DEVELOPMENT SYSTEM OF INFORMATION SUPPLY CHAIN MANAGEMENT AT CV. SURYA NEDIKA ISABELLA

Rizki Abdul Rozak[1], Utami Dewi Widianti[2]

Informatic Engineering – Indonesia Computer University
Dipatiukur Street 112-114 Bandung
E-mail : rizki780@gmail.com[1], Utami.dewi.widianti@email.unikom.ac.id[2]

ABSTRACT

CV. Surya Nedika Isabella are one of the companies that engaged in the production of bottled mineral water (bottled water) that located in Kuningan District, West Java. CV. Surya Nedika Isabella use make-to-stock strategy that is their production process already happened before costumer order. The company perform mass production to sufficient the stock to anticipate the AMDK product purcase order by costumer. The company produces two types of mineral water that is in the packaging of cup and bottle.

Currently product orders from the customer every month is an uncertain, that cause a difficulty from the head of the purchasing department to determine the amount of raw materials to be ordered to the supplier. Another issue are the amount of product that is going to deliver often have discrepancies with the number of customer requests for products available warehouse stock had deficient or even run out. Based on problems occurring now at CV. Surya Nedika Isabella therefore the supply chain management information system is needed at CV. Surya Nedika Isabella.The objective are to make it easy for the companies to determine the amount of raw materials to be ordered so it fulfill the demands of the products ordered by customer and easier for companies to carry out the process of distributing the total amount of the right products. Forecasting method on product order demand using single exponential smoothing by the method of evaluating the forecast error using Mean Square Error (MSE), while for the prediction calculation of the products availability in warehouse using a method of securing supplies (Safety Stock).

Based on the results of black box testing, UAT testing and last users testing after applying in the environment may be concluded that this system has been able to help the head of the purchasing department on determining the amount of raw materials to be ordered and simplify the head of the warehouse in regulating the distribution schedule amount of the right product based on the available stock.

Key : Supply Chain Management, make-to-stock, single exponential smoothing, Safety Stock.

1. INTRODUCTION

CV. Surya Nedika Isabella is one of the companies engaged in the production of bottled mineral water (bottled water) is located in the Kuningan district of West Java province. CV. Surya Nedika Isabella stood on 10 October 2010. CV. Surya Nedika Isabella strategy make-to-stock namely the production process before their booking. The company carries out the production process in a large (Mass Product) conducted the CV. Surya Nedika Isabella to create sufficient stock to anticipate the purchase order by the customer bottled water products. The company produces two types of mineral water that is in the packaging cup and bottle. For cup packaging company has three types of brands that ASMI 220 ML, Efata 220 ML and 220 ML ARTA, whereas for bottled company has two types of brands that ASMI Efata 600 ML and 600 ML. The company has a series of upstream work done by CV. Surya Nedika Isabella with suppliers that do the procurement of raw materials to suppliers, for the acceptance of raw materials from suppliers, to process raw materials into finished products. Meanwhile, the downstream activities that are carried out by CV. Surya Nedika Isabella with the customer that is accepting reservations and make the process of distribution to the customer who has ordered the product.

CV. Surya Nedika Isabella has a number of product orders from January to June 2016 as many as 1,092,429 carton with the highest number of bookings is the product ASMI Cup ML 220 with the number of bookings reached 915 188 cartons. Based on the facts obtained in the time period of each month bookings unknown erratic, causing head of the purchasing department had difficulty in determining the amount of raw materials to be ordered to the supplier to meet the production process during the period of the next month. This becomes a problem when the demand for increased product orders shortages of raw materials in the warehouse, which resulted in the production process

can not run smoothly so that when there is a booking occurs reservation can not be met.

Based on interviews that have been conducted by Mr. Gunawan as head of the warehouse and distribution in the warehouse department stated that the process of distributing the products to the customer done by the distribution often experience problems with the amount of product to be delivered often have discrepancies with the number of requests costumer for stock products provided warehouse often have limited or even void, it is based on actual data inventory stock for ASMI Cup 220 ML January to June 2016 experienced a vacuum products 11 times (days), it is resulting in the duration of delivery takes longer than the time has been estimated previously.

Process payments made by the customer using the payment method of credit (maturity) with the specified time payment rules apply to existing customers, while new customers will have to pay in cash with a minimum of 3 times the transaction after payment in cash with a minimum of 3 times the transaction then your next purchase may use the payment on credit (maturity). As for the purchase of raw materials using cash and credit system in accordance with the policies dimasing supplier - each company.

