# *INFORMATION SYSTEMS IN RAW MATERIAL MANAGEMENT USING ECONOMIC ORDER QUANTITY METHOD IN PT ADETEX*

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## *ABSTRACT*

*PT Adetex is a company engaged in the textile industry located in the Banjaran area of Bandung Regency, PT Adetex manufactures starting from the main raw material namely yarn to be made into fabric that is ready for sale. PT Adetex has several activities related to raw material inventory management under the Weaving Manager in the spinning unit starting from the supply of raw materials from suppliers to the logistics unit, storage of raw materials in the logistics unit, raw material expenditure from the logistics unit to the production unit. The problem that occurs at PT Adetex is that it is difficult to determine the amount of raw material with the type of cotton, rayon and polyester that will be in PO and the amount of raw material that will come out during the PO period or the import process due to the release of raw materials that are not, this results in frequent buildup of materials standard, Then the solution that can be done to overcome the problems in the background of the problem at PT Adetex is that a raw material inventory management information system is needed. The order planning uses Economic Order Quantity (EOQ).*

*Keywords: Inventory Management Systems, Systems, Economic Order Quantity*

## *1. INTRODUCTION*

### 1.1 *Background*

*PT. Adetex is a company engaged in the textile industry, located in the Banjaran area of Bandung Regency. This company produces various kinds of textile products whose main products are GRAY fabric. This Gray fabric has three types of raw materials, including Gray fabric with cotton yarn raw material with 4 types of quality Gray cotton fabric, Gray fabric with polyester yarn raw material with 9 types of quality Gray polyester fabric and Gray fabric with rayon yarn raw material with 27 types Gray rayon fabric quality..*

*PT.Adetex has several activities related to raw material inventory management under the Weaving Manager in the spinning unit starting from the supply of raw materials from suppliers to logistics units, storage of raw materials in the logistics unit, expenditure of raw materials from the logistics unit to the production unit. The problem that occurred at PT.Adetex was the accumulation of the amount of raw material stock in the logistics unit in the raw material warehouse flow report such as the attached data (Appendix B) that occurred in January and February 2014 on the type of cotton with the type of CD quality 40 AJL with the amount of stock initial 90.72 kg, which increased the stock of raw materials in March by the amount of 19900 kg, so that the stock of raw materials in March piled up to 19990.72 kg, this is because the production unit did not make a request to the logistics unit but there was a demand for raw materials from the logistics unit to the supiler to make the supply. In the type of polyester with a quality type of PE 50 in January there was no initial amount of stock, then the weaving manager planned the supply of raw materials from the logistics unit to the supplier as much as 2540.16 kg, and the stock of raw materials increased from February to October, therefore there was a buildup of raw materials in October with a total stock of 136,582.08 kg, this is because the production unit did not make a request to the logistics unit but the Weaving Manager carried out the supply of raw materials from the logistics unit to the supplier. In the type of rayon with the type of quality RY'30 Wax with an initial stock of raw materials in January with a total of 1,088.64 kg, the Weaving Manager supplies raw materials from the logistics unit to the supplier as much as 43,375.31 kg, then there is a demand from the production unit to the logistics unit as much as 40,000 kg, so that the final stock in January accumulates as much as 4463.95 kg, in February there is an input of raw materials from the supplier to the logistics unit as much as 43,375.31 kg, then there is demand from the production unit to the logistics unit as much as 40,000 kg, so that the final stock in February piles up to 7839.26 kg, this is due to the excessive supply of raw materials caused by the demand for raw materials from the production unit to the logistics unit which is erratic.*

*Solution that can be done to overcome the problems in the background of the problem at PT. Adetex is needed an inventory management information system as outlined in the form of thesis research.*

### *1.2 Research methodology*

*The research method is a research method used to obtain complete data to achieve certain goals [1]. The research design used by the writer is descriptive research design. In the context of information systems descriptive research is research that describes a system that is happening now systematically, factually about the system being studied. In this study the authors tried to describe the system and the performance of the application designed and its implementation to the user. The steps in conducting this research are as follows:*

