INFORMATION SYSTEMS SUPPLY CHAIN MANAGEMENT AT AZ HOUSE COMPANY BASED ON WEBSITE

Oka Dwifa Rachmat[1], Iskandar Ikbal[2]

[1,2] Informatics Engineering Program, Universitas Komputer Indonesia
Dipatiukur Sreet 112-114 Bandung
okadwifa@gmail.com[1], iskandar.ikbal@email.unikom.ac.id[2]

ABSTRACT

Az House is a type of company engaged in convection. The resulting product is a dress gamis for women with some models of clothes gamis. Az House uses a make-to-stock production strategy whereby this strategy stores ready-to-sell product inventory to distributors. Az House often finds problems where the procurement head finds it difficult to determine the amount of raw material that must be purchased due to uncertain product demand, so often the demand from distributors is not met due to lack of product inventory, it will affect the distribution that will be too late. From the above problems Az House needs a supply chain management system that aims to help determine the amount of raw materials and maintain product inventory. Forecasting method used to predict product sales and determine the amount of raw materials using Single Moving Average method while to calculate the amount of security inventory of products and raw materials using the method of Safety Stock. Based on the results of the test can be concluded that the system has been made to help Az House companies in determining the amount of raw materials to be purchased to suppliers and can avoid empty supplies of certain raw materials in the warehouse so as to minimize problems that will occur.

Keywords : *make-to-stock, supply chain management, forecasting, single moving average, safety stock.*

1. INTRODUCTION

Az House is a company engaged in the convection, the resulting product is a dress gamis for women with several models of gamis syar'i gamis, moslem gamis, gamis ethnic, latest moslem gamis, gamis adolescent, gamis ethnic 2, gamis garden syar'i, latest teen gamis, gamis beautiful, and gamis ethnic 3. Az House products are distributed to several distributors in Indonesia namely Depok, Jakarta, Pontianak, Palembang and Aceh. The production strategy at Az House uses a make-to-stock strategy whereby this strategy keeps ready-to-sell product inventory to the distributor, so the company continuously produces the product to be available in warehouse and is expected to meet the demand of the distributor (customer) .

After conducting observations and interviews with related parties in Az House said that currently in the pengadan raw materials still use the reference from the previous month's sales report but there are problems when the demand from distributors experienced a jump increase that resulted in demand from distributors are not met because the stock inventory is not inadequate with that causes the distribution share to be delayed distribution, Based on the report from the timeframe of March 2017 to August 2017 known from the data report in May 2017 the company experienced an increase in product demand from distributors (customers) by 28% from the previous month resulting in lack of stock product because the raw material inventory is insufficient to make the production so that the demand from the distributor (customer) is not fulfilled and resulted in the distribution of difficulties to make the product delivery. And from the July 2017 report data the company experienced a decrease in product demand from distributors (customers) by 31% from the previous month which resulted in the stockpile of warehouse products.

Based on the problems described above Az House needs a supply chain management system to integrate and connect between business processes within the entire company in order to manage a supply chain activity so as to maximize and achieve the efficiency of the entire system. The objectives to be achieved in this research are as follows:

a. Facilitate the procurement department to determine the estimated amount of raw materials to be ordered to the supplier.
b. Facilitate the distribution to distribute products to distributors (customers).

2. RESEARCH CONTENT

2.1 Theoritical Basis

The foundation of this theory will explain the definition, concepts that have been arranged systematically about the factors used to create and support in this study.

2.1.1 System

System is a set of objects or elements that are mutually organized, interact and integrate with each other for a common purpose, the system consists of several elements such as input, processing, output [1].

2.1.2 Information

Information is a data that has been processed and processed into something useful and useful for penyimannya for decision-making current and future [1].

2.1.3 Information Systems

Information Systems can be defined as a useful tool for presenting information in such a way that useful, the purpose of this information system is to convey information for decision making on the planning, management and control activities of a process on the system in the company [1].

2.1.4 Supply Chain

Supply Chain is a company relationship that jointly operates to make a product into the hands of the user or end user [2].

Supply Chain can also be defined as a place of organization or company that distributes goods or services to its customers, this chain is also a network of companies that correlate with the same expectations and goals.

