



## INVENTORY MANAGEMENT ANALYSIS USING THE MATERIAL REQUIREMENT PLANNING (MRP) METHOD IN THE OPTIMIZATION OF HANDICRAFT RAW MATERIALS

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### Abstract

Raw material inventory is a very important asset for a business. The inability to carry out effective planning of raw material inventory can have a negative impact on the production process. Research aimed at optimizing material inventory planning is a very important step to increase the efficiency of the production process. Qualitative analysis is indeed an important and relevant research method in optimizing material inventory planning. This method focuses on an in-depth understanding of the data collected, exploring the meaning of the information provided by informants through interviews, observation, or documentation.

The MRP (Material Requirements Planning) method is an effective approach in optimizing material inventory planning. This method allows companies to place orders for raw materials precisely, determine the amount of goods to be purchased, and reduce the risk of delays in the supply of raw materials. The results of using the MRP method are: (1) being able to order raw materials precisely, because we already know what is needed, (2) can determine the amount of goods to be purchased, (3) reducing the risk of delays in the supply of raw materials.

**Keywords:** Safety Stock, Inventory, MRP, Reorder Point

### INTRODUCTION

Shop owners and/or traders play an important role in inventory management. Inventory management involves ordering activities, where the shop owner or merchant needs to determine the right quantity of product orders and the right time to meet customer demand. (Panigrahi, et al, 2021). By implementing effective inventory management, shop owners or traders can optimize their business operations, meet customer demands, avoid over or under stock, and increase the efficiency and profitability of their business. In inventory management, ordering activity plays an important role. The shop owner or trader is responsible for determining the right product order quantity and right time to ensure sufficient stock to meet customer demand. (Orobia, et al, 2020). In all, it is important for the shop owner or merchant to carry out careful inventory planning, taking into account customer demands, inventory needs, and exact timing of orders. By carrying out ordering activities properly, they can minimize the risk of inventory shortages or excess stocks, increase customer satisfaction, and improve the operational efficiency of their business.

Particular attention should be paid to inventory, because an error in determining (selection) of inventory can lead to financial losses and customer dissatisfaction. Too much inventory leads to higher inventory costs (Panigrahi, et al, 2021), which eats up capital and throws a company's finances into

disarray. Too much inventory can also cause a variety of problems, including supplies that become obsolete, damaged, or lost through theft. (Orobia, et al, 2020).

Low inventory also has a negative impact on business. Some of the impacts that may occur due to low inventory are lost sales, customer dissatisfaction, production disruptions, decreased efficiency. To avoid this negative impact, companies need to carry out effective inventory management by paying attention to customer demand, carrying out good inventory planning, and monitoring inventory levels regularly. The goal is to strike a balance between sufficient inventory to meet customer demand and moderate inventory. (Orobia, et al, 2020).

Inventory must be planned to reduce storage costs and maximize customer service. Therefore, store owners and retailers must maintain effective inventory levels at the right time, in the right place, at the right cost and at the right time intensity. Inventory management is closely related to purchasing decisions. In making purchasing decisions, owners and/or dealers must consider cost factors, quality factors, time factors, and response factors to acquisition and maintenance. In addition, warehouse management is also heavily influenced by human error, especially when many employees are involved in warehouse management. (Panigrahi, et al, 2021)

One of the methods used to control inventory levels is Material Requirement Planning (MRP). The MRP method is used to plan and control the supply of materials or raw materials so that they are always available in the right amount and at the time needed to meet the needs of orders or production. The purpose of your research is to maintain raw material supplies, even if in small quantities, in the hope of reducing inventory costs incurred.

## **LITERATURE REVIEW**

### **Supply**

Inventory is one of the valuable assets owned by the company as a form of meeting customer needs. In the journal Batubara et al., (2022) states that the capital invested by companies for the success of the production process is around 50% of the total capital.

Inventory is considered as goods stored to facilitate production activities, meet customer needs, or be sold in future periods (Sofiyannurriyanti, 2017). In the book Rangkuti (2022) in Tannady & Filbert, (2018a) explains a number of materials used in processes that are within the company to carry out the production process on finished goods in order to fulfill customer requests known as inventory. To meet current customer needs, companies are required to have sufficient inventory. This means that the expected inventory is neither excess nor reduced. With sufficient inventory, the company does not bear the risk of excessive costs or the risk of damage to goods. According to Batubara et al., (2022), too much inventory results in storage costs borne by the company.

