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THE ANALYSIS OF PRODUCTION CAPACITY USING ROUGH CUT CAPACITY PLANNING METHOD (CASE STUDY AT PT. UNTUK INDONESIA HIJAU)

Analisis Kapasitas Produksi Menggunakan Metode Perencanaan Kapasitas Kasar (Studi Kasus di PT. Untuk Indonesia Hijau)

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ABSTRAK

PT. Untuk Indonesia Hijau is a small-scale company based in Indonesia, specializing in the processing of cocoa beans to produce fermented cocoa beans, cocoa mass, and chocolate bars. Currently, the company's production process is driven by customer demand, often neglecting the efficient utilization of available facilities and resources, resulting in escalated operational costs. The existing workstations exhibit underutilized resources while certain machines and workers are overloaded in specific conditions. The objective of this study is to thoroughly evaluate and analysis the production capacity of each workstation for the production of each product. This comprehensive evaluation and analysis, employing the Rough-Cut Capacity Planning method, encompasses production forecasting, calculation of available capacity at each workstation, determination of the required capacity for each workstation, and a rigorous capacity feasibility test by comparing available capacity with required capacity. The findings of the Rough-Cut Capacity Planning using the CPOF method indicate that nearly all workstations demonstrate positive capacity values over 12 months, indicating that available capacity can satisfy production demands. However, there exists a considerable excess work capacity, underscoring the need for additional strategies to optimize operation efficiency.

Kata kunci: Analysis Production, Cut Capacity Planning, PT. Untuk Indonesia Hijau

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INTRODUCTION

Production capacity planning is an important part of effective production system management. The aim is to avoid wastage of resources and ensure that the company has sufficient capacity to fulfil market demand efficiently. Poorly managed capacity can lead to imbalances, where certain workstations have a lack of capacity while other workstations have excess capacity. This can lead to higher operational costs and failure to meet market demand (Sugarindra & Nurdiansyah, 2020)

Rough Cut Capacity Planning (RCCP) is one of the most common capacity planning methods. This method allows companies to conduct an initial analysis of capacity based on the main production schedule (MPS) that has been prepared (Najy, 2014). According to (Sugiatna, 2021), RCCP helps determine whether available resources, such as labor and machinery, are sufficient to meet projected production demand. In addition, RCCP allows companies to conduct an initial feasibility test before embarking on more in-depth capacity planning (Najy, 2014). Capacity planning with RCCP involves several approaches, one of which is Capacity Planning Using Overall Factors (CPOF), which assesses capacity requirements based on historical data and MPS (Master Production Schedule) (Sugiatna, 2021) (Irawan et al., 2020). Through this calculation, the company can identify capacity requirements in each production period and determine whether the available capacity is sufficient or requires further adjustment (Nurhamidah et al., 2020)

This study aims to evaluate and analysis the production capacity at *PT Untuk Indonesia Hijau* (PT. UIH) by using the RCCP method and the CPOF approach. The results of this evaluation are expected to provide recommendations for capacity optimization and improve the company's operational efficiency.

MATERIALS AND METHODS

Production Forecasting using Minitab Software

The first step of this research is to perform production forecasting based on historical data (Rachim et al., 2023). The forecasting methods will be evaluated to determine the most accurate one with the smallest error rate. To choose the most appropriate forecasting method, we must first recognize clear data patterns. This is important because in forecasting data, we have to make projections based on past data, and patterns that occur in the past will greatly affect the value of the data we are trying to predict. To determine the forecasting method on time series data, it is necessary to know the pattern of the data so that data forecasting can be done with the appropriate method. Data patterns can be divided into four types, namely seasonal, cyclical, trend, and irregular patterns (Barbosa et al., 2015).

Furthermore, Minitab statistical software is used to process the historical data in a way that matches the previous data pattern (Wiijaya et al., 2022). The results of Minitab data processing are then compared with the best. Average Absolute Percentage Error (MAPE), Mean Absolute Deviation (MAD), and Mean Square Deviation (MSD) are used to evaluate the forecasting data from these methods. The method with the lowest error value will be the best model (Lawi & Gunawan, 2022) (Wibisono et al., 2022).

