasting for the number of Java V-1 Steel type meters in September 2017. The forecasting calculation is as follows.*

1) *Calculation for n = 3*

*The forecast result for n = 3 is obtained by entering the Xt value 3 months before the month to be known forecasting results. Below is the breakdown of the calculation results to determine forecasting in September 2017.*

$$St_{September} = \frac{Xt_{Juni} + Xt_{Juli} + Xt_{Agustus}}{n}$$

$$= \frac{1250 + 1050 + 1140}{3}$$

$$= \frac{3440}{3}$$
$$= 1146.667\ Unit$$

*rounded to* 1147 *Units.*

*2) The forecast result for n = 5 is obtained by entering the Xt value of 5 months before the month to be known forecasting results. Below is the breakdown of the calculation results to determine forecasting in September 2017*

$$St_{September} = \frac{Xt_{April} + Xt_{Mei} + Xt_{Juni} + Xt_{Juli} + Xt_{Agustus}}{n}$$
$$= \frac{950 + 1500 + 1250 + 1050 + 1140}{5}$$
$$= \frac{5890}{5}$$
$$= 1178 \text{ Unit}$$

*Here are all the forecasting results using the method of forecasting SMA (single moving average) which can be seen in Table 3*

*Table 3 Forcasting result Of Java V-1*

| ***Month*** | ***Data Java V-1*** | ***Period 3 Month*** | ***period 5 Mouth*** |
|---|---|---|---|
| March | 1200 Unit | | |
| April | 950 Unit | | |
| May | 1500 Unit | | |
| June | 1250 Unit | 1216.66667 | |
| July | 1050 Unit | 1233.33333 | |
| August | 1140 Unit | 1266.66667 | 1190 |
| Hasil Peramalan | | 1146.667 | 1178 |

*After the results of forecasting for each period n moving average. The next step is to determine the results of forecasting by choosing the best method. The parameters used are using Mean Square Error (MSE) criteria. A method is considered better than another method if it has the smallest MSE value*

*b. MSE calculation on forecasting results*

*MSE calculations use data from forecasting results in table Table Here is an example of MSE value calculation.*

*1) The MSE calculation for the 3 month moving average in June. June was chosen as the beginning of the calculation because the data forecasting results for the value of the 3-month moving average period is only available this month.*

$MSE$ = ($X$Juni−$F$Juni)2
= (33.333)2
= 1111.111

*2) The MSE calculation for the 5 month moving average in August. August was chosen as the beginning of the calculation because the data forecasting results for the 5 month moving average is only available this month.*

$MSE$ = ($X$Agustus−$F$Agustus)2
= (38)2
= 1444

*The MSE value calculation for the next month is performed in the same manner according to the MSE calculation for each value of n moving average. After performing the MSE calculation, the next step sums up all MSE results for each moving average value. Here is a sample calculation to find out the value of MSE.*

*a) MSE calculation for moving average value for 3 month period*

$MSE$ = (1111.11111 + 33611.1111 + 16044.4444) / 3
= 50766.6667/ 3
= 16922.2222

*b) MSE calculation for moving average value for 5 month period*

$MSE$ = (1444) /1
= 1444

*Table 4 MSE For Forcasting Result Of Java V-1*

| No | Peiode | Jumlah Pengeluaran Poduk | 3 Bulan | | | 5 bulan | | |
|---|---|---|---|---|---|---|---|---|
| | | | Hasil Peramalan | error | error^2 | Hasil Peramalan | error | Error 2 |
| 1 | Maret | 1200 | | | | | | |
| 2 | April | 950 | | | | | | |
| 3 | Mei | 1500 | | | | | | |
| 4 | Juni | 1250 | 1216.667 | 33.34 | 111.1 | | | |
| 5 | Juli | 1050 | 1233.333 | 83.34 | 33611 | | | |
| 6 | Agustus | 1140 | 1266.667 | 126.7 | 16044 | 1178 | 38 | 144 |
| MSE | | | 16922.22222 | | | 1444 | | |

*Based on the comparison results can be concluded that forecasting with 5 months Moving Average forecasting method that will be used as the basis for forecasting in determining the raw materials due to the smallest MSE error value found in the method of forecasting Single Moving Average 5 bulan.dari forecasting results can be drawn conclusions in table 5*

*Table 5 Forcasting Product Of Java V-1*

| **product code** | **Product Name** | **Results forecasting** | **Month** |
|---|---|---|---|
| FEBB2520001 | Java V-1 | 1178 | September |