From the impacts described above, in this case the company needs good and appropriate management to allocate the amount of inventory effectively and efficiently so that it can reduce wastage of costs and achieve the goal of profit. One of the management is inventory management. Inventory

management is the most important aspect to be considered by decision makers in the company. Inventory management is the ability of a company to control, manage, arrange materials so that they are always available. With the presence of inventory management, it can reduce the waste of costs for inventory (Lutfiana & Puspitosari, 2020). One form of inventory management activity is inventory control.

In the journal (Wikantari et al., 2018) decisions in determining inventory policies such as how many goods or raw materials to order in a certain period must be wisely scrutinized by the company. This is in line with the explanation (Ayu, 2018) that the number of needs needs to be calculated carefully so that the number of needs is not too large so that the inventory costs are not too large so as to minimize the risk as small as possible. Every company must be clever in determining the amount of inventory to be used in production activities due to costs such as factory operating costs, building costs, lost costs, and damage costs (Sulaiman & Nanda, 2015).

### **Material Requirements Planning (MRP)**

According to the statement of Heizer and Barry Render (2015), Material Requirements Planning (MRP) is a dependent demand technique that uses lists of materials, inventory, expected receipts, and master production schedules to determine material requirements. In practice, MRP combines information about production schedules, bill of materials, demand levels, and existing inventories to calculate the required material requirements in a given time period. This method uses the dependent relationship between raw materials, components, and final products to calculate material requirements based on planned production levels. The application of MRP can help increase production efficiency, reduce inventory costs, improve delivery timeliness, and increase customer satisfaction by ensuring adequate availability of raw materials for production.

Based on the views stated above, material requirements planning is a planning method that aims to plan the acquisition of raw materials by controlling the availability of raw material capacity for production purposes in such a way as not to disturb it. The system used to plan raw material requirements is the Material Requirement Planning (MRP) method. With the help of a material requirements planning system, the amount of raw materials ordered can be determined according to production needs by calculating costs arising from storage such as ordering and storage. The balance achieved is the balance between the demand for production raw materials and the supply of these goods, both stock and made to order. Therefore we need a method of planning material requirements for inventory management in accordance with the reality of the company. The integration of raw material planning can be continued with the material back planning method which can be used to speed up the sales process thereby affecting sales. With good planning and leadership, companies can produce products based on needs with timely production and cost efficiency.

## **Safety Stock**

The definition of safety stock according to Fahmi (2016) is additional inventory maintained by the company as a security measure to overcome uncertainties in customer demand, ordering time, or delivery time from suppliers. The purpose of safety stock is to protect the company from the risk of inventory shortages which can cause interruptions in operations, lost sales, or customer dissatisfaction.

Safety stock has an important role in protecting the company's inventory from the risk of late delivery and maintaining smooth production. Factors that affect the amount of safety stock include lead time (order time until goods are received) and optimal raw material requirements. (Wahid & Munir, 2020).

## **Reorder Points (ROP)**

Reorder point is one of the strategies used by companies to ensure timely fulfillment of customer needs. The reorder point is the inventory level at which the company must reorder to avoid inventory shortages (Mujiastuti, et al., 2018). The process of calculating reorder points can involve factors such as lead time, stable or fluctuating demand levels, confidence in delivery reliability, and the need to avoid inventory shortages that could negatively impact customers or company operations. By setting the right reorder point, companies can optimize their inventory, avoid inventory shortages, and ensure that customer needs are met in a timely manner.

## **METHOD**

### **Research Type**

The research described is qualitative research. The qualitative research method, as explained by Sugiyono (2018), is a research approach that is based on the philosophy of postpositivism and focuses on understanding the meaning and construction of phenomena, not on generalizations. In qualitative research, researchers try to understand the context and complexity of the phenomena studied. The method of collecting data in qualitative research is usually carried out through triangulation techniques, which combine various data sources, such as interviews, observation, and document analysis. An inductive approach is used in data analysis, in which the findings and patterns that emerge from the data become the basis for developing understanding and constructing the phenomena studied.

Qualitative research methods are used when researchers want to understand and explain phenomena in their natural contexts, such as human behavior, social interactions, or individual experiences. This approach is useful in studying aspects that are complex, not quantifiable, or in situations where experimentation is not possible or does not fit the research objective.

### **Location and Time of Research**

The research was conducted at the by Ovi bucket manufacturing site on Jl. Sumurpecung Tegal, No. 30 Sumurpecung Serang District, Serang City, Banten 42118. While the research was conducted in January 2023.

## **Research Subjects and Objects**

### **1. Research Subjects**

The subjects of this study were Rofifah as a business owner and flower bucket craftsman with various sizes and creations and 4 consumers who had bought flower buckets at the bucket shop by Ovi

### **2. Research Object**

The object carried out by researchers in this study is the availability of raw material stocks in the manufacture of handicrafts that are still fulfilled by bucket by Ovi artisans using the MRP method.