Create a Master Plan Schedule (MPS)

A Master Production Schedule (MPS) is a detailed plan that regulates the amount and time of production for each type of product that must be produced within a specific period. MPS is prepared by taking into account existing production capacity and time constraints. This MPS explains the number of product units that need to be produced each period based on demand predictions. Using historical data and demand patterns (Hanke & Dean, 2005) (Damara & Yusuf, 2020), MPS is used to determine the number of units of products that must be produced each period.

The master production schedule (MPS) provides formal details of production plans and converts them into plans for the needs of raw materials, labor, and work equipment/production machinery. Therefore, the MPS is an appropriate statement in production including product, time, and quantity for more mature planning in the system (Meirizha & Ardiansyah, 2017). MPS is primarily used to 1) convert aggregate planning into specific end products; 2) assess alternative schedules; 3) ascertain production capacity; 4) ascertain production materials needed; 5) expedite information processing; and 6) utilize capacity efficiently.

Capacity Analysis with RCCP Method

Capacity analysis is carried out with the following steps:

1. Available Capacity Calculation: Calculates the available capacity at each workstation, taking into account the working hours, number of machines, and the number of available labor. Time

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measurement is carried out using the stopwatch time study method to obtain accurate data (Barbosa et al., 2015).

2. Calculation of Required Capacity: Calculate capacity requirements based on the MPS that has been compiled by multiplying the production load by the processing time at each workstation.
3. Capacity Due Diligence: Conduct a capacity feasibility test by comparing the available capacity with the required capacity. The analysis uses the Capacity Planning Overall Factor (CPOF) to evaluate whether the available capacity can meet the planned production needs. If there is a shortage of capacity, an analysis is carried out to find the cause and recommendations for improvement (Meirizha & Ardiansyah, 2017)

RESULTS AND DISCUSSION

Production Forecasting

PT UIH produces three main products: fermented cocoa beans, cocoa mass, and chocolate bars. All of these products are made according to customer demand, so sales and production data will be the same. The historical production and sales data of PT UIH is presented below:

Table 1. Production History Data PT. UIH for 24 Month (August 2022 – July 2024)

Month	Fermented Cacao Beans (Kg)	Cacao Mass (Kg)	Chocolate bar (pcs)
Aug-22	2500	200	600
Sep-22	2500	150	600
Oct-22	3000	150	600
Nov-22	3000	200	600
Dec-22	4000	200	600
Jan-23	5000	100	600
Feb-23	2000	150	600
Mar-23	2000	150	600
Apr-23	8100	150	600
May-23	8200	150	600
Jun-23	8350	150	600
Jul-23	8500	250	600
Aug-23	7300	250	600
Sep-23	0	250	600
Oct-23	0	150	800
Nov-23	4750	100	800
Dec-23	4400	150	800
Jan-24	5000	100	600
Feb-24	500	100	600
Mar-24	500	150	600
Apr-24	8600	150	600
May-24	8250	200	600
Jun-24	8100	300	600
Jul-24	8000	250	600
Total	**112550**	**4150**	**15000**

a Source : MS Excel Data Processing

Based on the historical data above, a comparative analysis of methods to forecast production or demand is carried out using Minitab software to choose which method produces the least errors (Rachim et al., 2023). For fermented cocoa beans and cocoa mass, our production pattern shows an upward and seasonal trend, so the Holt Winter method and plot decomposition are chosen to be tested. This is because cocoa plants produce seasonally (Sya'adah et al., 2023), there are two harvest seasons in cocoa plantations in West Sulawesi, namely April to August and November to January.

The production pattern shown tends to be non-seasonal for chocolate bar products. Therefore, the Single exponential Smoothing, double exponential, moving average, and linear trends methods can be used to forecast if the stationary and non-stationary type data do not contain seasonal patterns (Nurhamidah et al., 2020).

Seasonal patterns are fluctuations in data that occur periodically over a period of one year, such as quarterly, quarterly, monthly, weekly, or daily. Cyclical patterns occur when the data is affected by long-term economic fluctuations, such as those related to the business cycle. This pattern is difficult to detect and cannot be separated from trend patterns. Trend patterns are trends in the direction of data in the long term, which can be in the form of increases or decreases. While irregular patterns are unexpected and random events, their occurrence can affect fluctuations in time series data (Nurhamidah et al., 2020).

