

ASSISTANCE OF RAW MATERIAL INVENTORY PLANNING TO SUPPORT THE CURRENT PRODUCTION PROCESS IN NINA BAKER BREAD MSMEs

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Abstract

Inventory problems, especially raw material inventory is a very important thing in a manufacturing company. Planning for raw material inventory is needed to produce goods, so that what is made can be appropriate and appropriate for the needs that are met according to the amount to run the production process properly. No shortage of available raw materials can result in the cessation of the production process due to running out of materials to be processed or not excessive in buying a raw material in order to be efficient in producing. Inventories of raw materials that are not good at UMKM Roti Nina Bakery are the main obstacle to the smooth production process, because the system used in planning raw material inventory is not based on existing methods. The results show that by using the Moving Average forecasting method, the highest error rate can be seen. small. This is the basis for calculations in the Material Requirement Planning (MRP) method, using the MRP method it is proven that the smooth production process from September 2020 to August 2021 has a smooth production process value of almost 100%.

Keywords: Raw Material Inventory and Smooth Production Process

I. INTRODUCTION

Raw materials are one of the most important production factors for a manufacturing and industrial company. Lack of raw materials can also cause inhibition or cessation of the production process due to running out of materials to process. However, if there is too much inventory in terms of spending, it is not effective because there are too many idle and non-producing inventories. Availability of sufficient raw materials is an important factor to ensure a smooth production process. In the production process and companies in general, the smooth implementation of the production process is something that is very desirable in every company. In carrying out the smooth production process properly, it is necessary to have a good production system and it is very necessary to have proper control of the production process. According to Rusdiana (2014) the production process is essentially a process of changing inputs into expenditures. Various forms of goods or services that are done a lot so that the various processes that exist also become many.

Production is an activity carried out to add use to an object or create new objects so that they are more useful to meet needs. According to Heizer and Render (2010)

The definition of production in his book is the process of creating goods and services.

Every company also always conducts inventory planning. Inventory is a very important link in the production and sale of a product. The continuity of the implementation of a company's production process will not be disturbed if a company is able to control the planning of raw material inventory. However, determining the amount of inventory that is too much will result in waste in storage.

The need for raw materials for UMKM Roti Nina Bakery is still not using the forecasting method, so currently it is only an estimate. The following is about the target data and the realization of raw materials as well as targets and realizations for the UMKM Roti Nina Bakery:

TABLE I.
SWEAT BREAD PRODUCTION TARGET AND ACTUAL
SEPTEMBER-AUGUST 2021

Month	Production Target	Production Realization
	Sweet Bread (Pcs)	Sweet Bread (Pcs)
September	2150	2048
October	2210	2139
November	2185	2197
December	2160	2185
January	2275	2158
February	2175	2054
March	2145	2067
April	2220	2189
May	-	-
June	2230	2254
July	2345	2181
August	2300	2231
Amount	24395	23703

Source: Data UMKM Roti Nina Bakery 2020-2021

Based on the table above, it is known that UMKM Roti Nina Bakery in May for a full month did not produce production due to holidays during the month of Ramadan. In addition, the inventory at UMKM Roti Nina Bakery also experienced an excess of inventory and a shortage of material supplies.

TABLE II.
RAW MATERIAL INVENTORY IN SEPTEMBER 2020-
AUGUST 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	2176	128	188	45	16	13
October	2183	130	192	48	18	19
November	2180	129	195	54	22	22
December	2185	137	198	55	23	18
January	2168	125	185	44	16	15
February	2172	127	187	42	15	15
March	2165	123	184	47	13	11
April	2158	118	180	44	15	12
May	-	-	-	-	-	-
June	2130	110	175	40	10	11
July	2145	114	182	46	10	10
August	2164	120	184	43	15	10
Amount	23826	1361	2050	508	173	156

Source: Data UMKM Roti Nina Bakery 2020-2021

Based on the supply of raw materials needed by UMKM Roti Nina Bakery in September 2020 - August 2021, for wheat flour totaling 23826 Kg, eggs totaling 1361 Kg, butter totaling 2050 Kg, developer amounting

to 508 Kg, softening amounting to 173 Kg, and sugar totaling 156 Kg. After the need for raw material inventory, then there is the use of the required raw materials.

