CHAPTER I INTRODUCTION

I.1 Research Background

Indonesian construction chemicals market has been witnessing significant growth over the last few years. According to the report of research and market, the construction chemical market in Indonesia is forecast to register a Compound Annual Growth Rate (CAGR) of 13.6% till 2019. It is supported by the demand data for waterproofing compounds which is expected to remain high in Indonesia due to the country's tropical climatic.

The Indonesia's economic growth is expected to continue as the Indonesian government focuses on upgrading and building the new infrastructure. It is also followed by the increasing demand for paint and coatings in this country. The growth of the paints and coatings market are further propelling the increasing of paint industries globally. This phenomenon will impact to the increasing of industrial competitiveness in the field of paint and coatings. The local competition between industries demanding all of them to be able to compete with similar industry, one of them is by improving the customer service level. The improvement of service level could be achieved by the availability of finished goods to meet all the customer needs.

The availability of finished goods itself are associated with the implementation of inventory management in a company. The appropriate inventory management is really affect the service level of company in serving their customers, where the main objective of inventory management is to have the appropriate amounts of materials in the right place, at the right time, and at low cost (Tersine, 1994).

PT XYZ is a company runs in the paint industry and chemical construction. They were originally established in 1951 as a small building materials store in Bandung and now have developed rapidly become a paint industry which is located in Cimahi since 1988. Basically, the coating products which are produced in PT XYZ can be classified into 4 based chemicals mediums, such are water based, solvent based, pigment pasta, and construction chemical. The products are designed to meet all the customer needs by provide some kinds

of paints from architectural paint to heavy duty and from industrial paint to construction chemical. They are including top coat (wall paint, roof paint, synthetic paint, water repellent, boat finish), primer & sealer (alkali resisting primer, masonry sealer, base coat), putty (wall filler, wood filler), and construction chemical (waterproofing, epoxy, bonding agent, water ponding, grout).

This company has been expanding their product distribution through 42 cities in Indonesia covering Java, Sumatera, Kalimantan, and Sulawesi. In order to fulfill demand from all coverage area with least total cost, PT XYZ must provide physical distribution in other locations to satisfy customer demand directly which is called multi-echelon distribution system. The product distribution was starting from Central Distribution Center (Plant) located in Cimahi, that is supplied by manufacturing facility, to the Distribution Centers (DC) located Surabaya. This distribution center was also directly distributing the product to the retailer (called "retailer") and end customer in the area of West Java (covers Bandung Barat, Bandung Timur, Bogor, Bekasi, and Cirebon) and Sumatera (covers Palembang, Lampung, Jambi, and Bangka). The distribution process will not stop until this level, but rather from DC in Surabaya, the product will be distributed to retailer in Malang, Jember, Bali, Lombok, and Sampit (Kalimantan).

The implementation of multi-echelon distribution networks in PT XYZ, regarding the existing of DC in Surabaya, was aimed to satisfy the customer demands in diverse geographical areas directly within short period of time in the purpose of getting customer satisfaction and also provide transportation economies. It is necessary because in today's marketplace, the business competitiveness is forcing the company to offer quicker response to customer needs because customers are satisfied only if their order requests are met at the time they order. Yet, the retailer is supplied from DC Surabaya have fulfillment rate below the company's target as seen on Figure I. 1.

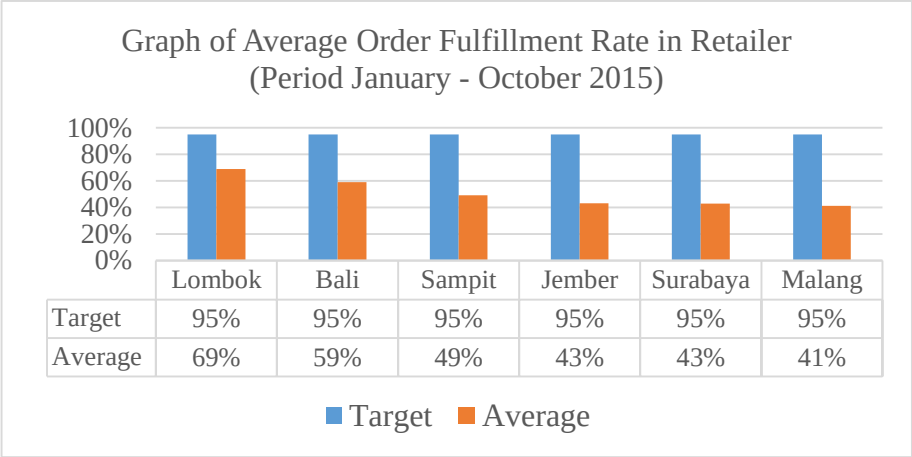

Figure I. 1 Graph of order fulfillment rate in retailer

The graph above describes about the average of order fulfillment rate in retailer (Lombok, Bali, Sampit, Jember, Surabaya, and Malang) has not achieved yet the target of fulfillment rate.