Table 2. Comparison of Error Values of Forecasting Methods for Fermented Cocoa Bean Products.

Forecasting Method	MAPE	MAD	MSD	Remark
Winter's Method additive	**36**	1432	3474020	**Used**
Winter's method multiplicative	50	2517	10276780	Not used
Decomposition plot additive	44	749	1816797	Not used
Decomposition plot Multiplicative	48	1031	1818201	Not used

[a] Source: Minitab software data processing results

Table 3. Comparison of Error Values of Forecasting Methods for Cocoa Mass.

Forecasting Method	MAPE	MAD	MSD	Remark
Winter's Method additive	16.3	27.23	1319.12	Not used
Winter's method multiplicative	**16.04**	26.66	1316.16	**Used**
Decomposition plot additive	17.82	30.51	2043.83	Not used
Decomposition plot Multiplicative	18.11	32.49	2272.59	Not used

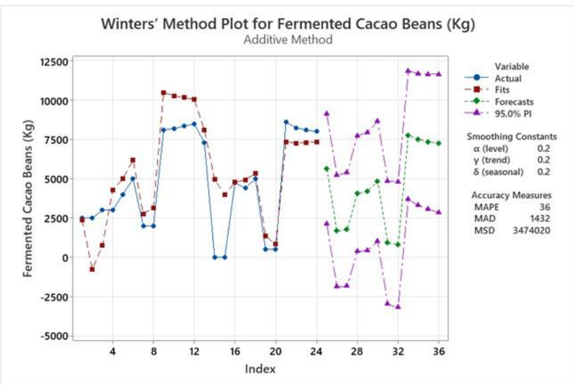
[a] Source : Minitab software data processing results

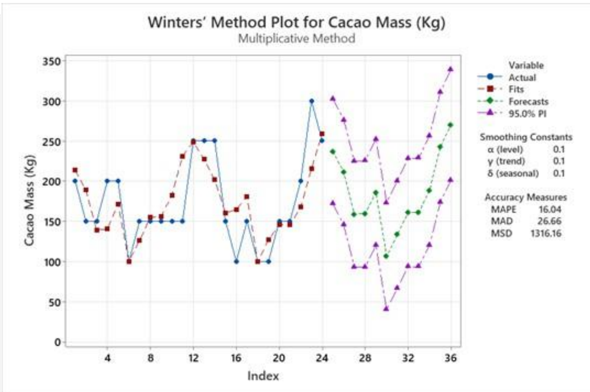
Table 4. Comparison of Error Values of Forecasting Methods for Chocolate Bar.

Forecasting Method	MAPE	MAD	MSD	Remark
Linear Trend model	6.15	21.08	1053.8	Not used
Single Exponential Smoothing	**2.43**	8.33	833.3	**Used**
Double Exponential Smoothing	2.79	9.50	843.9	Not used
Moving Average	4.62	15.83	701.4	Not used

[a] Source : Minitab software data processing results

The comparison of Table 2 shows that the Hold Winter Additive forecasting method was chosen for fermented cocoa bean products with the lowest MAPE value of 36, while the comparison of Table 3 shows that the Holt Winter Multiplicative forecasting method was chosen for the mass cocoa bean products with the lowest MAPE value of 16.04, which makes it the forecasting method for Cacao Mass products. For chocolate bar products, the single exponential smoothing method is used because it produces better results with a MAPE value of 2.43 the following time series graph shows the results of data processing performed by the Minitab application.





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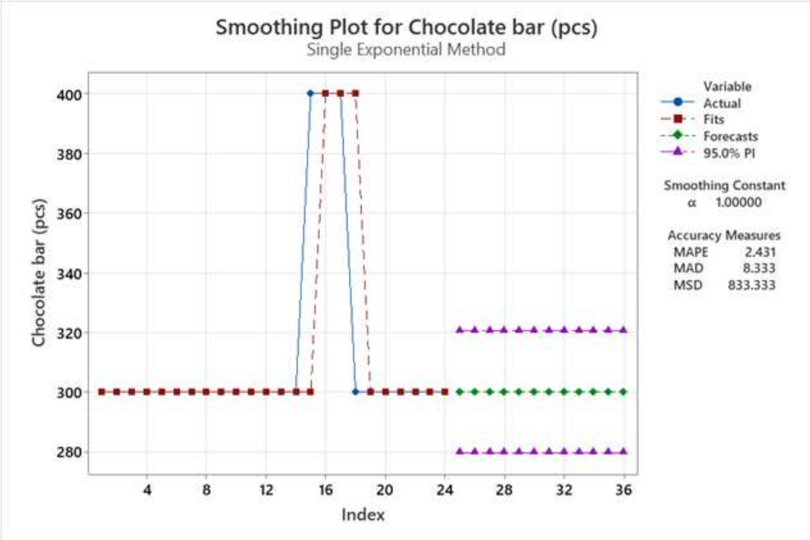

