

# Medicine and Consumer Goods Supply Management Design to Reduce Stockout and Days of Inventory in PT. XYZ

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**Abstract:** Stockout and overstock are the trigger factors for increased costs. Overstock will result in a waste in the cost of savings and a high Days of Inventory (DOI), but if the inventory is low, there will be a potential loss of opportunity for profit if the actual demand is greater than the estimated inventory and trigger customer disappointment. This study was an observational (non experimental) study. Medicine and consumer goods inventory management planning conducted ABC analysis to find out the products that become classes A, B, and C. Class A products are forecasted using exponential smoothing method for product needs in 2019 and calculated EOQ and ROP. Interviews were conducted with informants regarding the current inventory management system. The root cause of the stockout is analyzed using fishbone diagrams. From the results of fishbone analysis and interviews that have been carried out on informants, it is known that: 1) lack of communication with marketing; 2) making stock estimates is not according to needs; 3) no planned sales average; and 4) there is no coordination between the planner, marketing, and warehouse.

## 1 INTRODUCTION

Good planning needs to be done so that the inventory level has maximum benefits. Overstock requires large funding, and conversely the stockout can have a consequence on customer disappointment with the company which can have an impact on customer loss and a decrease in company revenue.

At present competition takes place not only between companies, but also competition between supply chains. The company does not only compete in products and services, but corporate competition already involves competition in acquiring material goods from suppliers, competition in obtaining resources and services in transportation, warehousing, and finished goods distribution systems that can reach customer or market access as wide as broad.

Key activities in SCM include: mapping of customer needs and unmet demand to determine sales and production forecasting, fulfilling sales orders, vendor management, warehousing and inventory, managing transportation and distribution, managing accounts payable and receivable, and

managing cash inflows and outflows (Jacobs & Chase, 2018).

Inventory management is a branch of business management that focuses on planning and controlling inventory, which is a critical issue of logistics management for most companies, both large, medium and small companies. Logistics is all about managing inventory, whether moving or stationary in the warehouse, in the form of finished products or raw materials. The Bill of Rights from logistics is "Sending the right product to the right place, at the right time, the right number and conditions, and at the right cost (Goldsby & Martichenko, 2005). Therefore, effective inventory management is needed to make that happen.

The challenge in managing inventories is to balance supply and demand. PT. XYZ is a distributor in Sidoarjo that distributes medicine and consumer goods. The company has difficulty adjusting supply to customer demand efficiently, where there is a high stockout and Days of Inventory (DOI) in the business. Every time there is a stockout, then an additional order is submitted, and a long DOI item will remain in the warehouse until there is a sales request, there are even products that have never been sold until they wait to expire to be

returned to the center. Figure 1 shows the number of additional orders at PT. XYZ to suppliers.



Figure 1: Additional Orders from 2015 to May 2018

Additional order requests from the data above are not always fulfilled, so that the stockout event still occurs and ends in the occurrence of potential shortages in the company, one of which is the non-fulfillment of Purchase Order. This can have a negative impact on the company, where there are many complaints because the amount of empty stock does not fit the needs, and can result in the loss of sales sales due to customer disappointment. The data in table 1.1 shows the number of Purchase Orders that are not met every month at PT. XYZ from 2016 to November 2018.

Table 1: Number of Purchase Order Not Fulfilled.

Month	Year		
	2016	2017	2018
January	NA	627	166
February	NA	689	203
March	NA	685	196
April	NA	555	264
May	NA	438	222
June	282	197	146
July	551	227	253
August	745	275	168
September	706	358	248
October	783	243	217
November	837	185	157
December	607	232	-

Based on the background above, the problem in this study is to evaluate the current inventory management system and explore the root causes of the large number of stockouts and high Days of Inventory based on fishbone diagram, and design an optimal inventory management system based on Economic Order Quantity (EOQ) method and ABC classification at PT. XYZ.

## 2 METHODOLOGY

This research was conducted in the logistics department of PT. XYZ in November-December 2018. This study is observational research (non experimental) by analysis root cause of stockout and high Days of Inventory using fishbone diagram and interview to informant, ABC analysis, and forecasting class A results of ABC analysis.

