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Overstock Improvement by Combining Forecasting, EOQ, and ROP

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Abstract

Optimum stock inventory level is an essential factor in inefficient production. Overstock is an obstacle to achieving optimum cost. The purpose of this paper is to provide solutions in overstock in the electronic spare parts industry by comparing the various approaches Forecasting, EOQ, ROP with DDMRP to get the best model to obtain the inventory level Optimally. The Reset is done on the material Copper wire 0, 14mm as the primary material, which is the most expensive material and widely used in production activities. The results of this study showed that the method of DDMRP could decrease the average amount of the supply of Copper wire 0, 14mm per month from 2779 kg to 1499 kg.

Keyword: *Inventory level, Forecasting, DDMRP, Overstock, Optimal*

INTRODUCTION

The pattern of consumer demand is dynamic and unpredictable. Long lead times, rapid product life cycle, inaccurate forecasts, significant product variations, volatile supply, impact poor production planning, and are unable to comply with current environmental demand conditions (Ptak & Smith, 2011). Such a situation has a significant impact on the complexity of the supply chain in a variety of corporate goods and services. According to a survey from the Aberdeen Group, in which forty-eight percent (48%) of the companies had signs of excessive pressure on the company due to the supply chain or the increasingly complex supply chain. Demand fluctuations and the risk of mismatch predictions with actual demand have an impact on changes in production planning made so far. Likewise, the current environmental conditions that are different from the decade provide a basis for planning to adapt to these changes. This phenomenon can be seen in the findings of the American Association for Production and Inventory Controls (APICS) published at the 2008 international conference. The focus of the survey is on volatility, which is due to factors such as *inaccurate forecast, the long lead time part/components*, dan *demands for learner inventory*.

Research related to production planning is often carried out as production planning research in limited inventory capacity which allows for the lack of storage allowed using dynamic programming models (Attarian *et al.*, 2009), in this study the optimum production ratio is seen at the beginning and end of the process, minimum cost amount, optimal inventory level at the beginning of the period and optimal ratio of backorders. Manufacturers of Electronic Transformers have fluctuated in sales; the company's commitment is to provide customers with timely and high-quality transformers. Nevertheless, overstock stock or Overstock problems cost around 2 billion rupiahs or 11% more than the company's current target.

The number of inventory orders to suppliers is derived from previous sales forecasts using forecasts with its formula where the number of forecasts is derived from the average demand in the previous three months. The company has been using these calculations continuously to cause this phenomenon. This phenomenon has occurred over the years. Visible calculations determining the number of orders from suppliers do not match current

developments so that the PPIC team determines the volume of suspected orders by increasing the stock of 80% -100% of their forecasted output to meet the requirements of the sub-contracting process that requires significant production hours. One month ahead.

Based on this phenomenon, this study aims to analyze inventory control with predictions from previous one-year demand data that is useful for determining the amount and when to order with suppliers to reduce overstock and optimize sales accurately. Based on previous studies, one way to predict demand fluctuations is to predict the future. So that it can predict future demand and help companies meet their needs and improve operational efficiency, based on yearly sales data have similarities based on a specific period, so that the pattern includes the type of stationery that can be used to use short-term forecast series. The simple transition method (SA), Moving Average (MA), Weight Moving Average (WMA), and Single Exponential Smoothing (SES) are using the time series function; this method requires the introduction of model approaches and initial estimates of parameters (Smith & Agrawal, 2014).

LITERATURE RESEARCH

Each method of forecasting involves two steps: (i) time series analysis and (ii) selection of the most suitable prediction model for the data. Overstock makes the company work hard to solve this problem by reducing inventory levels. For companies that know when to order to suppliers and how much inventory to expect by using the rebound points and reserve inventory level, also in terms of maximum inventory with minimum cost to determine the number of orders to suppliers can be determined by the Economic Order Quantity method (EOQ). Inventory levels also have to do with predictions and critical times (Senapati *et al.*, 2012), companies must determine demand estimates to know how many products are available in the future, while the first time from the order, until the materials are received, is the need to determine the level of inventory. This study also uses MRP Demand Drive (DDMRP) theory to compare to produce the most efficient production planning and control methods in an environment with inaccurate and long-term forecasting accuracy. From several literature reviews, there is the opportunity to test MRP-Driven Demand (DDMRP) in the electronics component industry.