## **Data Sources and Data Collection Techniques**

In research, there are two types of data sources that are commonly used, namely primary data sources and secondary data sources. According to Sugiyono (2016) states that “data collection is carried out under natural conditions, primary data sources, as well as more on participant observation, in-depth interviews and documentation”.

1. **Primary Data Sources:** Primary data sources are data collected directly from the original source for the purpose of the research being conducted. Some examples of primary data sources include: Interviews, Observations, Questionnaires, Case studies.
2. **Secondary Data Sources:** Secondary data sources are data that has been collected by other parties for other purposes, but can be used by researchers for their analysis. Examples of secondary data sources include: Scientific publications, statistical data, research reports, official documents.

The combination of using primary data sources and secondary data sources can provide more complete and in-depth information in research. Primary data sources provide direct data relevant to research objectives, while secondary data sources can provide context, comparison, or support for research findings that are being conducted.

## **Data Collection Instruments**

In qualitative research, the researcher himself is the main instrument for collecting data. Sugiyono (2016) states that researchers are a tool for recording information during research. Researchers directly go into the field to find and collect data needed in research. In qualitative research, research instruments are often in the form of observation guides and interviews. The observation guide contains a list of questions, topics or important points that will be observed by researchers when conducting field observations. The interview guide contains questions or topics that will be asked of respondents in the interview.

## **Data Analysis Methods**

Data analysis in qualitative research, as explained by Sugiyono (2019), involves the process of finding, compiling, and organizing data obtained from interviews, field notes, and documentation. This

process aims to produce a deeper understanding and facilitate the interpretation of data by researchers and others. Following are the steps that are commonly carried out in qualitative data analysis based on Sugiyono's explanation:

1. Organizing data into categories: The data obtained is grouped into categories or themes that are relevant to the research objectives.
2. Breaking down into units: Data in each category or theme is further analyzed by explaining and describing the relevant data units.
3. Synthesize: The data from the units described are thoroughly studied to look for patterns, similarities, differences, or relationships between them.
4. Organize into patterns: The data found is organized into broader patterns or themes.
5. Choose what is important and will be studied: The researcher determines the elements that are important and relevant in the data analysis.
6. Draw conclusions: Conclusions are drawn based on the results of data analysis, integrating emerging findings, and providing a comprehensive understanding of the phenomenon under study.

According to Miles and Huberman in Sugiyono's book (2019) Qualitative research data analysis was carried out at the time of data collection and after data collection was completed within a certain period of time. Qualitative data analysis activities are carried out interactively and continue until completion, so that the data becomes saturated.

## **DISCUSSION OF RESEARCH RESULTS**

### **Bucket Inventory Analysis By Ovi**

As a creative worker by relying on expertise and creativity to sell various products to consumers, of course you cannot escape the raw materials used. When the products have been sold, the supply of raw materials also decreases. As a result, raw materials are running low, so the products that will be sold later will not be optimal. Based on interviews, bucket by Ovi owners often run out of most of the raw materials in making buckets due to a lack of attention to raw material inventory stocks.

The researcher also interviewed several bucket buyers to get information on the consumer side. Some buyers say that they are satisfied with the results of the buckets they bought, not only are the results good, but the materials used for the buckets are of good quality. One buyer said that he once ordered something he didn't fully desire, one of which he ordered a bucket with a silver ribbon but the availability of ribbon stock at Bucket by Ovi was not available so he had to choose another color, even so he was very satisfied with the results of the bucket he ordered .

### **Manage Inventory**

Managing stock inventory with the help of technology has indeed become easier. With faster and more efficient stock management, consumer demand for products has also increased. So as to maintain business performance to be able to meet consumer needs.

Separation of storage warehouses for raw materials and finished products is the first step in managing inventory. Apart from providing separate warehouses for different stocks, here are some ways to optimize stock management:

1. Set a Maximum Item Limit

Businesses need to have a stockpile of raw materials to create a product. To maintain business performance and meet consumer demand, it is necessary to set a minimum stock limit, and if the stock is close to the minimum limit, it is necessary to place an order for stock. That way, businesses can continue to produce without any constraints both from time and stock.

2. Conduct Consumer Demand Research

To keep the business running smoothly, business people need to have predictions of consumer demand for a product. To predict consumer demand, business people must have data from several sources such as market trends, previous sales data, economic growth rates and calculate planned advertising costs.

3. Build Good Relationships With Suppliers

To be able to maintain the availability of raw material stocks, it is necessary for business people to build good relationships with suppliers or suppliers. That way suppliers will be more willing to cooperate regarding raw material stocks. So that businesses can maintain the quality of the products produced, and meet the number of consumer demands.