2.1.5 Supply Chain Management

Supply Chain Management or in the Indonesian language can be called supply chain management is a systematic and strategic coordination of business functions within the organization as well as for the whole supply chain [3].

2.1.6 Forecasting

Forecasting is an art and science to predict future events and the results of forecasting can be used or used to take a strategic policy to solve problems or problems in the future [4]. Various Forecasting:

a. Time Series Model
   This time series method is a method that uses the method of forecasting quantitatively by using time as the basis of forecasting.
b. Casual Model
   Casual model method is a method that uses the cause and effect relationship as an assumption that is what happened in the past will re-occur in the current period.
c. Judge Mental Model
   The Method of judge mental model is a useful method when subjective factors are expected to become very important when appropriate quantitative data are obtained.

2.1.7 Single Moving Average

This method is a single moving method using new and up-to-date request data to generate approximate or predictive values for the number of requests in the future. This method is effectively applied if we can assume that the demand for the product is stable over time. This method has a special characteristic of making the forcast requires historical data within a certain period, the longer the moving average will be smoother. The following is a systematic calculation of moving average can be seen in equation (1) below.

$$S_{t+1} = \frac{x_t + x_t - 1 + \cdots + x_t - n + 1}{n} \quad (1)$$

Information:

S_{t+1} = Forecast for t+1.
Xt = Data in period t.
n = Time Period Moving Averages

2.1.8 Safety Stock

Safety stock is a technique of protection against the uncertainty of demand or supply the company will store more inventory than expected is needed for a certain period so that needs can be met more without waiting. Here is the formula to determine safety stock can be seen in equation (2) below.

$$Safety\ Stock = \text{Z x Sdl} \quad (2)$$

Information:

Z = Service Level
Sdl = Lead Time

Reorder point or point of re-order is when the inventory to dititik where to do re-order. Here is the formula in determining the reoder point can be seen in equation (3) below.

$$\text{Sdl} = \sqrt{(d^2 \text{ x } sl^2 + l \text{ x } sd^2)} \quad (3)$$

Information:

d = Average Usage
sl = Standard Lead Time Deviation
l = Lead Time
Sd = Standard Average Deviation Usage

2.2 Analysis of the Problem

Analysis of the Problem is a description of the problems that have been processed and processed,

here is a system analysis that is running at this time:

1. It is difficult for the procurement department to determine the amount of raw material to be ordered to the supplier due to the uncertain demand of the distributor (customer), if the demand suddenly rises will result in the inventory depleted and vacate in the warehouse and vice versa if the demand to eat will result in stockpiling warehouse products
2. Distribution department is difficult to deliver products due to the uncertain demand from distributors (customers) if demand rises often cause unmet demand due to lack of inventory of warehoused products this impact on deliveries that will be late to be sent to shipping services or third parties.

2.3 Supply Chain Management Analysis (SCM)

Supply chain management analysis is used to apply approach to supply chain management that will be built later system.

2.3.1 Supply Chain Management Model

Here is the model of Supply Chain Management in Az House can be seen in Figure 1 below.

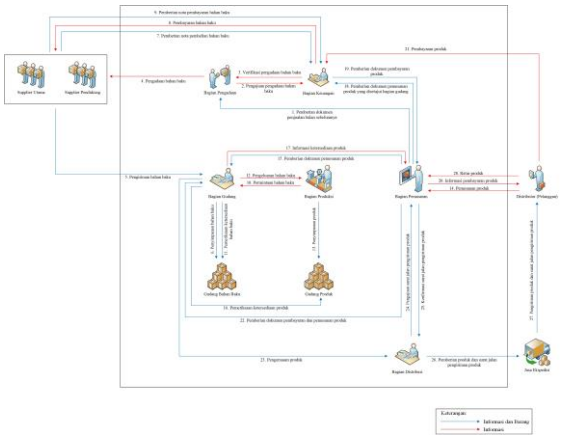


Figure 1. Supply Chain Management Model at Az House

2.3.2 Supply Chain Management Analysis

Supply chain management analysis is done to describe supply chain management process that will be built in Az House based on supply chain management model in figure 1. Here is supply chain management analysis can be seen in picture 2 below.