METHODOLOGY

The purpose of this study is to propose an appropriate and efficient production planning system for controlling inventory of materials so that stock inventory is optimal so that there is not too much stock in the company's inventory. This research is a case study in the transformer electronics manufacturing industry, where researchers focus on obtaining data from the company's inventory system, which converted to number units that still reflect the quantitative value of stock preparation in the company.

After identifying the problem of overstock, this study tries to focus on objects from the level of inventory of copper materials. The next step is to collect data on the value of the company's stock, 0.14mm copper wire material data, which is the most influential and material stock, inventory stock data, planning, requirements, and lead time of copper wire 0.14mm. Then the next step is to process the data through a comparison table between the actual stock and the planning parameters, requirements, crucial time, final stock. These comparisons are formed in a visual information format for easy analysis. The analysis is based on data pattern, comparison, order timing, deviation, MAFE, MAD so that the best value of inventory value is obtained.

RESULTS AND DISCUSSIONS

Copper wire 0,14mm diameter material is the most widely used and used type of production company. Table 1 is the data showing material transactions in 2018, in line with the output of the company's inventory program.

Table 1. Copper wire 0.14 mm Stock Data 2018

No	Transaction of Copper Wire 0.14mm	UNIT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des	**Total**	Average
1	Requirement Plan	Kg	1510	1426	1318	1321	1329	1688	1801	1830	2121	2255	2336	1821	**20756**	1729,66
2	Material Purchase	Kg	1195	741	1593	1000	1113	1090	1592	2202	3645	1701	3610	1999	**21481**	1790,07
3	Material Receipt	Kg	1574	905	2309	1247	824	1500	1408	3189	3100	1301	1793	1560	**20710**	1725,85
4	Stock Target (Company Standard)	Kg	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	**18000**	1500,00
5	Actual Usage	Kg	1187	1125	692	1068	1353	3014	1751	1272	2147	1739	1758	436	**17542**	1461,83
6	Final Stock	Kg	1873	1653	3271	3450	2810	1296	953	2870	3822	3384	3419	4543	**33344**	2778,69
7	Standard lead time	month	1	1	1	1	1	1	1	1	1	1	1	1	**12**	1,00
8	Actual time	month	1,25	1	1	1,25	1,25	1	1	1	1	1,25	1	1	**13**	1,08
9	Final Stick divided Stock Target		1,25	1,10	2,18	2,30	1,87	0,86	0,64	1,91	2,55	2,26	2,28	3,03	**22,23**	1,85
10	Actual Usage divided Requirement Plan		0,79	0,79	0,52	0,81	1,02	1,79	0,97	0,70	1,01	0,77	0,75	0,24	**10,15**	0,85
11	Actual Usage divided Material Receipt		0,75	1,24	0,30	0,86	1,64	2,01	1,24	0,40	0,69	1,34	0,98	0,28	**11,74**	0,98
12	Actual time devided Standard Lead Time		1,25	1,00	1,00	1,25	1,25	1,00	1,00	1,00	1,00	1,25	1,00	1,00	**13,00**	1,08
13	Material Receipt divided Requrement Plan		1,04	0,63	1,75	0,94	0,62	0,89	0,78	1,74	1,46	0,58	0,77	0,86	**12,07**	1,01
14	Mean Forecast Error (MFE)		-323	-300	-626	-253	24	1326,00	-50	-558	26	-516	-579	-1385	**-3213,95**	267,83
15	Mean Absolute Deviation (MAD)		323	300	626	253	24	1326,00	50	558	26	516	579	1385	**5965,13**	497,09
16	Mean Average Percentage Error (MAPE)		27%	27%	90%	24%	2%	44%	3%	44%	1%	30%	33%	318%	**6,42**	54%

Source: Company Data, 2018

The above purchase plan is based on the company's current calculation method:

a. 1-month forecast: 6-month average demand
b. Total Order: (Forecasting + Security Stock) x (20%)) - Stock.
c. Order Time: 1 Month or four weeks

Data processing is an attempt to find data patterns in solving problems of companies with too much material.

