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ANALYSIS OF INVENTORY PLANNING FOR BRICK RAW MATERIALS USING THE MATERIAL REQUITMENT PLANNING (MRP) METHOD

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Abstract: *Material Requirement Planning (MRP) is a method used to control the availability of raw material planning for a product. MRP is a better inventory planning and scheduling technique for a unit of product produced. Problems at PT. Maju Jaya Prima Batu Bata. that has been implemented and researched by the author is about the availability of planning for raw materials for brick products, so that it is successful and on time as expected and in order to fulfill the ever-changing demand in each period. For this reason, proper planning is needed for the planning needs of red brick raw material inventory to run effectively and efficiently. Planning material requirements using the MRP method in this paper uses the lot sizing method, where the lot sizing methods used are Lot-for-lot, Economic Order Quantity (EOQ) and Period Order Quantity (POQ), as well as using Moving Average and Simple forecasting. Average to find out the need for raw materials in the future. Based on the results of the smallest MSE calculation, the method chosen is the Moving Average with a value of 72,211,414. Based on the results of the MRP calculation with the lot sizing technique, namely POQ, resulting in a total cost of 1,939,788 orders for the minimum raw material, POQ is used as a solution for controlling raw material inventory at PT. Maju Jaya Prima Batu Bata.*

INTRODUCTION

The development of the industrial world makes the company optimize its production planning system. A good planning system will help companies manage production activities, reduce production costs, and streamline product results so that they can produce competitive selling prices. One of the things that affect the cost of production activities is the cost of raw material inventory.

Inventory planning has an important role in production activities and streamline the inventory system. If the supply of raw materials is not sufficient, it will disrupt production activities, on the other hand, if there are too many, it will cause large storage costs. As in the brick industry, things that still cannot be controlled properly are the problem of raw

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material production, where raw materials are difficult to obtain, so managers are more extravagant to look for raw materials to each area where raw materials can be obtained for brick making. The use of bricks is widely used for walls in residential buildings, buildings, fences, channels and foundations. Utilization of bricks in buildings there needs to be an increase in production and planning as well as quality inventory and the right time as expected when purchasing raw materials. The bricks themselves are made of clay with added materials, water, soil ash, diesel/palm oil. The brick business is a business that has potential to be developed, because this business has created jobs and can absorb labor in rural areas and small cities.

One of the things that affect the cost of production activities is the cost of raw material inventory. Inventory planning has an important role in production activities and streamline the inventory system. If the supply of raw materials is not enough, it will disrupt production activities, on the other hand, if there are too many, it will cause large storage costs. The phenomenon that is happening is the problem at PT. Maju Jaya Prima Batu Bata Serdang Bedagai. The brick craftsman who will be examined by the researcher is regarding the availability of planning raw materials for brick products, so that it is successful and on time as expected in order to fulfill the ever-changing demand in each period. For this reason, it is necessary to have proper planning for the need for planning supplies of raw materials for bricks to run effectively and efficiently. Before using the MRP analysis method PT. Maju Jaya Prima Batu Bata Serdang Bedagai is able to produce 160,000 bricks with a stock capacity of safety raw materials at a cost of Rp. 24,888,279.00.

But in 2019 PT. Maju Jaya Prima Batu Bata Serdang Bedagai has started using MRP analysis and was able to save production costs of Rp. 18,776,190.00 by using the LFL method of 1,200,000, so as to increase production results by saving raw material stock costs by analyzing raw material inventory savings so that they can increase the amount of production so that it can meet the ever-changing demand. Demand in the manufacture of these bricks can affect the company in producing and result in risks to the supply of raw materials. Demand is closely related to the global financial economy which has often weakened recently because the need for raw material supplies depends on the stock and prices of goods. In today's competition, companies must have a strategy to provide optimal raw materials and minimize the risk of loss of raw material inventory to facilitate the company's activities in the production process. To anticipate this uncertainty, the company must provide raw material storage so that later the need for raw material inventory can be predicted. So the company must be careful, precise, and correct in planning the purchase of raw material inventory.

