STANDARD OPERATING PROCEDURE IN COUVEE COFFEE USING MATERIAL REQUIREMENTS PLANNING APPROACH

THESIS

Submitted to International Program
Industrial Engineering Department in Partial Fulfillment of
Requirements for Bachelor Degree of Industrial Engineering
Universitas Islam Indonesia

Name : Kevin Lukita Pratama
Student Number : 12 522 078

INTERNATIONAL PROGRAM
INDUSTRIAL ENGINEERING DEPARTMENT
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ISLAM INDONESIA
YOGYAKARTA
2019

AUTHENTICITY STATEMENT

AUTHENTICITY STATEMENT

By Allah, I declare this research was conducted by me, unless the citation in which each of those are already mentioned the source and rewrite by myself. If someday this declaration letter is proved plagiarism, Universitas Islam Indonesia has right to revoke to its confession.

Yogyakarta , November 2019

ukita Pratama

THESIS APPROVAL OF SUPERVISOR

THESIS APPROVAL OF SUPERVISOR

STANDARD OPERATING PROCEDURE IN COUVEE COFFEE USING MATERIAL REQUIREMENTS PLANNING APPROACH

THESIS

By

Name : Kevin Lukita Pratama

Student Number : 12 522 078

Yogyakarta, October 2019

Supervisor

(Muhammad Ridwan Andi Purnomo, S.T., M.Sc., Ph.D.)

THESIS APPROVAL OF EXAMINATION COMMITTEE

THESIS APPROVAL OF EXAMINATION COMMITTEE

STANDARD OPERATING PROCEDURE IN COUVEE COFFEE USING MATERIAL REQUIREMENTS PLANNING APPROACH

By

Name : Kevin Lukita Pratama

Student Number : 12 522 078

Was defended before Examination Committee in Partial Fulfillment of the Requirements for the bachelor degree of Industrial Engineering Department Universitas Islam Indonesia

Examination Committee

Muhammad Ridwan A P, ST., M.Sc., Ph.D
Examination Committee Chair

Agus Mansur, ST., M.Eng.Sc
Member I

Dr. Taufiq Immawan, ST., M.M.
Member II

Acknowledged by,
Head of Undergraduate Program
Department of Industrial Engineering
Faculty of Industrial Technology
Universitas Islam Indonesia

(Dr. Taufiq Immawan, ST., MM)

DEDICATION

I dedicated my final project for my Parents, My Workmates and thank you for all my best friends. maybe I will not be able to complete this final project without help, support and assistance of all of you, thank you very much once again.

MOTTO

“Life is like riding a bicycle, to keep your balance, you must keep moving”

-Albert Einstein-

"Great people in any field are not just working because they are inspired, but they become inspired because they prefer to work. They don't waste time waiting for inspiration."

-Ernest Newman-

"Successful people have learned to make themselves do things that must be done when they really have to be done, whether they like it or not."

-Aldus Huxley-

PREFACE

AssalamualaikumWarrahmatullahi Wabarakatuh.

Alhamdulillahirabbil ‘alamin. Praise to Allah SWT the most glorious and the most merciful. Shalawat and Salam toward our adoration Prophet Muhammad SAW along with his family and followers. The guidance of Allah allows the author to finish this thesis. From the deepest of my heart, let the Author expresses the highest appreciation to those who have given supports and motivations so this thesis can be accomplished. The Author thanks to:

1. My beloved Parents, Especially for my mom, Tri Wahyu Widyaningsih. Thank you very much for any support in terms of, thank you very much for the advice and patience that is extraordinary to the author to work on this final project until finish.
2. Muhammad Ridwan Andi Purnomo, ST., M.Sc., PhD as the supervisor. Thank you very much for the help, advice and topic giving to do this final project, you are a very patient person so you can guide the writer to do this final project until the end of this semester, thank you for the guidance and advice in the process of doing this final project, hopefully You are always patient in guiding students towards the beginning of success.
3. Head of International Program Industrial Engineering, Faculty of Industrial Technology, Universitas Islam Indonesia.
4. Mrs. Diana, Mrs Devy, for giving the guidance about what are the steps the author must take to complete his study on campus.
5. For my workmates at Couvee, Lutie Coffee and especially Kaktus Coffee Place, thank you very much for never stopping to scold, be patient, provide assistance, provide support, and assist so that the writer can immediately complete this final project even though it takes a long time to complete.
6. And also for all of my friends in International Program Industrial Engineering batch 2012, thank you very much for thank you very much for having struggled together in the study period to become undergraduate.

the author also thanks all the parties concerned and that the authors cannot mention one by one who have helped in writing this final project, maybe the writer will not be able to complete this final project without the help of all of you because the writer is just an ordinary person who always needs help.

Wassalamualaikum Warahmatullaahi Wabarakatuh

Yogyakarta, November 2019

Kevin Lukita Pratama

TABLE OF CONTENT

LIST OF FIGURE

LIST OF TABLE

ABSTRACT

Nowadays, there are so many coffee shop appears in Indonesia especially at Yogyakarta. But, several coffee shops do not have a good management in operational management such as inventory management. The lack of inventory management has big impact for the business, in this case about availability of the products. One of the biggest mistakes if the coffee shop can not sell the coffee product because of there are no ingredients available in the warehouse. Of course, the customer will be disappointed.

This study aims to determine the concept of inventory management by using material requirements planning development. The method used is descriptive research with a qualitative approach. Data collection is done by the method of data collection, used in this writing is the literature method, the study of literature is done by reading the literatures related to and supporting this writing, in the form of printed and electronic libraries (internet data), while the analysis of the data used is annotated bibliography analysis.

Some conclusions obtained from this study include the forecast result after implement the MRP model. MRP model will help the coffee shop owner to know the forecast amount of some items. However, coffee shop should update the calculation for the better forecast in future. In other conclusion, the author also put some suggestion for the coffee shop owner. Build the additional standard operating procedure will help the daily operational of coffee shop easier.

Keywords: Inventory Management, Material Requirements Planning, SOP

CHAPTER I

INTRODUCTION

1.1 Background

needs is important that makes company priority, then to fulfill their needs company need to know the market's need. Marketing focus on the needs of customer to understand the future of customers just before produce a product or service for them, with customer wants and needs incorporated into the product, sales and profit goals are would met (Kehinde et al, 2016). There are various types of business from vehicle, gadget, food and beverages, and many else. One of the growing business or industry is food and beverage.

Food and beverages Industry istoo fast growing in market place, so there is much weak spot to improve. Inventory is one of the tangible investments. Inventory can help indirect profit, one of the problems that arise for business owners are not realize the true cost of carrying excess inventory. Inventory cost is defined as the cost of holding goods in stock. In the industrial world certainly looking for a way to reduce inventory cost, and chances to dead stock is bigger. There are 4 things to improves inventory management and reduce inventory cost, such as using just in time inventory management practices, measure inventory turns and set aggresive goals, reduce inventory items, and view inventory realistically.

Companies often experience problems in controlling or procuring raw materials, some examples of problems are sometimes occurring in small medium enterprises. One small medium enterprise is Coffee shop. Coffee shops usually only thinks about how is the taste of coffee, packaging of coffee, and the place. Coffee shop does not consider about their raw material, for example the scheduling orders, stock inventory and many else. Inventory problems will certainly affect the system in the company, such as bad inventory could make dead stock or miss

calculation of stock, besides that other risks may arise due to the length of storage of raw materials.