In figure 1, it is shown that the material in financing the material is a Copper wire or copper wire with a value of Rp. 3,209,121,449 per month, which is why it is the object of this study.

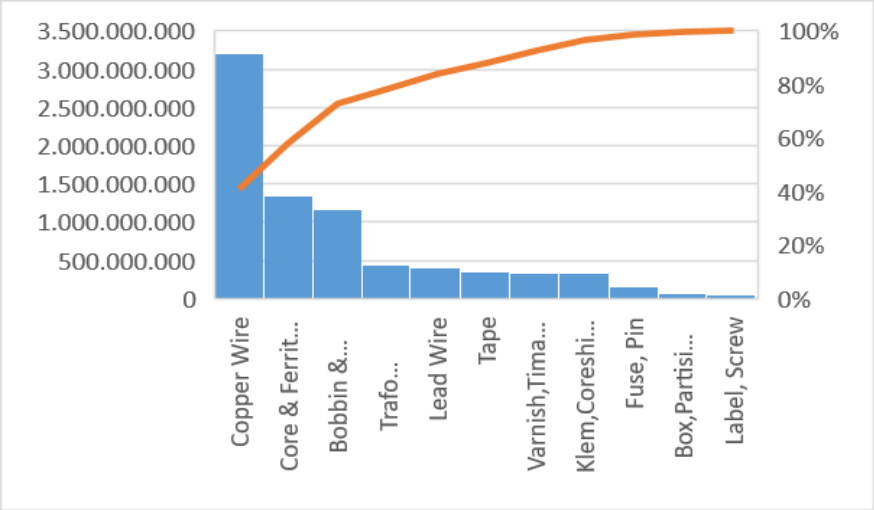

Figure 1. The Company's Stock Value Pareto Diagram
(Source: Data processing, 2018)

Figure 2 describes the type of material copper wire purchased and used. By using a Pareto diagram in Figure 2, the use of copper wire is the most in part No. 1120140TRF, namely COPPER WIRE 0.14 MM 2UEW, ROHS. With the purchase value of 1590 kg per month.

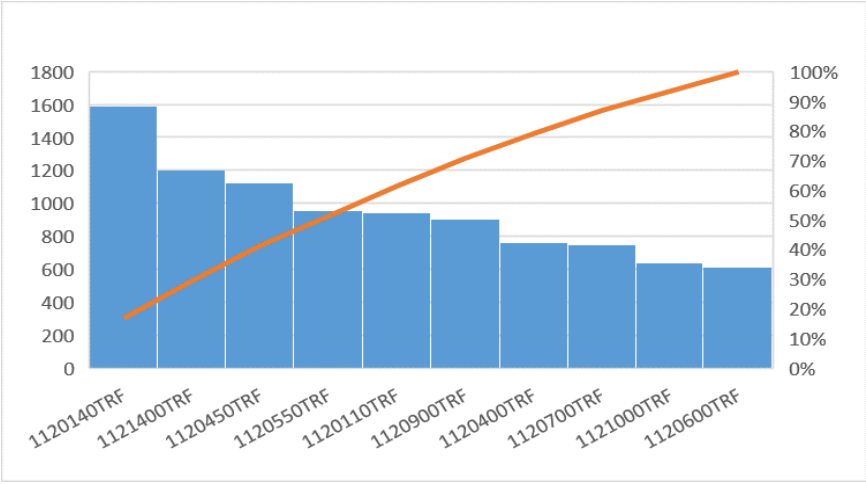

Figure 2. The Most Significant Buying Amount of Copper wire
(Source: Data Processing, 2018)

Based on the company's data above, the author concluded, to solve the main problem of overstock material, the material copper wire 0.14 mm (part No: 1120140TRF) can be used as a research object for analysis in settlement Overstock problems in the enterprise.

