SYSTEM OF SUPPLY CHAIN EMBROIDERY THREAD USING THE PRODUCT SUPPLY CHAIN MANAGEMENT IN PT. TUGU JAYA MANDIRI

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ABSTRACT

PT. Tugu Jaya Mandiri is a company of embroidery thread at Bandung City, West Java. PT. Tugu Jaya Mandiri produce rayon embroidery thread and polyester embroidery thread. Currently the selling product from consumers every month is uncertain, and make the production section feel troubled when estimate the total number of raw material that being used. The ordered process of raw material to supplier tend experiencing problem at delivery process, currently the delivery process of raw material has pause timeout that reach three until four days, this make the production process obstructed so the delivery process to consumers was delayed.

Purpose of this research is to make the head of production easier in determine the number of raw material that will be ordered from supplier to determine requirements of production process. And make the head of production planed the number of finished product and time distribution so that obstructed will not happen on distribution process of finished product to consumers. Supply Chain strategy used is Push Supply Chain that is because the compatibility of currently supply chain which is using make-to-stock strategy. This supply chain developed from the upstream to the downstream. Methods of forecasting demand of raw material used is single exponential smoothing. Calculation the prediction of availability of raw material in warehouse used is method of Minimal Stock. The ordered process of raw material used is tender and direct order.

Based on the result of black box testing, uat and beta, can be concluded that this system has helped the head of production on determining the amount of raw material that must be ordered from supplier for meet the needs of production process and make the head of production easier when planning the number of finished product and the time distribution of finished product to consumers.

Keyword: Supply Chain Management, Single Exponential Smoothing, Minimal Stock, Push Supply Chain, Make-to-stock

1. INTRODUCTION

PT Tugu Jaya Mandiri is one of the companies engaged in the production of embroidery thread located in Bandung Regency of West Java province. PT. Jaya Mandiri Monument stands on June 6, 2011. PT Tugu Mandiri Jaya has a lot of consumer marketing in the area of West Java, Jakarta and Bali. The company produces 2 types of embroidery thread embroidery threads are the same i.e. Viscose Rayon and Viscose Polyester. A series of system working in the upstream section conducted by PT Tugu Mandiri Jaya against the supplier, namely procurement of raw materials to the supplier, do the reception of raw materials from suppliers, conduct the processing of raw materials into a finished product. The raw material needed is the raw material used for the production of White yarn is Yarn Obras rayon, dyes cid, amcomsof, silicone, vinegar, cones, plastic pvc, dus, kenfix, sodium sulphate, and soda ash. While the activities contained in the downstream conducted by PT Tugu Jaya Mandiri with consumers that is receiving sales and distribution process to the consumers who have purchased the product.

Based on the results of the interviews have been conducted with Mr. Sodikin as the head of production at the Ministry of production stated that the head of production determine the amount of raw materials still using estimates from report of the month yesterday. PT Tugu Mandiri Jaya procurement of raw materials from a month earlier. Procurement of raw materials to the supplier of these often have constraints on the delivery process is done by the supplier, the delivery process of the raw materials it has pause wait time reached twenty-eight to forty five days from the begin time of procurement carried out up to the raw materials received by the company. The result of the determination of estimated raw material is not appropriate may result in problems of the emptiness of the raw materials or the buildup of raw materials in the warehouse. And the result of the delay in the receipt of raw materials that can cause terhambatnya process time of production and distribution process, resulting in consumers being felt less believing in

the company so that consumers switch to another company and resulted in the company into a loss. And because the suppliers are not only from the area of bandung, supplier PT Tugu Jaya Mandiri also occurs outside the island of Java, then required the construction of web-based information systems in order to facilitate the production of head in the procurement of raw materials to the supplier. PT. Jaya Mandiri Monument doing inventory finished products using Push Supply Chain strategy based on the alignment of the supply chain that occurs in the company at this time i.e. make-to-stock. Where the company produced continuously and is expected to supply the finished product already available in the warehouse prior to ordering from consumers. Distribution in PT Tugu Mandiri experienced problems due to Jaya the amount and time of the finished product to be sent to consumers often experience a lack of rendering, the glaring discrepancy occurs because the amount of stock of existing products in the warehouse is not appropriate so that it can not meet sales from consumers booking this has resulted in the distribution of time required for taking quite a long time.