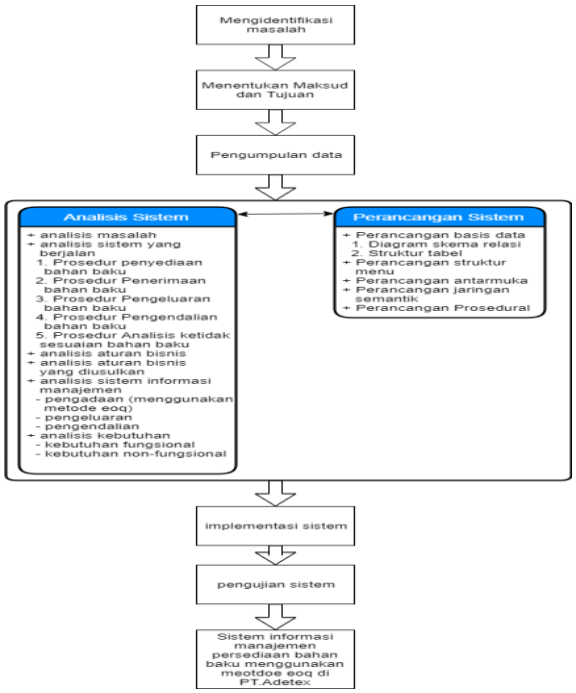



***Figure 1.1 Research Methodology Schema***

## *2. REVIEW LITERATURE*

### *2.1 Company profile*

*PT. Adetex is a company engaged in the textile industry, located in the Banjaran area of Bandung Regency. PT. Adetex produces various kinds of textiles, such as Spinning, Weaving, Printing, Dyeing and Finishing. PT.Adetex manufactures starting from the main raw material namely yarn to be made into fabric that is ready for sale.*

*This company produces various kinds of textile products whose main products are GRAY fabric. This Gray fabric has three types of raw materials, including Gray fabric with cotton yarn as raw material 4 types of quality Gray cotton fabric, Gray fabric with polyester yarn raw material with 9 types of Gray polyester fabric quality and Gray fabric with rayon yarn raw material with 27 types of Gray rayon fabric quality.*

### *2.2 Information Systems*

*The information system is a collection of components that work together, which is used to record data, process data, and present information for decision makers so that they can make decisions well [2].*

*Information Systems (SI) are a combination of information technology and the activities of people who use that technology to support operations and management. In a very broad sense, the term information system that is often used refers to interactions between people, algorithmic processes, data, and technology. In this sense, the term is used to refer not only to the use of information and communication technology (ICT) organizations, but also to the ways in which people interact with this technology in supporting business processes [3].*

#### *2.2.1 Management information System*

*According to DR. Ir. Eddy Soeryanto Soegoto in the book Entrepreneurship becomes a master of business management words can be interpreted "the process of planning, organizing, directing, and controlling the resources of each organization to achieve organizational goals that have been created [4].*

*In the journal entitled Management Information Systems Model at PT.XYZ which was arranged by Tati Harihayati and Utami Dewi Widianti, in the journal explained that the management information system is a set of interconnected subsystems, gather together and form one unit, interact with each other and work together from one part to another in certain ways to perform data processing functions, receive input (input) in the form of data / facts, then process it (processing), and produce output in the form of information as a basis for decision making that is useful and has real value that can be felt as a result both at the moment and in the future, supporting operational activities, managerial, and strategic organization, by utilizing the various resources available and available for these functions to achieve goals [5].*

##### 2.2.1.1 *Inventory Management Information System*

*According to Robert J F and Richard C B in his book Operations and Supply Chain Management (Issue 1 Book 2) Inventories are inventory of goods or resources used in an organization. Inventory system is a set of policies and controls that oversee the level of supply and determine the level of inventory that must always be present, when inventory must be refilled and how many orders must be ordered [6]. Therefore the Inventory Management Information System is one technique to solve problems in inventory to achieve a balance between shortages or excess inventory by minimizing inventory costs and increasing service levels aimed at increasing profits.*