Figure 1. Time Series Plot of Fermented Cacao Beans, Cocoa Mass and Chocolate Bar PT. UIH

Master Planning Schedule

Using the appropriate forecasting technique, the Master Planning Schedule (MPS) is created using the chosen forecasting data. Weekday availability is added to each scheduled month in this schedule. At the moment, the factory only runs one shift per day, and PT. UIH works six days a week for seven hours a shift. Before the calculation of the MPS begins, demand and estimates must be aggregated. In calculating the MPS, the input data required is the result of forecasting based on historical data that has been filled in previously (Syahanifadhel et al., 2023). The Master Planning Schedule for PT. UIH is shown in Table 5 below.

Table 5. Forecasting Master Production Schedule (MPS) for All PT. UIH Products

Month	Production Forecasting			Weekdays
	Fermented Cacao Beans (kg)	Cocao Mass (kg)	Dark Chocolate bar (kg)	
Aug-24	5636	237	600	26
Sep-24	1674	211	600	24
Oct-24	1761	159	600	27
Nov-24	4050	159	600	26
Dec-24	4186	186	600	25
Jan-25	4827	107	600	27
Feb-25	911	133	600	24
Mar-25	779	161	600	26
Apr-25	7774	161	600	26
May-25	7502	189	600	27
Jun-25	7361	243	600	25
Jul-25	7250	270	600	27

Source: MS Excel Data Processing

Rough Cut Capacity Planning with CPOF Method

Available Capacity Calculation

There are several stages of the production process for each product made by PT UIH. For fermented cacao beans products, all production activities are still carried out manually with small tools and machines to help work. In the production line of cacao mass and chocolate bar products, almost all of them have used machines, manual activities only in molding and packaging activities.

Table 6. Production Process Information Each Product PT. UIH

Production Process	Machine and Tools	Qty Machine & Tolls	Man Power
Fermented Cacao Beans			
Fermentation	Fermentation box	22	2
Drying	Drying Floor	1	3
Grading & sorting dry beans	Sortation table	1	3
Packing dry beans	Sewing Machine	5	3
Cocoa Mass			
Roasting	Roaster Machine	1	1
Crushing and winnowing	Disc Mill & Winnowing Machine	1	1
Sieving	Sieving machine	1	1
Manual Cleaned	Electric turbo Fan	2	2
Grinding/refining	Coanching/refiner machine	1	1
Molding and Cooling	Refrigerator	6	2
Packing	Vacuum machine	1	2
Chocolate Bar			
Mixing	Coanching/melanger machine	1	1
Tempering	Tempering machine	1	1
Molding	Molds and Refrigerator	60	2
Packing	Manual packing	0	1

[a] Source: PT. Untuk Indonesia Hijau

The process of fermented beans production is 1) fermentation of wet beans for 4 days, 2) drying using solar heat on the drying floor, 3) manual sorting of dry beans and 4) packaging in sacks. Cacao mass production process starts with 1) roasting fermented cocoa beans, 2) crushing and winnowing, 3) sieving, 4) manual cleaning, 5) grinding and refining, 6) molding and cooling and

7) Packaging. As for the production of chocolate bars, 1) mixing all raw materials, 2) tempering, 3) Molding and cooling and finally 4) packaging. The table 6 provides detailed information regarding all product production activities carried out by PT UIH.