In-depth interviews were conducted to strengthen the results of the analysis and dig deeper into the causes of the large number of stockouts and high Days of Inventory assisted by fishbone diagrams. Fishbone diagrams are used to trace the causes so that they can be expected as managerial aspects and suggestions to the management of PT. XYZ.

ABC classification divides inventory items into three groups: high value volumes (A), moderate volume values (B), and low value volumes (C), with volume value categories mapped into strategies that are appropriate for that category. The purpose of ABC classification is to try to separate the important from the unimportant, and to establish the appropriate level of control over each item.

Unit of analysis that will be examined in this study are sales data, warehouse and corporate purchasing department. The unit of analysis of a study can be in the form of individuals, groups, organizations, objects, regions and certain times in accordance with the focus of the problem (Kothari, 2004).

The research design used in this study is descriptive, explaining how the phenomenon of problems faced in inventory management at PT. XYZ to be able to answer research questions, and then provide a design solution.

The data sources used in this study come from primary data and secondary data. Primary data is data from the process of observation and direct interview with the Finance Supervisor and Marketing Supervisor. Interview questions use a list of questions assisted with recording devices as documentation. The search for the high number of stockouts and Days of Inventory is done using fishbone diagrams. Secondary data is obtained from the supporting document study process at PT. XYZ.

## 3 RESULT AND DISCUSSION

### 3.1 Fishbone Analysis

Fishbone analysis is a great tool to go inside and finding out the root cause of stockout. Based on the results of observations and interviews, fishbone analysis are shown in figure 1.



Figure 1: Fishbone analysis

In this research, the main problems of PT. XYZ is a high stockout and Days of Inventory. Overstock requires large funding, and conversely the stockout can have a consequence on customer disappointment with the company which can have an impact on customer loss and a decrease in company revenue.

PT. XYZ is a pharmaceutical distributor, with supply chain services consisting of inventory management, ordering, inventory storage, shipping, order acceptance, information systems, and all other processes so that activities can run smoothly. Second fishbone analysis alongside the Why-Why analysis will reveal the reasons.

### 3.1.1 System Problems

Having a computerized system and using it properly is one of the supporting factors in the inventory management system. PT. XYZ revealed that one of the causes of goods vacancies was due to the unavailability of a system for inventory control, so it was still manual by conducting one-on-one checks by the personnel on duty. Another reason is to upgrade to a more call system that requires high costs, therefore PT. XYZ has not been able to catch up in the technology field and lags behind in competition with other distributors.

### 3.1.2 Process Problems

The process of inventory management management of PT. XYZ revealed a number of problems, namely because of the large amount of inventory that must be managed, but done manually causing frequent stockouts and overstocks. Estimated stock requirements are made more than demand and vice versa, this is due to the absence of sales plans. Poor execution of this process also stems from causes such as the wrong ordering system and high costs. PT. XYZ also has many suppliers and high lead

times, which can also worsen the frequent occurrence of stockout cases.

### 3.1.3 Procedure Problems

Every company must have a procedure in carrying out an activity so that it runs correctly and accordingly. Ordering procedure at PT. XYZ must be done through the Center distribution of PT. XYZ first, so that the lead time becomes longer, because there are several factories whose locations are the same as PT. XYZ, but must be sent to the Center of PT. XYZ first in Jakarta. There are also many routine allocations every month from the distribution center, and this affects the amount of inventory.

If the current stock is low, but the demand is greater then it creates additional orders, and impacts on the vacuum of goods, and vice versa, if the current stock is still sufficient due to small demand, but coupled with routine allocations, the stock will accumulate and make days of inventory long.

PT. XYZ also has a routine activity called 'closing day', which is the pursuit of turnover so that it can be reached, every end date of the month, before changing tomorrow (already changing months). The phenomenon that is often faced is to close the turnover, suddenly there is a surge in demand, where the existing stock is insufficient, so there is a 'goib' item, where the stock can increase first, but new items will be sent that day.

### 3.1.4 Human Resource Problems

Human resources must be well motivated and directed according to the company's vision and mission. Human resources at PT. XYZ is enough for now, but the lack of skills in inventory management is something that has a negative impact on the company's process flow. The company is still manual in checking the stock so that more time is needed in reviewing the number of available stocks.