**2.3 *Economic Order Quantity (EOQ)***

*EOQ model is one of the calculation models to get the optimal order strength value of a company. Assuming the value of demand for a product (rate of demand), ordering costs (ordering cost), purchase price per unit (purchasing unit price) is constant value [7].*

***2.3.1 Factors Economic Order Quantity (EOQ)***

*Factors that influence to be able to achieve the above objectives, the company must meet several factors about the supply of raw materials, including*:

*1. Estimated usage*
*2. Price of ingredients*
*3. Inventory costs*
*4. Real use*
*5. Waiting time*
*6. Model of material procurement*
*7. Stock of safety materials*
*8. Reorder (reorder point*)

***2.3.2 Policies Economic Order Quantity (EOQ)***

*The raw materials available in ensuring the smooth production process and the costs incurred by the company in connection with the company are asinal as possible, then the action that needs to be done is to determine Economic Oerder Quantity (EOQ), Safety Stock, Reorder Point (ROP). Data requirements using the EOQ method* (*economic Order Quantity*) *as follows :*

*1. The level of request is known*
*2. Lead time known*
*3. Goods ordered are assumed to be available immediately*
*4. There is no back order because there is no inventory (Storange)*
*5. Every order is accepted in one shipment and can be used immediately*
*6. The purchase price does not change*
*7. There is no discount (quality discount)*
*8. Variable costs are just the cost of the message (ordering cost) and saving costs (Holding cost)*

***2.3.3 Policies Economic Order Quantity (EOQ)***

*1. EOQ formula*

$$EOQ = \sqrt{\frac{2 \times R \times S}{P}} \quad \text{.....(2.1)}$$

*Where :*
*EOQ = Optimal economical total order costs*
*R = Number of Orders During Lead Time*
*S = The cost of each order*
*P = Price of goods per unit*
*Or ...*

$$EOQ = \sqrt{\frac{2 \times D \times S}{P}} \quad \text{.....(2.2)}$$

*Where :*
*EOQ = Optimal economical total order costs*
*D = number of requests for 1 year or 1 period*
*S = the cost of each order*
*C = storage costs*

*2. The message fee formula*
*(TOC) = (D / EOQ) S.....(2.3)*
*Where :*
*TOC = Order fee*
*D = number of requests for 1 year or 1 period*
*S = the cost of each order*

*3. Message frequency formula*
*(F) = D/ EOQ.....(2.4)*
*Where :*
*F = order frequency*
*D = number of requests for 1 year or 1 period*
*EOQ = Optimal economical total order costs*

*4. Storage cost formula*
*(TCC) = (EOQ / 2) x C.....(2.5)*
*Where :*
*TCC = Total Storage Cost*
*EOQ = Optimal economical total order costs*
*C = storage costs*

*5. The total inventory cost formula [8].*
*TC = TOC + TCC.....(2.6)*
*Where :*
*TC = Inventory costs*
*TOC = Order fee*
*TCC = Total Storage Cost*

*6. Formula for the number of requests per day*
*d = D / Number of working days.....(2.7)*
*Where :*
*d = Number of requests per day*
*D = number of requests for 1 year or 1 period*

*7. The order quantity formula for lead time*
*R = d x L.....(2.8)*
*Where :*
*R = Number of Orders During Lead Time*
*d = Number of requests per day*
*L = Lead time*

*8. Formula Reorder point*
*ROP = (d x L) + Ss.....(2.9)*
*Where :*
*ROP = ReOrder Point*
*d = Number of requests per day*
*D = number of requests for 1 year or 1 period*
*L = Lead time*
*Ss = Safety Stock*

*9. Purchase cost formula*
*Bp = EOQ x P..... (2.10)*
*Where :*
*BP = Cost of purchase*
*EOQ = Optimal economical total order costs*
*P = Price of goods per unit*