## *3. Checkk*

*This stage is the examination stage whether the forecasting result is good to be applied and in accordance with what is planned at Plan stage. This examination is done by examining the evaluation results of the forecasting results with what is planned at the planning stage using monitoring techniques. Monitoring stage is the stage where the Logistics Manager supervises and controls the process of ordering raw materials with the aim of avoiding the occurrence of shortage of raw materials that is by using the method of Safety Stock. Safety stock or security stock serves to protect errors in predicting demand during lead time. Here is the calculation of forecasting the number of Java V-1 type meter products using the method of safety stock*

*Known :*

*Number of raw material forecast for September* 2017 = 1178

*weekdays in a month* = 22 *days*

*Lead time (l) = 3 days*

Average raw material expenditure in one month (d) =1178 /22 = 53.546 pcs
Standart deviasi (sd) = 53.546 /10 = 5.3546 Unit
*Standart deviasi and lead time* (sl) = 3/10 = 0.3
*Sevice level* 95% (Z) = 1.645
*Safety Stock* = Z x Sdl

$Sdl = \sqrt{((d^2 \times Sl^2) + (l \times Sd^2))}$

$Sdl = \sqrt{((53.546^2 \times 0.3^2) + (3 \times 5.3456^2))}$

$Sdl = \sqrt{((2867.174 \times 0.9) + (3 \times 28.57544))}$

$Sdl = \sqrt{((2580.456) + (85.726))}$

$Sdl = \sqrt{2952.9}$

Sdl = 54. 340
*Safety Stock* = 1.645 x 54. 340 = 89.389=> 90 *unit (rounding results ).*

*Based on above safety stock calculation, PT.Mecoindo-Itron must provide safety stock for Java V-1 type meter product in accordance with safety stock that is 90 units. Safety stock for each raw material of Java V-1 type meter can be seen in Table 3.6*

*Table 6 Monitoring Process Of Product Java V-1*

| Kode Produk | Nama Produk | Stok | Safety Stock | Status |
|---|---|---|---|---|
| FEBB2520001 | JAVA V-1 | 47 | 90 | Tidak Aman |

### *4. Act*

*This stage is the stage that must be done in determining the ordering of the amount of raw materials according to the needs of Java V-1 type meter production based on the forecasting and the amount of safety stock that is by making improvements in the ordering stage of raw materials to the supplier by the Logistics Manager at PT. Mecoindo-Itron. Logistic Manager's way of ordering raw materials with forecasting results plus safety stock and the following is the number of Java V-1 type meter products that must be produced by Production Staff for September 2017 can be seen in Table 7.*

*Table 7 Product That Must Be Production Of Java V-1*

| Kode Produk | Nama Produk | Stok | Hasil Peramalan | Safety stock | (HasilPeramalan-Stok) + (Safety Stock) |
|---|---|---|---|---|---|
| FEBB2520001 | Java V-1 | 47 | 1178 | 90 | 1224 Unit |

*From the results of the evaluation it can be concluded the result of planning procurement Java V-1 is 1224 units*

### *2.6.2 Procurement Planning Process Number of Products*

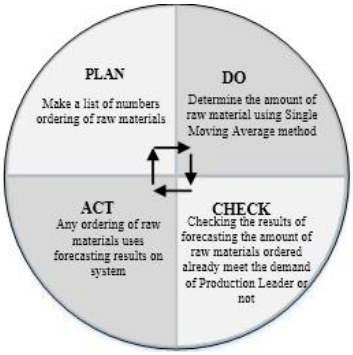



*Figure 3 Raw Material Booking Procedure*

**1. *Plan***

*At this stage the problem is identified how to make a list of the amount of raw materials that must be ordered to the supplier in order to meet the needs of the production process Planning of raw material ordering done with the forecasting results on the procurement of the number of products but previously managers must take into account the anticipation of the product failed during the production process because will greatly affect the ordering of raw materials, while the product data failed in March until sengan August 2017 can be seen in table 3.8*

*Table 8 Product Data Failed March 2017 to August 2017*

| Nama Produk | Data Produk Gagal Bulan | | | | | | Total Produk Gagal 6 Bulan |
|---|---|---|---|---|---|---|---|
| | Maret | April | Mei | Juni | Juli | Agustus | |
| Marroco 5(20)A TCM14/17 | 21 | 19 | 26 | 23 | 16 | 23 | 128 |
| Marocco 10(30)A TCM14/17 | 18 | 24 | 15 | 17 | 22 | 27 | 123 |
| Niger 10(40)A | 22 | 14 | 23 | 16 | 19 | 14 | 108 |
| Java V.1 | 36 | 29 | 31 | 37 | 33 | 42 | 208 |
| Nias DC METER | 12 | 28 | 17 | 19 | 26 | 22 | 124 |
| Nias CT METER | 16 | 15 | 18 | 18 | 21 | 19 | 107 |
| C114GR1 ST 5(20)A | 13 | 23 | 16 | 27 | 15 | 17 | 111 |
| C114GR1 ST 20(60)A | 24 | 12 | 26 | 19 | 27 | 22 | 130 |
| C116 X/5 A ST | 31 | 16 | 35 | 21 | 14 | 18 | 135 |
| Centian 3 ERITRIA | 17 | 27 | 15 | 17 | 21 | 19 | 116 |
| Centian 1 ERITRIA | 27 | 19 | 26 | 22 | 18 | 24 | 136 |
| Total Jumlah Penjualan Seluruh Produk Perbulan | 237 | 226 | 248 | 236 | 232 | 247 | 1426 |