Supply Chain Management (SCM) is the management of the complete cycle of chains ranging from the supplier, are concerned with operational activities, the distribution to the consumer, so the above problem can be overcome by using Supply Chain Management system, whereby PT Tugu Mandiri Jaya can work together with its business partners because of Supply Chain Management function itself is to integrate business processes ranging from supplier through to the consumer. Purpose is to make the flow of information in companies ranging from the acceptance of the booking of the consumer, the procurement of raw materials, the reception of raw materials to distribution or delivery of finished products to consumers will create synchronization and consistency. Based on the description of the matter contained in the PT Tugu Jaya Mandiri. Then it takes a system development supply chain using embroidery FLOSS products supply chain management approach in PT. Tugu Jaya Mandiri.

Based on the background that you have described, then the outline of the research problem is how to build an embroidery thread information system in PT Tugu Mandiri Jaya by using Supply Chain Management approach.

While the goal will be achieved in this research are:

a. Make it easier for the heads of production in determining the amount of raw material that will be ordered against the supplier to meet the requirements of the production process.
b. Ease the head of warehouse in planning the amount of finished product and time of distribution so that does not occur within the discouraging process of distribution of finished products to consumers.

2. RESEARCH

2.1 The Cornerstone Of The Theory

The cornerstone of the theory on writing this thesis will explain about the theories related to the application of the system of supply chain Embroidery Floss Products in PT Tugu Jaya Mandiri.

2.1.1 Information Systems

System is a network of procedures which are interconnected, gathered together to perform the activity or to do an objective target.[1]

Information is data that is processed into a form that is more useful and more meaningful to the recipient that later will be used to decide the present nor the future.[1]

So the notion of information system is a set of components that are interconnected and work together to collect, process, store and distribute relevant information to support the decision-making process, coordination and control that exists therein.

2.1.2 Supply Chain Management

Supply Chain is a system of funneling goods organization places of production and services to its customers. The chain is also a network or networks of interconnected organisations which have the same purpose, namely as best we can organise the procurement or distribution of the goods. [2]

The concept of the supply Chain is a new concept in terms of looking at the question of logistics. In the old concept, logistics internal problems as more of each company, and a possible solution was placed on solving in intern in the company respectively. While in this new concept, the problem of logistics is seen as a broader issue which is very long, starting from raw materials to finished goods used the end consumer, which is the chain of procurement. It can be said that the supply Chain is the logistics Networks. In this connection, there are a few major players which are the companies that have the same interests, i.e. [2]:

1. *Suppliers;*
2. *Manufacturer;*
3. *Distribution;*
4. *Retail outlets;*
5. *Customers.*

Chain 1 : Suppliers

The network at the start of the supplier, which is the source that provided the first ingredient, where the chain of distribution of goods will be started. This first material can be in the form of raw materials, raw materials, materials, auxiliary materials, spare parts, merchandise and so on. The first source is named suppliers. Number of suppliers could be many or few, but suppliers typically amount to much at all.

Chain 1 – 2 : Suppliers - Manufacturer

The first chain linked to the second, namely chain Manufacturer or plants or assembler or fabricator or any other forms that do the work of making, mengfabrikasi, mengasembling, assemble, convert, or completed goods (finishing).

Chain 1 – 2 – 3 : Suppliers – Manufakturer – Distribution

Stuff already so generated by the Manufacturer already had to start distributed to customers. Although there are many ways for channelling merchandise to customers, the public is through a distributor and is usually reached by most of the supply chain. The goods from the factory via Keflavík transmitted to warehouse distributors or wholesalers in large quantities, and large traders later in time shall transmit such items in smaller quantities to retailers or retailers.

Chain 1 – 2 – 3 - 4 : Suppliers – Manufakturer – Distribution – Retail Outlets

Wholesalers usually has its own warehouse facilities or can be also rented from other parties. The warehouse is used for stockpiling goods prior to transferring it again to the retailer. Here again there is a chance to acquire the savings in the form of the amount of inventories and the cost of the warehouse, with the way the design patterns return shipment from the Manufacturer or warehouse to the store retailers (retail outlets). Although there are some factories that directly sell its results to the customer, but the relative amount not much and most use this pattern.

Chain 1 – 2 – 3 - 4 – 5 : Suppliers – Manufakturer – Distribution – Retail Outlets – Customers

The retailers or retailers offers the goods directly to the customer or buyer or user of the item. That includes outlets are shops, stalls, Department stores, supermarkets, cooperative store, Mall, Club store, and so on, anyway the end where buyers make a purchase. New supply chain completely stopped after the goods concerned arrive at the user end of the goods or services.