*10. The formula to find out the maximum inventory [9]. The formula used to calculate the maximum inventory is:*
*MS = Ss +EOQ.....(2.11)*
*Where :*
*MS = Maximum Inventory*
*Ss = Safety Stock*
*EOQ = Optimal economical total order costs*

*11. Formula Safety Stock [10].*
*Ss = (Max Usage - Average Usage) Lead Time.....(2.12)*
*Ss = Z x √((PC / T) x ) σD.....(2.13)*
*Where :*
*Ss = Safety Stock*
*Z = Safety Factor*
*PC = Performance cycle*
*σD = Standara Deviansi from demand*
*T = Period Cycle Or...*
*Ss= Z x √((PC/T x ⟦σD⟧ ^2) + ( σLTLT x D average))2.....(2.14 ) Dimana :*
*Ss = Safety Stock*
*Z = Safety Factor*
*PC = Performance cycle*
*σD = Standara Deviansi from demand*
*σLTLT = std deviasi lead time*
*D rata2 = demand / average needs*

## *3. RESEARCH CONTENTS*

### *3.1 Model Analysis of Raw Material Inventory Management Information System at PT. Adetex*

Analysis of raw material inventory management information system is used to analyze the process of planning and implementing raw material inventory management at PT. ADETEX. Discussing the problems that occur with management based on existing data.

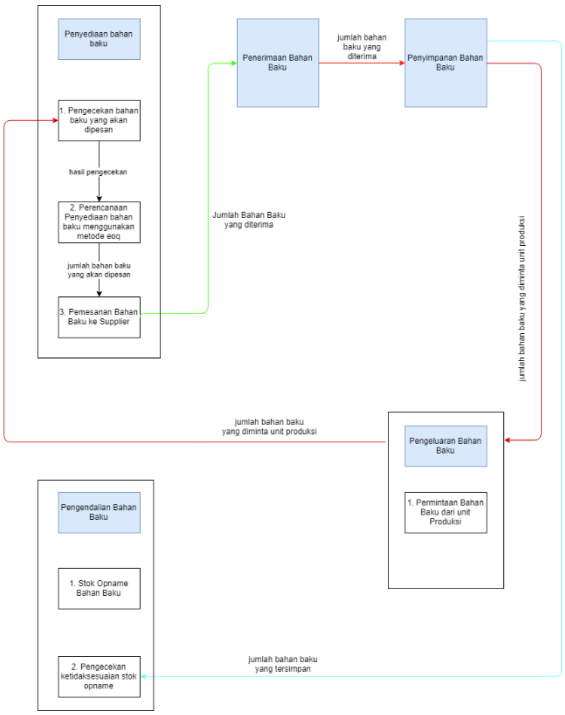



***Figure 3.1*** *Management Information Model Inventory management at PT. Adetex*

### *3.2 Model Analysis of Raw Material Inventory Management Information System at PT. Adetex*

#### 3.2.1 Analysis of determining the amount of raw material to be ordered

*This analysis was carried out by the EOQ method while the details of the calculations performed were:*
*Known :*
*Formula EOQ :*
*EOQ = √((2 x D x S) / C)*
*D is the result of the assumption of average needs from 2014, 2015.*

*Table 3.1 needs for 2014, 2015*

| Tahun | CD 40 AJL | PE 50 | RY'30 WAX |
|---|---|---|---|
| 2014 | 39300,4 Kg | 116200,8 Kg | 126645,4 Kg |
| 2015 | 221,55 Kg | 945,61 Kg | 951,48 Kg |
| Total | 39521,95 Kg | 117146,41 Kg | 127596,88 Kg |

*The calculation results for D by entering the number of raw material requirements in 2014 and the number of raw material requirements in 2015, with detailed calculation results to determine the number of raw material requests in one period as follows:*