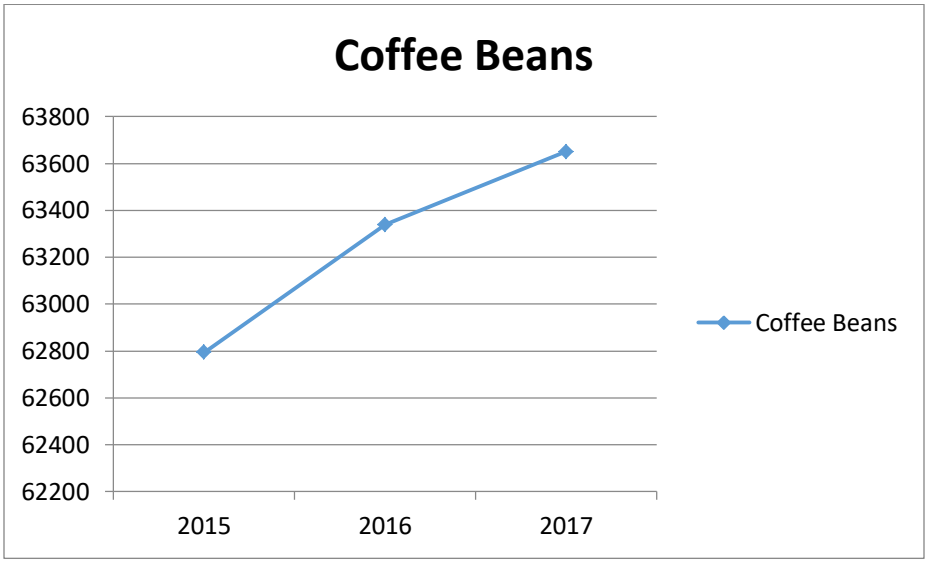
Coffee shop does not know the critical case such as when to buy material and how much quantity of material should be purchased to avoid empty stock. Therefore, Scheduling Orders Raw material is useful to know at what point the coffee shop must purchase and how much material must be purchased. Solution for get good plan in inventory is implement a material procurement scheduling system can be to use the material requirement planning. Therefore, one way to implement a material procurement scheduling system can be to use material requirements planning. Material requirement planning is a planning technique of time phased-priority to calculate the material requirement and schedule supply to meet demand of a product (Iasya & Handayati, 2015). Material requirement planning could design a specific system for corrugated demand situations that are typically demand, which aims to ensure the availability of materials, items or components when needed to meet the production schedule, and ensure the availability of finished products for consumers and keep inventory at minimum conditions and planning shipping activities, scheduling and purchasing activities

Couvee coffee is one of the businesses in food and beverages industry, located in Yogyakarta which was established in 2017. Couvee coffee are selling coffee and snack and should be able to meet the needs of customers, especially when customers want to buy coffe based or non-coffee and snack. This study conducted an analysis of inventory control of coffee in Couvee coffee by using material requirement planning methods. Material requirement planning has a contribution to good scheduling. Material requirement planning is a concept that is able to survive and is able to adapt to changes desired by the business world in facing the current global period. With the implementation of the material requirement planning, it is expected that Couvee coffee has a scheduling system in the material requirement planning to be used to determine when the purchase and how much material quantity must be ordered by Couvee coffee. Hopefully, it can give an advice for storeman for a monthly procuring a raw material in Couvee Coffee.

Couvee coffee should to know the scheduling and the quantity of material in properly. The observation so far of handling information in the field of raw material requirements planning and production planning is still manually, so that sometimes Couvee coffee could buy beans of coffee from second supplier. In addition, there is often a buildup of raw materials. The system that regulates inventory planning that has been implemented by Couvee coffe is uncertain. Therefore, an information system is needed that can help reduce the risk of shortages or excess raw materials, that can facilitate the production process.

Coffee beans have critical impact to coffee shop, because their important material. There is no beans they cannot selling their menu, so to decreasing the miss calculation of stock researcher trying to find the amount of coffee beans as a consideration that will show in table 1.1.

Table 1.1 Coffee beans



Resources Badan Statistika Nasional

After getting the results of the coffee beans produced in Indonesia from 2015 - 2017, the researcher will forecast calculation will be done first to get the average sales to know their needs of coffee beans. Forecasting is the science of predicting what will happen in the future. Forecasting is one of the most important functions because almost all business decisions are taken based on forecasting what will happen in the future. After doing forecasting, the results obtained will be continued to the calculation of material requirements planning.

This research is expected to create a material requirements planning model for the procurement process of Couvee coffee material based on when to buy coffee beans and also how much quantity of coffee beans must be purchased by Couvee Coffee. This research is also to solve the problem of the process of procuring raw material carried out by the coffee shop as one of the small medium enterprises. This research also will discuss scheduling raw material and reduce inventory of material requirements planning.

1.2 Problem Formulation

Based on the background mentioned above, the material requirement planning has many advantages. Material requirement planning model is expected to be able to create a system for scheduling material procurement for Couvee coffee. In this research, the researcher will determine how to calculate the material requirements for the procurement of materials to be implemented by couvee coffee. This research will also provide advice for Couvee Coffee for the process of procuring raw materials and arrange the supplier based on when to buy material and how much material to fulfill their needs.

1.3 Research Objective

The purpose of the following study aims to help Couvee coffee in making material procurement planning orders and arrange the scheduling and amount of coffee beans to supplier to fulfill their needs. Material requirement planning is used to determine and make the procurement of goods and how many quantities are needed. Then it can help Couvee coffee in a more efficient and effective procurement system.

1.4 Research Limitation

Limitations in this study determined in order that research conducted is not too broad and limp from existing research. The boundaries of that problem are:

1. The researcher only focuses on coffee beans.
2. The researcher only take demand of coffee beans.

3. The researcher only takes historical data at Couvee coffee.
4. The data only used sales product in August 2018 until May 2019 at Couvee coffee.

1.5 Benefit of Res earch

Research is conducted in order to provide benefits and usefulness for all parties, while the expected benefits are as follows:

1. Helping companies in managing raw material inventory for the smooth production process.
2. Helping management in decision making processes related to the needs of raw materials in the choosing supplier.
3. Helping student to graduate from University of Islamic Indonesia and hopefully could implement in the coffee shop that student work right now.

1.6 Systematic Research

Systematic writing is made to provide a general overview of the research to be undertaken. In general systematics of writing as follows:

CHAPTER I INTRODUCTION

This chapter explains the background, problem statement, problem question, objective of research, benefit of research, problem limitation, and systematic research.

CHAPTER II LITERATURE REVIEW

This chapter elaborates the theories of reference books and journals as well as the results of previous researches related to the research problem which are used as references for problem solving

CHAPTER III RESEARCH METHODOLOGY

This chapter will be steps for conducting the research that are applied as a references in order to keep focusing on the primarily goals, which are going to be achieved. It will explain and resume the phases of the systematic literature review undertaken, the method and tools that are used to support every stage as well as the section of the article where these are addressed.

CHAPTER IV DATA COLLECTING AND PROCESSING

It contains the data obtained during the research and how to analyze the data. Data processing result is displayed either in the form of tables and figure.

CHAPTER V DISCUSSION

This chapter contains a discussion of the results obtained in the research, and the suitability of the results with the research objectives.

CHAPTER VI CONCLUSION AND DISCUSSION

Contains the conclusion of the analysis and any recommendations or suggestions on the results for the problems identified during the study, so it needs to be done in the future studies.

CHAPTER II

LITERATURE REVIEW

2.1 Previous Research

Research conducted by Manullang (2003) at PT. Halintar Bahana Prima Leuwikopo Bogor analyzes short-term production planning in particular the procurement of auxiliary raw materials and packaging materials based on historical data on product sales in the past. In this study, analysis uses 2 forecasting methods, namely the Simple Projection Method and the Simple Moving Average. The purpose of this study is that forecasting results can be used to calculate the main raw material requirements, additional raw materials, and packaging materials every month.

Research conducted by Fiona (2006) at PT. Gunungarta Manunggal analyzes the production planning system and controls raw materials for bottled mineral water. In this study, the production strategy used only made to order while the demand for products increased. Therefore, a production planning system is designed with a make to stock strategy, there are three production planning proposals made which are focused on filling inventory until it reaches the minimum stock, the second focuses on filling inventory until it reaches the maximum stock, and the third makes production planning based on the target company. The purpose of this study is to determine the best proposal that can be used by the company.

Abubakar (2017) conducted research at CV. Nur Khairunnisa. This study analyzes material requirement planning can drive a smooth production process and achieve production efficiency. Production activities that will smoothly increase product sales and with production efficiency can result in increased profits. Then this will make an increase in the competitiveness of the company in order to be the capital to compete and survive, so that business continuity will be more assured.

From core of previous research, there are Material Requirement Planning method to identify scheduling of material to reduce cost, to increase profit, analyze and evaluate material. This research will combine 2 methods which are Forecasting and Material Planning Requirements. Forecasting is used to find out the coffee beans need by Couvee coffee. After identifying forecasting of coffee beans, researchers will determine the amount of coffee beans needs. Material Requirement Planning used by the researcher to arrange the scheduling period and choosing supplier that will be implemented in coffee shop.

2.2 Theoritical Background

2.2.1 Forecasting

1. **Definition**

   Forecasting is defined as predicting or estimating a situation in the future based on past and present conditions that needed to determine when an event will happen, so that appropriate action can be taken for future anticipation (Makridakis, 1999). Forecasting is a problem that can cover many fields including industrial business, government, economics, environmental sciences, medical, social, political and financial sciences (Montgomery et al, 2015). Forecasting function is employed as a basis for capacity planning, budgeting, sales planning, production planning and inventory, resource planning, and planning for purchasing raw materials.