Based on the existing problems in current CV. Surya Nedika Isabella it needed a construction supply chain management information system that the management of the flow of raw materials / products and flow of information contained in the company from the start ordering raw materials, raw material processing, and distributing their products to agents can create synchronization and consistency. Based on the problems studied, the purpose of this thesis was to build a supply chain system quinine salt products in PT. Sinkona Indonesia Lestari (SIL) using the approach of Supply Chain Management. While objectives to be achieved in this study are:

Facilitate Head of Purchasing in determining the amount of raw materials to be ordered to the supplier to meet the needs of products ordered by the customer.

1. Facilitate Head of Purchasing in determining the amount of raw materials to be ordered to the supplier to meet the needs of products ordered by the customer.
2. Simplify the Head of Warehouse and Distribution in determining the distribution process by scheduling the delivery and distribution of the amount of the right products.

2. CONTENTS RESEARCH

2.1 Theoretical Basis

The theoretical basis of this thesis will explain the theories relating to the application of Information Systems Supply Chain Management at CV. Surya Nedika Isabella.

2.1.1 Information Systems

System information (information system) is a regular combination of people, hardware (hardware), software (software), communications networks, and data resources that collect, transform, and distribute information within an organization. People dependent on information systems to communicate between each other using various types of physical tools, commands and procedures of information processing, telecommunications lines or networks, and data stored or data resources. [9]

2.1.2 *Supply Chain Management*

Supply Chain (supply chain) is a system where an organization distributing goods production and services to its customers. This chain is also a network or networks of various organizations that are interconnected which share the same goal, which is the best possible conducting procurement or distribution of goods. [3]

The concept of supply chain is a new concept in terms of seeing the logistical problems. In the old concept, logistics as an internal problem of the respective companies and solutions focused on solving internally in the company respectively. While in this new concept, the logistical seen as a broader problem that lie very long starting from raw material to finished goods used by end consumers, which is the chain of supply of goods. It can be said that the supply chain is a logistics Networks. In this connection, there are several major players which are companies that have the same interests, namely [3]:

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

Chain 1: Suppliers

Network at the start of the supplier, which is a source that provides a first material, where the chain of distribution of goods will begin. The first material can be in the form of raw materials, raw materials, auxiliary materials, merchandise materials, spare parts, and so on. The first source is named suppliers. The number of suppliers can be a lot or a little, but suppliers usually amount to much at all.

Chain 1-2: Suppliers - Manufacturer

The first chain is connected with a second chain, namely Manufacturer or plants or assembler or fabricator or other shapes that do the work of creating, mengfabrikasi, assemble, assemble, convert, or finish goods (finishing).

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

Finished goods produced by the Manufacturer must begin to be distributed to customers. Although there are many ways for the distribution of goods to customers, the public is through distributors and this is usually taken by most of the supply chain. Goods from the factory to the warehouse channeled through warehouse distributors or wholesalers in large numbers, and in time wholesalers will distribute the goods in smaller quantities to retailers or retailers.

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

Wholesalers usually have their own warehouse or facility can also be rented from other parties. This warehouse is used to hoard goods before it is piped back to the retailer. Here again, there is the opportunity to obtain the amount of savings in the form of inventories and warehouse costs, by way of back design patterns both freight from warehouse Manufacturer as well as to the retail store (retail outlets). Although there are some mills that directly sell their production to the customer, but is relatively not many and mostly use this pattern.

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

The retailer or retailers offering goods directly to the customer or the purchaser or user of the goods. Which includes outlets are stores, shops, department stores, supermarkets, cooperative shops, malls, Club stores, and so forth, just where the final buyer making a purchase. The new supply chain really stopped after the goods in question arrive at the end user of goods or services.

2.1.3 Supply Chain Systems

Based on expert opinion about the system and supply chain authors conclude supply chain system is a system in the supply chain that has the objective of creating mutually beneficial cooperation in controlling, regulating and improving the flow of material and information of a product from the supplier to the end user. Construction supply chain system in PT. Sinkona Indonesia Lestari authors use the approach in the development of supply chain management.