Table 7. Calculation of Standard Production Time for All PT. UIH Products

Work Station	Kg/ batch	Set up time (min)	Run time (min)	Total time (min)	Total time to produce 2667 kg dry beans (35.56% yield)	Hours/ Kg	PH	Utility (%)	Efficiency (kg)
WS1	1000	0	14	14	105	0.001	0.02	100%	100%
WS2	750	0	192	192	1920	0.012	0.36	95%	95%
WS3	7500	353	2528	2881	2881	0.018	0.54	95%	100%
WS4	200	4	20	24	320	0.002	0.06	100%	95%
WS5	120	2	2	4	89	0.001	0.02	100%	100%
Total		**359**	**2756**	**3115**	**5315**	**0.033**	**1**	**95%**	**98%**
Work Station	**Kg/ batch**	**Set up time (min)**	**Run time (min)**	**Total time (min)**	**Total time to make 200 kg of cocoa mass**	**Hours/ Kg**	**PH**	**Utility (%)**	**Efficiency (kg)**
WS1	10	2	25	26.5	795	0.066	0.24	80%	95%
WS2	5	0	10	10	572	0.048	0.18	95%	80%
WS3	5	0	8	8	458	0.038	0.14	80%	95%
WS4	286	0	300	300	300	0.025	0.09	100%	100%
WS5	250	20	600	620	620	0.052	0.19	80%	95%
WS6	1	0	1	1	200	0.017	0.06	100%	100%
WS7	200	0	120	120	120	0.01	0.04	100%	100%
WS8	1	1	1	2	200	0.017	0.06	100%	100%

Total		23	1065	1088	3265	0.272	1	86%	97%
Work Station	**Kg/ batch**	**Set up time (min)**	**Run time (min)**	**Total time (min)**	**Total time to make 100 pcs or 2 kg chocolate bars**	**Hours/ Pcs**	**PH**	**Utility (%)**	**Efficiency (pcs)**
WS1	2	0	5	5	5	0.001	0	100%	100%
WS2	2	0	720	720	720	0.12	0.58	95%	100%
WS3	0.5	0	30	30	120	0.02	0.1	90%	90%
WS4	0.5	0	60	60	240	0.04	0.19	100%	100%
WS5	2	0	150	150	150	0.025	0.12	100%	100%
Total		**0**	**965**	**965**	**1235**	**0.206**	**1**	**98%**	**100%**

[a] Source: P*T. Untuk Indonesia Hijau*

the first step in calculating capacity is to determine the average time at each Workstation for each product. The information needed includes the amount of labor time required to produce each unit of product. The input data in the CPOF technique are standard time, production quantity per month, and proportion (Aisyah et al., 2020). Tables 7 are the calculation of standard time to produce each product.

Available capacity is calculated based on working days, working hours, number of shifts, number of machines/workforce, efficiency and utilities available in each work center. In determining the available capacity with the CPOF method, the following formula is used, the following formula is used: Available capacity = number of machines x number of shifts x working hours x number of working days x utility x efficiency x PH (Sugiatna, 2021) (Subchan & Wiwi, 2014).

An example of calculating the available capacity for fermented cocoa beans at workstation 2 in August 2024: Available capacity Aug 24 = 1 x 1 shift x 7 jam x 26 hari x 95% x 95%x 0,36, Available capacity Aug 24 = 59.3 hours. Tables 8, 9, and 10 are the results of calculating the available capacity in each workstation to make each product of PT. UIH.

Table 8. Available Capacity for Fermented Cacao Beans (Hours)

Month	Week days	Work Hours	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)
Aug-24	26	182	3.6	59.3	93.7	10.4	3.0
Sep-24	24	168	3.3	54.8	86.5	9.6	2.8
Oct-24	27	189	3.7	61.6	97.3	10.8	3.2
Nov-24	26	182	3.6	59.3	93.7	10.4	3.0
Dec-24	25	175	3.5	57.1	90.1	10.0	2.9
Jan-25	27	189	3.7	61.6	97.3	10.8	3.2
Feb-25	24	168	3.3	54.8	86.5	9.6	2.8
Mar-25	26	182	3.6	59.3	93.7	10.4	3.0
Apr-25	26	182	3.6	59.3	93.7	10.4	3.0
May-25	27	189	3.7	61.6	97.3	10.8	3.2
Jun-25	25	175	3.5	57.1	90.1	10.0	2.9
Jul-25	27	189	3.4	61.6	97.3	10.8	3.2

[a] Source: MS Excel Data Processing

Table 9. Available Capacity for Cacao Mass (Hours)