   Forecasting is an important tool in effective and efficient planning, especially in the economic field. In modern organizations, it is identified that impending situation is not only important to see good or bad but also aims to make forecasting preparations. According to (Yamit, 1999), forecasting is predictions, projections or estimations of uncertain events in the future.

   Forecasting is an activity to predict events that will occur in the future. The usefulness of forecasting is seen during decision making. A good decision is a decision based on consideration of what will happen when the decision is made. The use of forecasting techniques begins with exploring the conditions (data patterns) in the past

times in order to develop a model that fits the data pattern assuming that the pattern of data in the past will repeat again in the future. Prediction is needed to provide information as a basis for making decisions in various activities. Good forecasting is forecasting carried out by following good steps or procedures. Basically, there are three important forecasting steps (Makridakis, et al., 1993), there are:

a. Historical data analysis.
b. Determine the methods that will be used.
c. Projecting the data then using the selected methods to consider the multiple factors change

In the business field, forecasting is an important thing that can influence decision making. Forecasting is the basis for long-term planning in business processes. For example, in the financial sector, with forecasting, the finance department can plan the costs to be incurred in the future in the marketing field, forecasting can estimate what products need to be added to production or what products do not need to be reproduced.

Two main things that must be considered in the forecasting process are:

1. Relevant data collection in the form of information that can produce accurate forecasting.
2. The selection of the right forecasting technique will utilize the data information obtained as much as possible.

Basically there are two approaches of forecasting, namely a qualitative approach and a quantitative approach. Qualitative forecasting methods are used when historical data are not available. Qualitative forecasting method is a subjective method. The method is based on qualitative information. With the basis of this information, we can predict future events. Of course the accuracy of this method is very subjective. Quantitative forecasting methods can be divided into two types, causal and time series. Causal forecasting methods include factors related to predicted variables such as regression analysis. Time series forecasting is a quantitative method for analyzing past data that has

been collected regularly using appropriate techniques. The results can be used as a reference for forecasting value in the future (Makridakis. S, 1999).

Various forecasting techniques, including: qualitative technique, extrinsic technique, and intrinsic technic. Intrinsic techniques are projections based on historical data. It based on the assumption that what happened in the past will happen in the future. Various method in intrinsic technique are:

1. Naive method
2. Moving average
3. Weighted moving average
4. Moving average with trend
5. Exponential smoothing
6. Double exponential smoothing

Steps for performing Forecasting:

1. Define forecasting goals
2. Past data plot
3. Choose at least two forecasting methods that are considered appropriate.
4. Calculate the forecasting function parameters for each method
5. Calculate the fitting error for all methods tried
6. Choose the best method, which is the method that gives the smallest error
7. Predict demand for the coming period
8. Verify forecasting.

2. Forecasting Purpose

In general, what is meant by forecasting is an activity that aims to find out or predict events in the future. The purpose of forecasting according to Diana Khairani Sofyan (2013: 15) the main purpose of forecasting is to forecast demand in the future, so that an estimation is approached to the actual situation. Forecasting will never be perfect, but even so the forecasting results will provide direction planning. A company usually uses a

forecasting procedure that is initiated by conducting environmental forecasting, followed by sales forecasting for the company and ending with forecasting market demand.

3. Forecasting Principal

In production activities forecasting the level of demand for a product is needed to anticipate volatile demand. In general, the types of forecasting according to Jay Heizer and Barry Render (2015: 115):

a. Economic Forecast

Planning useful indicators that helps organizations to prepare medium to long term forecasting, which explains the business cycle that predicts inflation rates, the availability of money, the funds needed to build other planning indicators.

b. TechnologycalTechnological Forecasting

Long-term forecasting that takes into account the level of technological progress that can launch new products.

c. Demand Forecast

Predict the sales and demand of a company in each period in the time horizon. Sales forecasting that controls production, capacity, and scheduling systems and becomes input for financial planning, marketing, and human resources.

4. Forecasting Methods

Forecasting method is a way of estimating or estimating quantitatively and qualitatively what will happen in the future, based on relevant data in the past. The usefulness of the forecasting method is to estimate systematically and pragmatically on the basis of relevant data in the past. Thus, forecasting is expected to provide greater objectivity.

Forecasting methods provide a sequence and solution to the problem approach in forecasting, so that if the same approach is used for the problem, it will get the basic rationale and solution to the same argument.

There are 2 general approaches to the types of forecasting methods namely qualitative and quantitative. Qualitative forecasting methods are very important where when historical data does not exist, but this method is very subjective and requires assessment by experts. On the other hand quantitative forecasting uses existing historical data. According to Levine, et al. (2002) the purpose of this method is to learn what has happened in the past to be able to predict values in the future.

a) Periodic Series Forecasting Method

Periodic forecasting methods, or commonly referred to as time series, are one of the methods included in quantitative forecasting methods in addition to regression or causal methods. According to Levine et al. (2002) the periodic forecasting method involves projection of future values of a variable based entirely on observations of the past and present of these variables.

b) Smoothing Method

Smoothing method, or commonly called smoothing method, is included in the periodic forecasting method. According to McGee, et al., (1999) smoothing methods have a basis for methods namely simple weighting or smoothing of past observations in a periodic source to obtain future predictions. In smoothing out these historical values, random errors are averaged to produce "smooth" predictions. Among the benefits are low cost, easy to use in its application, and fast in delivery. This characteristic can make it interesting especially when the time horizon is relatively short (less than 1 year). The smoothing method consists of smoothing method, where when doing the same weighting on the values of security in accordance with the conventional understanding of the middle value, and the exponential smoothing method uses different weights for past data, because the characterized weight decreases as exponential from the data points last to the earliest.

2.2.2 Time Series Analysis

Time series data are defined as a set of data at a certain time period. Time series forecasting is forecasting based on past data behavior to be projected into the future by utilizing mathematical and statistical equations. Time series data types according to divided into several types, among others:

a) The cycle pattern cycle is a series of changes up or down, so that this cycle pattern changes and varies from one cycle to the next. Cycle patterns and irregular patterns are obtained by eliminating trend patterns and seasonal patterns if the data used is in the form of weekly, monthly, or quarterly. If the data used is annual data then all that has to be removed is the trend pattern.

b) Random Patterns are randomly irregular, so they cannot be described. This random pattern is caused by unexpected events such as war, natural disasters, riots, etc. Because the shape is irregular or does not always occur and cannot be predicted, the pattern of random variation in its analysis is represented by an index of 100% or equal to 1.

c) Seasonal The seasonal pattern shows a movement that recurs from one period to the next period regularly. This seasonal pattern can be shown by data grouped on a weekly, monthly, or quarterly basis, but for data in the form of annual data there is no seasonal pattern. This seasonal pattern must be calculated every week, month, or quarterly depending on the data used for each year, and this seasonal pattern is expressed as a number. The technique used to determine the value of seasonal patterns is the method of moving averages, exponential smoothing of winter, classical decomposition.

Time series forecasting techniques consist of:

a) Statistics

   1) Moving average
   2) Exponential smoothing
   3) Regression

b) ARIMA (Box Jenkins)

   1) Artificial Intelligence
   2) Simulated Annealing
   3) Genetic Programming

Moving averages are included in the time series model which is a quantitative forecasting method using time as a basis for forecasting. To make a forecast, it is required historical data (past) requests.

2.2.2.1 Simple Moving Average

Simple Moving Average or commonly abbreviated as SMA is the simplest Moving Average and does not use inner weighting calculation of the closing price movement.

Simple moving average (SMA) is calculated by taking the average value of the price of a security at a certain time period backwards. This calculation can be taken from the average value of the opening price, closing price, highest price, or the lowest price of a security. There is a formula to calculate the Simple Moving Average indicator:

$$SMA_n = \frac{x_n + \cdots + x_2 + x_1}{n} \qquad [1]$$

dimana:

SMA_n = Rata-rata bergerak harga saham n hari sebelumnya
x_n = Harga saham n hari sebelumnya
x_2 = Harga saham 2 hari sebelumnya
x_1 = Harga saham 1 hari sebelumnya
n = Lamanya hari

Figure 2.1 Formula of SMA

2.2.2.2 Linier Regression *(Linier Forecasting)*

Linear Regression is a Statistical Method that serves to test the extent to which the causal relationship between the Variable Factor Cause (X) of the Variable Consequences. The cause factor is generally represented by X or also called the Predictor while the Result Variable is denoted by Y, also called Response. Linear Regression or often abbreviated as LR (Linear Regression) is also one of the Statistical Methods used in production to forecast or predict characteristics of quality and quantity.