*D = (raw material needs for 2014 + raw material needs for 2015)/2*

*D = (39300,4 + 221,55 ) / 2*

*D = 19760,975 Kg*

*D = 19761 Kg (rounding results)*

*Table 3.2 Results of EOQ CD 40 AJL*

| Bahan Baku | D | S | C | EOQ | Pembulatan |
|---|---|---|---|---|---|
| CD 40 AJL | 19761 | 54000 | 1 | 46197,27 | 46197 Kg |

*The variable used is the amount of raw material used monthly during the period January 2014 to December 2015*

*Calculation results for D by entering the number of raw material requirements in 2014 and the number of raw material requirements in 2015, with detailed calculation results to determine the total demand for raw materials in one period as follows:*

*D = (raw material needs for 2014 + raw material needs for 2015)/2*

*D = (39300,4 + 221,55 ) / 2*

*D = 19760,975 Kg*

*D = 19761 Kg (rounding results)*

*the calculation of the cost of each order as follows:*

*S = price of the message / number of raw materials per type*

*S = 54000 / 4*

*S = 13500*

*Table 3.3 Results of EOQ Procurement of raw materials in April 2014*

| Bahan Baku | D | S | C | EOQ | Pembulatan |
|---|---|---|---|---|---|
| CD 40 AJL | 4997,68 | 13500 | 1 | 11616,25 | 11616 Kg |
| PE 50 | 3065,16 | 13500 | 1 | 9097,21 | 9097 Kg |
| RY'30 WAX | 0 | 0 | 1 | 0 | 0 |

*This raw material ordering process is carried out directly by the Weaving Manager to suppliers for procurement in April 2014 with applicable procedures. Following are the quantities of raw materials that must be ordered for procurement in April 2014:*

*Table 3.4 Ordering of Raw Materials in April 2014*

| Jenis bahan baku | Stok awal (Kg) | Pengeluaran bahan baku (Kg) | Stok akhir (Kg) | Tanggal pemesanan | Pemesanan bahan baku (KG) |
|---|---|---|---|---|---|
| CD 40 AJL | 90,72 | 0 | 90,72 | 1 April 2014 | 4997,68 |
| PE 50 | 90,72 | 0 | 90,72 | 1 April 2014 | 3065,16 |
| RY'30 WAX | 90,72 | 0 | 19990,72 | 1 April 2014 | 0 |

*1. Calculate supply frequencyf = D/EOQ*

*f = 15877 / 3536*

*f = 4.49 ≈ 4 times ordering*

*1. Calculate supply costs*
*TOC = f x c*

*TOC = 4 x 540000*

*TOC = RP 2.160.000*

*2. The next step is to supervise so that from the results of the calculation of this supervision is carried out in anticipation if an error occurs, this supervision is carried out by calculating the safety stock*
*Calculating Safety Stock:*

*Amount of stock needed = 19761 Kg*

*Number of workdays 1 period = 360 day*

*Lead time for procurement = 25 day*
*average yield*

*Average Procurement per day = 19761/ 360 = 54,89 Kg*

*Standar Deviasi Lead Time (sl) = 360 / 10 = 36*

*Standar Deviasi Amount of Forecasting (sd) = 54.89 / 10 = 54,89*

$Safety\ Stock = Z\ x\ Sdl$

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

$Sdl = \sqrt{((278,98 \times 1296) + (25 \times 10,89))}$

$Sdl = \sqrt{361558,8 + 272,25}$

$Sdl = \sqrt{361831,05}$

$Sdl = 601.52$

$Safety\ Stock = 54,89 \times 601,52$

*= 33017,43 atau 33017 ( rounding results)*

*The receipt of raw materials with the type of cotton, polyester, and rayon is the beginning of the flow of raw materials that move in the warehouse, the process of receiving raw materials is carried out by the logistics unit.*