*Based on the above failed product data, the calculation will use the sample of Java V-1 because Java V-1 product has the highest number of failed products than other products. From table 8 it can be drawn data product failed Java V-1 in March to August 2017 on tabe 9*

*Table 9 Product Data Failed Java V-1 In March Until August 2017*

| Month | Number of Products Failed |
|---|---|
| Maret | 36 |
| April | 29 |
| Mei | 31 |
| Juni | 37 |
| Juli | 33 |
| Agustus | 42 |

**2. *Do***

*This stage is to do the calculation to determine the amount of raw materials to be ordered is from the results of forecasting the number of procurement of products in the process of planning the number of procurement of the product and then added with the number of failed products in the previous month, the following table evaluation of the number of ordering raw materials for September 2017 seen in table 10*

*Table 10 Evacuation of Total Raw Material Reserves For September 2017*

| Kode Produk | Nama Produk | Hasil perhitungan perencanaan jumlah pengadaan produk | Produk gagal bulan Agustus (y) | Total Jumlah ((x+y) + z) |
|---|---|---|---|---|
| FEBB2520001 | Java V.1 | 1224 | 42 | 1266 |

**5. *Check***

*This stage is the examination stage whether the forecasting result is suitable to be applied in accordance with what is planned in the Plan stage. This examination is done by examining the evaluation results of the forecasting results with what is planned at the planning stage using monitoring techniques. Monitoring stage is the stage where the Logistics Manager supervises and controls the process of ordering raw materials with the aim of avoiding the occurrence of shortage of raw materials that is by using the method of Safety Stock. Safety stock or security stock serves to protect errors in predicting demand during lead time. Here is the calculation of production forecasting product type meter Java V-1 using the method of safety stock :*

*Known :*
*Total of raw material forecast for September* 2017 = 1266
*weekdays in a month* = 22 *days*
*Lead time*(l) = 3 days
*Average raw material expenditure in one month* (d) =1266 /22 = 57.5455
Standart deviasi (sd) = 53.546 /10 = 5.575455 *units*
*Standar deviasi form lead time* (sl) = 3/10 = 0.3
*Sevice level* 95% (Z) = 1.645
*Safety Stock* = Z x Sdl

$Sdl = \sqrt{((d^2 \times Sl^2) + (l \times Sd^2))}$

$Sdl = \sqrt{((57.54545^2 \times 0.3^2) + (3 \times 5.75455^2))}$

$Sdl = \sqrt{((3311.479 \times 0.9) + (3 \times 31.08569))}$
$Sdl = \sqrt{((2980.331) + (93.25708))}$
$Sdl = \sqrt{3073.588}$
Sdl = 55.440
*Safety Stock* = 1.645 x 55.440 = 91.1998 => 91 unit.

*Based on the above safety stock calculation, PT.Mecoindo-Itron must provide safety stock for Java V-1 type meter product in accordance with safety stock that is 91 units.*