2.1.4 Process Supply Chain Management (SCM)

The process of supply chain management is the process the product from start still made from raw, semi-finished products to finished products obtained are then sold through a variety of facilities connected by a chain along the flow of products and materials. When depicted in chart will appear as follows :

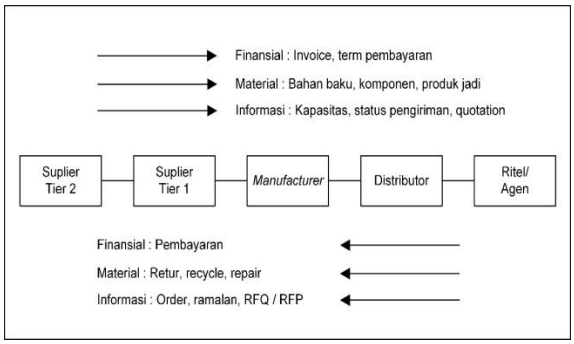


Figure 1 Simplification model of supply and 3 kinds of managed flow [5]

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

a. Material flows involving physical product flow from suppliers to consumers via a chain, as well as the feedback from the returns of products, services, recycling and disposal.
b. The flow of information includes demand forecasts, the transmission of orders and order status reports.
c. Financial flows include credit card information, credit terms, payment schedules, assigning ownership and delivery.

2.1.5 *Push* dan *Pull Supply Chain*

Pull supply chain strategy is the production of "make-to-order" the main benefit is to avoid waste inventory or a company's strategy is mainly a manufacturing company where the new production is done always after the market demand and actually performed at the request of customers.

Push Supply Chain is a production strategy Make-to-Stock. Push system is basically a system of production planning and control based requirments material planning (MRP) [8]. Pull strategy is more popular than pull system because the system of production based forecasting and produce output in large numbers will be entered into the inventory before it is piped to customers.

2.1.6 Single Exponential Smoothing Forecasting Method

Forecasting is based on exponential smoothing method (exponential smoothing) is generally used to estimate the sales of individual products. This method is often considered better than the two previous methods are simple averages and a single moving average because of its ability to use past data by assigning weights based on the present data. More data are now given greater weight than the previous data. The assumption is that more data is now always have a stronger influence on the forecasting results are compared with data more obsolete [8].

The formula for single exponential smoothing can be seen in equation 2.3

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

Information :

F_{t+1} = Result forecast for the period t-1

a = smoothing constant

X_t = actual demand data for the period t

F_t = Forecast in period t

2.1.7 *Mean Squares Error (MSE)*

Calculating the forecasting error is used to determine the accuracy of forecasting results that have been made to the actual data. There are many models for calculating the forecast error. The method used to calculate the forecast error (forecast error) is a method of MSE (Mean Squared Error). MSE is the average of the difference of squares of the value predicted by the observed [5]. MSE is used to generate an error that is showing how big differences in the estimation results with the destination. This makes it different because of the randomness in the data or because it does not contain a more accurate estimate. The formula for the MSE can be seen in equation 2.

$$MSE = \frac{\sum(At - Ft)^2}{n} \quad (2)$$

Where,

A_t = Actual Demand in period t

F_t = Forecasting Demand in period t

n = number of forecast period involved

2.1.8 Inventories (Inventory)

Inventories along the supply chain have major implications for the financial performance of a company. The amount of money that is embedded in inventory are usually very large so the inventory is one of the greatest assets owned supply chain. Many companies that have a value persediaanya melibihi 25% of the overall value of assets owned. This means that the cost of capital is retained in the form of stock in a company / supply chain is huge. [5]

2.1.9 Mechanical Safety Stock

Based on the classification of inventory described earlier authors use the technique Safety stock to mngakomodasi demand uncertainty affecting the supply [5].

Safety stock (safety stock) is useful to avoid shortages of raw materials at a certain moment or during the grace period (lead time) in the process of future bookings, inventory security (safety stock) are useful to protect the company from the risk of running out of [5].

Formulas safety stock (SS) to find the value of safety stock can be seen in equation 3.

$$Safety\ Stock = Z \times S_{dl} \quad (3)$$

Where,

Z = Service Level (A company's ability to service requests or translated from management decisions)

S_{dl} = set of uncertainties request provided it can be seen in Figure 2

variabel	konstan	variabel
Permintaan	$Sdl = Sd \times \sqrt{(l)}$ *Safety Stock* ditentukan oleh ketidakpastian permintaan.	$Sdl = \sqrt{(d^2 \times Si^2 + l \times sd^2}$ *Safety Stock* ditentukan oleh interaksi dua ketidakpastian.
konstan	Tidak diperlukan *safety stock*, situasi deterministik ($S_{dl} = 0$).	$Sdl = d \times sd$ *Safety Stock* ditentukan oleh ketidakpastian *lead time*.