TABLE III.
RAW MATERIAL USAGE IN SEPTEMBER 2020-AUGUST
2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	2172	130	192	47	17	15
October	2186	134	196	52	23	16
November	2183	132	193	50	20	18
December	2189	135	201	57	25	21
January	2175	130	180	48	18	17
February	2165	123	185	44	14	13
March	2169	125	187	46	15	15
April	2163	122	183	42	13	14
May	-	-	-	-	-	-
June	2135	113	172	38	8	8
July	2142	112	184	43	12	12
August	2156	123	182	45	13	13
Amount	23835	1379	2055	512	178	162

Source: Data UMKM Roti Nina Bakery 2020-2021

Based on the use of raw materials needed by UMKM Roti Nina Bakery in September 2020-August 2021, for wheat flour totaling 23835 Kg, eggs totaling 1379 Kg, butter totaling 2055 Kg, developer amounting to 512 Kg, softening amounting to 178 Kg, and sugar amounting to 162 Kg.

TABLE IV.
EXCESS RAW MATERIAL INVENTORY IN SEPTEMBER
2020-AUGUST 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	4	0	0	0	0	0
October	0	0	0	0	0	3
November	0	0	2	4	2	4
December	0	2	0	0	0	0
January	0	0	5	0	0	0
February	7	4	2	0	1	2
March	0	0	0	1	0	0
April	0	0	0	2	2	0

May	-	-	-	-	-	-
June	0	0	3	2	2	3

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
July	3	2	0	3	0	0
August	8	0	2	0	2	0
Amount	22	8	14	12	9	12

Source: Data UMKM Roti Nina Bakery 2020-2021

Based on the excess supply of raw materials at UMKM Roti Nina Bakery in September 2020 - August 2021, for wheat flour amounted to 22 Kg, eggs totaled 8 Kg, butter amounted to 14 Kg, developer amounted to 12 Kg, and sugar amounted to 12 Kg.

TABLE V.
SHORTAGE OF RAW MATERIALS IN SEPTEMBER 2020- AUGUST 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	0	2	4	2	1	2
October	3	4	4	4	5	0
November	3	3	0	0	0	0
December	4	0	3	2	2	3
January	7	5	0	4	2	2
February	0	0	0	2	0	0
March	4	2	3	0	2	4
April	5	4	3	0	0	2
May	-	-	-	-	-	-
June	5	3	0	0	0	0
July	0	0	2	0	2	2
August	0	3	0	2	0	3
Amount	31	26	19	16	14	18

Source: Data UMKM Roti Nina Bakery 2020-2021

Table 5 shows that there are still many shortages of raw material inventory rather than excess raw material inventory. Effective planning of raw materials must do the right inventory forecasting, because the planning of raw materials in UMKM Roti Nina Bakery is still not optimal. Forecasting also has a function to reduce various risks that can occur in storage such as excess inventory and also shortage of inventory, with the forecasting method it can be useful for UMKM Roti Nina Bakery to find out how much inventory value is in

each. Forecasting also helps to know how much inventory must be reordered each periode.

The purpose of this study was to analyze the planning of raw material requirements for UMKM Roti Nina Bakery and analyze the needs for planning raw materials after using the MRP method to support the smooth production process.

II. LITERATURE REVIEW

A. Inventory Planning

According to Tjokroamidjojo in Syafalevi (2011) planning in the broadest sense is a process of systematically preparing activities to be carried out to achieve a certain goal. Planning is a way of how to achieve goals as well as possible with existing resources to be more effective and efficient. According to Listyansih (2014) planning is a continuous process that includes two aspects, namely planning and implementation. Planning can be used to control and evaluate the course of activities, because of the nature of the plan as a guide for implementing activities. According to Assauri (2016) raw material inventory is purchased in an unprocessed state. This inventory is used separately from its supply from the production process. Generally, the preferred approach is to eliminate differences from suppliers in quality, quantity, or delivery time, so there is no need to separate them.

B. Production Process

According to Sunyoto and Wahyudi (2016) the production process is a transformation process from input to output so as to produce more value. According to Rusdiana (2014) in essence the production process is a process of changing inputs into expenditures. There are a lot of goods or services that are done, so there are still many kinds of processes. According to Rusdiana (2014) the production process or operating process is essentially a process of changing inputs into outputs. Various forms of goods or services that are done a lot so that the various processes that exist also become many.

