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## Model of Supply Chain Management for Food Product Industry Companies

To cite this article: U D Widianty and T Harihayati 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **662** 072008

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# Model of Supply Chain Management for Food Product Industry Companies

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**Abstract.** The purpose of this research is to produce an SCM model that can be used as a reference by the Head of the Procurement Section and the Head of the Distribution Division in controlling each activity in the supply chain, covering activities from upstream to downstream in the food industry. This study used descriptive analysis method. The Head of the Procurement Section in planning the determination of the number of raw materials that must be held for production activities sometimes has difficulty in determining the right amount of raw materials to be held and ordered to suppliers so that the stock of raw materials in the warehouse is deficient or sometimes excessive. The result was a problem that occur in the Upstream which has an impact in the downstream, namely the Head of Distribution Division. The distribution activities has difficulty in scheduling distribution. It can be concluded that Single Moving Average is a type of forecasting method that can be used in completing the determination of raw materials that must be held in procurement activities, while the company's business processes can be used in making the distribution schedule.

## 1. Introduction

Analysis of several food industry companies in their operational activities in the upstream section are related to the process of procuring raw materials for production needs or downstream related to distribution and finding constraints, it affects the company's optimization in achieving profits. The obstacle that occurs in the supply chain in the upstream part is in the process of determining the amount of raw material supply where mismatch often occurs, the raw materials sometimes sre excessive or even lacking, this affects the production process which can stop at any time due to lack of raw materials, or can lead to build-up of products in the warehouse. In addition, these procurement activities correlate to the outside parties. Raw material suppliers sometimes struggle in determining the right supplier and the needs of the company. Whereas in the downstream part, it is related to the product distribution process where the company deals with distributors or consumers. The obstacle encountered in this section is the mismatch of the distribution amount and the distribution process itself which is the impact of the problems that occur in the upstream section. The process of product delivery to consumers is still constrained in the aspects of transportation and packaging. All these problems can be solved by the Supply Chain Management (SCM) approach which is an integrative method or approach that manages the flow of products, information, and money in an integrated manner involving parties ranging from upstream to downstream consisting of suppliers, factories, distribution networks, and logistics services [1]. Studies regarding supply chain management provide an overview and reference regarding the scope of each SCM.

In Enty Nur Hayati's research entitled Supply Chain Management and Logistics Management, companies should focus more on optimizing costs and prices and shortening the supply chain cycle.



Whereas according to research made by Ewa Kempa with the title Problems in Relationships between Participants in Supply Chains of Food Products in the European Union provides an overview of SCM which focuses more on competition strategies in the market, commercial, and forms of SCM models that are influenced by global competition.[2] The difference between this research and the previous one lies in the broader scope of supply chain management, including the scope of consignment and cash payments, stale product management, return of products, and raw materials which in the previous study did not become a scope within the supply chain even though they applied forecasting methods in the process of procurement of raw materials and scheduling in the product distribution process. So, in this SCM study our focus is on the management of activities and problem-solving models of each of its activities in the supply chain in food industry companies. This study complements the aspects of discussion in supply chain management science where it focuses more on solving problems in the upstream and downstream supply chains. With this SCM model built, the problems that arise in the supply chain namely the procurement and distribution department can be handled.

In the research made by Saurav Anand on the same topic, SCM was described more focused on the packaging process for distribution activities in the downstream chain. The packing arrangement process that emphasizes implementation efforts to get optimization in distribution activities. Of course, this research can complement the research that is being carried out where support for optimizing distribution is something that needs to be considered in the construction of the SCM model for food industry companies. [3]

## 2. Methods

This research stage is done by identifying the problems first, namely as a statement stage that questions a variable or the relationship between variables in a phenomenon. In this case, it catches an obstacle in the upstream activities of the company related to the procurement of raw materials and downstream activities of the company in the distribution of finished products to distributors or retailers, then collecting data through literature and the results of previous research by studying, researching and analyzing various literature sourced from books, texts, journals, sites and readings that correlate with the topic of research. After obtaining the literature in accordance with the problems to be raised in this study, the next step is to form an SCM framework consisting of elements of the framework, sub-elements of the framework and implementation in the company, namely SCM network structure and SCM business processes. the next stage is the development stage of the Supply Chain Management model based on the constraints of existing problems, starting from the model of determining the number of products and raw materials produced, monitoring the inventory of products and raw materials, monitoring expiration and remaining products to consumers, supplying raw materials, and selecting suppliers. Payment and product Supply Chain Management is a total approach system to deliver products to end consumers using information technology to coordinate all supply chain elements from suppliers to retailers, then reach the next level which is a competitive advantage that is not available in traditional logistics systems [3]. Whereas according to Simchi-Levi et. al[4] Supply chain management is defined as a series of approaches that are used to integrate suppliers, producers, warehouses and stores effectively so that inventory can be produced and distributed in the right amount, to the right location, and at the right time so that the overall cost of the system can be minimized while trying to satisfy needs and services [5]. Forecasting (prediction) is a prediction of the values of a variable based on known values of these variables or related variables. Fortune-telling can also be based on assessment skills, which in turn are based on historical data and experience [6]. Single moving average method uses a number of actual data requests that are new to generate forecast values for future demand. This method will be effectively implemented if we can assume that market demand for the product will remain stable at all times. This method has two special properties, namely to make forecast requires data. Historically in a certain period of time, the longer the moving averages will produce a finer moving average, the moving average can be systematically calculated by the equation 1 which includes returns and management of stale products.