*Table 11 Calculation of Raw Materials for Java Product V-1*

| No | Kode Bahan Baku | Nama Bahan Baku | Komposisi | Safety Stock | Komposisi X Safety Stock |
|---|---|---|---|---|---|
| 1 | A205326 | (Nickel plating) | 1 | 91 | 91 |
| 2 | A205914 | Screw M5x12 Cap Steel | 10 | 91 | 910 |
| 3 | A205916 | Intensity Terminal | 10 | 91 | 910 |
| 4 | A206208 | Subminiature snap action switch | 1 | 91 | 91 |
| 5 | A208698 | Label 14x50mm | 0.0004 | 91 | 0.0364 |
| 6 | A209434 | Sealing Screw M4x20 steel | 4 | 91 | 364 |
| 7 | A209435 | Sealing Screw M4x35 steel | 2 | 91 | 182 |
| 8 | A209628 | Base Assembly | 1 | 91 | 91 |
| 9 | A209708 | Rubber Keypad | 1 | 91 | 91 |
| 10 | A209709 | Keypad PCB | 1 | 91 | 91 |
| 11 | A209710 | Ribbon Cable | 1 | 91 | 91 |
| 12 | A209713 | Phase Latch Relay 12V Assembly | 1 | 91 | 91 |
| 13 | A209714 | Neutral Latch Relay 12V Assembly | 1 | 91 | 91 |
| 14 | A209723 | Contactor PCB Assembly | 1 | 91 | 91 |
| 15 | A5000148 | Current Transformer n=2000 turn | 1 | 91 | 91 |
| 16 | A5002285 | ELECTROLYTIC CAPACITOR 0.47F 20% 3.6V RAD ALUM | 1 | 91 | 91 |
| 17 | A5002513 | Name Plate Sticker | 1 | 91 | 91 |
| 18 | A5002533 | Cover | 1 | 91 | 91 |
| 19 | A5002535 | PCBA EM512 Type 700 JAVA v1 | 1 | 91 | 91 |
| 20 | A5002686 | Retainer | 1 | 91 | 91 |
| 21 | A5002688 | Terminal Cover | 1 | 91 | 91 |
| 22 | A5003479 | Base Plate Zinc Platted | 1 | 91 | 91 |
| 23 | R9305AA | LABEL Box 150X105mm | 0.0002 | 91 | 0.0182 |
| 24 | R9306AB | Ribbon Box 110mmx76M | 0.001325 | 91 | 0.120575 |
| 25 | R9704AC | No Clean Cored Solder Wire Dia 0.8mm | 0.00169 | 91 | 0.15379 |
| 26 | X57083C | Wire dia 1.25mm Red L=150mm | 1 | 91 | 91 |
| 27 | X57083D | Wire dia 1.25mm Orange L=150mm | 1 | 91 | 91 |
| 28 | X84277A | Sealing Nut for Base BS Bakelite | 3 | 91 | 273 |
| 29 | X73068S | Master Box | 0.1 | 91 | 9.1 |
| 30 | X75240D | Non Magnetic Card | 1 | 91 | 91 |
| 31 | X75240Y | Leaflet EM512 Type 700 | 1 | 91 | 91 |
| 32 | X81010E | Metrology Seal 1 phase Class 1 | 1 | 91 | 91 |
| 33 | X82040F | Combo Kit F | 1 | 91 | 91 |
| 34 | X86252A | Register Tapping Screw (M2.6X6) | 2 | 91 | 182 |
| 35 | X86295A | Screw M3 X 4 (Nickel plating) | 4 | 91 | 364 |
| 36 | X86422B | Screw M4 X 8 (+/-) Cap | 2 | 91 | 182 |
| 37 | X86422E | Screw M4 X 4 (+/-) Cap | 1 | 91 | 91 |
| 38 | X953010X | Individual Box | 1 | 91 | 91 |

*From the calculation results can be done monitoring of raw material inventory for Java V-1 products in Table 12*

*Table 12 Monitoring Process For Raws Material Product Java V-1*

| No | Kode Bahan Baku | Nama Bahan Baku | Stok Bahan Baku | Komposisi X Safety Stok | Status |
|---|---|---|---|---|---|
| 1 | A205326 | (Nickel plating) | 1469 | 91 | Aman |
| 2 | A205914 | Screw M5x12 Cap Steel | 2094 | 910 | Aman |
| 3 | A205916 | Intensity Terminal | 68 | 910 | Tidak Aman |
| 4 | A206208 | Subminiature snap action switch | 391 | 91 | Aman |
| 5 | A208698 | Label 14x50mm | 0.0661 | 0.0364 | Aman |
| 6 | A209434 | Sealing Screw M4x20 steel | 2094 | 364 | Aman |
| 7 | A209435 | Sealing Screw M4x35 steel | 428 | 182 | Aman |
| 8 | A209628 | Base Assembly | 104 | 91 | Aman |
| 9 | A209708 | Rubber Keypad | 14 | 91 | Tidak Aman |
| 10 | A209709 | Keypad PCB | 128 | 91 | Aman |
| 11 | A209710 | Ribbon Cable | 93 | 91 | Aman |
| 12 | A209713 | Phase Latch Relay 12V Assembly | 8 | 91 | Tidak Aman |
| 13 | A209714 | Neutral Latch Relay 12V Assembly | 330 | 91 | Aman |
| 14 | A209723 | Contactor PCB Assembly | 34 | 91 | Tidak Aman |
| 15 | A5000148 | Current Transformer n=2000 turn | 44 | 91 | Tidak Aman |
| 16 | A5002285 | ELECTROLYTIC CAPACITOR 0.47F 20% 3.6V RAD ALUM | 110 | 91 | Aman |