The line equation that approaches linear data forms is:

$$Y'(t) = a + b(t)$$

The constants of A and b are determined from the raw data based on the least square criterion. Where a and b can be calculated by the following formula:

$$\boldsymbol{b = n \sum_{i=1}^{n} tY(t) - \sum_{i=1}^{n} Y(t) \sum_{i=1}^{n} tb}$$

$$\boldsymbol{a = \frac{\sum_{i=1}^{n} Y(t) - b \sum_{i=1}^{n} t}{n}}$$

Where: t = time

Y(t) = Demand Period

2.2.3 Material Requirement Planning

Material requirement planning is a method used to control inventory in products with dependent demand. MRP was first discovered by Joseph Orlicky of the J.I Case Company around 1960. Material requirement planning method is Computer Oriented Approach which consists of a set of procedures, decision rules and a set of recording mechanisms designed to describe a Master Production Schedule (MPS). The main objectives of the MRP system are:

1. Ensure the availability of goods, components, products - products for production planning and for delivery to customers.
2. Maintain the possibility of a lower level in inventory.
3. Plan manufacturing activities, delivery schedules and purchasing activities.

2.2.3.1 Input and Output System Material Requirement planning

A. Input MRP

Inventory Status Record (ISR) contains information about all items, components or sub-assemblies for each end item. ISR also contains on hand and on-order arrangements in inventory. Requests for end items are final numbers scheduled for a period of time and listed on MPS. In this system ISR contains the status of all raw materials and products in inventory adjustment. As the minimum amount allowed, the raw material codes, product codes and other - other. Thus, if there is an order from the consumer, then the status of the goods can be known immediately so that the right decisions and actions can be taken.

The MRP system must have and maintain an up-to-date inventory data for each component of the goods. This data must provide accurate information about the availability of

components and all inventory transactions, both those that have occurred and those that are planned. The data include the identification number, the number of items in the warehouse, the amount allocated, the minimum inventory level (safety stock level), the components that are being ordered and the time of arrival, and the procurement lead time for each component (Herjanto, 2008, hal. 280).

B. Output MRP

Hendra & Kusuma (2009) output plan for material needs is information that can be used to control production. From the three main inputs described above, then this system will produce output in the form of order planning information which will be handled by the company. From this information the company can re-order raw materials to suppliers, namely in the form of raw materials that can be used at this time and if necessary can be rescheduled as previously scheduled.

From the information generated by the system, the information will be reprocessed to produce information in the form of:

a. Planning the next purchase order.
b. Purchase order that will be carried out.
c. Rescheduling (reschedule) what has been scheduled.

2.2.4 Basic Step of Material Requirement Planning

According to Hendra & Kusuma (2009) there are four basic steps MRP system, namely:

1. Netting Process

   Netting is a calculation process to determine the amount of net needs, the amount of which is the difference between gross needs and the state of inventory (which is in stock and which is being ordered).

2. Lotting Process

The lotting process is a process to determine the optimal order size for each product item based on the calculation of net requirements. The lotting process is closely related to determining the number of components / items that must be ordered or provided.

3. Offsetting Process

   This process is intended to determine the right time to make a booking plan in an effort to meet the level of net needs. The order plan is carried out when the required material is reduced at the time of departure

4. Exploding Process

   The exploding process is the process of calculating the gross needs of items at a lower level, based on the ordering plan that has been prepared in the offsetting process. In this explosion process the product structure data and Bill of Materials have an important role because they determine the direction of exploding component items.

2.3 Determination of lot sizing

Lot sizing is an activity to determine the number of units to be ordered as defined by haming & Mahfud Nurnajamuddin (2014, 36). The decision to determine lot size is the process or technique used to determine lot size (Heizer & Barry Render, 2014, hal. 654).

Heizer & Barry Render (2014, 654) states that the decision to determine lot sizing is a decision made about how much to order or make. There are various ways to determine lot size in the MRP system, including Lot for Lot techniques, Economic Order Quantity techniques, and Period Period Balancing, Period Order Quantity (POQ), and Wagner-Whitin Algorithm (WW). Lot for Lot technique is a technique that helps determine the lot size exactly by the net requirement. While the other techniques are based on optimum capacity and cost with the aim of optimization.

2.3.1 Lot for Lot Technique

The Lot for Lot technique produces precisely how much raw material needs are needed. This technique is consistent with MRP's goal of meeting boundary demand requirements. If orders are often economical and just in time inventory techniques are applied, this technique becomes very efficient. Conversely, if the set up costs are large enough or the management is unable to implement just in time, then this technique becomes expensive (Heizer dan Render, 2015:654)

2.3.2 Economic Order Quantity (EOQ)

EOQ technique is a statistical technique that uses an average (such as the average demand for one year). So the EOQ technique is a statistical technique that is actually more suitable for use when demand is free, while MRP is preferred when demand is bound. The production manager must utilize the request information when this information is known, rather than assuming a fixed request (Heizer dan Render, 2015:655). The approach with this technique uses the following equation:

$$Q = \sqrt{2DS\ H}$$

Where: Q = demand lot size,

D = needs per year,

S = demand cost per order, and

H = holding cost per unit per year

2.3.3 Part Period Balancing (PPB)

The PPB technique is a more dynamic approach to balance setup and storage costs. PPB uses additional information by changing the lot size to describe the next lot size requirements in the future. PPB tries to balance setup and storage costs for known requests. Partial balancing period makes an economic part period (EPP) or part of the economic period, which is a comparison between setup costs and storage costs. (Heizer dan Render, 2015:657).

2.3.4 Period Order Quantity (POQ)

The POQ technique often referred to as the Uniform Order Sycle method, is the development of the EOQ method for a number of unequal requests in several periods. The average demand is used in the EOQ model to get the average number of requests per period and the results are rounded up to integer numbers. The last number indicates the number of time periods covered in each order (Herjanto, 2018:292).

The calculation POQ method using formula as follows:

$$POQ = Q = \sqrt{2S\ DH}$$

Where: Q = quantity demand of lot size,

D = needs per year,

S = demand cost per order, and

H = holding cost per unit per year

2.3.5 Algorithm Wagner-Whitin (WW)

The WW technique uses an optimization procedure based on a dynamic program model that adds some complexity to the calculation of lot size. This procedure assumes a limited time horizon outside of a situation where there is no additional net need, this procedure gives good results. The aim is to get the optimum ordering strategy for all clean demand schedules by minimizing the total procurement costs and storage costs. Basically, this technique tests all possible ordering methods in meeting the net requirements of each period at the planning horizon so that it always provides optimal answers (Heizer dan Render, 2011:222).

2.4 Roasting Profile of Coffee Beans

There are two kinds of beans which are green beans and roasted beans. Green bean is kind of coffee bean that is produced by farmer and cannot ready serve to customer. The process of green

beans should through roasting process to become roasted beans. The roasted beans cover three kinds of type of roasted process, which are light roast coffee, medium roast coffee and dark roast coffee. According to Oden (2016) there are several profiles of roasted coffee beans, which are:

1. Light Roast Coffee

   Light roast coffee produces a light brown color that has no oil on the surface of the beans. The coffee that resulted from this procedure typically has a crisp acidity, a mellow body, and bright flavors.

2. Medium Roast Coffee

   Medium roast coffee produces brown color and rarely has an oily surface. The coffee will have a medium acidity and body, as well as a rounded flavor profile.

3. Dark Roast Coffee

   Dark roast coffee has dark brown color and often has an oily surface. The coffee will have a low acidity, heavy body, and tend to reveal deeper, darker flavors. This roast profile usually called by full-city roasted beans.

Roaster and coffee geek recommend around 3 – 5 days from the roast date. Coffee in that time is considered the best for consumption because the degassing process in coffee has been completed. The rest in the rate of coffee beans is all natural substances and good substances that are fully loaded. Some experts state that this ideal duration is still considered good enough to the 32 – 35 day deadline.

Coffee should be stored in a canister or tightly closed glass container (if possible, airtight) while the seal on the coffee packaging is opened. Because the freshness of coffee will decrease once the coffee is exposed to air.