Judging from the phenomenon above, the researchers are interested in conducting research with the title "Brick Raw Material Inventory Planning Analysis with the Material Requitretment Planning (MRP) Method at PT. Maju Jaya Prima Batu Bata Serdang Bedagai".

Research purposes

The objectives of this research are:

1. To find out how the Strategy Analysis of Raw Material Inventory Planning Material Requitretment Planning (MRP) at PT. Maju Jaya Prima Batu Bata Serdang Bedagai.
2. To find out how the Material Requitretment Planning (MRP) Method Strategy at PT. Maju Jaya Prima Batu Bata Serdang Bedagai.

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LITERATURE REVIEW

Definition of Raw Material Inventory Planning and Control

Before arriving at the notion of planning and controlling raw material inventory, the following explains the meaning of raw material inventory. According to Heizer and Render (2014), all organizations have some type of planning system and inventory control system, because essentially inventory planning and control need to be considered. From the above understanding it can be interpreted that inventory control is something that needs to be considered where to maintain a balance between the amount of inventory and the costs incurred from inventory.

Control Purpose

Inventory Inventory control activities of raw materials carried out by a company have targets that must be considered or which become the object of control itself. In general, raw material inventory control is to maintain a balance between costs and production targets, or in other words the company can make savings. According to Agus Ristono (2009) the purpose of carrying out inventory control is stated as the company's efforts to:

1. To be able to meet consumer needs or requests quickly (satisfy consumers).
2. To maintain the continuity of production or keep the company from running out of inventory which results in the cessation of the production process, this is because: a. Possibility of goods (raw and auxiliary materials) become scarce so difficult to obtain b. It is possible that the supplier is late in sending the ordered goods. To maintain and where possible increase the company's sales and profits
3. To maintain and if possible increase the company's sales and profits

Inventory Model

According to Kamarul (2009) there are two main types of models in inventory management, namely models for independent inventory and dependent inventory models.

a. Independent inventory model independent inventory model is a model for determining the amount of material/goods purchases that are free, usually applied to the purchase of inventory where the demand is continuous from time to time and is constant. Purchase orders can be placed without considering the use of the end product. The inventory model used, namely: Economic Order Quantity (EOQ) is one of the oldest and widely known inventory control techniques, this inventory control method answers two important questions, namely when to order and how much to order.
b. independent inventory model, what is meant by dependent inventory model is a model for determining the amount of purchase or supply of materials/goods which is highly dependent on the number of final products that must be made in a certain production period. The amount of final product that must be produced depends on consumer demand. The amount of consumer demand is independent, but spare parts or product components are dependent on the number of final products that must be produced. The model for determining the amount of purchase or supply of spare parts or product components can be approached with Material Requirement Planning (MRP). MRP 8 can also be applied if the number of requests for the final product is sporadic and irregular (irregular).

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Request Management

Demand management is defined as a function of managing all product requests to ensure that the master schedule is aware of and aware of all product requests (Gaspersz, 2012). Demand management will collect information related to forecasting (forecasting), order entry, order promising, branch warehouse requirements, inter-factory orders (interplan orders), and the need for service parts, such as spare parts for equipment maintenance, research needs. and product development, etc. Broadly speaking, the activities in demand management can be categorized into two main activities, namely: service orders (order service), and forecasting (forecasting).

RESEARCH METHODOLOGY

A. Type of Research

The type of research used in this research is descriptive qualitative. According to (Sugiyono, 2014) qualitative research methods are research methods used to examine the condition of natural objects where the researcher is the key instrument. This study aims to find out how companies optimize raw material supplies to the production process so that it can meet the ever-changing demand.

B. Location and Time of Research

This research was conducted at PT. Maju Jaya Prima Batu Bata Serdang Bedagai, Jalan Jati Mulyo, Pengjahan, Serdang Bedagai Regency. The time of this research began in May 2021 until it .