In table 1, the data above, then calculated comparison between parameters. The main comparison to the stock performance measure is the difference between actual stock and target, as well as actual usage and planning. The following table 2 below is a comparison of the parameters in table 1 above.

Table 2. Comparison of Stock Parameters

No	Data Processing Results	Different	Target
1	Final Stock divided Stock Target	85%	0%
2	Actual Usage divided Requirement Plan	15%	0%
3	Actual Usage divided Material Receipt	2%	0%
4	Actual time divided Standard Lead time	8%	0%
5	Material Receipt divided Requiremet Plan	1%	0%
6	Standard Deviation (Actual Usage)	47%	-
7	Mean Forecast Error (MFE)	267,83	
8	Mean Absolute Deviation (MAD)	497,09	
9	Mean Average Percentage Error (MAPE)	54%	
10	Comulative Forecast Error (CFE)	-3213,95	
11	Tracking Signal	-6,47	

(Source: Data Processing, 2018)

From the presentation of the above data can be found that there is an excess of material needs planning of 15% of the actual needs and delay of arrival of material by 8% from the specified time standard, this causes the excess or overstock of 85% of the specified stock target. So, it needs improvement on the existing planning method and needs evaluation system and a standard assessment against the supplier. In this study offered several combinations of planning methods as a corrective action in order to eliminate overstock. The first method is to choose the best forecasting method of the following four-time series methods, namely Moving Average (MA), Weight Moving Average (WMA), Single exponential Smoothing (SES), and exponential Smoothing With Trend (ES + Trend). The results of the actual data calculation of copper wire need 0, 14mm in the period from January 2017 to December 2018 and the comparison of the four methods.

Tabel 3. Comparison Results of Time Series Forecasting

Month	Actual Demand	Forecast by 5-MA	Forecast by 3-WMA	Forecast SES	Forecast by ES+Trend
1	1164				
2	923			466	640
3	898		753	649	854
4	760		971	748	951
5	335		835	753	920
6	854	816	582	586	663
7	907	754	701	693	804
8	1178	751	751	779	906

Tabel 3. Comparison Results of Time Series Forecasting

Month	Actual Demand	Forecast by 5-MA	Forecast by 3-WMA	Forecast SES	Forecast by ES+Trend
9	1933	807	1029	938	1106
10	1721	1041	1488	1336	1625
11	1082	1319	1638	1490	1783
12	581	1364	1455	1327	1508
13	910	1299	991	1029	1073
14	1057	1245	871	981	1012
15	933	1070	901	1011	1057
16	1211	913	958	980	1012
17	1546	938	1103	1072	1138
18	1231	1131	1309	1262	1389
19	1051	1196	1305	1250	1349
20	1312	1194	1220	1170	1224
21	1222	1270	1227	1227	1297
22	1187	1272	1202	1225	1284
23	1125	1201	1227	1210	1256
24	692	1179	1165	1176	1204
25	1068	1108	924	982	936
26	1353	1059	988	1017	996
27	3014	1085	1117	1151	1187
28	1751	1450	2112	1896	2204
29	1272	1576	1967	1838	2059
30	2147	1692	1827	1612	1707
31	1739	1907	1829	1826	1991
32	1758	1985	1724	1791	1916
33	436	1733	1851	1778	1880
34		1470	1092	1241	1129
MAD		397,8	376,2	359,9	386,4
MAPE		37%	32%	30%	30%
		m=5	m=3 W(1)=0,25 W(2)=0,25 W(3)=0,50	$\alpha = 0,4$	$\alpha = 0,5$ $\beta = 0,1$

(Source: Data Processing, 2019)

The results of the calculations from four forecasting time series models compared to the current company's planning results, shown in the table 4.