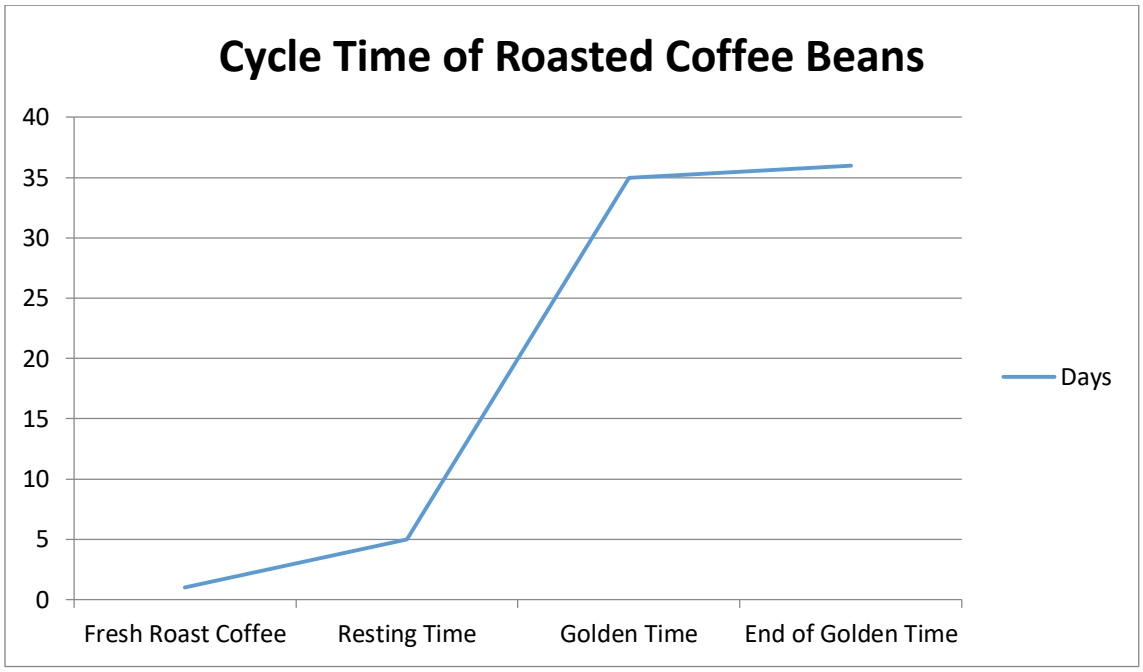


Figure 2.1 Cycle Time of Roasted Coffee Beans

From the first day of roasted beans has been released, the coffee beans cannot directly be served to the customer, because the coffee bean needs time to release the carbon dioxide inside of coffee. This process called by degassing process or coffee beans resting time. This process needs time around 5 days from the roasted beans released by roasting machine. After that the coffee beans does not fulfilled much carbon dioxide gas, so the coffee beans has optimum an aroma, taste and body, which called by golden time. The coffee shop should serve the coffee beverage to the customer only by using coffee beans during their golden time. It takes about 30 days to serve the perfect cup of coffee to the customer. After 30 days the coffee beans no longer have perfect aroma, taste and body, this moment namely the end of golden time.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research objective

Object of this study is to identify the raw material based on material requirement planning method for creating Standard Operational Procedure to supplier.

3.2 Data Source

The data source is something that can provide information on the data. This type of data is divided into two, they are primary data and secondary data.

1. Primary data

   Primary data were obtained from historical data and lead time that are developed to obtain the information of the last production. The historical data and lead time are assessed by the data from manager at Couvee coffee. This assessment is proposed to result the historical to fulfill the steps in forecasting.

2. Secondary data

   Secondary data were obtained from journal, book as literature and Couvee's data to support this research.

3.3 Data collecting

Data that are collected in this study are related to forecasting and material requirement planning methods of data collection are as follows:

1. Historical data, the method that researcher collected to calculate the forecasting coffee beans in Couvee coffee, lead time to get average time for the flow of one product unit throughout the process including the waiting time between sub-processes.
2. The Literature Study is a data collection that is derived by collecting sources from journal, article, book and website that related to forecasting and analitical neural network. In this study, the researcher provides information sources in a description and data sources in the references.

3.4. Moving Avarage

Forecasting method used in this study uses the moving average method because the sales data that occurred is not fluctuating or on the other word, data do not have seasonal factors. Moving average method applies the data that are being observed and data before observation.

$$MA_m = \frac{\sum_{i=1}^{m} D_{t-i}}{m}$$

Where:

MA_m = Moving average periods

$\sum_{i=1}^{m} \boldsymbol{D_{t-i}}$ = Total demand value periods

m = Moving periods

In determining the best forecasting method, it is necessary to conduct an evaluation analysis of the results of the forecasting using several approaches:

A. Mean Absolut Deviation

MAD

$$\frac{\sum_{t=1}^{m} |A_t - F_t|}{m}$$

B. Mean Square Error

MSE

$$\frac{\sum_{t=1}^{m} (A_t - F_t)^2}{m}$$

Where:

m = Moving periods

A_t = Demand forecast for period t

F_t = Number of period requests t

3.5. Linear Regression

The line equation that approaches linear data forms is:

$$Y'(t) = a + b(t)$$

The constants of A and b are determined from the raw data based on the least square criterion. Where a and b can be calculated by the following formula:

$$\boldsymbol{b = n \sum_{i=1}^{n} tY(t) - \sum_{i=1}^{n} Y(t) \sum_{i=1}^{n} tb}$$

4.

5.

$$\boldsymbol{a = \frac{\sum_{i=1}^{n} Y(t) - b \sum_{i=1}^{n} t}{n}}$$

Where: t = time

Y(t) = Demand Period

3.6. Data Processing

3.6.1. Material Requirement Planning

Material Requirement Planning is a method for determining what, when and how many components and materials are needed to meet the needs of a production plan.

1. Lead Time

Lead time is the time period needed since the MRP suggested an order until the ordered item is ready for use.

2. On Hand

   On hand is an initial inventory that shows the quantity of items that are physically in the warehouse.

3. Lot Size

   Lot size is an order quantity of the item.

4. Gross Requirement

   Gross requirement is a gross request from an item obtained from production planning.

5. Schedule Receipts

   Schedule of arrival of goods ordered in period t

6. Project on Hand

   Project on hand is a record of the items' number that existed in the initial period obtained from inventory records.

   (Planned order release + on hand inventory + schedule receipt – gross requirement)

7. Net Requirement

   Net requirement is the net requirement needed in period t.

   (Net requirement – schedule receipts – on hand inventory before – planned order receipts)

8. Planned Order Receipts

   Planned order receipts is the quantity of orders planned to be received in that period.

9. Planned Order Release

Planned order release is the quantity of plan orders placed or issued within a certain period so that the ordered items will be available when needed.

Table 3.1 of Horizontal display of MRP

	Lot Size :				
Lead Time :	Time Periods (weeks)				
On Hand :	1	2	3	4	5
Gross Requirement					
Schedule Receipts					
Projected on Hand					
Net Requirement					
Planned Order					
Receipts					

3.7. Flow chart

The research diagram is used to solve problem. Research diagram explains the steps of conducting research from the beginning until final result. The research diagram can be seen in figure 3.2, as follows:

1. Start
2. Problem Identification
3. Literature Review
4. Collecting Data
5. Data Processing
6. Result and Analysis
7. Discussion
8. Conclusion
9. End