### **Analysis of the Use of the Material Requirements Planning (MRP) Method**

The use of the Material Requirements Planning (MRP) method in the bucket by Ovi business can help identify the amount and time of material needed, it also helps to avoid production delays caused by problems with material shortages or raw materials. The use of this method also guarantees that materials or raw materials are always available to meet the needs of the bucket by Ovi.

### **Product Availability In Maximum Safety Stock**

Store inventory systems often face problems in determining the quantity of goods needed. Insufficient inventory can cause stock shortages and interfere with smooth sales, while too much inventory can result in high storage costs and the risk of damaged or obsolete goods. In this context, the safety stock function is very important in store inventory management. Safety stock is additional inventory that is maintained by the company as a safeguard to deal with demand uncertainties or delivery delays. It should be understood that too much inventory will be detrimental to the company, whereas if it is too little, the business is prone to running out of stock. The benefits of safety stock are as follows:

1. Increasing Profits

Safety stock is the company's way of ensuring that every consumer request can be fulfilled. In this way, the business will never run out of goods and sales will continue to occur so that profits increase.

2. Anticipate Surge in Demand

Ahead of big days such as Eid and Christmas, many people will look for bucket gifts as a form of celebration. At times like these, the artisan business must have safety stock. Thus, buyers will not miss the opportunity to increase sales just because they run out of stock.

3. Number of Consumers Continues to Increase

The existence of a safety stock can guarantee that the product will always be available whenever a consumer buys it so they will not be disappointed. If all customers can get the product they want to buy, of course there will be a much greater chance for them to make another transaction.

### **Use of Reorder Points (ROP)**

The use of Reorder Point (ROP) in inventory management, including in the context of “bucket by Ovi”, has a very important role. If ROP is not implemented properly, several problems can arise that can disrupt the business cycle. Some problems that may occur if ROP is not implemented properly include:

1. Out-of-Stock

If the ROP is set too low or is inaccurate, there is a risk of running out of stock in the store. This can lead to the unavailability of the goods that the customer wants, causing lost sales and disappointing customers. Out of stock can damage a store's reputation and customers may seek other alternatives.

2. Overstock

On the other hand, if the ROP is set too high or does not match the actual demand, the store may experience overstock. Excess inventory can tie up a company's capital and increase storage costs, as well as increase the risk of damaged or expired goods. This can reduce the profitability and efficiency of the store.

3. High Storage Costs

If ROP is not managed properly, stores can face high storage costs. Excess inventory caused by an ROP that is too high can lead to unnecessary storage costs, such as warehouse costs, inventory management costs, insurance, and the risk of damaged or obsolete goods.

4. Lack of Demand Prediction

Imprecise ROP may result in the inability to accurately predict actual supply requirements. If there is no adequate prediction, stores may find it difficult to respond to changes in demand, be it increases or decreases, which can disrupt the smooth business cycle.

5. Supply Chain Disruption

If ROP is not adjusted according to lead time or delivery delays from suppliers, there may be a misalignment between inventory requirements and procurement times. This can lead to unavailability of inventory when needed or increase the risk of excess inventory due to late delivery.



In order to avoid these problems, it is important to carry out a thorough analysis, take into account relevant factors such as demand, lead time and supplier reliability level, and set the ROP wisely. This will help maintain proper inventory availability, avoid stockouts, reduce storage costs and improve operational efficiency.

## CONCLUSION

To maintain business performance and meet consumer demand, it is necessary to set a minimum stock limit, and if the stock is close to the minimum limit, it is necessary to place an order for stock. Building Good Relationships with Suppliers To be able to maintain the availability of raw material stocks, it is necessary for business people to build good relationships with suppliers or suppliers. Analysis of the Use of the Material Requirements Planning (MRP) Method The use of the Material Requirements Planning (MRP) method in the bucket by Ovi business can help identify the amount and time of material needed, it also helps to avoid production delays caused by problems with material shortages or raw materials. Availability of Products in Maximum Safety Stock Often the store's inventory system experiences major problems with the number of items needed, both raw materials and other supporting materials. Increasing Profits Safety stock is a way for companies to ensure that every consumer request can be fulfilled.

Thus, the business will never run out of goods and sales will continue to occur so that profits increase. Use of Reorder Point (ROP) Use of Reorder Point (ROP) for buckets by Ovi has a very important role, if it is not implemented properly, there is a possibility will cause problems that can disrupt the business cycle. So that there are times when the product that is in demand is no longer available on the market. When the product is available on the market, buyer interest may have decreased or not exist, because consumers can fulfill their needs by making purchases at other stores.

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