| No | Kode Bahan Baku | Nama Bahan Baku | Stok Bahan Baku | Komposisi X Safety Stok | Status |
|---|---|---|---|---|---|
| 17 | A5002513 | Name Plate Sticker | 11 | 91 | Tidak Aman |
| 18 | A5002533 | Cover | 116 | 91 | Aman |
| 19 | A5002535 | PCBA EM512 Type 700 Java v1 | 104 | 91 | Aman |
| 20 | A5002686 | Retainer | 1 | 91 | Tidak Aman |
| 21 | A5002688 | Terminal Cover | 33 | 91 | Tidak Aman |
| 22 | A5003479 | Base Plate Zinc Platted | 3 | 91 | Tidak Aman |
| 23 | R9305AA | LABEL Box 150X105mm | 0.723 | 0.0182 | Aman |
| 24 | R9306AB | Ribbon Box 110mmx76M | 0.001325 | 0.120575 | Aman |
| 25 | R9704AC | No Clean Cored Solder Wire Dia 0.8mm | 0.00169 | 0.15379 | Aman |
| 26 | X57083C | Wire dia 1.25mm Red L=150mm | 554 | 91 | Aman |
| 27 | X57083D | Wire dia 1.25mm Orange L=150mm | 730 | 91 | Aman |
| 28 | X84277A | Sealing Nut for Base BS Bakelite | 170 | 273 | Aman |
| 29 | X73068S | Master Box | 484 | 9.1 | Aman |
| 30 | X75240D | Non Magnetic Card | 535 | 91 | Aman |
| 31 | X75240Y | Leaflet EM512 Type 700 | 604 | 91 | Aman |
| 32 | X81010E | Metrology Seal 1 phase Class 1 | 443 | 91 | Aman |
| 33 | X82040F | Combo Kit F | 1 | 91 | Tidak Aman |
| 34 | X86252A | Register Tapping Screw (M2.6X6) | 1199 | 182 | Aman |
| 35 | X86295A | Screw M3 X 4 (Nickel plating) | 6400 | 364 | Aman |
| 36 | X86422B | Screw M4 X 8 (+/-) Cap | 195 | 182 | Aman |
| 37 | X86422E | Screw M4 X 4 (+/-) Cap | 904 | 91 | Aman |
| 38 | X953010X | Individual Box | 11 | 91 | Tidak Aman |

*In addition to monitoring raw materials, the process that affects the amount of raw material stocks that the number of products fail during the production process. At the time the product failed to exceed the calculation of the number of products failed in the next month then the logistics manager must reorder the raw materials and the following information data the number of failed products can be seen in table 13*

*Table 13 Product Data Information Failed In September 2017*

| Kode produk | Nama Produk | Jumlah Produk Gagal Bulan Agustus | Jumlah Produk Gagal Bulan September | Status |
|---|---|---|---|---|
| FEBB2520001 | Java V.1 | 42 | 21 | Aman |

*For safety monitoring the number of failed products in September is smaller than the number of failed products in August it can be concluded safe, but if the number of failed products in September exceeded the number of products failed in August it can be said unsafe status and require logistics managers to re-order to suppliers.*

## 4. *Act*

*This stage is the step that must be done in determining the ordering of the amount of raw materials according to the demand of Java V-1 type meter production based on the forecasting and the amount of safety stock, the anticipation of the failed product is by making improvements in the ordering stage of raw materials to the supplier by Logistics Manager at PT. Mecoindo-Itron. The way the Logistics Manager orders the raw materials is the result of forecasting the number of procurement of products plus safety stock then added the number of recaps of failed products the previous month can be seen in Table 14*

*Table 14 Data Recap Total Product Failed Java Product V-1*

| Kode Produk | Nama Produk | Jumlah pengadaan | *Safety Stock* | Jumlah Pengadaan + *Safety Stock* |
|---|---|---|---|---|
| FEBB2520001 | Java V-1 | 1266 | 91 | 1357 |

*Then in kalkuklasikan with the composition of raw materials for java V-1 product then get the results in table 15*