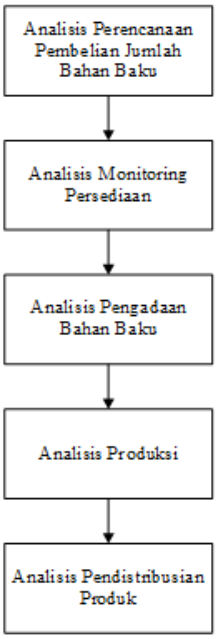


Figure 2. Supply Chain Management Analysis

1. Analysis of Planning Purchase Amount of Raw Materials, in planning the purchase of raw materials made based on sales data the previous month. The method used in forecasting is a single moving average with the data sampled is the latest teen gamis product sales data because the product is the most widely sold product on the vulnerable time March 2017 to August 2017. Here is the latest teenager sales data can be seen on table 1 below.

Table 1. Sales Data Gamis Remaja

No	Period	Sold
1	March	130 pcs
2	April	145 pcs
3	May	195 pcs
4	June	127 pcs
5	July	165 pcs
6	August	170 pcs

And the following sales chart teenagers latest can be seen in picture 3 below.

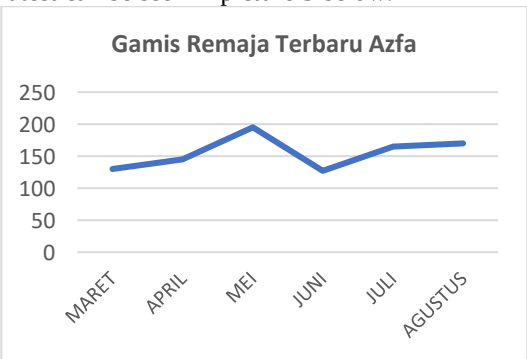


Figure 3. Sales Chart Gamis Remaja

Based on the graph above that the data pattern found is stationary data where the pattern indicates a fluctuation around the mean value which means it does not change all the time so that the single moving average method is a suitable method for use in forecasting.

The following calculation results to determine the forecasting in September 2017 can be seen below.

$$St_{Sep} = \frac{Xt_{Apr}+Xt_{Mei}+Xt_{Jun}+Xt_{Jul}+Xt_{Ags}}{n}$$

$$= \frac{145 + 195 + 127 + 165 + 170}{5}$$

$$= 160$$

Here are the results of the composition of the product based on the results of forecasting can be seen in table 2 below.

Table 2.
Product Composition Based on Forecasting Results

Raw of Material	Calculation	Number of Raw Materials	Amount Ordered
Kain Trikotin	160 x 2.5	400 meter	366 yard
Benang Jahit	160 x 50	8000 gram	53 roll
Benang Bordir Merah	160 x 3	480 gram	3 roll
Benang Bordir Kuning	160 x 2	320 gram	2 roll
Benang Bordir Hijau	160 x 5	800 gram	5 roll
Benang Bordir Biru	160 x 3	480 gram	3 roll
Benang Bordir Putih	160 x 35	5600 gram	37 roll
Benang Bordir Pink	160 x 15	2400 gram	16 roll
Benang Bordir Coklat	160 x 12	1920 gram	13 roll
Payet Press	160 x 1	160 pcs	160 pcs
Renda	160 x 1.5	240 meter	240 meter
Resleting	160 x 35	5600 cm	160 pcs
Kancing	160 x 1	160 pcs	160pcs

2. Inventory Monitoring Analysis

Monitoring the supply of raw materials and determine the safe limits of the amount of raw materials that must exist in the warehouse, in order to avoid shortages of raw materials and products using the method of safety stock, Here is the calculation of raw materials based on product inventory results.

Safety Stock Calculation:

Forecasting September 2017 = 160
Weekdays in 1 month = 30 hari
Lead Time procurement (l) = 5 hari
Average procurement (d) = 160/30
= 5.33
Standard deviation lead time (sl) = 0.5
Standard deviation of booking (sd) = 3
Standard level 93% (Z) = 1.48

Safety stock = Z x Sdl

$Sdl = \sqrt{(d^2 \text{ x } sl^2 + l \text{ x } sd^2)}$

$Sdl = \sqrt{5.33^2 \text{ x } 0.5^2 + 5 \text{ x } 3^2}$

$Sdl = \sqrt{46.3325258}$

Sdl = 6.80679997

Safety stock = 1.48 x 6.80679997

Safety stock = 10.0746064

Safety stock = 10 (Rounding)

Based on the above safety stock calculation then must provide stock of raw materials in accordance with the above calculation results of 10 pcs for the latest teen gamis products. Here are the details of safety stock can be seen in table 3 below.