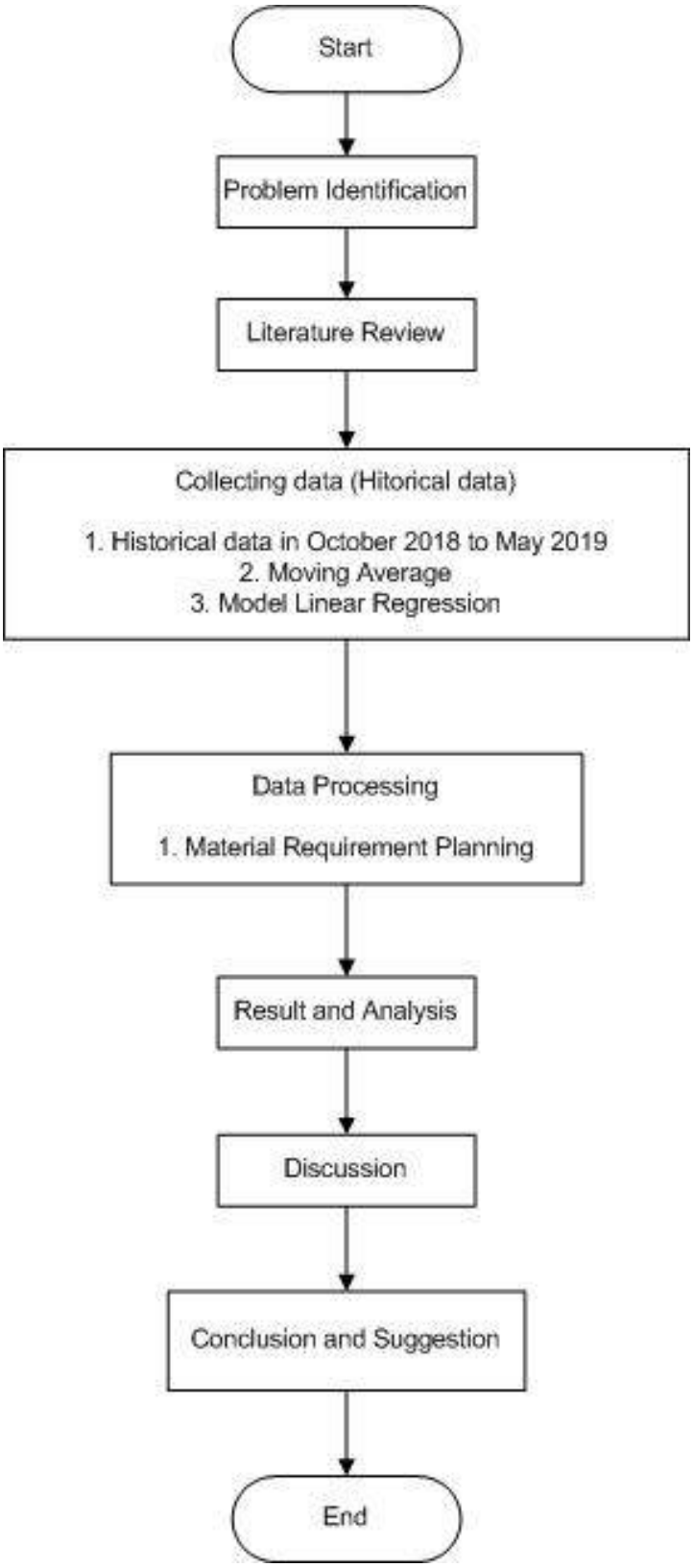


Figure 3.1 Flowchart Process of Research

CHAPTER IV

DATA COLLECTING AND PROCESSING

4.1. Collecting Data

In this chapter, researcher will identify material requirement planing in Couvee Coffee. The historical data are used to collect data about sales that consist of sales demand. Historical data is needed for supporting data processing. Historical data ofdemand on coffee beans that will be used are accumulated in 10 month from August 2018 until May 2019. The data structure will be shown in the Table 4.1.

4.1.1. Forecasting

The researcher collected data in Couvee from August 2018 until May 2019, later the data are processed to forecast the demand in future. By forecasting the data, it will improve the amounts of coffee beans availability in Couvee. The author gets the data of coffee demand per cup that are shown in Table 4.1.

Table 4.1 Demand of coffee per cup

	Coffee Demand									
	August '18	September '18	October '18	November '18	December '19	January '19	February '19	March '19	April '19	May '19
1st Week	521	259	456	719	1265	791	921	981	977	1577
2nd Wee	530	268	510	748	831	825	917	973	1257	1351

k										
3rd Week	529	242	540	762	857	852	949	947	1351	1479
k										
4th Week	476	227	558	788	889	883	957	1027	1579	1533
k										

In Table 4.2, it is shown the 40 data of coffee demand per pack which is explained in detail from each week for 10 months.

Table 4.2 Demand of coffee per pack

	Coffee Demand									
	August '18	September '18	October '18	November '18	December '19	January '19	February '19	March '19	April '19	May '19
1st Week	11	6	10	15	16	16	19	20	20	32
2nd Week	11	6	11	15	16	17	19	20	25	27
3rd Week	11	5	11	16	16	18	19	19	27	30
4th Week	10	5	12	16	16	18	20	21	32	31

4.1.2 Data of Coffee Beans Demand

Data of coffee beans demand in Couvee is significantly raised month by month as shown by Table 4.1 and 4.2. The author determines to get the data because there are some problems with the coffee beans availability. The data above could become a source for the forecasting calculation.

Forecasting method that is chosen by the author is Simple Moving Average (SMA) and Linear Regression. The author wants to identify the forecasting of coffee beans demand for the next few months. After that from the Simple Moving Average (SMA) and Linear Regression calculation, it can be found the error from each calculation. Then the author could compare them and identify which has the lowest error that will be selected for the best method in this research.

4.2 Data Processing

The data processing already conducted by performing several calculations. Simple Moving Average (SMA) calculation will be shown in Table 4.3.

Table 4.3 Simple Moving Average Calculation

		MA 2				
Month	Demand	Forecast	FE	CFE	FE^2	
1	41120					
2	19920					
3	41280	30520	10760	10760	115777600	
4	60340	30600	29740	40500	884467600	
5	76840	50810	26030	66530	677560900	SEE
6	67020	68590	-1570	64960	2464900	
7	74880	71930	2950	67910	8702500	
8	78560	70950	7610	75520	57912100	
9	103280	76720	26560	102080	705433600	
10	118800	90920	27880	129960	777294400	
Total			129960	558220	3229613600	23200.62

As shown in table 4.3 , the author can get the result of Forecast Error (FE) amount are 129960, total amount of Cumulative Forecast Error (CFE) is 558220, total amount of Square Forecast Error (FE^2) is 3229613600 and total Standard Error Estimated (SEE) is 23200.62.

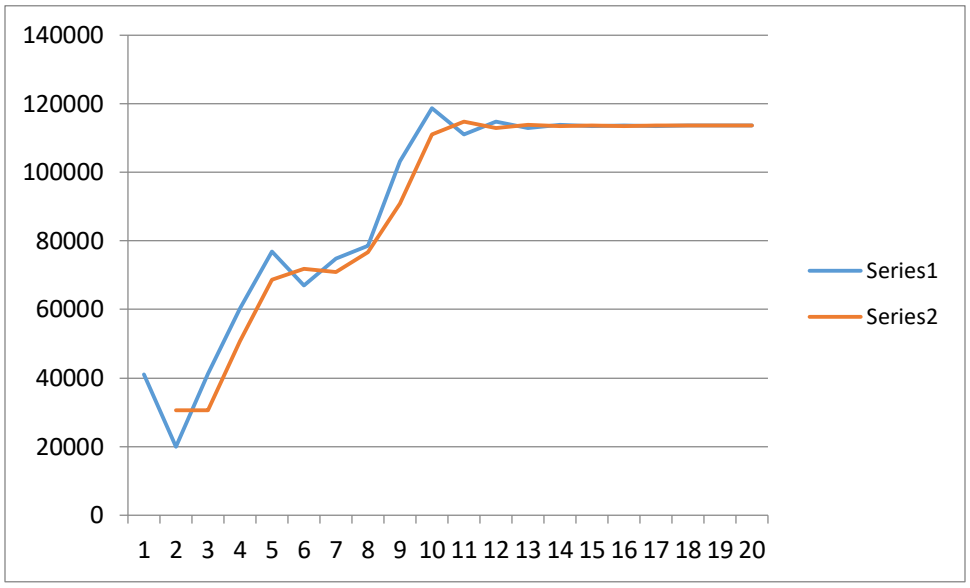


Figure 4.1 Graphic of Simple Moving Average Calculation

In Figure 4.1, it is shown the 10 data already calculated by Simple Moving Average (SMA) method and transforms the data into graphic. According to the Figure 4.1, the forecast and actual demand has equal result in period 4 and 6.

The processing data already calculated by the author. Linear Regression calculation will be shown in table 4.4.

Table 4.4 Linear Regression Calculation

Month	Demand	Forecast	Y(t)*t	t^2	FE	CFE	[y(t) - y'(t)]^2	
1	41120	118298.6	41120	1	-77178.6	695.12	5956539385.10	SEE
2	19920	127406.7	39840	4	-107487	-106792	11553399275.83	

	3	41280	136514.9	123840	9	-95234.9	-202026	9069678559.22	
	4	60340	145623	241360	16	-85283	-287309	7273186677.68	
	5	76840	154731.1	384200	25	-77891.1	-365201	6067023459.21	
	6	67020	163839.2	402120	36	-96819.2	-462020	9373961361.41	
	7	74880	172947.3	524160	49	-98067.3	-560087	9617203174.68	
	8	78560	182055.5	628480	64	-103495	-663583	10711310240.61	
	9	103280	191163.6	929520	81	-87883.6	-751466	7723523633.62	
	10	118800	200271.7	1188000	100	-81471.7	-832938	6637637900.89	
Total	55	682040	1592852	4502640	385	-910812	-4230727	83983463668.24	102459.4

As shown in table 4.4, the period that author used is 10 periods and has total 55 periods. The result of Forecasting times period *(Y(t)*t)* is 4502640, the total amount of square of period is 385, then for Forecast Error (FE) amount are -910812, total amount of Cumulative Forecast Error (CFE) is -4230727, total amount Sum of Square Error $([y(t) - y'(t)]^2)$ is 83983463668.24 and total Standard Error Estimated (SEE) is 102459.4.