*Table 15 Process Table 15 number of raw material ordering*

| No | Part no | Part Name | Raw Material Ordering Amount | Unit | Action |
|---|---|---|---|---|---|
| 1 | A205326 | (Nickel plating) | 1310 | Units | Order |
| 2 | A205914 | Screw M5x12 Cap Steel | 12722 | Units | Order |
| 3 | A205916 | Intensity Terminal | 12722 | Units | Order |
| 4 | A206208 | Subminiature snap action switch | 1310 | Units | Order |
| 5 | A208698 | Label 14x50mm | 42.5072 | RL | Order |
| 6 | A209434 | Sealing Screw M4x20 steel | 5114 | Units | Order |
| 7 | A209435 | Sealing Screw M4x35 steel | 2578 | Units | Order |
| 8 | A209628 | Base Assembly | 1310 | Units | Order |
| 9 | A209708 | Rubber Keypad | 1310 | Units | Order |
| 10 | A209709 | Keypad PCB | 1310 | Units | Order |
| 11 | A209710 | Ribbon Cable | 1310 | Units | Order |
| 12 | A209713 | Phase Latch Relay 12V Assembly | 1310 | Units | Order |
| 13 | A209714 | Neutral Latch Relay 12V Assembly | 1310 | Units | Order |
| 14 | A209723 | Contactor PCB Assembly | 1310 | Units | Order |
| 15 | A5000148 | Current Transformer n=2000 turn | 1310 | Units | Order |
| 16 | A5002285 | ELECTROLYTIC CAPACITOR 0.47F 20% 3.6V RAD ALUM | 1310 | Units | Order |
| 17 | A5002513 | Name Plate Sticker | 1310 | Units | Order |
| 18 | A5002533 | Cover | 1310 | Units | Order |
| 19 | A5002535 | PCBA EM512 Type 700 JAVA v1 | 1310 | Units | Order |
| 20 | A5002686 | Retainer | 1310 | Units | Order |
| 21 | A5002688 | Terminal Cover | 1310 | Units | Order |
| 22 | A5003479 | Base Plate Zinc Platted | 1310 | Units | Order |
| 23 | R9305AA | LABEL Box 150X105mm | 42.2536 | RL | Order |
| 24 | R9306AB | Ribbon Box 110mmx76M | 43.6801 | RL | Order |
| 25 | R9704AC | No Clean Cored Solder Wire Dia | 44.14292 | KG | Order |
| 26 | X57083C | Wire dia 1.25mm Red L=150mm | 1310 | Units | Order |
| 27 | X57083D | Wire dia 1.25mm Orange L=150mm | 1310 | Units | Order |
| 28 | X84277A | Sealing Nut for Base BS Bakelite | 3846 | Units | Order |
| 29 | X73068S | Master Box | 168.8 | Units | Order |
| 30 | X75240D | Non Magnetic Card | 1310 | Units | Order |
| 31 | X75240Y | Leaflet EM512 Type 700 | 1310 | Units | Order |
| 32 | X81010E | Metrology Seal 1 phase Class 1 | 1310 | Units | Order |
| 33 | X82040F | Combo Kit F | 1310 | Units | Order |
| 34 | X86252A | Register Tapping Screw (M2.6X6) | 2578 | Units | Order |
| 35 | X86295A | Screw M3 X 4 (Nickel plating) | 5114 | Units | Order |
| 36 | X86422B | Screw M4 X 8 (+/-) Cap | 2578 | Units | Order |
| 37 | X86422E | Screw M4 X 4 (+/-) Cap | 1310 | Units | Order |
| 38 | X953010X | Individual Box | 1310 | Units | Order |

## *2.7 Functional Needs Analysis*

*Functional Needs Analysis is an analysis that describes the flow of data or information that includes the drawing, planning, and making a sketch or arrangement of several separate elements into a unified whole and functioning in the process of making software to be built.*

### *2.7.1 Database Analysis*

*Database analysis on inventory management information system development at Logistikk Manager at PT.Mecoindo-Itron which will be built using Entity Relationship Diagram (ERD). ERD is a data model that uses several notations to describe data in the entity context and the relationships described by that data. The diagram is illustrated in Figure 4*

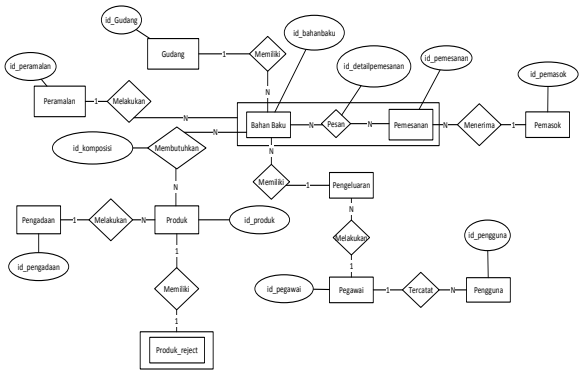



*Figure 4 ERD Inventory Management information system*

### 2.7.2 ***Diagram Konteks***

*Context diagram is a model that serves to explain globally how data is used and transformed to process or describe the flow of data into and out of the system. Context diagram on inventory management information system can be seen in figure 5*