III. RESEARCH METHODS

A. Types and Sources of Research Data

Based on the research conducted, the type of research used in this research is descriptive exploratory with a case study method that aims to collect data describe thoroughly.

The data collected is quantitative data which is primary and secondary data. Primary data collection was obtained through observation and interviews with the owner of the UMKM Roti Nina Bakery. The data collected are in the form of: ¹⁾ Primary data, namely those obtained through direct observation and interviews which include MSME profiles, prices, types of raw material supplies and material prices. This research was conducted on the owner of the UMKM Roti Nina Bakery. ²⁾ Secondary data, which is intended to support

the use of primary data. Secondary data which includes information on the amount of inventory and use of raw materials.

B. Sampling Method

In determining the type of sample to be used in this study, using a purposive sampling technique by examining all raw material inventories from September 2020 to August 2021.

C. Method of Collecting Data

Data collection methods are carried out in several ways, namely:

1. Conducting interviews with the owner of the UMKM Roti Nina Bakery to obtain the required data such as raw material data on inventory and usage as well as the things that support this research.
2. Conduct direct observations by collecting data by direct observation to the object of research, namely the production department to see the conditions, situations and work processes carried out.
3. Documentation, namely obtaining data collection obtained directly from the MSMEs.

D. Data Processing/Analysis Method

The method used to determine the inventory of raw materials in order to improve the smoothness of the production process by using the Material Requirement Planning (MRP) method and in determining the needs in one period will make forecasting using the Moving Average and Exponential Smoothing methods, after forecasting it will determine the forecasting method that will be used, best with the smallest error. The steps are as follows:

1. Moving Average
Forecasting the moving average (*Moving Average*) uses a number of historical actual data values to produce forecasts.
2. Exponential Smoothing
Exponential Smoothing is based on the calculation of the average smoothing of past data exponentially, namely by repeating the calculation continuously using the latest data.
3. Material Requirements Planning (MRP)
 - a. Determining the Master Production Schedule
The master production schedule (*Master Production Schedule*) includes what, when, and how much of a material must be purchased, MPS is also a description of the planning period of a request.
 - b. Bill of Materials (BOM)
The list of material requirements (*Bill of Materials*) includes the structure or components needed to make a bakery product at the UMKM Roti Nina Bakery.
4. Smooth Production Process

Good inventory can affect the smooth production process. With a good supply of raw materials, there will be no shortage or excess of raw materials that can cause delays in the production process.

IV. RESULTS AND DISCUSSION

A. Forecasting

The results of this study were obtained based on the analysis of the data obtained. At this stage, data analysis is carried out regarding inventory planning and the smooth production process in forecasting and Material Requirements Planning (MRP).

TABLE VI.
FORECASTING THE MOVING AVERAGE OF RAW MATERIALS FOR UMKM ROTI NINA BAKERY IN SEPTEMBER 2020-AUGUST 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	2180	129	192	49	19	18
January	2183	132	195	52	21	20
February	2178	130	193	51	20	18
March	2175	130	190	47	18	16
April	2168	125	185	44	15	14
May	-	-	-	-	-	-
June	2165	123	184	44	14	13
July	2151	117	180	44	13	11
August	2144	114	179	43	12	11
Amount	17344	1000	1498	374	132	121

Source: Processed data by the author 2021

Before forecasting the Moving Average on raw materials from September 2020 to August 2021, the first thing to do is perform forecasting calculations on each raw material such as wheat flour, eggs, butter, developer, softener, and sugar. After forecasting raw materials in September 2020 to August 2021, then forecasting for September and October 2021.

TABLE VII.
MOVING AVERAGE FORECASTING ON UMKM RAW MATERIALS FOR NINA BAKERY IN SEPTEMBER AND OCTOBER 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	-	-	-	-	-	-
October	-	-	-	-	-	-

September	2146	115	180	43	12	10
October	2152	116	182	44	12	10
Amount	4298	231	362	87	24	20

Source: Processed data by author 2021

Information:

Because the data is in the form of raw material data for UMKM Roti Nina Bakery, for that reason, the result of the fractions are rounded up with the following conditions:

0 – 0.499 rounded up to 0

0.5 – 0.999 rounded up to 1

After forecasting the moving average of raw materials in September and October 2021, the next step is to forecast the raw materials in the Exponential Smoothing forecasting.

TABLE VIII.