Lead Time

Figure 2. The interaction between demand and lead time on the determination of safety stock

2.2. Problem analysis

Analysis of the problem is an assumption of the issues that will be described in the data processing procedures in a development program Information Systems Supply Chain Management at CV. Surya Nedika Isabella. Analysis of problems of the current system at this time is:

1. Head of Purchasing difficulty in determining the amount of raw materials to be ordered to the supplier because of the difficulty predicted the number of bookings that will happen in the next month period.
2. Head of Warehouse and Distribution of the difficulty in making the right product distribution schedule for the amount of product that will be shipped to the customer often have incompatibilities.

2.3 Analysis of Supply Chain Management (SCM)

Analysis of supply chain management is used for the employment component in the information system to be built. Supply chain management has a framework that is a component for the construction of the system.

2.3.1 Model Supply Chain Management (SCM) in the CV. Surya Nedika Isabella

SCM Based on the analysis presented in the previous section, while the supply chain model contained in the CV. Surya Nedika Isabella can be seen in Figure 3.

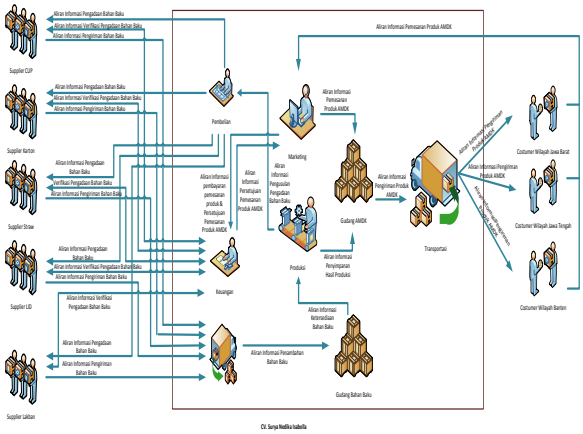


Figure 3. Model CV supply chain. Surya Nedika Isabella

2.3.2 Stages of Supply Chain Management at CV. Surya Nedika Isabella

Stages Supply Chain Management conducted to describe the process of supply chain management which will be built in the CV. Surya Nedika Isabella based supply chain model in Figure 3. The stages of supply chain management in the CV. Surya Nedika Isabella can be seen in Figure 4.



Figure 4. Supply Chain Management at CV. Surya Nedika Isabella

1. Forecasting Analysis Product Order

Analysis forecasting stages that will be done is to predict the needs of raw materials for the production process. Forecasting demand of raw materials intended to meet the needs of production when demand for the product where the product has been available ASMI Cup, due to planning appropriate raw materials for use in the production process. Forecasting technique used is quantitative forecasting techniques, due to the availability of past data that adequately met.

2. Analysis of Stock Monitoring Products and Raw Materials

At this stage is to analyze the product inventory monitoring and inventory of raw materials as well as determining the safe limit of products and raw materials that must exist in warehouse aimed to avoid shortage or vacancy of products and raw materials using methods Safety Stock.

3. Raw Material Procurement Analysis

The procurement process is carried out by means of cooperation agreed upon. When the raw materials that have been ordered to come will be handled by the quality control department. The quality control check of the raw materials have to meet the standards of the company. If the goods are coming to meet the standards of the company, will be entered into the warehouse inventories of raw materials and if it does not comply will be returned to the supplier.

4. Analysis of Product Distribution to Customer

Actors involved in the analysis of the distribution of products is the company's internal parts, namely the warehouse department. The warehouse will make product delivery schedules and determine the type of vehicle and driver that will send the product reaches the customer.

2.4 Analysis Database

Database analysis on supply chain management information system in CV. Surya Nedika Isabella which will be built using Entity Relationship Diagram (ERD). ERD is a data model built using some notation to describe the data in the context of the entities and relationships described by the data. The diagram is depicted in Figure 5.

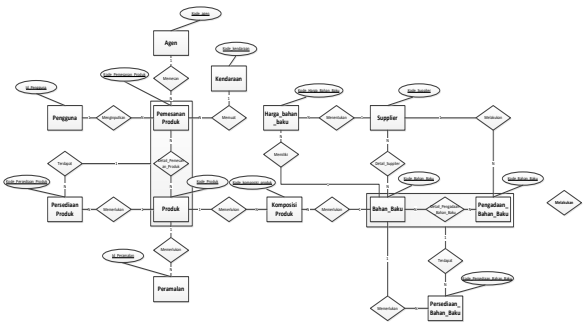


Figure 5. Entity Relationship Diagram (ERD) Supply Chain Management Information System at CV. Surya Nedika Isabella

2.5 Diagram Context

Diagram context is a global model to explain how the data is used and transformed to the process or describe the flow of data into and out of the system. Diagram context on the system can be seen in Figure 6.