2.1.3 Supply Chain System

Based on the opinions of experts about the system and the authors conclude supply chain supply chain system is a system in the supply chain which has the aim of creating mutually beneficial cooperation in controlling, regulating and improving the flow of material and information of a product from supplier to end users. Development of supply chain system in PT Tugu Mandiri Jaya author in development using supply chain management approach.

2.1.4 Supply Chain Management (SCM)

Supply chain management process is a process of processing of products from raw material still start, semi-finished products to finished product is obtained and then sold through a wide range of facilities which are connected by chains along the flow of products and materials. When depicted in the form of a chart will appear as follows:

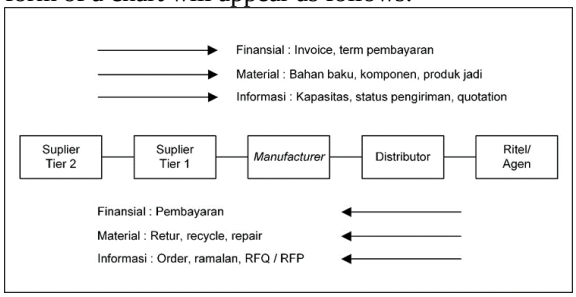


Figure 1. Supply chain model simplification and 3 kinds of flow

Figure 1 shows that the supply chain management is the coordination of material, financial and information among the participating companies.

1. First was the flow of goods that flow from upstream (upstream) to downstream (downstream).
2. Second is the flow of money and the like which flows from downstream to upstream.
3. Third is the flow of information that may occur from the upper to the lower or vice versa.

2.1.5 Push and Pull Supply Chain

Pull supply chain is a strategy of production make-to-order "that the main benefit is avoiding waste or inventory is a strategy the company mainly manufacturing companies where new production done always after the sales market and actually done on orders from consumers.

Push the Supply Chain is a strategy of production Make-to-Stock. The push system is essentially a system of planning and controlling production [6]. The push strategy is more popular than with pull system because the system of production-based forecasting and forecasting or to produce output in large quantities that would later go into inventory before it is transmitted to the customer.

2.1.6 Single exponential smoothing forecasting method

Forecasting based on exponential smoothing method is generally used to estimate sales of products individually. This method is often considered better than the previous two methods, namely simple average and a single moving average because of its ability to use past data by administering the weighting based on the present data. More data is now being given greater weight in comparison with previous data. The assumption is that more data is now always have a stronger influence against the results of the forecast compared with the more obsolete data [8]. The formula for the single exponential smoothing can be seen in the Parallels 2.3.

$$F_{t+1} = aX_t + (1-a)F_t \quad (2.3)$$

Description:
F_{t+1} = The results of the forecast for the period t-1
a = Smoothing constants
X_t = Actual demand data for the period t
F_t = Forecast period t

2.1.7 *Mean Squares Error (MSE)*

Counting errors of forecasting used to know the accuracy of forecasting results that have been made against actual data. There are many models for forecasting errors doing the calculations. The method used to calculate the fault forecasting (forecast error) is a method of MSE (Mean Squared Error). MSE is the average of the difference in the squares of the values predicted with observed [5]. MSE is used by generating an existing error indicates how large the difference results estimation with the destinations. This makes it different due to the randomness in the data or because it does not contain a more accurate estimation. The formula for the MSE can be seen in the Parallels 2.4

$$MSE = \frac{\sum(|X_t - F_t|)^2}{n} \quad (2.4)$$

Description:
X_t = The actual demand in the period t
F_t = Demand forecasting in the period t
n = the number of forecasting period involved

2.1.8 Technique Of Minimum Stock

After doing the forecasting, PT Tugu Mandiri Jaya Monitoring inventory that aims to monitor and control inventories of existing digudang. Inventory control monitoring process that is by looking at the inventory history data each month. Function monitoring in order to avoid the occurrence of the vacancy and the shortage of raw materials there is digudang PT Tugu Jaya Mandiri. Monitoring inventory control requires an indicator to determine how the limits of safe products that should be available in the warehouse by using the method of minimum stock.

Application of the method of Minimum Stock limit is the calculation process in secure supplies that should be available digudang PT Tugu Mandiri for the next period of Jaya and the point of booking again. Examples of the calculation will use the products product type yarn rayon obras white January to July 2015.