FORECASTING EXPONENTIAL SMOOTHING OF UMKM RAW MATERIALS FOR NINA BAKERY IN SEPTEMBER 2020-AUGUST 2021

Month	Raw material					
	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	1958	115	170	41	15	12
January	1763	104	153	37	14	10
February	1585	93	136	32	12	9
March	1427	84	123	29	11	8
April	1284	75	110	27	10	7
May	-	-	-	-	-	-
June	1155	67	99	26	9	6
July	1037	60	89	23	8	5
August	935	54	81	21	7	4
Amount	11144	652	961	236	86	61

Source: Processed data by the author 2021

Before forecasting Exponential Smoothing on raw materials from September 2020 to August 2021, the first thing to do is perform forecasting calculations on each raw material such as wheat flour, eggs, butter, developer, softener, and sugar. After forecasting raw materials in September 2020 to August 2021, the forecasting for September and October 2021.

TABLE IX.

FORECASTING RESULTS OF EXPONENTIAL ON UMKM RAW MATERIALS FOR NINA BAKERY IN SEPTEMBER AND OCTOBER 2021.

Month	Raw material					
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	Wheat Flour (Kg)	Eggs (Kg)	Butter (Kg)	Developer (Kg)	Softener (Kg)	Sugar (Kg)
September	843	49	73	19	7	4
October	627	37	55	15	6	3
Amount	1470	86	128	34	13	7

Source: Processed data by the author 2021

After calculating the Moving Average and Exponential Smoothing forecasting, then selecting the smallest error using MAD (Mean Absolute Deviation) in September and October 2021.

TABLE X.

MAD CALCULATION RESULTS ON MOVING AVERAGE FORECASTING

Information	Moving Average					
	Flour	Egg	Butter	Developer	Softener	Sugar
Error	12	3	3	2	2	2

Source: Processed data by the author 2021

It can be seen that the smallest error calculation results in the Moving Average forecasting where 12 wheat flour, 3 eggs, 3 butter, 2 developer, 2 softener, and 2 sugar. After the smallest error on the Moving Average then calculate the smallest error on Exponential Smoothing.

TABLE XI.

MAD CALCULATION RESULTS ON EXPONENTIAL SMOOTHING FORECASTING

Information	Exponential Smoothing					
	Flour	Egg	Butter	Developer	Softener	Sugar
Error	769	42	65	14	5	4

Source: Processed data by the author 2021

It can be seen that the MAD calculation results in the Exponential Smoothing forecasting, where 769 flour, 42 eggs, 65 butter, 14 developer, 5 softener, and 4 sugar. After calculating the MAD (Mean Absolute Deviation) from the moving Average and Exponential Smoothing forecasting results, then do a comparison on MAD (Mean Absolute Deviation) and choose the best result.

TABLE XII.

COMPARISON OF MAD (MEAD ABSOLUTE DEVIATION) ON MOVING AVERAGE AND EXPONENTIAL SMOOTHING

Information	MAD					
	Flour	Egg	Butter	Developer	Softener	Sugar
Moving Average	12	3	3	2	2	2

Exponential Smoothing	769	42	65	14	5	4
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Source: Processed data by the author 2021

Judging from the table above, it can be determined the appropriate forecasting method for UMKM Roti Nina Bakery, the forecasting method used is the Moving Average method, because it has the smallest Mean Absolute Deviation (MAD) level.

B. Material Requirements Planning (MRP)

TABLE XIII.
LIST OF MATERIAL REQUIREMENTS

No	Material name	Necessary Requirements For Production	Information
1	Butter	20 (Gr)	Bought
2	Egg	15 (Gr)	Bought
3	Water	0.05 (Lt)	Bought
4	Wheat	75 (Gr)	Bought
5	Sugar	20 (Gr)	Bought
6	Developer	5 (Gr)	Bought
7	Softener	6 (Gr)	Bought

Source: Processed data by the author 2021

After making a list of the raw material requirements needed for production, then making inventory data containing the name of the component, how much inventory is there, and how much is the plan to receive the component in the future.