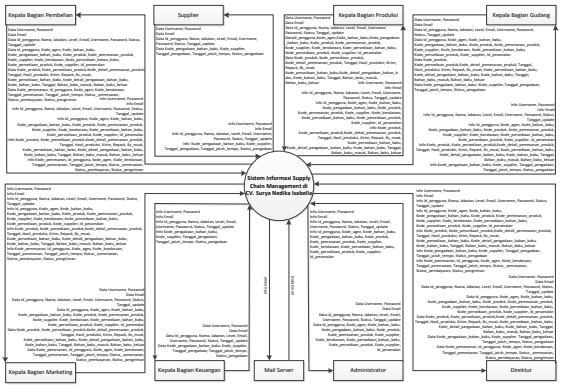


Figure 6. Diagram Context System Opera-Supply Chain Management at CV. Surya Nedika Isabella

2.6 *Data Flow Diagram (DFD)*

Data Flow Diagram shows how the flow of data outlining the processes that occur in the system to process more detail. In such a context diagram Figure 6 can be broken down into several DFD.

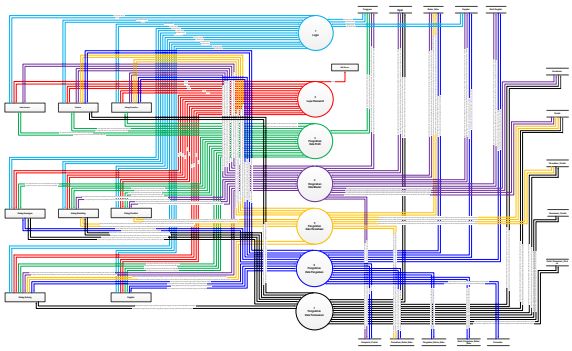


Figure 7. DFD Level 1 Supply Chain Management Information System CV. Surya Nedika Isabella

2.7 Table Relation

Tabel relasi menggambarkan hubungan antar data, arti data dan batasannya. Proses relasi antar atribut merupakan gabungan antar atribut yang mempunyai kunci utama yang sama, sehingga atribut-atribut tersebut menjadi satu kesatuan yang dihubungkan oleh *field* kunci tersebut. Tabel relasi akan dijelaskan pada terlampir pada Gambar 8.

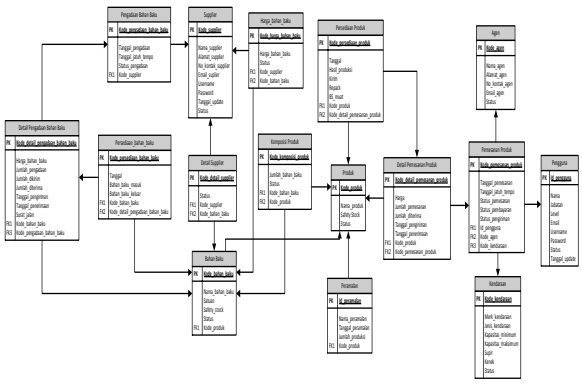


Figure 8. Table Relationships Supply Chain Management Information System CV. Surya Nedika Isabella

2.8 Designing Interfaces

Interface design created to describe the look of the program that will be used by the user to interact with the system are made. The design is based on input and output that will be generated when the application is implemented. Here is a sample login interface design that can be seen in Figure 9.

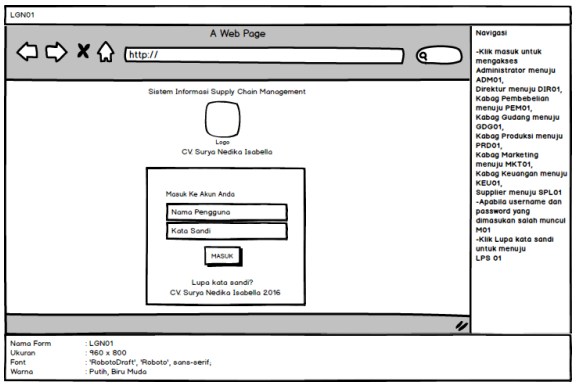


Figure 9. Interface Design LGN01 Login

2.9 Perancangan Jaringan Semantik

The design of the semantic network representation of the design interface that shows where each interface is connected. The design of the semantic network in supply chain management information system in CV. Surya Nedika Isabella can be seen in Figure 9.