Tabel 3. *Safety Stock* Bahan Baku

Raw of Material	Calculation	Result	Number of Raw Materials
Kain Trikotin	10 x 2.5	25 meter	23 yard
Benang Jahit	10 x 50	500 gram	4 roll
Benang Bordir Merah	10 x 3	30 gram	1 roll
Benang Bordir Kuning	10 x 2	20 gram	1 roll
Benang Bordir Hijau	10 x 5	50 gram	1 roll
Benang Bordir Biru	10 x 3	30 gram	1 roll
Benang Bordir Putih	10 x 35	350 gram	3 roll

Benang Bordir Pink	10 x 15	150 gram	1 roll
Benang Bordir Coklat	10 x 12	120 gram	1 roll
Payet Press	10 x 1	10 pcs	10 pcs
Renda	10 x 1.5	15 meter	15 meter
Resleting	10 x 35	350 cm	10 pcs
Kancing	10 x 1	10 pcs	10 pcs

And the following is the monitoring or monitoring inventory of products and raw materials can be seen in tables 4 and 5 below.

Tabel 4. Product Inventory Monitoring

Product Name	Stock	Safety Stock	Status
Gamis Remaja Terbaru	158 pcs	10 pcs	Safety

Table 5. Monitoring of Raw Material Inventory

Raw of Material Name	Stock	Safety Stock	Status
Kain Trikotin	110 yard	23 yard	Safety
Benang Jahit	55 roll	4 roll	Safety
Benang Bordir Merah	3 roll	1 roll	Safety
Benang Bordir Kuning	2 roll	1 roll	Safety
Benang Bordir Hijau	4 roll	1 roll	Safety
Benang Bordir Biru	3 roll	1 roll	Safety
Benang Bordir Putih	5 roll	3 roll	Safety
Benang Bordir Pink	3 roll	1 roll	Safety
Benang Bordir Coklat	2 roll	1 roll	Safety
Payet Press	5 pcs	10 pcs	Not Safety
Renda	10 meter	15 meter	Not Safety
Resleting	15 pcs	10 pcs	Safety
Kancing	5 pcs	10 pcs	Not Safety

3. Procurement of Raw Materials Analysis

This analysis procures raw materials based on a production plan document prepared by the Warehouse. Based on the monitoring of raw material inventory if the unsafe status of feeding raw material suppliers to suppliers. To determine the amount of raw materials ordered from the forecasting results added safety stock and reduced inventory in the warehouse.

4. Production Analysis

Production analysis performs production plan, daily production amount is calculated from forecast result divided by number of working days in 1 month. Here is the calculation of the number of production plans of the latest teen gamis products.

Forecasting September 2017 = 160 pcs
Number of working days per month = 30 days
Total production = 160/30
= 5.33
= 5

Judging from the above calculation then the latest teen gamis products will be produced a number of 5 pcs per day for a month and need raw materials for its production.

5. Product Distribution Analysis

This distribution analysis discusses the determination of the expedition services used to make the delivery of products and at this stage also carried out the monitoring process so that the company knows for sure whether the goods have been received or not by the distributor (customer).

2.4 Entity Relationship Diagram (ERD)

Entity Relationship Diagram (ERD) is a method used to model the needs of system development and development, as well as tools to provide the design of relational database design underlying the developed information system. Components contained in this ERD include Entities, Relationships and Attributes. Here is the entity relationship diagram (ERD) can be seen in Figure 4 below