RESULTS AND DISCUSSION

A. Data Analysis

The purpose of data analysis is to simplify data into a form that is easier to read and interpret, often using qualitative descriptive as a tool. And in general, data analysis uses the triangulation method as a method that ensures the credibility of the data. Triangulation is a technique of checking the validity of data that utilizes something other data outside the data for checking purposes or as a comparison against the data. The most widely used triangulation technique is examination through other sources. According to Sugiyono (2016) there are 3 types of data triangulation, namely source triangulation, technical triangulation, and time triangulation. In this study, researchers used source triangulation and technique triangulation. This process is carried out in order to produce information that has a high level of credibility and can describe information that actually occurs in the interaction space. The following explains the triangulation of sources:

1. Triangulation Technique

This triangulation tests credibility by checking data from the same source with different techniques (Sugiyono 2016). Triangulation techniques consist of observation, interviews and documentation. The process carried out by researchers is to visit the research site. The following is an explanation of technical triangulation:

a. Interview

Interviews are part of the technique that researchers use in research, this is where the researchers consider a situation where information is obtained by continuing the observation technique, namely interviews or by asking informants to produce information

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that is able to answer the problems in this study. At this stage the researcher in collecting data is conducting interviews and discussions about creative marketing. The next step is to conduct in-depth interviews. Implementation of in-depth interviews addressed to employees. In-depth interviews were carried out to add data that had been obtained previously through observation.

b. Documentation

Documentation is an inseparable part of the techniques used in this research such as observation and interviews. Documentation itself acts as a reinforcement of information from the results of interviews or from observations made by researchers during the study from the beginning was finished. until the end of the study. The information that the researcher obtains from the documentation is a description of what the researcher observes, searches for, and gets intentionally to document the research journey. The results of interviews conducted by Mr. Beni as an employee of the warehousing and raw material staff of PT. Maju Jaya Prima Batu Bata Serdang Bedagai:

1) In your opinion, what is the right raw material inventory planning strategy in this brick business? "The most important thing in my opinion is to see how big the demand for stone products is, so we can predict how we will prepare raw material supplies when the order will be made."
2) What materials do you need to make bricks? Answer "for the manufacture of bricks consists of clay, water, sand and oil."
3) What is the price list of raw materials for the manufacture of these bricks? Answer "ordinary clay for a maximum stock of 3 dr = um stuck for IDR 3 million Water is sourced from drilled wells and for stock is placed in a water tank of approximately 4000 liters, it costs around IDR 400 thousand to pay for 1 dum struck sanyo sand at a price of IDR 300 thousand and 50 liters of oil at IDR 550 for mixed ordinary oil as much as possible because this oil is used for lubricants when printing only."

Interview with Mr. edi as an employee of the brick marketing division of PT. Maju Jaya Prima Batu Bata Serdang Bedagai. The results of interviews with production employees at PT. Maju Jaya Prima Batu Bata Serdang Bedagai are as follows:

1) What is the maximum dum truck for brick making supplies? Answer "For ordinary supplies, taking land can be 5x in 1 day because to find land it is not easy to increase inventory to avoid shortage of raw materials"
2) And what media do you use for burning the bricks? The answer "for the brick burning itself, this company uses palm pulp because it is more durable for burning and more efficient than wood".
3) For the manufacture of 1 ordinary brick required some raw materials? The answer is "usually for 1 brick that we make weighing 2 kg, it requires a clay mixture of approximately 1.5 kg of water, 0.4 liters of sand, about 1 handful for the mixture and 0.5 oil for lubricating only"

A. Discussion

1. From the Results of Interviews with Marketing and Warehousing Staff Some Raw Material Inventory Planning Seen From Demand. Data Production and demand data for brick products during 2020 starting from January to December can be seen in table 4.1 below.