*Table 3.5 Amount of Raw Materials Received*

| Jenis bahan baku | Tanggal pesan | Tanggal diterima | Jumlah yang dipesan | Jumlah yang diterima | Stok akhir (KG) |
|---|---|---|---|---|---|
| CD 40 AJL | 1 April 2014 | 2 April 2014 | 4997,68 | 4997,68 | 24988,4 |
| PE 50 | 1 April 2014 | 2 April 2014 | 3065,16 | 3065,16 | 15325,8 |
| RY'30 WAX | 1 April 2014 | 2 April 2014 | 0 | | 11214,57 |

*Storage of Raw Materials*

*The process of storing each raw material certainly has a chance of damage. The damage can be in the form of physical damage. Physical damage in storage can cause damage to the quality of raw materials, therefore during the storage process must be under supervision or monitoring. Every incoming raw material and outgoing raw material must have a*

*report for each unit so that employees can easily report.*

*Table 3.6 Storage of Raw Materials for April 2014*

| Jenis bahan baku | Bulan | Sisa stok (Kg) | Penerimaan bahan baku (Kg) | Stok akhir (Kg) | Kapsitas bahan baku di unit logistik (8800 Bal ) | Status |
|---|---|---|---|---|---|---|
| CD 40 AJL | Maret | 90,72 | 19900 | 19990,72 | Sisa kapasitas bahan baku : 8800-199,51= 8600,49 Bal | Aman |
| PE 50 | Maret | 5780,32 | 6480,32 | 12260,64 | | Aman |
| RY' 30 WAX | Maret | 87839,26 | 43.375,31 | 131214,57 | | Aman |

*Raw Material Expenditures*

*Raw material expenditure is the process of raw material being released from the logistics unit to the production unit, this process is triggered because there is an order from the customer to the production unit. The stages are carried out starting from receiving orders from the production unit, checking the raw material stock of the logistics unit, and releasing raw materials from the logistics unit to the production unit.*

*The stages in releasing raw materials are as follows:*

*1. Ordering raw materials to logistics*

*Table 3.7 number of raw material orders in March 2014*

| Jenis bahan baku | Bulan | Stok awal (Kg) | Pengeluaran bahan baku | Stok akhir (Kg) |
|---|---|---|---|---|
| CD30'WAX | Maret | 65000,18 | 64900,9 | 99,28 |
| PE 45 AJL | Maret | 18542,4 | 17800 | 742,4 |
| RY' 28 WAX | Maret | 28421,8 | 3700,89 | 24720,91 |

*From the above table it can be seen that the production section requires raw materials of CD 30 'WAX of 64900.9 kg to meet the needs of the production of CD 30' WAX of 64900.9 kg and also for polyester, the production section requires raw material of 1700 kg, and for rayon the production department requires raw materials as much as 3700.89 kg.*

*2. Delivery of raw materials to the production unit :*

*Table 3.8 Delivery of Raw Materials to the Production unit*

| Jenis bahan baku | Bulan | Stok awal (Kg) | Pengeluaran bahan baku | Stok akhir (Kg) |
|---|---|---|---|---|
| CD30'WAX | Maret | 65000,18 | 64900,9 | 99,28 |
| PE 45 AJL | Maret | 18542,4 | 17800 | 742,4 |
| RY' 28 WAX | Maret | 28421,8 | 3700,89 | 24720,91 |

*Delivery of raw materials from the logistics unit to the production unit is fulfilled, but the remaining stock in the RY'28 WAX type shows a considerable buildup of raw materials so that the risk of goods being damaged or unfit for use.*

*Furthermore, logistic administrators monitor the release of raw materials with type CD30 'WAX, PE 45 AJL and RY' 28 WAX on the final stock in logistics can be seen in the following table:*

*Table 3.9 Monitoring of Raw Material Expenditures*

| Jenis bahan baku | Bulan | Stok awal (Kg) | Pengeluaran bahan baku | Stok akhir (Kg) | Status |
|---|---|---|---|---|---|
| CD30'WAX | Maret | 65000,18 | 64900,9 | 99,28 | Tidak Aman |
| PE 45 AJL | Maret | 18542,4 | 17800 | 742,4 | Aman |
| RY' 28 WAX | Maret | 28421,8 | 3700,89 | 24720,91 | Aman |