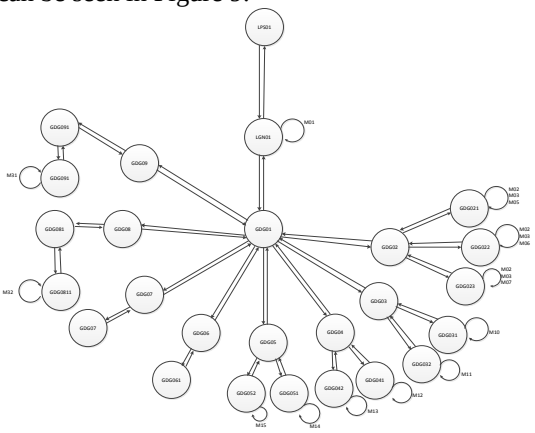


Figure 9. Network Design Semantics Head Warehouse

2.9 Testing Systems

Testing of the system is the cornerstone that aims to find errors or omissions in the information system under test. System testing is to determine the performance of information systems that have been made in accordance with the purpose of information system design. Testing the system uses black box testing. Black box testing focuses on functional requirements of software and user acceptance testing (end users).

1. Functional Tests

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

2. User Acceptance Testing (End Users)

User acceptance testing (end users) is a test that is conducted objectively where tested directly into the field, a company that circumstances regarding user satisfaction with the content of the points that meet the needs of the initial objectives and the interface of the information system of the Supply Chain Management. In user acceptance testing (end users), there are two scenarios that test will be conducted are using UAT (User Acceptance Testing) is conducted software testing process involving the potential users who are on the company chosen by the developer and accompanied when doing testing. This is done with the aim of finding defects (defects) that can not be found by the developer. Then do the end-user acceptance testing after the system is implemented in an enterprise environment by using the interview to end users who use the software.

Interviews were conducted with the testing of each user's page consists of the head of marketing, head of production, head of packaging, head of procurement and distribution head. Tests conducted on the end-user acceptance testing after the system is implemented in a corporate environment is done directly in the corporate environment or a place to study the CV. Surya Nedika Isabella. This is done in order to know whether the software that was built to provide a solution of some problems faced by the company.

3. CLOSING

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

3.1 Conclusion

Based on the results obtained in this thesis, it can be concluded as follows:

1. The supply chain management information system that is built to facilitate the purchasing agent in determining the amount of raw materials to be ordered to the supplier to meet the production needs of every month.
2. supply chain management information system to facilitate the head of the warehouse in product distribution schedule appropriate to the stock of available products.

3.2 Suggestion

Suggestions for the development of supply chain management information systems are some suggestions that can be done, among others:

1. The information system may be expanded with the addition of features of their online ordering process is done by the consumer to rejuvenate the company in introducing or promoting products to consumers.
2. This information system can be developed with the approach of CRM (Customer Relationship Management) that can be used in determining the development of bottled water products.

BIBLIOGRAPHY

[1] Fathansyah. (2007). *Basis Data.* Bandung: Informatika.

[2] Huda, Miftakhul, Nugroho, & Bunafit. (2010). *Membuat Aplikasi Database dengan Java, MySQL, dan NetBeans* . Jakarta: PT. Gramedia.

[3] Indrajit, Eko, R., Djokopranoto, & Richardus. (2002). *Konsep Manajemen Supply Chain : Cara Baru Memandang Mata Rantai Penyediaan Barang.* Jakarta: PT. Gramedia Widiasarana Indonesia.

[4] McGEE, M. W. (1999). *Metode dan Aplikasi Peramalan.* Jakarta: Binarupa Aksara.

[5] Pujawan, I. N., & ER, M. (2010). *Supply Chain Management Edisi Kedua.* Surabaya: Guna Widya.

[6] Riyanto. (2010). *Membuat Sendiri Sistem Informasi Penjualan dengan PHP dan MySQL.* Yogyakarta: Gava Media.

[7] Simarmata, J. (2010). *Rekayasa Perangkat Lunak.* Yogyakarta: ANDI.

[8] Sinulingga, & Sukarya. (2009). *Perencanaan dan Pengendalian Produksi.* Yogyakarta: Graha Ilmu.

[9] Yakub. (2012). *Pengantar Sistem Informasi.* Yogyakarta: Graha Ilmu.