Table 4. Comparison of Planning Results Indicators

No	Description	Curent Corporate Planning	Moving Average (MA)	Weight Moving Average (WMA) (w1:0,25; w2:0,25; w3:0,5)	Single Exponential Smoothing (SES) (α = 0,4)	Exponential Smoothing With Trend (ES+Trend)(α = 0,5; β = 0,1)
1	MAD	497,09	397,77	376,22	359,93	386,45
2	MAPE	54%	37%	32%	30%	30%
3	Result	disagree	disagree	disagree	**Agree**	disagree

(Source: Data Processing, 2019)

Based on value consideration (%) Smallest MAFE (30%) And the value of MAD approaching ZERO (359.93), then at the Disconnect method selected is SINGLE EXPONENTIAL SMOOTHING (SES) with α = 0.4. The following calculation of the selected Forecasting method is Single Exponential Smoothing (SES) Considering the value of Economic Order Quantity (EOQ) and Re-Order Point (ROP) in order to obtain more optimal planning,

Tabel 5. Value of Economic Order Quantity (EOQ)

No	Part No	Description	EOQ Teory	Frequency Order / Year	Old Order Method	
					EOQ	Frequency
1	112014TRF	COPPER WIRE 0.14MM	3742	5	2509	12

(Source: Data Processing, 2019)

Calculation Data above, based on the following values:

- The Total planning of SES method is 18304
- Save Cost is Rp. 50
- The cost of work and transportation is Rp. 20,000,-

As for the Reader Point (ROP) calculation, the results is in the Table 6.

Table 6. Value of Reorder Point (ROP)

No	Part No	Description	ROP (Teory)	Beginning Stock of company
1	112014TRF	COPPER WIRE 0.14MM 2 UE W; ROHS FREE	2393	1486

(Source: Data Processing, 2019)

The ROP calculation data is based on the following supporting data:

• Safety Stock (SS) is 934
• Lead Time Supplier is one month
• The average purchase planning is 1458
• Service or service level towards the customer is 98% (Z = 2.6)
• Standard deviations planning is 359.2

The calculation result of the SES planning, considering the EOQ and ROP values, will result in stock inventory value as in the table 7.

Table 7. Result of Stock Calculation With SES, EOQ And ROP Methods

	Forecasting SES (α = 0,4)	Economic Order Quantity (EOQ)	Re Order Point (ROP)	Final Stock
Dec-17				1486
Jan-18	1225	0	2393	261
Feb-18	1210	3742	2393	2793
Mar-18	1176		2393	1617
Apr-18	982	3742	2393	4377
May-18	1017		2393	3361
Jun-18	1151		2393	2209
Jul-18	1896	3742	2393	4055
Aug-18	1838		2393	2217
Sep-18	1612	3742	2393	4347
Oct-18	1826		2393	2521
Nov-18	1791		2393	730
Dec-18	1778	3742	2393	2694
TOTAL	17502	18710	28716	31185
			Average Stock/ Month:	**2599**

(Source: Data Processing, 2019)

From Table 7. Obtained that the common stock obtained by the company for Copper wire 0.14 mm is 2599 kg per month.

The second method is to use the Demand Driven Material Requirement Planning (DDMRP) method. The determination and data required in the DDMRP calculation specify the following parameters 1) Strategic inventory positioning, obtained value a) Level 2 on the Copper wire in BOM structure. b) Leadtime Copper wire: 4 weeks (1 month), Long term category. c) Time buffer: 0 with consideration derived from a local supplier. d) Minimum Order Quantity (MOQ): 100 Kg. D) The average value of usage per week: 670 Kg, this is obtained from the usage data within one year divided by 52 weeks. 2) Buffer Profiles and Level, consisting of a) Material copper wire 0.14 mm, adhering to the longterm standard for the determination of the Buffer zone value, following the Ptak & Smith guidelines. (2011). B) Safety stock value: 80%. c) Red Zone value: 30%, with Top of RED value: 110%. d) Yellow Zone value: 40%, with the value of Top of Yellow: 150%. Green Zone Value: 30%, with Top of Green value: 180%. e) value of Order Spike Threshold: 40% (0.5 x Safety stock). The strategic positioning and buffer profile of the above planning system can be seen as in the table 8.