*Figure 5 Context Diagram*

### 2.7.3 ***Data Flow Diagram* (DFD)**

*Data Flow Diagrams (DFDs) show data flows, data storage, and processes that respond to incoming data and modify them. Data Flow Diagram Level 1. Level 1 DFD on the development of inventory management information system at PT. Mecoindo-Itron can be seen in Figure 3.9 Explain in general what processes can be performed on the built system.*

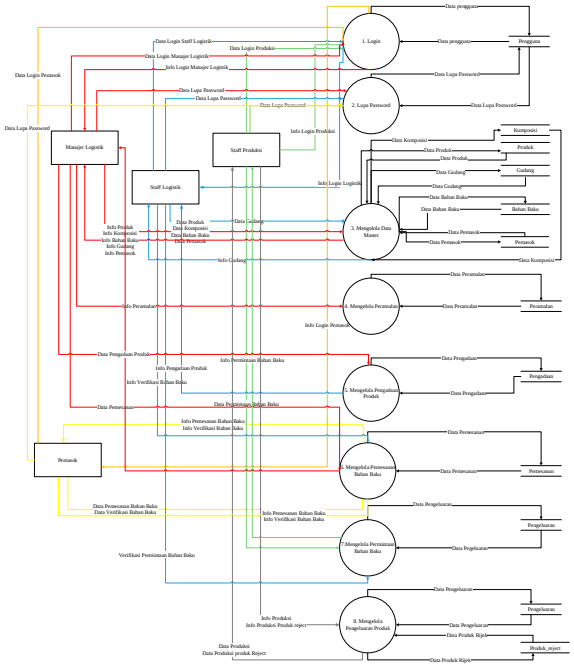


*Figure 6 DFD Level 1 Inventory Management Information System*

## 2.8 ***System planning***

*System design is the next stage after analysis phase. Design is identified as a process aplikai system to be implemented. The design is depicted as a multi step process where representation of info structure, program structure, display characteristics and detailed procedures.*

### 2.8.1 ***Relation Table***

*Table relation is a picture of the relationship between data, meaning data and limitations. The process of relations between attributes is a combination of attributes that have the same primary key so that these attributes into a unity connected by the key. Table relation on PT. Mecoindo-Itron can be seen in figure 7*

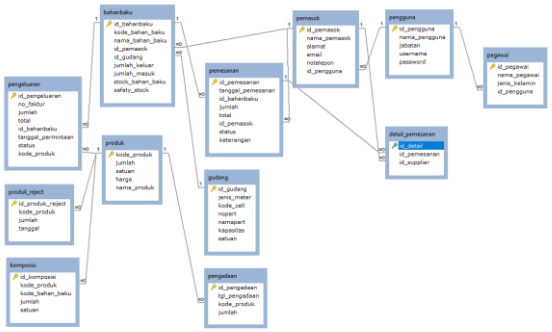



*Figure 7 Table Relationships Inventory Management System*

### 2.8.2 *Interface Design*

*Interface design is made to describe how the program will be used by the user to interact with the system to be built. The design of the interface is made based on the display, either input, output or that will be generated when the application has been built in implementation. Interface design in inventory management information system PT.Mecoindo-Itron can be seen in the following figure*

### 2.8.3 *Login Interface*

*The design of Logistics Manager login page interface on the construction of inventory management information system at PT. Mecoindo-Itron can be seen in figure 8*

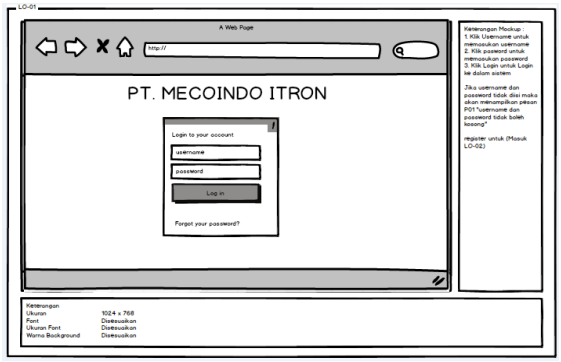



*Figure 8 interface display login page*

### 2.8.4 *System Testing*

*Testing the system is the most important thing that aims to find errors or deficiencies in the system being tested. Testing intends to know the inventory management information system built has met the performance in accordance with the design objectives. The test used to test the system is a black box testing method. Black box testing focused on testing the functional requirements of information systems.*

#### 2.8.4.1 *Blackbox Testing*

*Black box testing is focused on the functional requirements of the built system. Black box testing scenario for the construction of inventory management information system at PT. Mecoindo-Itron can be seen in table 16*