The following example calculation with Minimum Stock methods*:*
Note :
Production forecasting results = 8337,05 cones
Minimum number of stock = 2502 cones
The number of remaining stock = 1500 cones

The number of procurement:

(The results of the forecasting products + a minimum of stock) – the remaining stock
= (8337,05 + 2502)-1500
= 10839,05 – 1500
= 9339,05 cones = 9339 cones

Based on the calculation of minimum stock, then PT Tugu Mandiri Jaya should provide at least as much stock 9339 cones, so at the moment the stock yarn rayon obras white is less than the minimum amount of the stock i.e. 2502 cones, then the system will give you a notice that there is a product of white yarn rayon obras have stock is not secure. Monitoring product inventory thread rayon obras white will be presented in the form of a table. For example the presentation of monitoring will be using yarn rayon obras white where the minimum stock for yarn rayon obras white is 2502 cones while for instance the remaining stock yarn rayon obras 1500 white cones.

2.2. Analysis Of The Problem

Analysis of the problem is an assumption of the problem which will be outlined in the procedures of data processing system of warehouse in PT Tugu Mandiri Jaya using Supply Chain Management approach. Analysis of the problems of the system that is running at the moment is:

1. Head of production have difficulty in determining the amount of raw material that will be ordered against the supplier to meet the requirements of the production process.
2. Head of warehouse experience difficulties in planning the number and time of distribution thus inhibition in the process of distribution of finished products to consumers

2.3 Analysis *Supply Chain Management (SCM)*

Analysis of supply chain management is used to apply the approach to supply chain management supply chain system to be built. Supply chain management has a framework that is a component of the development for the system.

2.3.1 Model *Supply Chain Management (SCM)* di PT. Tugu Jaya Mandiri

Based on the analysis of SCM are described in the previous section, as for the model of supply chain in PT Tugu Mandiri Jaya can be seen in Figure 2.

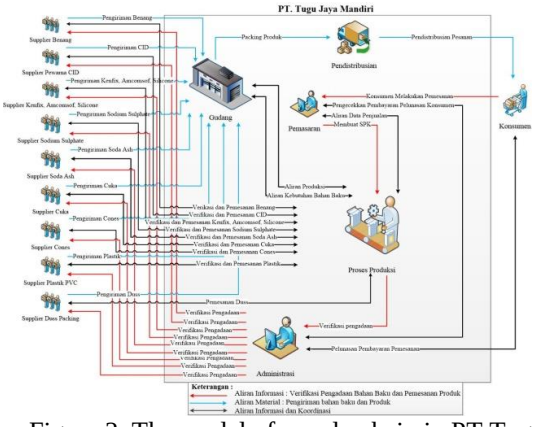


Figure 2. The model of supply chain in PT Tugu Jaya Mandiri

2.3.2 Stages of the Supply Chain Management in PT Tugu Jaya Mandiri

Stages of the Supply Chain Management was conducted to describe the supply chain management process that will be built in PT Tugu Jaya Mandiri based on supply chain model in Figure 3. As for the stages of the supply chain management in PT Tugu Mandiri Jaya can be seen in Figure 3:



Figure 3. Supply Chain Management in PT Tugu Jaya Mandiri

1. Forecasting Analysis Of Booking Products

The analysis of stage of forecasting is going to do is predict the need of raw materials for the production process. Forecasting needs raw materials aiming to meet the needs of production where the demand for Yarn Rayon Obras White was available, because the American raw materials appropriate for use in the production process. The technique used is the forecasting techniques forecasting quantitatively, due to availability of data past the quite fulfilled

2. Analysis of Monitoring Inventories of products and raw materials

At this stage is to conduct an analysis of monitoring inventories of products and inventory of raw materials as well as determine the limits of safe products and raw materials which must be digudang which aims to prevent the occurrence of deficiencies or vacuum products and raw materials using the method of Minimum stock.

3. The Analysis Of Procurement Of Raw Materials

The procurement process is carried out by means of the agreed cooperation. When the raw materials have been ordered to come will be handled by the warehouse. Parts warehouse examining the raw material meets the standards of the company. When goods come meet the standards of the company then will go into the shed and if it does not comply will be returned to the supplier.

4. The distribution of Products to consumers

The offender was seen in the analysis of the distribution of the product is part of the company's internal head of warehouse. Head of warehouse will make product delivery schedules and determine the kind of vehicle and driver that will send the product sampau into the hands of consumers.

2.4 Analysis Database

Data base analysis on product supply chain system thread rayon obras white PT. Jaya Mandiri Monument to be constructed using Entity Relationship Diagram (ERD). ERD is a data model that uses some notation to describe the data in the context of the entities and relationships described by the data. As for the chart depicted in Figure 4.