TABLE XIV.
RAW MATERIAL INVENTORY

No	Component Name	Existing Inventory (Kg)	Acceptance Plan (Kg)	Week-
1	Butter	20	45	1
2	Egg	20	28	1
3	Flour	350	536	1
4	Sugar	3	3	1
5	Developer	8	10	1
6	Softener	2	3	1

Source: Processed data by the author 2021

C. Material Requirement Planning (MRP) with Lot Sizing

TABLE XV.
LOT FOR LOT ON BREAD

Component	Information	1	2	3	4	5	6	7	8
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Gross Needs	536	536	536	538	538	540	536	538
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Scheduled Admission

Inventory Projection On Hand	536	0	0	0	0	0	0	0
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Bread

Clean Needs	186	536	536	538	538	540	536	538
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Order Receipt Plan		536	536	538	538	540	536	538
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Delivery Order Plan	536	536	538	538	540	536	538
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Source: Processed data by the author 2021

You can see Lot For Lot on bread, gross needs in the first week are 536, the second week is 536, the third week is 536, the fourth week is 538, the fifth week is 538, the sixth week is 540, the seventh week is 536, and the eighth week is 538. .

In the projected inventory on hand in the first week as many as 536, then in the second week to the eighth week as much as 0.

The net needs for the first week are 186, the second week is 536, the third week is 536, the fourth week is 538, the fifth week is 538, the sixth week is 540, the seventh week is 536, and the eighth week is 538.

In the second week, 536 orders are received, 536 in the third week, 538 in the fourth week, 538 in the fifth week, 540 in the sixth week, 536 in the seventh week, and 538 in the eighth week.

In the first week delivery orders are 536, the second week is 536, the third week is 538, the fourth week is 538, the fifth week is 540, the sixth week is 536, and the seventh week is 538.

D. Smooth Production Process

TABLE XVI.
 SMOOTH PRODUCTION PROCESS AFTER USING MRP

Month	Smooth Production Process (%)	
	Sweet bread	
September	98	
October	99	
November	98	
Month	Smooth Production Process (%)	
	Sweet bread	
February	99	
March	99	
April	98	
May	-	
June	98	
July	97	
August	97	
Amount	98	

Source: Processes data by the author 2021

The smoothness of the production process from November to August looks almost 100%, therefore the smoothness of the production process after using MRP is running well.

E. Discussion

Raw Material Inventory Planning After Forecasting

In planning raw material inventory, UMKM Roti Nina Bakery still uses estimates in the previous period and still does not use existing methods, so there are still excess and shortage of raw materials that can hinder the production process which makes the production process not optimal.

In the use of raw materials, these MSMEs use raw materials every time they make production, where the process of using these raw materials is carried out regularly.

Amount of Raw Material using MRP Method to Support Smooth Production Process

1. Raw Material Planning MRP Method After Forecasting

Based on the results of the calculation of raw materials using the MRP method after forecasting, there are two forecasting methods used, namely Moving Average and Exponential Smoothing. The forecast used for the raw material is the Moving Average, because based on the Moving Average and Exponential Smoothing forecasting, the Mean Absolute Deviation (MAD) calculation is carried

out and after determining the smallest error after the MAD calculation, namely the Moving Average.

In analyzing raw material inventory planning, the authors use forecasting methods and Material Requirement Planning (MRP) in which raw materials and production processes are expected to run well and structured so that there are no excess and shortage of raw materials.

2. Smooth Production Process

Smoothness in the production process of UMKM Roti Nina Bakery is still not good, this is due to the planning of raw material inventory is not optimal so that the supply of UMKM Roti Nina Bakery still has advantages and disadvantages of raw materials.

After performing calculations using the Material Requirement Planning (MRP) method, it is seen that there is a smoothness in the production process where the smoothness value is almost 100%. To improve the smooth production process, it is hoped that the UMKM Roti Nina Bakery pays attention to the determination of raw materials so that the production process can run smoothly.

V. CLOSING

A. Conclusion

From the results of research and discussions conducted by researchers related to the Analysis of Raw Material Inventory Planning to Support the Smooth Production Process, it can be concluded that:

1. Planning for raw material inventory at UMKM Roti Nina Bakery is still not optimal. This can be seen because the inventory planning carried out is still based on estimates, which makes a mismatch in the need for raw materials, so that there are still shortages and excess inventories and obstacles to the smooth production process.
2. Based on forecasting related to raw material inventory planning, forecasting is done using the Mean Absolute Deviation (MAD) calculation from two forecasting methods, namely Moving Average and Exponential Smoothing. Forecasting with the Moving Average method gives the best results.