*Table 16 Blackbox Testing*

| Kelas Uji | Butir Uji | Jenis Pengujian |
|---|---|---|
| Login | Login user | *Black Box* |
| Monitoring | Bahan baku | *Black Box* |
| | Penerimaan Bahan Baku | |
| Stok Produk | Melihat stok produk | *Black Box* |
| | Mencari produk | |
| | Hapusstok prroduk | |
| | Edit stok produk | |
| | Menambah user | |
| | Melakukan ubah Kata Sandi | |
| Peramalan Produk | Pengelolaan Peramalan produksi | *Black Box* |
| | Pengelolaan Pemesanan Bahan Baku | |
| | Konfirmasi Jumlah Pemesanan | |
| | Konfirmasi Jumlah Pemesanan | |
| | Pengelolaan Riwayat | |
| | Riwayat Peramalan | |
| | Riwayat Pemesanan | |
| Struktur Produk | Melihat data struktur produk | *Black Box* |
| | Cari pstruktur produk | |
| | Menampilkan struktur produk | |
| Gudang | Menampilkan pilihan gudang | *Black Box* |
| | Menampilkan data gudang | |
| Peemesanan Bahan Baku | Melihat form pemesanan jumlah bahan baku yang harus dipesan kepada pemasok | *Black Box* |
| | Mencari bahan baku | |
| | Melakukan verifikasi pemesanan kepada pemasok dengan cara ceklis | |
| | Simpan data pemesanan bahan baku kepada pemasok | |
| Permintaan bahan Bahan Baku | Melihat form data bahan baku yang akan di pesan | *Black Box* |
| | Mencari bahan baku yang akan dipesan | |
| | Melakukan verifikasi pemesanan bahan baku | |
| | Menampilkan status verifikasi bahan baku | |
| Pemasok | Melihat data pemasok bahan baku | *Black Box* |
| | Cari pemasok | |
| | Ubah Pemasok | |
| | Tambah Pemasok | |
| | Hapus Pemasok | |
| Pengelolaan Data User | Melihat user | *Black Box* |
| | Menambah user | |
| | Melakukan ubah Kata Sandi | |
| | Menghapus user | |
| | Riwayat Distribusi | |

*Berdasarkan hasil dari pengujian blackbox pada kasus sample uji yang telah dilakukan didapatkan kesimpulan bahwa proses sudah benar. Penyaringan kesalahan proses dalam bentuk arahan tampilan halaman pesan sudah cukup maksimal. Secara fungsional sistem sudah dapat menghasilkan output yang diharapkan.*

#### 2.8.4.2 *Beta Testing*

*Beta testing is a direct test in the environment. Users make an assessment of the software using interview methods. From the results of these interviews it can be concluded whether the software built in accordance with the purpose or not. Interviews wereconducted to logistic managers logistic staff warehouse, production staff and supplier sampele*

*Based on beta testing that has been done pasa inventory management system in PT. Mecoindo-Itron, it can be concluded that.*

1. *This system can assist logistic manager, logistic staff, production staff and supplier in carrying out their respective work.*
2. *The built system is easy enough to use.*
3. *System has good interface temps.*
4. *User language used system is easy to understand.*

## *3. COVER*

### *3.1 Conclusion*

*After doing the analysis, design, and testing. Then can be obtained conclusion as follows:*

1. *Management Information System This inventory can assist the Logistics Manager in making the order form of raw materials that must be ordered to the supplier in accordance with product needs in the next production period.*
2. *Management Information System This inventory can also assist the Logistics Manager in moniroring the amount of raw material inventory in the*

*warehouse so that it can reduce the possibility of the occurrence of the condition of deficiency or excess of raw materials that cause disruption of the company's operational activities.*

### *3.2 Recomendation*

*After doing the analysis, design, and testing. Then can be obtained conclusion as follows:*

1. *Management Information System This inventory can assist the Logistics Manager in making the order form of raw materials that must be ordered to the supplier in accordance with product needs in the next production period.*
2. *Management Information System This inventory can also assist the Logistics Manager in monitoring the amount of raw material inventory in the warehouse so that it can reduce the possibility of the occurrence of the condition of deficiency or excess of raw materials that cause disruption of the company's operational activities.*

## *BIBLIOGRAPHY*


[1] Prof,Azha Susanto,MBus,ak, *Sistem Informasi Manajemen*, Bandung: Lingga Jaya, 2013.

[2] Senator Nur Bahagia, *Sistem Inventori, Bandung*: ITB,2006.

[3] John Warman,*Manajemen Pergudangan*,Jakarta: PT. Pustaka Sinar Harapan, 2012

[4] Spyros Makridakis, Steven C. Wheelwright, *Metode-Metode Peramalan Untuk Manajemen*, Jakarta: Bina Rupa Aksara, 1994.

[5] Syahu Sugian O, *Kamus Manajemen Mutu*, Jakarta: PT. Gramedia Pustaka Utama, 2006.