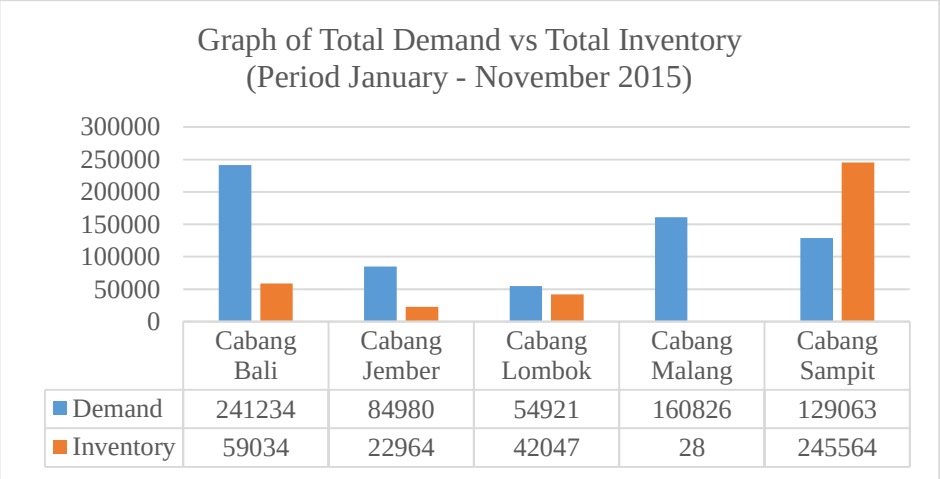

Figure I. 2 Graph of total demand vs total inventory

According to the Figure I. 2 above, it shows that the low order fulfillment happened in PT XYZ mostly caused by insufficient of inventory stock happened in retailer and/or DC, so the distribution centers should order to the predecessor echelon to supply the additional inventory to fulfill the customer demands at certain time. However, the additional request order, often called backorder, requires more time and cost. But, if the customer demands cannot be fulfilled so it will be considered as lost sales and cause the low order

fulfillment. Hence, the main focus of this research will be concerned on inventory system at multi-echelon (two-echelon) distribution network shown in Figure I. 3.

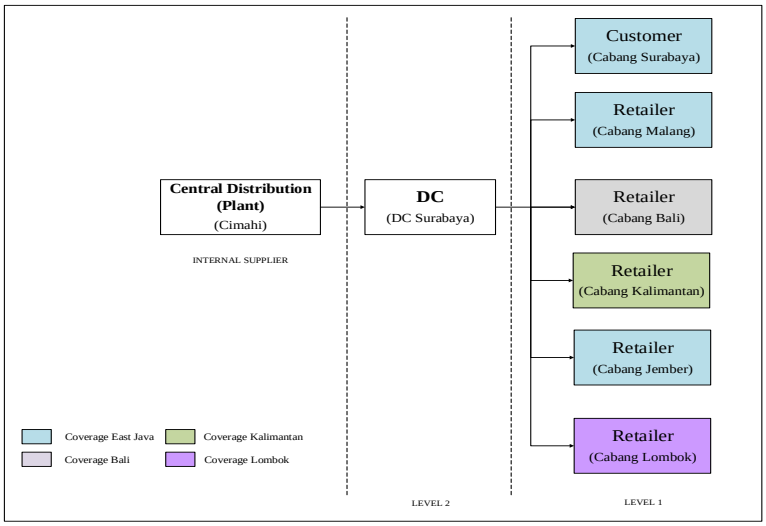

Figure I. 3 Two-echelons distribution network in DC Surabaya

The condition of stock available in retailers can be stated as insufficent stock because of the imbalance of demand and inventory. It is shown on Figure I. 4 below that more than 50% in every retailers of PT XYZ was having stockout problems. This condition of inventory will lead to directly and indirectly loss for company in maintain their business.