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Table 1. Demand Data for Measuring Inventory PT. Maju Jaya Prima Serdang Bedagai bricks

Periode	Tahun	Permintaan	Produksi
Januari	2020	27695	26642
Februari	2020	28126	27332
Maret	2020	28340	27094
April	2020	28732	28017
Mei	2020	28985	29452
Juni	2020	28874	28020
Juli	2020	29210	28272
Agustus	2020	29512	29868
September	2020	29686	29166
Oktober	2020	29864	29286
November	2020	29834	29785
Desember	2020	29437	29860

a. Raw Material Inventory Data Inventory data is a record of the state of inventory that is recorded. The recording of inventory data can be seen as follows.
b. Data Bill Of Materials (BOM). Based on the production structure with the specified load from the information on the type of components used, the number of components needed. Examples are as follows:

1. Forecasting (forecasting)

Forecasting is the art and science of predicting future events. This can be done by involving taking historical data and projecting it into the future with a form of mathematical model. In addition, it can also be a subjective intuition prediction. Or it can also be done by using a combination of mathematical models adapted to the good judgment of a manager. The forecasting method used is based on the plot of past demand data obtained from PT. Maju Jaya Prima Batu Bata Serdang, namely:

A. Implications of Research Results

The implications of this research are divided into two parts, namely practical and theoretical implications. Theoretical implications are related to the development of research results for future research related to the MRP analysis method.

1. Theoretical Implications

Based on the research results, the theoretical implications in this study are as follows:

a. This study provides a reference for the results of studies related to the Material Requitment Planning method.
b. This study provides additional references about the results of using MRP . techniques
c. This study provides a reference for the results of studies on forecasting in the future.
d. This study provides a reference for the results of studies on the master production schedule to schedule the inventory system so that it can run as desired

a. Practical Implications

The results of this study have several implications for the company PT. Maju Jaya Prima Batu Bata Serdang Bedagai, namely:

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1. PT Maju Jaya Prima Batu Bata Serdang Bedagai is expected in the future to be able to pay more attention to and correct the problem of ordering raw materials accurately, because this is very influential in being able to meet ever-changing demands.
2. The results of this study can be used as a basis for the company PT. Maju Jaya Prima Batu Bata Serdang Bedagai to perform a computerized system using the MRP method in order to make it easier to analyze raw materials and final results so that companies can find out in detail and can facilitate the company to stock up on raw materials in the future.

b. EXSPERT JUDGEMENT STATEMENT

I hereby request Ms. Yenni Arfah, S, H, M.AK as an expert lecturer in the field of Operational Management, asking Mrs. to be able to provide an assessment of the author's research instrument entitled "Brick Raw Material Inventory Planning Analysis using the Material Requitment Planning (MRP) method.) at PT. Maju Jaya Prima Batu Bata Serdang Bedagai" here are some questions, namely:

1. What do you think about the Material Requitment Planning (MRP) Method?
2. What are the Benefits of MRP for the Company?
3. What are the advantages or disadvantages of the Material Requitment Planning method?
4. What are the benefits of using the mrp method in a company to save production costs?
5. What are the benefits of strategic planning?
6. What is the purpose of MRP in a company?
7. Can using master production schedule analysis be completed in accordance with the expected time?

CONCLUSIONS

Based on the results of the study, the discussion of research results can be concluded:

1. The best forecasting method used for forecasting demand for the next 1 year is to use the Moving Average (MA) method because this method is the lowest so that it can meet the ever-changing demand for orders.
2. Lotting method for controlling raw material inventory of PT. Maju Jaya Prima Brick is the LFL method because it has the lowest cost value so it can reduce risk.

RECOMMENDATIONS

From the order price of the main raw material bricks, the costs incurred by PT. Maju Jaya Prima is not too expensive. Based on the results of the MRP calculation with the MRP technique, namely LFL because it produces the minimum order of raw materials used as a solution for controlling raw material inve

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