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

### 3. Results and Discussion

After obtaining the literature in accordance with the problems to be raised in this study, the next step is to form a SCM framework consisting of elements of the framework, sub-elements of the framework and implementation in the company, namely:

1. SCM network structure: SCM network structure: This stage is carried out to map the network structure both horizontally and vertically related to SCM activities in its implementation in the company.
2. SCM Business Process: This stage is what describes the scope of SCM activities and processes in a food industry company which consists of demand, production, procurement and distribution processes.
3. SCM Component: This stage describes the components that are involved in the scope of the relevant SCM, which consists of forecasting methods, work structures, communication flow and information facility.
4. Development of the Model Supply Chain Management: There are several models:
  - a. Phase of determining the number of products and raw materials produced.  
At this stage a process of determining the number of products to be produced involves a forecasting method from previous sales data so that this stage produces the amount of raw materials needed for a number of products to be produced. Example of a forecasting process from a food product industry company with the use of a single moving average method.
  - b. Monitoring the inventory of products and raw materials  
Product inventory in accordance with the type and raw materials of each product will produce production forecast / day = 30 packs  
Minimum stock = 40 packs  
The remaining amount of stock = 37 packs  
Monitoring product inventory, namely the number of entries, exits and remaining in the warehouse, is useful for consideration in the procurement of raw materials.
  - c. Monitoring expiration and remaining products for consumers  
Minimum stock application is for the process of calculating the safe limit of inventory that must be available in the company's warehouse and the point of reorder of raw materials.
  - d. Procurement of raw materials and supplier selection  
This stage is the core stage of a supply chain in the upstream part, that is, at this stage formulations will be made of the amount of raw material needed and will be ordered at the supplier and determine the selection of suppliers in accordance with the availability and price offered.  
Based on the results of the calculation of product inventory monitoring carried out, it can be seen that the company must procure raw materials by considering the results of monitoring the remaining products and expiration in the consumer. To find out the type of raw material to be ordered and how many needs, BOM data (Bill of Material) [7] is needed.
  - e. Product delivery / distribution  
Shipping or distribution is the stage that is carried out after the company receives ordering data from consumers so that the number of orders and orders (consumers) is clear. A number of orders will be sent based on the delivery schedule that has been formed by taking into account the capacity of the vehicle, the time of delivery and packaging of the product when it is sent.

f. Payment and product returns

In the payment phase, both upstream or downstream activities will consider two ways of payment [8], namely cash and consignment (payment according to the number of products sold). To return both the return of raw materials or products from consumers to the company will be carried out according to the time specified.

g. Management of stale products

In the stage of managing stale products this is important in SCM food industry companies [9], because it is very possible from this SCM process to produce stale products. Therefore, this stage will regulate how stale products are processed by companies that are likely to conduct business partners with other companies in their management. For example, PT. X cooperates with partners who will manage stale products into results that can be used and have resale value whether processed into animal feed or other. In the case of stale products, food industry companies will form chains and become suppliers for partner companies in managing stale products [10].

h. Establishment of the Food Industry Company Supply Chain Management Scheme

#### 4. Conclusion

This study can provide a recommendation for a Supply Chain Management model for food industry companies so as to reduce the constraints on upstream activities, namely the procurement of raw materials and downstream, namely distribution to consumers

#### Acknowledgement

We want to show our gratitude to Universitas Komputer Indonesia that have provided insight and expertise that are very helpful in research.

#### References

- [1]. Pujawan, I. N., & ER, M. 2010. Supply Chain Management Edisi Kedua. Surabaya: Guna Widya
- [2]. Ewa, Kempa 2016 Problems in the Relationships Between the Participants in Supply Chains Of Food Products in the European *Union Supply Chain Management Journal: Poland.*, **7,1**
- [3]. Saurav, Anand 2016 Role and Importance of Packaging in Supply Chain Management. *Supply Chain Management: University of Targovish*, **7,2**
- [4] Simchi-levi, D., Kaminsky, P., Simchi-levi, E., & Bishop, W. 2003. Designing and Managing the Supply Chain. Boston: McGraw-Hill
- [5]. Nur Hayati, Enty *Suplly Chain Management dan Logistik Management Universitas Seikubank: Semarang.*
- [6]. Fitzsimmons, J. A., & Fitzsimmons, M. J. 2004. Service Management: Operations, Strategy and Information Technology. Boston: McGraw-Hill.
- [7] Van Veen, E. A., & Wortmann, J. C. (1992). Generative bill of material processing systems. *Production Planning & Control*, **3**(3), 314-326.
- [8] Vachon, S., & Klassen, R. D. (2006). Extending green practices across the supply chain: the impact of upstream and downstream integration. *International Journal of Operations & Production Management*, **26**(7), 795-821.
- [9] Christopher, M. (2016). Logistics & supply chain management. Pearson UK.
- [10] Wognum, P. N., Bremmers, H., Trienekens, J. H., van der Vorst, J. G., & Bloemhof, J. M. (2011). Systems for sustainability and transparency of food supply chains—Current status and challenges. *Advanced Engineering Informatics*, **25**(1), 65-76.