B. Suggestion

1. Suggestions in determining the supply of raw materials to support the smooth production process for the coming period, further researchers should also use forecasting methods and Material Requirement Planning (MRP). This is because the production system will run well and no longer only use estimates in the previous period and there will be no shortage and excess inventory.
2. Suggestions for UMKM Roti Nina Bakery should no longer use estimates on raw material inventory, so UMKM Roti Nina Bakery can determine the optimal amount of raw material inventory needs

according to the number of needs in order to meet production needs.

REFERENCES

- [1] Andy Wijaya, Sisca, Hery Pandapotan Silitonga, Vivi Candra, Marisi Butarbutar, Onita Sari Sinaga, Abdurrozaq Hasibuan, Efendi, Eko Priyojadmiko, Janner Simarmata. *Production Operations Management*. Yasasan Kita Writing, 2020.
- [2] A. Rusdiana & Moh. Irfan. *Management Information System*. Bandung: Fauthful Library, 2014.
- [3] Assauri, Sofjan. *Production Planning and Control*. First Edition. Yogyakarta: Garaha Ilmu, 2013.
- [4] Diana Khairani Sofyan. *Production Planing and Control*. Yogyakarta: Graha Ilmu, 2013.
- [5] Diana Khairani Sofyan. *Production Planing and Control*. Yogyakarta: Graha Ilmu, 2015.
- [6] Dr. HA Rusdiana, M. *Operations Management*. Bandung: CV Faithful Library, 2014.
- [7] Dwika Ery Irwansyah. *Application of Material Requirements Planning (MRP) in Planning the Inventory of Raw Materials for Jamu Sehat Perkasa at PT Nyonya Meneer*, 2010. Accessed on April 15, 2019.
- [8] Eddy Herjanto. *Operations Management*. Revised Edition. Jakarta: Gramedia Publisher, 2015.
- [9] Fahmi Irham. *Production and Operations Management*. Bandung: Alfabeta, 2012.
- [10] Handoko, T. Hani. *Personalia Management and Human Resources*. Yogyakarta : BPPE Publisher, 2011.
- [11] Hani Handoko. *Management of Personalia & Human Resources*. Second Edition. Yogyakarta : BPFU UGM, 2010.
- [12] Heizer and Render. *Operations Management*. Jakarta: Salemba Empat, 2014.
- [13] Heizer, Jay and Barry Rander. *Operations Management, Sustainability Management and Supply Chain*, Translated: Hirson Kurnia, Ratna Saraswati and David Wijaya. Jakarta: Salemba Empat, 2015.
- [14] Heizer, Jay and Barry Render. *Operations Management*. Edition 11. Translated: Dwi Anoeagrah Wati S and Indra Almahdy. Jakarta: Salemba Empat, 2015.
- [15] Irham Fahmi. *Production and Operations Management*. Bandung: Alfabeta, 2016.
- [16] Kumar, AS, and Suresh, N. *Production and Operations Management: With Skill Development, Caselets, and Cases*. New Delhi : New Age International Limited, 2008.
- [17] Manahan P. Tampubolon. *Operations and Supply Chain Management*. Jakarta: Mitra Wacana Media, 2018.
- [18] Mulyono, Sri. *Operational Research Edition 2*. Jakarta : Mitra Wacana Media, 2017.
- [19] Nurmadhani Fitri Suyuthi, Darwin Lie, Nana Triapnita Nainggolan, Muhammad Gafur Kadar, Sukarman Purba, Marisi Butarbutar, Novy Anngraini, Astuti, Marto Silalahi, Ahmad Syafii, Nina Fapari Arif, Mustar. *Theory, Objectives, and Functions of Management Fundamentals*. Yayasan Kita Writing, 2020.
- [20] Ricky Virona Martono. *Operations Management Concepts and Applications*. Jakarta: Salemba Empat, 2018.
- [21] Rosnani Ginting. *Production System*. Yogyakarta: Graha Ilmu, 2007.
- [22] Sarinah, Mardalena. *Introduction to Management*. Yogyakarta: : CV Main Budi, 2017.
- [23] Shildah, Rohmawati. *Control of Bare Core Raw Materials in Ensuring Production Continuity At PT. Papan Jaya in Lumajang*. Unpublished Thesis. University of Jember: Jember, 2016.
- [24] Steveson, J. William, Chuong Sum Chee. *Operations Management: Asian Perspective*. Edition 9-Book 2. Jakarta: Salemba Empat, 2015.