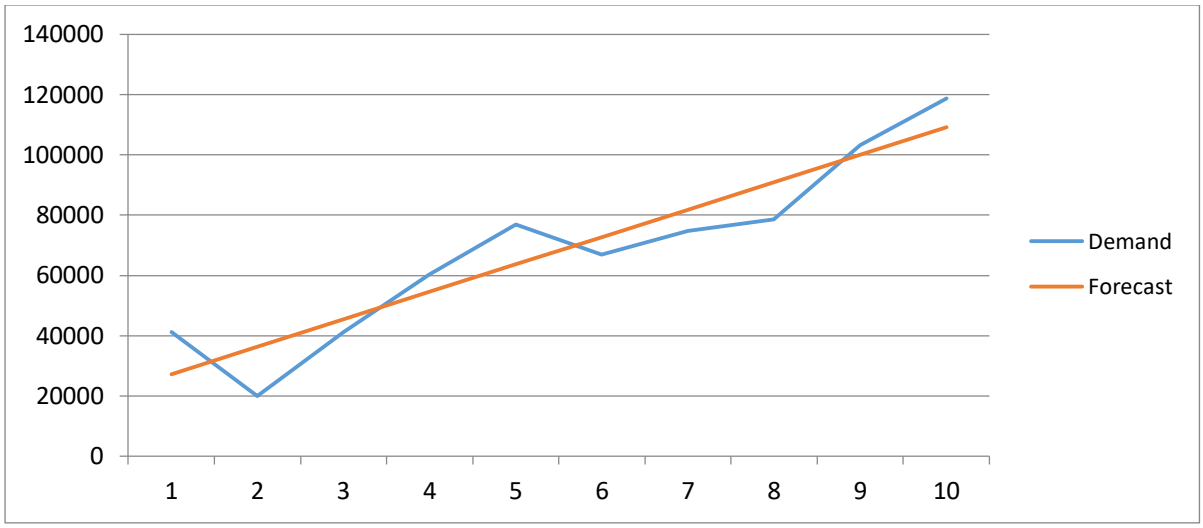


Figure 4.2 Graphic of Linear Regression Calculation

The author calculates it by using Linear Regression for 10 periods into graphic that shown in Figure 4.2. According to the Figure 4.2, the forecast and actual demand has equal result in period 3, 5, and 9.

Based on the analysis above, the author concludes that Simple Moving Average is the best method for this research, because the Simple Moving Average (SMA) method has the lowest amount of error compared to the Linear Regression. The error shows in Standard Error Estimated (SEE) column. Simple Moving Average (SMA) calculation has 23200.62, meanwhile Linear Regression has 102459.4.

1.2.1. Inventory Record

Inventory record is inventory data in the form of quantity and kind of inventory on hand inventory. Table 4.5 below is the list of inventory record:

Table 4.5 Inventory Record

Month	Item	Total
1	Coffee Bean	43000
2	Coffee Bean	22000
3	Coffee Bean	44000

Month	Item	Total
4	Coffee Bean	62000
5	Coffee Bean	64000
6	Coffee Bean	69000
7	Coffee Bean	77000
8	Coffee Bean	80000
9	Coffee Bean	104000
10	Coffee Bean	120000

From table 4.5 above, it can be seen that there are 10 items existed in the inventory record. The item of raw material above will be used as data for the next calculation of material requirement planning.

1.2.2 Lot for Lot

This section will calculate for material requirement planning of bean coffee. Calculation of material requirement planning in Couvee coffee will be shown in the figure below. This figure is describing about the gross requirement, on hand inventory, and net requirement of bean coffee. There is raw material that will be calculated to get gross material value.

Table 4.6 Material Requirement Planning of Lot For Lot of Coffee Beans

Item	Coffee Beans	Level	1											
Lot Size	Lot For Lot	Lead Time	1											
Safety Stock				0	1	2	3	4	5	6	7	8	9	10
Gross Requirement					114920	112980	113950	113465	113708	113586	113647	113617	113632	113624
Schedule Receipts														
On Hand Inventory				118800	3880	3880	0	0	0	0	0	0	0	0
Net Requirement						109100	113950	113465	113708	113586	113647	113617	113632	113624
Planned Order Receipts						109100	113950	113465	113708	113586	113647	113617	113632	113624
Planned Order Release					109100	113950	113465	113708	113586	113647	113617	113632	113624	

Table 4.6 above shows the results of the calculation of MRP, where the optimal order lot sizing is by releasing orders rate around 113148. So that supplier should fulfill the demand of coffee beans of Couvee Coffee around 113148 gr or in pack around 114 pack per month.

4.2.3. Opportunity Cost Lost

Lost opportunity in cost because there are no stocks of coffee beans then cannot fulfill the demand. Strategy that applied in Couvee Coffee when they doesn't has stock is buy coffee beans accidental not to supplier but another roaster and will impact of cost monthly.

The opportunity loss of cost happened in Couvee Coffee, even only 1 day, could impact to the sales of coffee basis. The sales of coffee basis are around 40 – 60 cup per day. So, it could be estimated the cost that Couvee Coffee lost in 1 day, if the rate of sales coffee basis are 50 cup and the rate of price is around Rp. 20.000,- then the total about Rp. 1.000.000,- per day.

4.2.4. Key Performance Index

Key performance index of Couvee Coffee according to ratio productivity will be shown in figure 4.4 below.

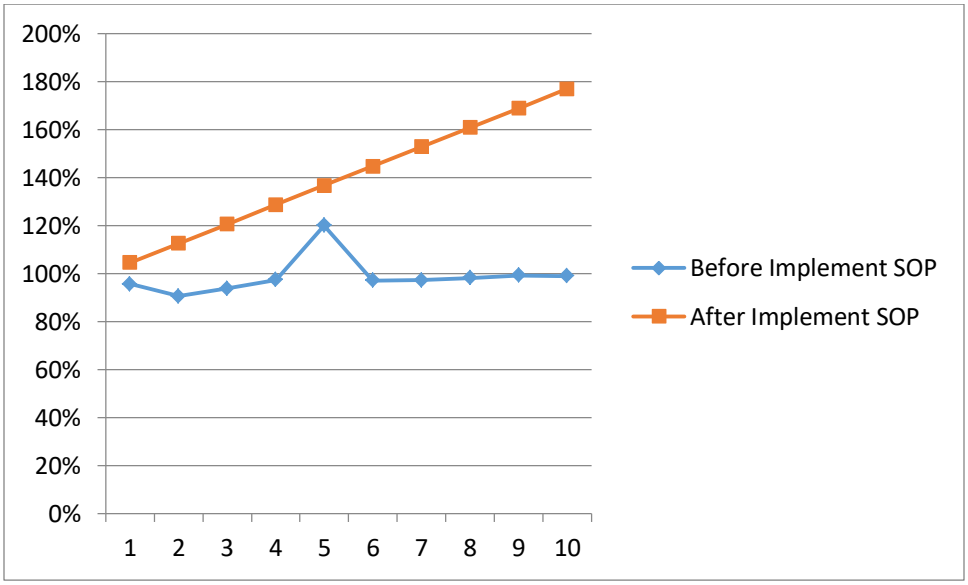


Figure 4.3 Compare Key Performance Index of Coffee Beans

From figure 4.3, it is shown the differences of performance of coffee beans in Couvee Coffee. The ratio of productivity coffee beans as the performance index in Couvee Coffee, figure

4.3 indicates the performance that always increasing each month after new SOP is implemented in Couvee Coffee.

CHAPTER V

DISCUSSION

5.1. Discussion

5.1.1. Gross Requirement

In calculating the material requirements planning, there are several calculation processes before getting the right schedule and amount to re-order material. The first calculation is to calculate the gross requirement for coffee bean by multiplying the amount of weight per gram on each coffee beans with the forecasting sales per day. To measure material requirement planning of gross requirement is by multiplying the number of measurements with forecasting sales per day. From here the company can conclude their gross requirements to predict their next net requirement.

5.1.2. Standard Operational Procedure Development

A standard operating procedure (SOP) is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations. Researcher develops the standard operational procedure to help Couvee in selecting the new coffee beans main supplier. SOP will explain below.

a. Calculation of Production Result Forecasting

Suppliers are willing to submit the calculation of forecasting coffee production with the time determined by the first party as proof that the supplier can be considered feasible to be the main supplier of coffee beans in Couvee. This can be a feasibility study for prospective suppliers.

b. Product Sample

Prospective suppliers provide samples of coffee bean production according to type, taste, profile of coffee beans that have been determined by Couvee and presented to all Couvee stakeholders. The product sample, which is coffee beans, will be tried and assessed by Couvee according to the standards quality that already developed by Couvee.

c. Company Profile

Prospective suppliers provide a profile of the company to Couvee who will later be considered as the main supplier of coffee beans for Couvee. At the company profile, at the same time attach NPWP, PKP, SIUP / IUI to support administrative documents.

d. Negotiation

Negotiations are carried out before the work contract taken place. Both parties met and discussed all aspects of the work that will be carried out before being agreed each other. Negotiations in this case include two very important things, namely work details and financing.