Table 8. Data Strategic Positioning, Buffer Profiles and Level of Copper wire 0.14 mm in product BOM structure

Level	Part No.	Description	Unit	Status	Top of GREEN	Top of YELLOW	Top of RED	Time Buffer	Leadtime/ Week	MOQ	Usage/ Week
0	MT523	[MT523G] FINISH GOOD MT-523G/514-04-068-20	PCE	Stocked	18015	15013	11009	0	2	100	5505
1	S MT523	SETTING MT-523G	PCE	Non Stocked	0	0	0	0	0		0
1	JCMT523	JOINTING CORE MT-523 G	PCE	Non Stocked	0	0	0	0	0		0
1	JS MT523	JOINTING SOLDER MT-523 G	PCE	Non Stocked	0	0	0	0	0		0
1	WMT523	WINDING MT-523 G	PCE	Non Stocked	0	0	0	0	0		0
2	90L28781	BOX L (280*250*90) MM	PCE	Stocked	3374	2812	2062	0	2	50	1031
2	6438400HRF	HITACHI INSULATING VARNISH WP 2952 F-2G (H)/180	KG	Stocked	6692	5577	4090	2	8	6120	2045
2	9LL28781	LAYER BOX L 270 X 235 X 3 MM	PCE	Stocked	2543	2119	1554	0	2	50	777
2	4411046SRF	CLUMPER ATAS 41 X 10 BERDIRI (NO STAMP} CHRO	PCE	Stocked	64602	53835	39479	0	4	100	19739
2	4411049MRF	CLUMPER BAWAH 41 X 10 BERDIRI CHROME FREE	PCE	Stocked	64602	53835	39479	0	4	100	19739
2	3140415NRF	CORE E-41 RN-14 UN ANNEAL;ROHS FREE	KG	Stocked	9270	7725	5665	0	8	200	2832
2	3140415YRF	CORE I-41 RM-14 UN ANNEAL;ROHS FREE	KG	Stocked	2740	2284	1675	0	8	70	837
2	5002100TSA	TAPE CLEAR 10 MM T=0.025 MM ROHS FREE (LOKAL)	MTR	Stocked	44719	37266	27328	0	3	500	13664
2	04100M5NRF	BOBBIN COVER ROHS FREE	PCE	Stocked	297115	247596	181570	0	8	1000	90785
2	64700NPB	CF110VMS FLUX (TAMURA CV-330VH) 1 GALLON 20 kG	KG	Stocked	0	0	0	0	8	100	0

Table 8. Data Strategic Positioning, Buffer Profiles and Level of Copper wire 0.14 mm in product BOM structure (Continued)

Level	Part No.	Description	Unit	Status	Top of GREEN	Top of YELLOW	Top of RED	Time Buffer	Leadtime/ Week	MOQ	Usage/ Week
2	6E10925ARF	LABEL 9 X 25 NON KD;ROHS FREE	PCE	Stocked	52209	43507	31905	0	2	5000	15953
2	646002LF	SOLDER BAR SN97% Cu3% (ASAHI)	KG	Stocked	213	178	130	0	8	50	65
2	5002160TSA	TAPE CLEAR 16 MM T = 0.025 MM ROHS FREE (LOKAL)	MTR	Stocked	12516	10430	7649	0	3	500	3824
2	6423000TRF	THINER FLUX DIFLUENT 4520 TAMURA 1 Gln 20 KG	KG	Stocked	0	0	0	0	4	100	0
2	2AD1100BLF	UL-1007#AWG 22, 110 [10~10] MM BLACK LEAD FREE;M	PCE	Stocked	33784	28153	20646	0	4	200	10323
2	2AD1300WLF	UL-1007#AWG 22, 130 [10~10] MM WHITE LEAD FREE;M	PCE	Stocked	33784	28153	20646	0	4	200	10323
2	04110T5DRF	BOBBIN 41 X 10 + PIN SOLDER LIF-11 = 5 PCS; ROHS FREE	PCE	Stocked	106600	88833	65145	0	8	10000	32572
2	1120100TRF	COPPER WIRE 0.10 MM 2UEW;ROHS FREE	KG	Stocked	511	426	312	0	4	100	156
2	**1120140TRF**	**COPPER WIRE 0.14 MM 2UEW;ROHS FREE**	**KG**	**Stocked**	**2194**	**1829**	**1341**	**0**	**4**	**100**	**670**
2	1120550TRF	COPPER WIRE 0.55 MM 2UEW;ROHS FREE	KG	Stocked	1379	1149	1149	0	4	100	421
2	5002180GSA	TAPE GREEN 18 MM T=0.025 MM ROHS FREE (LOKAL)	MTR	Stocked	23050	19208	19208	0	3	500	7043
	2002070GSA	TAPE GREEN 7 MM T=0.025 MM ROHS FREE (LOKAL)	MTR	Stocked	3888	3240	3240	0	3	500	1188