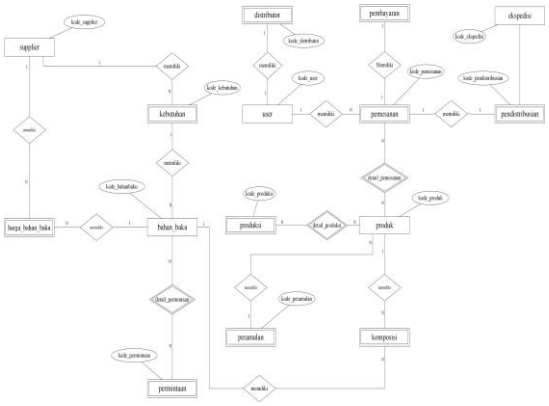


Figure 4. Entity Relationship Diagram (ERD)

2.5 Data Flow Diagram

Data Flow Diagram (DFD) is a diagram containing notations used to describe the functions and data flow of the system in order to help to interpret the system logically, organized and systematic. Here is the Data Flow Diagram on the construction of information systems in Az House can be seen in Figure 5 below.

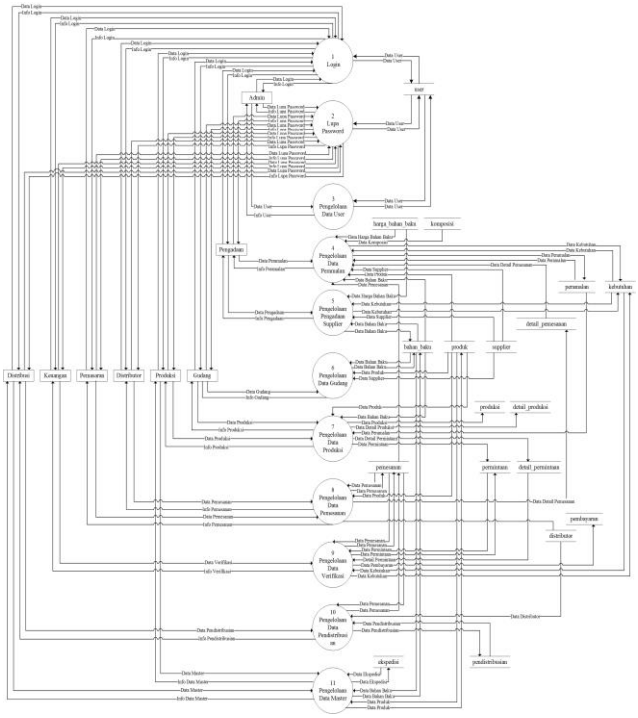


Figure 5. Data Flow Diagram (DFD)

2.6 Hardware Requirement Implementation

Here is the implementation of hardware requirements required to run the system that can be seen in table 6 below.

Table 6. Hardware Requirements

No	Hardware	Spesification
1	Processor	Intel Core i3-3217U (1.8 Ghz)
2	Memory	2 Gb
3	Storage	500 Gb
4	VGA	Intel HD Graphics 4000
5	Monitor	14”
6	Mouse	Optical Mouse
7	Keyboard	Standard

2.7 Implementation of Software Requirements

The following implementation of software requirements required to run the system that can be seen in table 7 below.

Table 7.
Software Requirements

No	Perangkat Lunak	Spesifikasi
1	Operating System (OS)	Windows 7 Ultimate (x64)
2	Web Server	XAMPP Server
3	Web Browser	Google Chrome
4	Database Server	MySQL
5	Code Editor	Sublime Text 3

2.8 Database Implementation

Here are some examples of database implementations in the SQL language

1. Tabel Pemesanan is used to store order data from distributors (customers) in the system, Here is a table of reservations can be seen in table 8 below.

Table 8. Tabel Pemesanan

SQL
CREATE TABLE pemesanan (kode_pemesanan VARCHAR(30) PRIMARY KEY, kode_distributor VARCHAR(20) NOT NULL, kode_ekspedisi VARCHAR(20) NOT NULL, tgl_pemesanan DATE NOT NULL, harga_total INT(15) NOT NULL, status_verifikasi ENUM(‘Belum’,’Sudah’), status_pembayaran ENUM(‘Belum’,’Lunas’), status_penerimaan ENUM(‘Belum’,’Sudah’), FOREIGN KEY (kode_distributor) REFERENCES user(kode_user), FOREIGN KEY (kode_ekspedisi) REFERENCES ekspedisi(kode_ekspedisi));

2. Tabel Peramalan is used to store data forecasting in the system, Here is a table of reservations can be seen in table 9 below.