The lack of time to review this stock is also one of the obstacles. In determining the estimation of stock requirements based on information from informants, there is no coordination and communication between the planner, warehouse, and marketing. The planner also has no reciprocal relationship with the supplier, so he does not know whether the order that has been made has been received, the stock at the supplier is there/ not, and whether it has been sent/ not. After the goods vacuum occurs, then PT. XYZ pursues suppliers.

### 3.1.5 Product Problems and Prices

Based on information from informants, so far the inventory management system at PT. XYZ has never

been classified based on ABC analysis. The budget allocation for drug supplies is not too calculated, so there is a lot of empty stock and then making additional orders, which can actually increase the cost for the company. The existence of a 'retail last bite' program also sometimes causes the number of orders to jump suddenly to suppliers and causes excess stock and warehouse capacity to overload / insufficient.

### **3.2 Solutions From Fishbone Analysis**

There are several reasons of stockout in PT. XYZ. Here are some solutions to help PT. XYZ for improving their supply management.

#### **3.2.1 Solution to System Problems**

To overcome system problems, PT. XYZ can upgrade the system so that it has a program as a 'reminder' of what stock is left, and when is the right time to reorder. So the system does not only function as a note taker and see what the final stock is, then it is checked manually, but it can also be used as a reminder of the remaining existing stock. The electronic system will be able to solve the problem of shortages and excess stock, and also the wrong ordering process.

#### **3.2.2 Solution to Process Problems**

To reduce and resolve process problems, PT. XYZ can supply contracts with suppliers, so there are clear agreement terms and commitments that must be fulfilled between PT. XYZ and suppliers. The supply of the contract can determine the lead time agreement that must be maintained, so that long lead time problems can be prevented by ordering earlier. With an earlier booking, the stock will arrive on time and there will be no stockout and backordering. Backordering can trigger customer disappointment and potential loss of sales / sales.

Estimates of fewer stock requirements than demand can be prevented by coordinating in advance between warehouses, marketing, and planning, so that better forecast results are obtained, not just on intuition. Another method that can be used is using the forecast method selection that is in accordance with the pattern of PT. XYZ.

#### **3.2.3 Solution to the Procedure Problem Procedure problems are the main key**

problem in management. The wrong initial procedure will make the whole series not smooth, and need to be resolved immediately. The procedure

where the goods must go through the central distributor first, even though it should be closer if from the factory directly to PT. XYZ should only be done administratively, so that the achievement of lead time is shorter and the cost estimation is lower, because there does not have to be a factory cost to the central distributor PT. XYZ first, then the Distribution Center sends to PT. XYZ. Also, there is no safety stock at PT. XYZ. So when the stock is out of stock, then planner make an additional orders, so in this study provides a design of inventory management for the management of PT. XYZ for optimal inventory.

#### **3.2.4 Solution to Human Resource Problems Human resource is the blood of business life**

and it is very important to motivate and maintain it so they are on the right track. To solve employee problems, PT. XYZ can conduct comprehensive training in the right way. Good communication and coordination between the marketing, warehouse, and purchasing also need to be done to determine about each other's responsibilities. Every time planner will make a purchase plan there should be good communication and coordination so that there is a clear estimation of sales requirements in the amount and how much stock is currently in the warehouse.

#### **3.2.5 Solution to Product Problems and Prices Based on information from informants, PT.**

XYZ has never done inventory classification based on ABC analysis. ABC analysis can be used to classify which products are more important and have a greater investment value so that they do not sit quietly in a warehouse and make a high Days of Inventory.

PT. XYZ also has many products that check it manually, so that proper forecasting is needed so that stockouts don't occur frequently. Better forecasting means lower safety stocks and higher levels of availability. It also means a reduced exposure to excess and obsolete stock risk (a large contributor to holding cost of stock).

#### **3.2.6 Solution to Supplier Problems**

PT. XYZ there should be a supply contract with the supplier, so that there are clear agreements regarding lead time, supplier response, and other agreements. A close relationship with supplier is crucial. When supplier lead times are reduced below the required lead time, it'll help remove the requirement to hold

much stock, especially consumables. Cutting lead times in half will reduce safety stocks by about 30% for the same availability.

Unreliable supply is one of the reasons for holding safety stocks. If delivery is guaranteed on the due date then safety stock can be reduced what's needed to cover common-cause variability. A good start is sharing demand, forecast and stock positions with suppliers. When there's heightened transparency of information throughout the supply chain it'll improve reliability and mitigate Bullwhip/Forrester effects.