(Source: Data Processing, 2019)

Results of the DDMRP calculation of Copper wire by following the data obtained can be seen in the following table:

Table 9. Demand Driven – MRP calculation

Week	Date	Part	On Hand Alert	On Hand	Today planning	Open Supply	Demand	Available Stock	Stock Alert	Action Result
	First Stock			1486,24						
1	01/01/2018	CW014	299	299	1895	1895	1187	299	2194	ORDER 1895
2	08/01/2018	CW014	299	299		1895		2194	2194	NONE 0
3	15/01/2018	CW014	299	299		1895		2194	2194	NONE 0
4	22/01/2018	CW014	299	299		1895		2194	2194	NONE 0
5	29/01/2018	CW014	2194	2194		0		2194	2194	NONE 0
6	05/02/2018	CW014	1069	1069	1125	1125	1125	1069	2194	ORDER 1125
7	12/02/2018	CW014	1069	1069		1125		2194	2194	NONE 0
8	19/02/2018	CW014	1069	1069		1125		2194	2194	NONE 0
9	26/02/2018	CW014	1069	1069		1125		2194	2194	NONE 0
10	05/03/2018	CW014	1502	1502	692	692	692	1502	2194	ORDER 692
11	12/03/2018	CW014	1502	1502		692		2194	2194	NONE 0
12	19/03/2018	CW014	1502	1502		692		2194	2194	NONE 0
13	26/03/2018	CW014	1502	1502		692		2194	2194	NONE 0
14	02/04/2018	CW014	1126	1126	1068	1068	1068	1126	2194	ORDER 1068
15	09/04/2018	CW014	1126	1126		1068		2194	2194	NONE 0
16	16/04/2018	CW014	1126	1126		1068		2194	2194	NONE 0
17	23/04/2018	CW014	1126	1126		1068		2194	2194	NONE 0
18	30/04/2018	CW014	2194	2194		0		2194	2194	NONE 0
19	07/05/2018	CW014	841	841	1353	1353	1353	841	2194	ORDER 1353
20	14/05/2018	CW014	841	841		1353		2194	2194	NONE 0
21	21/05/2018	CW014	841	841		1353		2194	2194	NONE 0
22	28/05/2018	CW014	841	841		1353		2194	2194	NONE 0
23	04/06/2018	CW014	-820	-820	3014	3014	3014	-820	2194	ORDER STRIKE 3014
24	11/06/2018	CW014	-820	-820		3014		2194	2194	NONE 0
25	18/06/2018	CW014	2194	2194		0		2194	2194	NONE 0
26	25/06/2018	CW014	2194	2194		0		2194	2194	NONE 0
27	02/07/2018	CW014	443	443	1751	1751	1751	443	2194	ORDER 1751
28	09/07/2018	CW014	443	443		1751		2194	2194	NONE 0
29	16/07/2018	CW014	443	443		1751		2194	2194	NONE 0
30	23/07/2018	CW014	443	443		1751		2194	2194	NONE 0
31	30/07/2018	CW014	2194	2194		0		2194	2194	NONE 0
32	06/08/2018	CW014	922	922	1272	1272	1272	922	2194	ORDER 1272
33	13/08/2018	CW014	922	922		1272		2194	2194	NONE 0
34	20/08/2018	CW014	922	922		1272		2194	2194	NONE 0

Source: Data Processing, 2019

Table 9. Demand Driven – MRP calculation (Continued)