Table 9. Tabel Peramalan

SQL
CREATE TABLE peramalan (kode_peramalan VARCHAR(20) PRIMARY KEY, kode_produk VARCHAR(20) NOT NULL, jumlah INT(15) NOT NULL, tgl_peramalan DATE NOT NULL, FOREIGN KEY (kode_produk) REFERENCES produk(kode_produk));

2.8 Interface Implementation

Here is the implementation of the login interface used to enter into the main menu, can be seen in Figure 6 below.

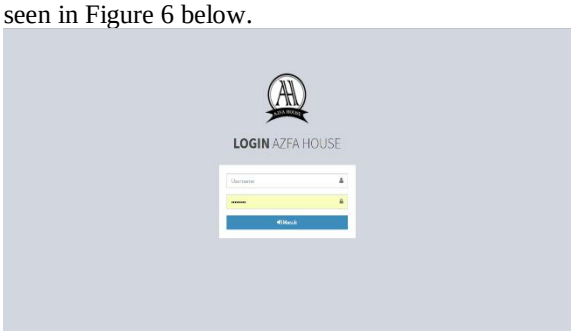


Figure 6. Implementation of Login Interface

Here is the implementation of the forecasting interface used to see the results of the forecasting of the month, can be seen in Figure 7 below.

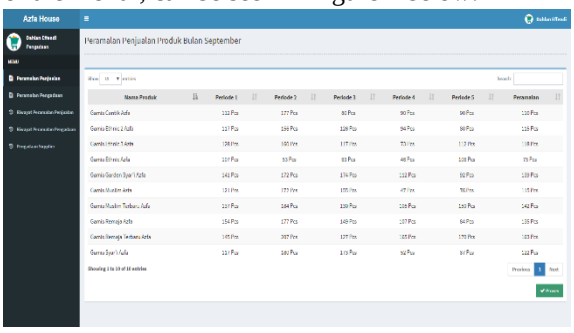


Figure 7. Implementation of Forecasting Interface

Here is the implementation of the distribution interface used to distribute and monitor the delivery of products, can be seen in Figure 8 below.

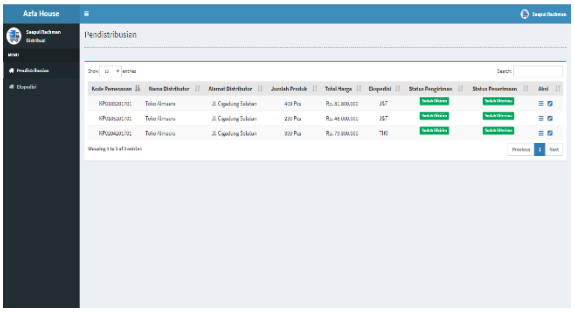


Figure 8. Implementation of Distribution Interface

2.9 System Testing

System testing is done to find the errors that exist in the system or application that has been built. There are several testing stages: Blackbox testing and Beta Testing.

2.9.1 Functional Testing

Functional testing or can be called Blackbox testing is a test that focuses on the output of the input response and testing blackbox is also to determine whether there is a fault (error) or function that does not berajalan as expected.

2.9.2 User Acceptance Test (UAT) Testing

User Acceptance Test (UAT) Testing is a testing process conducted by a user or user that aims to produce documents that will serve as proof that the built system can be accepted by the user or user when the test results have been able to meet the needs and interests of the user or user.

2.9.3 Beta Testing

Beta Testing is a test that takes place at the site of the research to validate the utility, functionality, compatibility and reliability test of the system that has been created. This test is done by interviewing techniques to all users involved in the built system.

2 CLOSING

3.1 Conclusions

Conclusions drawn from all processes and from the results of tests that have been done, the following conclusions obtained in this study:

1. The information system that has been built this can facilitate the procurement to determine the amount of raw materials ordered to suppliers.
2. Supply chain management information system can facilitate easy distribution to perform distribution schedule and monitor product delivery to distributor (customer)

3.2 Suggestions

From the conclusions that have been described above, submitted some suggestions as follows:

1. The development of the system is expected to increase the function or process of change of password by each user
2. Development of the system is expected to add more agara chart easier to see data per period and facilitate if there is an increase or decrease.

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