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Production and Capacity Planning as well as Inventory and Distribution Control in Snack Packaging Companies Using Open Source ERP Simulation

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Abstract—PT. XYZ is a company that produces cardboard packaging. The product that is most in demand by customers is snack packaging. Snack packaging products have an erratic demand that affects the production process and ordering of raw materials. Therefore, companies need a more effective improvement proposal design starting from forecasting, inventory, distribution, production planning, and ERP simulation. The data needed to start the research are the raw materials used, data on demand for snack packaging products for the past 1 year, lead times for raw materials, machines used, and other data. Data processing begins with forecasting using the Double Moving Average, Single Moving Average, Weight Moving Average, Double Exponential Smoothing, Single Exponential Smoothing, Cyclic, Linear Regression, and decomposition methods followed by validation and verification of forecasting methods Mean Absolute Deviation, Mean Square Error, Mean Absolute Percent Error, and Standard Error of Estimate. Forecasting results that have been verified are followed by aggregate planning, Rough Cut Capacity Planning with Capacity Planning using Overall Factors, Bill of Labour Approach, Resource Profile Approach, safety stock methods, Material Requirement Planning with the Least Unit Cost, Lot for Lot, Silver Meal, Economic Order Quantity, Period Order Quantity, Capacity Requirement Planning, Distribution Requirement Planning, and Enterprise Resource Planning methods. The proper forecasting method used is the decomposition method which has the least error compared to PT. XYZ methods. The calculation of mixed aggregate planning (overtime and shifts) is the right method because it costs the least total cost, namely \$ 34023.54. The results of Capacity Requirement Planning and Rough-Cut Capacity Planning calculations do not indicate a lack of capacity to meet the demand for the Master Production Schedule. The proper Material Requirement Planning method is the Period Order Quantity lot-sizing method with a 47.6% savings compared to PT. XYZ. Proper distribution planning using the Distribution Requirement Planning method with a savings of 36.3% compared to PT. XYZ methods.

Keywords—Forecasting, Aggregate, Rough Cut Capacity Planning, safety stock, Material Requirement Planning, Capacity Requirement Planning, Distribution Requirement Planning, Enterprise Resource Planning.

I. INTRODUCTION

In this millennial era, industrial growth is increasing with many unfulfilled community needs. Community needs that

have not been met cause the emergence of new companies (startups) so that companies also have new competitors. Therefore, companies need the right method or strategy to ensure that the products produced meet consumer demand and increase productivity so as not to compete with other companies [1]. One of the methods needed is the forecasting method. The forecasting method is a method used to estimate product demand in the next period [2]. This method is very useful to use because this method can help forecast how much raw material is needed for the product production process in the next period [3]. In addition to forecasting, planning raw materials is also important in production. This is because planning raw materials will avoid the lack or excess of raw materials which will later be used in the production process [4]. A well-planned amount of raw materials can reduce costs and facilitate the production process which will facilitate the product distribution process [5].

PT. XYZ is a company engaged in printing and packaging that has been established for 10 years in the Tangerang area. This company has a make-to-order principle and its products are dominated by consumer snack packaging. Snack packaging products become regular products ordered periodically by consumers. The snack packaging production process includes several stages starting from the cardboard cutting process, plate printing, design printing, coating, pond process, packing, glueing, and packaging. The raw materials used to produce this snack packaging are duplex paper, offset ink (cyan, black, yellow, magenta, blue, and green), a coating layer (UV oil), and adhesive glue. After the raw materials are processed, a snack packaging product will be produced.

Companies that have the principle of make-to-order, of course, must have the availability of sufficient and appropriate raw materials so that the production process activities can run according to existing plans. To ensure that sufficient raw materials are used, it is necessary to carry out inventory control and production planning. Inventory control and production planning are plans carried out to determine production levels, manage inventory, and plan raw materials based on forecasting or forecasting carried out [6]. Before planning production and inventory control, demand forecasting is done first. Forecasting itself is the initial stage of a decision-making process to forecast the demand for a product in the future [2].



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CERTIFICATE OF PARTICIPATION

This certificate is proudly presented to


Vanessa Angelica Budiono, Lina Gozali & I Wayan Sukania

whom have successfully presented the paper with the title of

**Production and Capacity Planning As Well As Inventory
and Distribution Control in Snack Packaging Companies
using Open Source Erp Simulation**

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PROF. DR. RAMLI ADNAN
General Chair
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