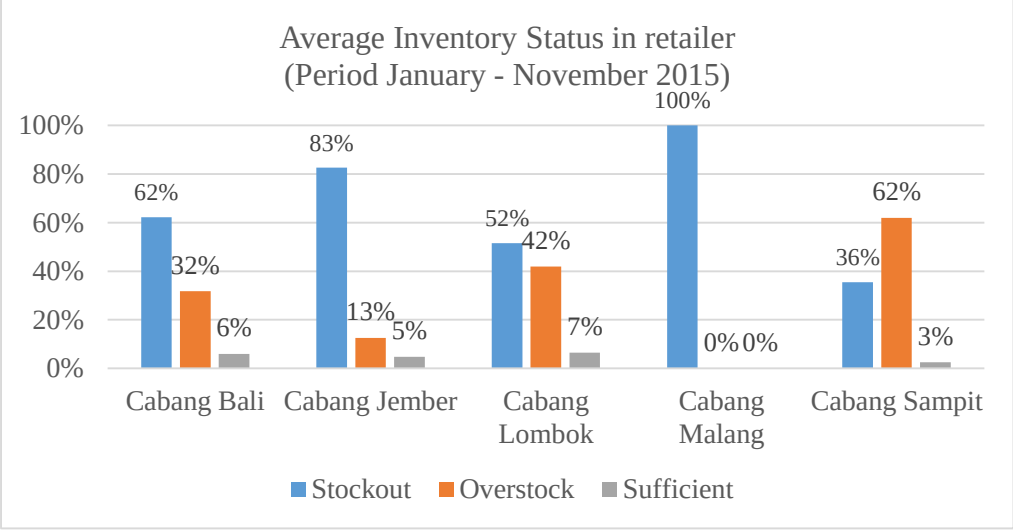

Figure I. 4 Graph of average inventory status in retailer and DC

Sometimes the company was unconcerned with the stock available at their lowest echelon and assume that it will be supplied by the parent echelon (DC). This situation leads to the phenomenon when several retailers put order for same at about the same time to DC and the inventory in DC cannot buffer the demand. In order to gain customer satisfaction, the DC Surabaya have to make order to the central distribution and it cost much more time and fees. Thus, it is necessary to be able to determine the optimal inventory policy with multi-echelon models to help determine how many stock needs to be ordered at certain time period in each retailer and DC. Moreover, it helps company to minimize the potential phenomenon of stock imbalance occur both in retailer and DC also increase the service level in facing the fluctuation of customer demands with the minimum cost.

I.2 Problems Identification

Based on the background that has been stated above, the problem identifications of this research are:

1. How to determine the optimal order quantity in order to avoid stock out and overstock of product in Distribution Center and retailers at PT XYZ?
2. How to determine the suitable reorder point for the inventory of finished goods in Distribution Center and retailers at PT XYZ?
3. How to increase the service level with multi-echelon inventory policy of finished goods in PT XYZ?

I.3 Research Objectives

The objectives of this research are:

1. Determine the optimal order quantity in order to avoid stock out and overstock of product in Distribution Center and retailers at PT XYZ
2. Determine the suitable reorder point for the inventory of finished goods in Distribution Center and retailers at PT XYZ
3. Increase the service level with multi-echelon inventory policy of finished goods in PT XYZ

I.4 Research Limitations

In order to get the research done in focused to the purpose, the limitations of this research are as follows.

1. This research is concerned with two-echelons distribution system of PT XYZ
2. This research is concerned on customer demand that follows Poisson demand which occurred at each retailer
3. The data used are the historical data on January 2015 – November 2015
4. This research does not consider the product return
5. This research assumes the replenishment lead time associated with each stage of echelon is deterministic
6. This research assumes that the production plant of PT XYZ is considered as internal supplier of DC with unlimited stock and the demand of each retailer has independent demand
7. This research does not consider the transportation cost
8. This research is up to recommendation phase only

I.5 Benefits of Research

The benefits of this research are:

1. Obtaining recommendations for PT XYZ to determine the optimal order quantity and reorder point for each retailer and distribution center (DC)
2. Obtaining recommendations for reducing stock out and increasing the service level with minimum inventory costs by optimizing the parameter of inventory control

I.6 Writing Systematics

The writing systematics of this research is described as follows:

Chapter I Introduction

This chapter describes about the background of research, problem identification, the purpose of research, the limitation of research, the benefit of research, and writing systematics.

Chapter II Literature Review

This chapter contains the detail description of literature study that examined from the existing researches as supporting references in conduct this research. In addition, this chapter will discuss the related theory and method that will be used to solve the problem.

Chapter III Research Methodology

This chapter describes the conceptual model and problem solving systematics of this research in detail including problem identification, data collecting and processing, and conduct the conclusion and recommendation

Chapter IV Data Collecting and Processing

In this chapter, it will show the primary and secondary data supporting this research and also conduct the data processing appropriate with the conceptual method and so being analyzed to get the recommendation for problem solving.

Chapter V Analysis

In this chapter, the analysis against the result of data processing obtained from previous chapter, will be conducted. Besides, the comparative analysis also will be performed in this chapter to compare the initial conditions and the recommendation proposed by the researcher.

Chapter VI Conclusion and Suggestion

This chapter will describe the summary of the research study and its results as well as the suggestions for the next study.