5.1.3. Work Cooperation Contract Development

A Work Cooperation Contract is a document of mutual agreement between the two parties which is the basis for making further implementation agreements as needed. Couvee with prospective new suppliers must make an official written agreement signed by both parties on the legal stamp. The work contract will be the basis of all work activities that will be carried out by both parties in the future. As for some important points that must be included in a work contract.

a. Rights and Obligation Each Parties

Each signed party in this contract must have the rights and obligations as long as the contract is valid. In preparing the Rights and Obligations, the two parties concerned must meet and discuss together so that all the rights and obligations of the cooperation running well in the future.

b. Work Cooperation Contract Duration

Both parties must determine how long this contract will work. The duration of the contract is very important in a work contract because the duration of the contract will be a binding contract for both parties. There will be a consequence or risk that can occur if one party does not comply with the written work cooperation contract for the duration of the work contract.

c. Work Cooperation Activity

In terms of collaborative activities, the first party, Couvee, gave details of the types of work to be carried out by the main suppliers of coffee beans. The working detail will be the full responsibility of the second party as the main executor of all types of work requested by Couvee. The details of this work are about technical and complex so they can be attached to a work cooperation contract.

d. Work Cooperation Costing

All work activities carried out incur costs. All costs arising from the implementation of work, will be a full burden for the first party as a client, namely Couvee. The cost details will be explained clearly in the attachment to the work cooperation contract finance agreement.

e. Guaranteed Confidentiality of Work Cooperation Contracts

Every work agreement includes details of work, forms of cooperation, financing etc. must be protected confidentially. This must be done by both parties as long as the employment contract runs as a form of professionalism between the two parties concerned.

f. Policy Changing

Both parties must also determine the policy rules that will be made if there are changes in the work contract that has been made. During the ongoingcooperation, it is possible that there will be changes in terms of work systems, financing, work details or others. This must be made and agreed by both parties.

g. Consequences of Violations and Problem Solving

The agreed work contract activities have the potential for problems to occur during the course of the collaboration. This can be influenced by several factors related to the process of cooperation

and financing. Therefore both parties must make and agree on the consequences of the violation and resolve professionally if during the process of cooperation things happen that are not in accordance with the employment contract.

h. Work Cooperation Contract Closing

In this section, both parties draw conclusions from all important points of the cooperation contract and both parties sign a work contract. After being signed by both parties and approved, then the cooperation process can be carried out.

5.1.4 Coffee Beans Quality

The quality of coffee beans it will charged by each party between supplier and coffee shop, in this study Couvee and coffee beans supplier need to cooperative to keep the quality stable. There is golden time in keeping up with the quality of coffee beans, it means time between roasting date and serving time. Thus, supplier needs to provide information to client, which is coffee shop, about coffee beans in optimal condition that will be served to customer as the end user.

Coffee shop that orders coffee beans dated on first day of month could give negative impact to quality of beans. It will show on graph below:

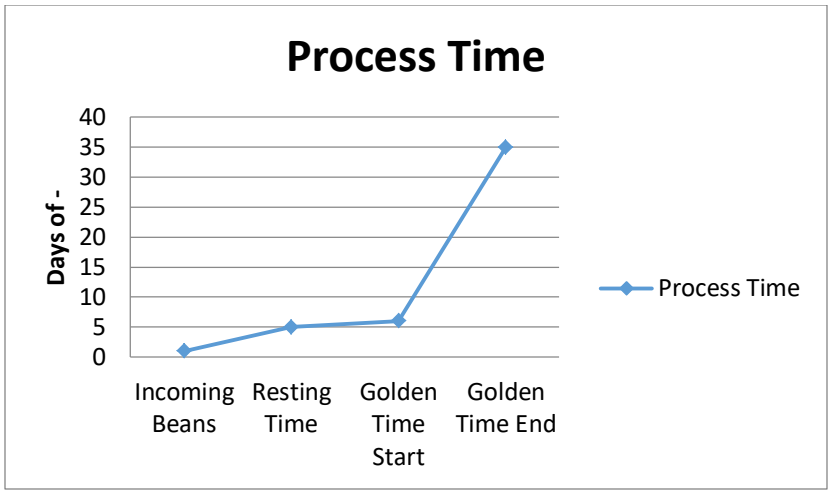


Figure 5.1 Used Coffee Beans Before Implemented

Figure 5.1 shows process time will take 35 days from incoming beans until golden time end. First incoming beans then need resting time. This process needs about 5 days from the first day of incoming beans. After resting time, it will in phase of golden time until days of 35, then finish in the end of golden time.

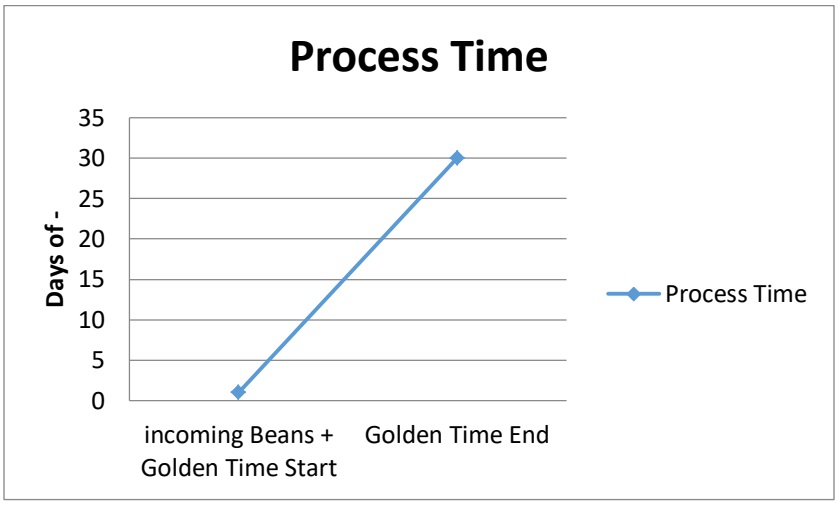


Figure 5.2 Used Coffee Bean After Implemented

From Figure 5.2 it shows process time of beans that will take around 30 days from incoming beans until the phase of end of golden time. The incoming beans does not need resting time because it could be used by coffee shop from the first time. By the time beans are coming in coffee shop, it is considered in phase of golden time until days of 30. Then, finish in the end of golden time phase.

5.1.4.1 Supplier

The supplier needs to provide roasting date tag on coffee beans as information to coffee shop. There is a resting time of coffee beans that should be informed properly to the coffee shop. Supplier needs to provide information about the resting time of coffee beans, to maintain stable quality.

Figure 5.1 Visualization Roasting Date Tag

Figure 5.1 shows the example of implantation of visualization roasted date from supplier. This is one way to inform barista about the proper time to use coffee beans to be served to customer in their golden time phase.

Figure 5.2 Recent Couvee's Coffee Bag

Figure 5.2 shows the real condition in couvee coffee. There is no information about roasting time, so barista does not know the right time to serve the beans to customers. Barista will serve the customers with a cup of coffee in good quality or bad quality due to the lack of information.

5.1.4.2 Coffee Shop

The coffee shop should sort the coffee beans based on roasting date tag that provided by supplier. The barista of coffee shop should familiar with the resting time that already considered by supplier. The resting time of coffee beans takes around 3 – 5 days, then barista should serve the coffee beans in the right time which is in golden time. If there are some rests of coffee beans in the end of golden time days, the barista should eliminate the coffee beans from the inventory. The rest of coffee beans can be used for other needs such as internal used, quality control, coffee calibration process or become material to make another profitable product.

CHAPTER VI

CONCLUSION AND SUGGESTION

6.1. Conclusion

This research has found the result from MRP method which are coffee beans that have lot sizing 114 pack per month since the lead time of supplier is only 1 month. According to standard operational procedure development and work cooperation contract development, the suppliers need to fulfill the demand of coffee beans per month for Couvee Coffee.

6.2. Suggestion

The suggestion that can be given from the results of this research for the company and further researches are:

1. After getting the results of the calculation on material requirements planning, Couvee coffee should make the standard operational procedure to create good relationship between supplier and coffee shop itself.
2. For further researches, cost could be put as one of the consideration for selecting the supllliers, to fulfill the amount and minimum operational cost of Couvee coffee.