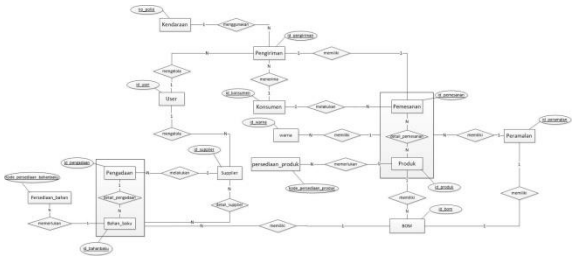


Figure 4. Entity relationship diagram of product supply chain system thread rayon obras white PT Tugu Jaya Mandiri

2.4 A Context Diagram

Context diagram is a model to explain how data is used globally and is transformed to the process or describe the flow of data into and out of the system. Context diagram on the system can be seen in Figure 5.

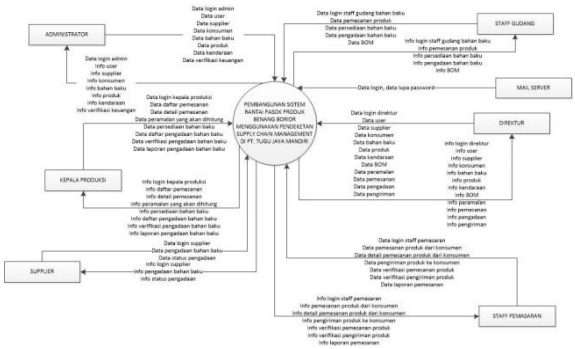


Figure 5. Supply chain system context diagram PT Tugu Jaya Mandiri

2.6 Data Flow Diagram (DFD)

Data flow diagram shows how data flow outlines the processes that occur in the system until the process in more detail. In the diagram context as Figure 5. can be decomposed into a number of DFD.

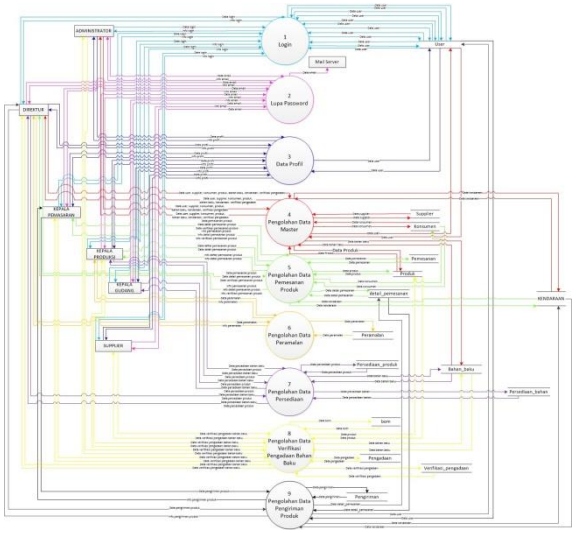


Figure 6. DFD Level 1 systems supply chain PT. Monument Jaya Mandiri

2.7 Table Relation

Table relation describing relationships between data, meaning data and their boundaries. The process of relationship between attributes is a combination between an attribute that has the same primary key, so that these attributes into a single entity linked by the key field. Table relationships are described in Figure 7.

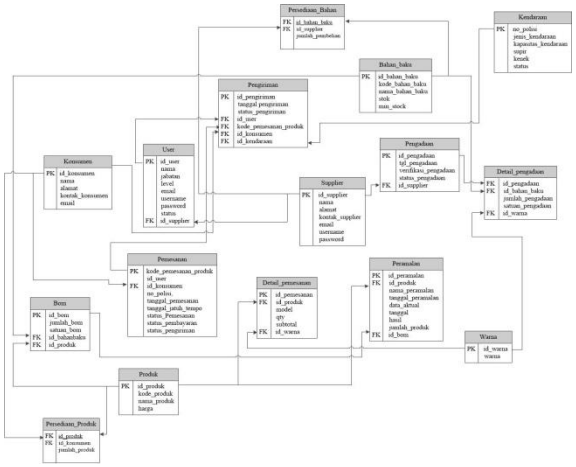


Figure 7. Supply chain system relation table PT. Monument Jaya Mandiri

2.8 The Design Of The Interface

The design of the interface was created to illustrate the appearance of the program that will be used by the user to interact with the system to be built. The design is based on the display of the input as well as output either interface to be generated when the application is implemented. The following is an example of a login interface design can be seen in Figure 8.