*From the results of monitoring the release of raw materials there are raw materials whose quantities are not safe, that is, with the type of CD 30 'WAX, it will be controlled or demand for raw materials to the supplier to secure the stock in the production process.*

### *3.3 ERD*

*ERD Inventory Management Information System at PT. Adetex can be seen in the following image:*

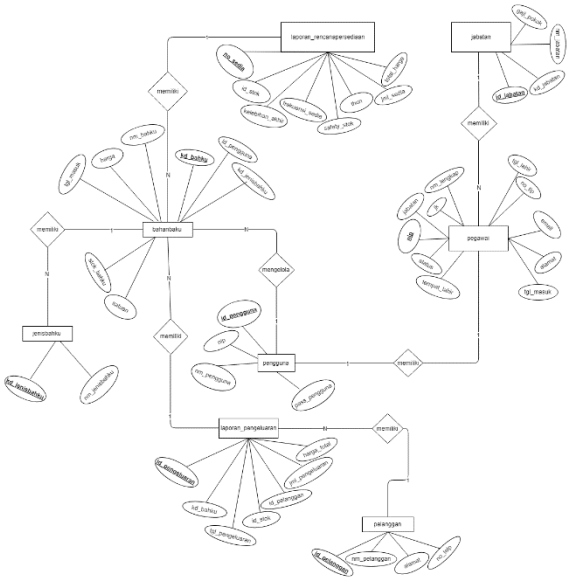



***Figure 3.2** Entity Relationshop Diagram (ERD)*

### *3.3 Diagram Konteks*

*Inventory Management Information System Context Diagram at PT. Adetex can be seen in the image:*

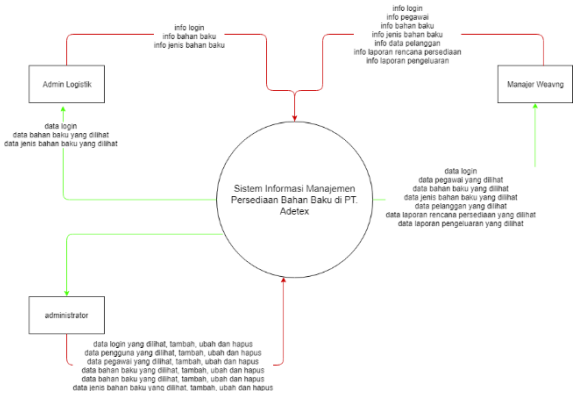
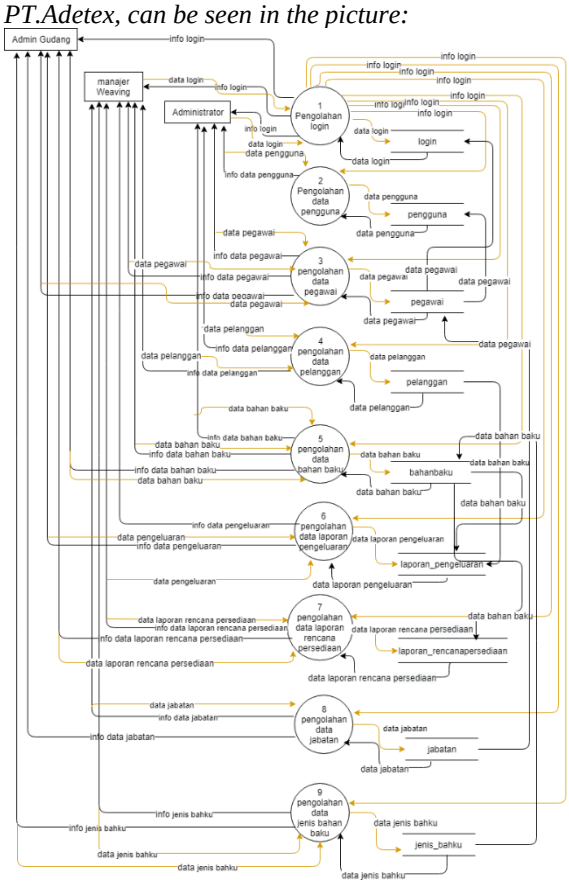