### 3.3 Inventory Level as an Effort To Minimize Stockout

In minimizing stockout cases, we need control over demand. the control applied by the company is to use inventory level. Inventory level is a safety stock that must be on that day to anticipate a surge in demand the next day. Inventory or level stock is used as an effort to anticipate high demand so companies don't have to worry about shortages of stock.

The stock level for suppliers is needed as an effort to optimize the order purchase costs related to minimum orders applied by suppliers. Considerations in installing stock levels to suppliers include lead time, condition of goods, quality, and others.

### 3.4 Inventory Optimization Using ABC Analysis

The researcher obtained data on the recording of demand and purchase prices in the period January-November 2018 totaling 469 products. A total of 469 products are grouped based on ABC analysis of investment value. According to the results of the interview, PT. XYZ has never done ABC analysis to help in product inventory management systems. Drug products and consumer goods are grouped based on the cumulative percentage of investment value. Products with a cumulative percentage of up to 70% are group A, 70-90% are group B, and 90-100% are group C.

Table 2: Result of ABC Analysis

Class	Investment	Perce	Total	Perce
	Amount (IDR)	ntage	Produ	ntage
A	31,483,513,143.00	70,4%	51	10,9%
B	8,751,119,247.00	19,6%	78	16,6%
C	4,467,926,887.00	10,0%	34	72,5%

Total	44,702,559,277.00	100%	9	46	100%
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From the calculation of ABC analysis, the value of investment is obtained by the results of group A with an investment amounting to 70.4% of the total investment consisting of 51 products which is equal to 10.9% of the total product. Group B investment amounted to 19.6% of the total investment and consisted of 78 products which amounted to 16.6% of the total product. Group C with a minimum investment of 10.0% of the total investment, consisting of 340 medicinal products and consumer goods, which amounted to 72.5% of total products.

### 3.5 Dynamic Inventory Approach To Minimize Days on Inventory

High Days of Inventory is a result of overstock that cannot be controlled and a waste with a considerable amount of expenditure. Until now, eliminating the risk of overstock up to 100% is not possible, given the fluctuating customer demand can cause the Purchase Order issued by the customer to be much smaller than the forecasting that the company had previously done.

For close suppliers, companies are still easier to make delays or order cancellations. different from outside island suppliers, considering the lead time is very long, which is one to two weeks, so the goods still come to the company without further processing due to the absence of requests again. based on this, the risk of a stockout will always be there and difficult to eliminate.

After conducting an analysis to find the root cause of the case of high stockout and Days of Inventory, then a proposed improvement is formulated which can be an alternative action that can be taken in reducing the occurrence of this stockout case. Approach to dynamic inventory by considering uncertainty in demand can be considered to be applied in minimizing high stockouts and Days of Inventory.

This policy is characterized by the parameters of the reorder point and number of orders. The ordering point is the same as the total forecasting and the maximum number of forecasting uncertainties during the + 1 period lead time for a service level cycle target. While the safety stock equals the maximum number of forecasting uncertainties during the protection interval. The point of reorder and the number of orders can be determined by the following equation:

$$EOQ = \sqrt{2 (\% h / 100)}$$

### **3.6 Limit Analysis**

This study is limited to internal logistics inventory management PT. XYZ in November - December 2018, does not reach the external supply chain network. Research focus on the categories of all products distributed. Historical data used is in the period January to November 2018.

## **4 CONCLUSIONS**

Stockout is never a pleasant incident for the company, it is even less so for those responsible for it. Retailer company as PT. XYZ suffer huge losses every year because of empty shelves and potency of disappointed customers. Damaged reputation and customer loyalty, decreased impact of promotions, and higher costs for re-ordering all again.

The fishbone diagram and analysis was very innovative and efficient way of resolving key issues of the organizations. This research reveals that the root causes of frequent stockouts at PT. XYZ is (1) lack of communication and coordination between planner, marketing, and warehouse, (2) no sales plan, and (3) estimation of stock requirements that are less than demand and vice versa (planning does not match reality) .

This research also provides some solutions for resolving those problems. If PT. XYZ can apply supply management design and undertake those they can get rid of the ongoing problems of stockout and strive forward for optimal inventory level.

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