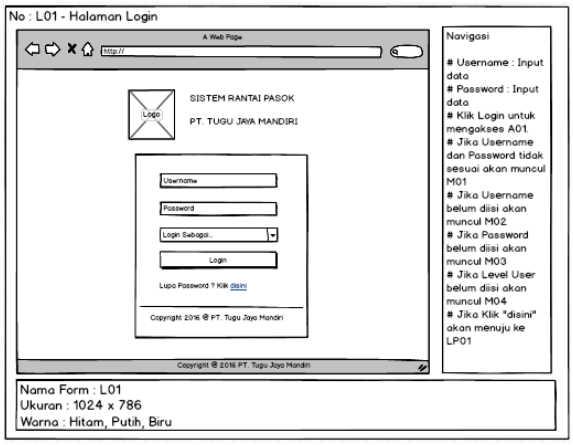


Figure 8. Design Of Login Interface L01

2.9 The Design Of The Semantic Network

The design of the semantic network is a representation of the design interface that shows where each interface is connected. The following is an example of the design of the semantic network user the operator procurement in supply chain system product yarn rayon white obras in PT Tugu Jaya Mandiri with supply chain management approach can be seen in Figure 9.

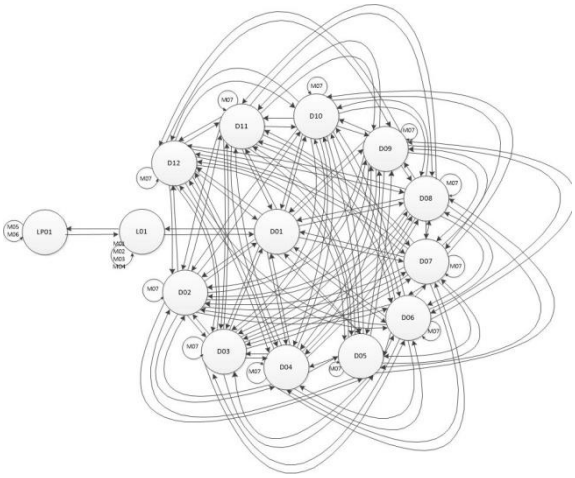


Figure 9. Semantic Network Design Director

2.10 Testing The System

System testing is the most important thing that aims to find any errors or omissions in the information system tested. Testing the system in question to know the performance of information systems that have been made in accordance with the objectives of the design of information systems. Testing the system using black box testing. Black box testing focuses on the functional requirements of the software and user acceptance testing (end user).

2.11 Functional Testing

Black box testing is a test used to test the new system. Black box testing is focused on testing the functional requirements for information systems.

2.12 User Acceptance Testing (End User)

User acceptance testing (end users) is testing undertaken where objectively tested directly onto the

field that is concerned about the company's user satisfaction with the content of points i.e. the initial goal fulfillment and display interface of information system in Supply Chain Management. In the user acceptance testing (end users) there are two test scenarios that will be made of them by using the UAT (User Acceptance Testing) done software testing process involves prospective users in the company that is selected by the developer as well as chaperoned when done. This is done with the aim of finding defects (defects) that are not found by the developer. Then the end user acceptance testing done after the system is implemented in an enterprise environment by using the interview to end users who use the software.

The interview was done testing against for any users of the page consists of a section head of marketing, head of production, the head of the Pack, head of the Chief of procurement and distribution. Testing is done on the end user acceptance testing after the system is implemented in the corporate environment is done directly in the corporate environment or place of study namely Tugu Mandiri PT. Jaya. This is done with the purpose of knowing whether software that is built can provide the solution of problems faced by the company.

3. COVER

In this section, describes the conclusions contains the results obtained after the analysis, design, and implementation of the design of software built and have been developed as well as suggestions that will provide an important record of and possible improvements that need to be done for previous software development.

3.1 Conclusion

Based on the results obtained in the writing of this final task, then the following conclusions can be drawn:

1. Supply chain systems built this can make head of Production in determining the amount of raw material that will be ordered against the supplier to meet the requirements of the production process.
2. Supply chain systems built this can make the head Shed in planning the amount of finished product and time distribution of finished products to consumers.

3.2 Advice

Suggestions for the development of this supply chain system there are some suggestions that may be made, inter alia:

1. The addition of a new user as consumers would be better off if the entry into the system because it can simplify the booking process will happen.
2. Need for development and better maintenance of the system that has been built, so that the system can be used in accordance with needs in the future.

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