*Figure 3.3 Context Diagram SIM Raw Material Inventory at PT.Adetex*

### *3.4 DFD Level 1 Data processing*

*The following level 1 DFD explains that inventory management information system users at PT.Adetex, can be seen in the picture:*




***Gambar 3.4** DFD level 1 pengolahan data*

### *3.4 Relationship scheme diagram*

*Relationship scheme diagram is describing the relationship in each entity in the database designed in the inventory management information system*

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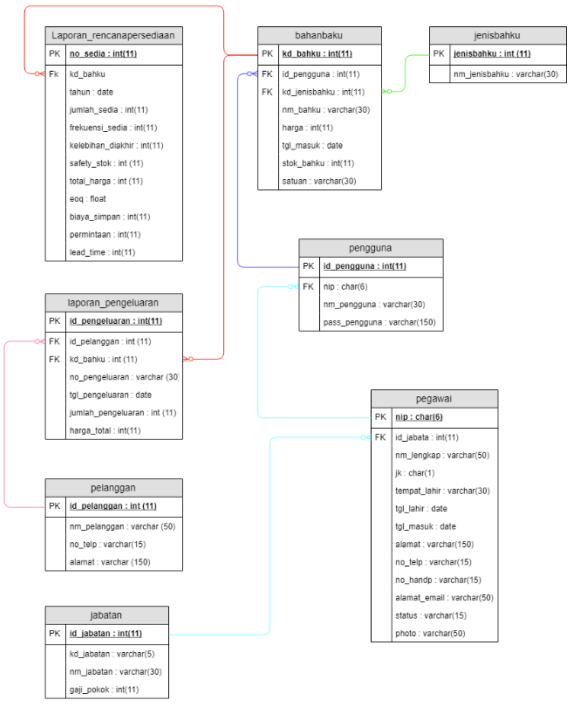


*Figure 3.4 Relationship Schematic Diagram*

### *3.5 Conclusion Black-Box Testing Results*

*Based on the results of black-box testing that has been done by inputting input data, it can be concluded that the testing process is functionally suitable for the system that has produced the expected output*

### *3.4 Conclusion of User Response Testing Results*

*Based on testing the User Response by conducting interviews with Administrators, Weaving Managers and Logistics Admin it can be concluded that the inventory management information system is quite easy to use, the data processing functions normally, the process of stock taking is easier, and the implementation of storage of raw materials received by parties company, the overall project management information system that is built is good enough and feasible to use.*

## *5. PENUTUP*

### *5.1 Conclusion*

*Based on the results of tests conducted on the project management system at PT. Adetex built.*

*The conclusions obtained are as follows: In the inventory planning menu in the system there is the amount of raw materials with the type of cotton, polyester and rayon that must be purchased each period refers to the EOQ (Economic Order Quantity) method so that the expected number of purchases per period is always optimal so that it can help the Weaving Manager in the Spinning unit in makes it easy to determine the amount of raw material that will be in the PO.*

### *5.2 Suggestion*

*Based on the results of testing the inventory management information system at PT Adetex and the results of interviews conducted with PT. Adetex got advice to support this inventory management system to be better. The suggestions are as follows: The need for additional features that show the type of raw material with the type of cotton, polyester, rayon that is empty or less than the minimum stock.*

1. *This inventory management information system is complemented by a calculation of the factor rating method, which is a method of determining allocations that emphasizes objectivity in the process of recognizing costs that are difficult to evaluate*
2. *This inventory management information system is equipped with a more detailed cost analysis calculation using the appropriate method*

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