Week	Date	Part	On Hand Alert	On Hand	Today planning	Open Supply	Demand	Available Stock	Stock Alert	Action Result
35	27/08/2018	CW014	922	922		1272		2194	2194	NONE 0
36	03/09/2018	CW014	47	47	2147	2147	2147	47	2194	ORDER 2147
37	10/09/2018	CW014	47	47		2147		2194	2194	NONE 0
38	17/09/2018	CW014	47	47		2147		2194	2194	NONE 0
39	24/09/2018	CW014	47	47		2147		2194	2194	NONE 0
40	01/10/2018	CW014	455	455	1739	1739	1739	455	2194	ORDER 1739
41	08/10/2018	CW014	455	455		1739		2194	2194	NONE 0
42	15/10/2018	CW014	455	455		1739		2194	2194	NONE 0
43	22/10/2018	CW014	455	455		1739		2194	2194	NONE 0
44	29/10/2018	CW014	2194	2194		0		2194	2194	NONE 0
45	05/11/2018	CW014	436	436	1758	1758	1758	436	2194	ORDER 1758
46	12/11/2018	CW014	436	436		1758		2194	2194	NONE 0
47	19/11/2018	CW014	436	436		1758		2194	2194	NONE 0
48	26/11/2018	CW014	436	436		1758		2194	2194	NONE 0
49	03/12/2018	CW014	1758	1758	436	436	436	1758	2194	ORDER 436
50	10/12/2018	CW014	1758	1758		436		2194	2194	NONE 0
51	17/12/2018	CW014	1758	1758		436		2194	2194	NONE 0
52	24/12/2018	CW014	1758	1758		436		2194	2194	NONE 0
53	31/12/2018	CW014	2194	2194		0		2194	2194	NONE 0

(Source: Data Processing, 2019)

From the calculation of DDMRP obtained, an average value of stock copper wire 0.14 mm is 1499 Kg, with a total purchase of 18250 Kg. Adjustment buffer value in this DDMRP study is manual adjustment done and in review with time Following the level of urgency, under normal conditions done three months. The action performed when the stock copper wire is in the position of Red Zone or near Deadline, the things done are as follows: contacting a Person In Charge (PIC) supplier, via Phone, Email or message, meeting to create a new deal Purchase Order Status, agreement document assignment, follow and control the result of the meeting.

After calculating the planning system using SES, EOQ, and ROP methods, and obtaining results from the DDMRP calculation, the determination of the best method is done. Here is a table comparing both of these methods.

Table 10. Comparison With Previous Research

Data 2018	Old Company Method (Kg)	SES - EOQ - ROP (Kg)	Demand Driven MRP (Kg)
Total of Requirement Plan (Year)	20756	18710	18250
Total of Actual Usage (Year)	17542	17542	17542
Average Stock (Month)	2779	2599	1499
Judgement	Not Selected	Not Selected	Selected

Source: Data Processing, 2019

From table 10, the DDMRP method is chosen as the best method of planning as it can produce the average stock value of the smallest inventory, which is 1499 Kg per month.

CONCLUSION

In this study, the results of the stock planning comparison system with forecasting time series single Exponential smoothing (SES), EOQ, and ROP methods compared to the DDMRP method were obtained that the DDMRP method Produce a better stock of inventory value. The results of this study showed that the method of DDMRP could decrease the average amount of the supply of Copper wire 0, 14 mm per month from 2779 kg to 1499 kg. It is expected to decrease the overstock experienced by the company so that it can be achieved the desired stock target company. The limitations faced in this research are limited only in one of the electronic spare parts companies producing transformers that are in the industrial area Cikarang, West Java. Research can be done to other electronic companies to provide variations in the influence of the management system of DDMRP planning to improve the competitiveness of the company itself as well as the competitiveness of companies in Indonesia Overall. This research only focuses on one item of inventory stock of electronic spare parts to see the total inventory of the company. Calculation of research using Ms. Excel software, which allows can be developed using the more complex inventory Software so that it is easily integrated into the enterprise System inventory.

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