Month	Work Hours	Work Days	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)	WS6 (hour)	WS7 (hour)	WS8 (hour)
Aug-24	182	26	33.7	24.2	19.4	16.7	26.3	11.2	6.7	11.2
Sep-24	168	24	31.1	22.4	17.9	15.4	24.2	10.3	6.2	10.3
Oct-24	189	27	35.0	25.2	20.1	17.4	27.3	11.6	6.9	11.6
Nov-24	182	26	33.7	24.2	19.4	16.7	26.3	11.2	6.7	11.2
Dec-24	175	25	32.4	23.3	18.6	16.1	25.3	10.7	6.4	10.7
Jan-25	189	27	35.0	25.2	20.1	17.4	27.3	11.6	6.9	11.6
Feb-25	168	24	31.1	22.4	17.9	15.4	24.2	10.3	6.2	10.3

Mar-25	182	26	33.7	24.2	19.4	16.7	26.3	11.2	6.7	11.2
Apr-25	182	26	33.7	24.2	19.4	16.7	26.3	11.2	6.7	11.2
May-25	189	27	35.0	25.2	20.1	17.4	27.3	11.6	6.9	11.6
Jun-25	175	25	32.4	23.3	18.6	16.1	25.3	10.7	6.4	10.7
Jul-25	189	27	35.0	25.2	20.1	17.4	27.3	11.6	6.9	11.6

a Source: MS Excel Data Processing

Table 10. Available Capacity for Chocolate Bars Production (Hours)

Month	Work day	Work Hours	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)
Aug-24	26	182	0.7	100.8	14.3	35.4	21.6
Sep-24	24	168	0.7	93.0	13.2	32.6	19.9
Oct-24	27	189	0.8	104.7	14.9	36.7	22.4
Nov-24	26	182	0.7	100.8	14.3	35.4	21.6
Dec-24	25	175	0.7	96.9	13.8	34.0	20.7
Jan-25	27	189	0.8	104.7	14.9	36.7	22.4
Feb-25	24	168	0.7	93.0	13.2	32.6	19.9
Mar-25	26	182	0.7	100.8	14.3	35.4	21.6
Apr-25	26	182	0.7	100.8	14.3	35.4	21.6
May-25	27	189	0.8	104.7	14.9	36.7	22.4
Jun-25	25	175	0.7	96.9	13.8	34.0	20.7
Jul-25	27	189	0.8	104.7	14.9	36.7	22.4

a Source: MS Excel Data Processing

Required Capacity Calculation

To determine the required capacity, several data points are required, as shown in table 7. When calculating the required capacity using the CPOF method, the following formula is used:
Required capacity = demand x standard time (Setiabudi et al., 2018).

Tables 11, 12 and 13 are the results of calculating the capacity requirement in each workstation to make each product of PT. UIH.

Table 11. Required Capacity for Fermented Cacao Beans Production (Hours)

Bulan	MPS (kg)	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)
Aug-24	5636	3.7	67.6	101.5	11.3	3.1
Sep-24	1674	1.1	20.1	30.1	3.3	0.9
Oct-24	1761	1.2	21.1	31.7	3.5	1.0
Nov-24	4050	2.7	48.6	72.9	8.1	2.2
Dec-24	4186	2.7	50.2	75.4	8.4	2.3
Jan-25	4827	3.2	57.9	86.9	9.7	2.7
Feb-25	911	0.6	10.9	16.4	1.8	0.5
Mar-25	779	0.5	9.3	14.0	1.6	0.4
Apr-25	7774	5.1	93.3	140.0	15.5	4.3
May-25	7502	4.9	90.0	135.1	15.0	4.2
Jun-25	7361	4.8	88.3	132.5	14.7	4.1
Jul-25	7250	4.8	87.0	130.5	14.5	4.0

a Source: MS Excel Data Processing

Table 12. Required Capacity for Cacao Mass Production (Hours)

Month	MPS (kg)	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)	WS6 (hour)	WS7 (hour)	WS8 (hour)
Aug-24	237	15.70	11.30	9.04	5.93	12.25	3.95	2.37	3.95
Sep-24	211	13.98	10.06	8.05	5.28	10.90	3.52	2.11	3.52
Oct-24	159	10.53	7.58	6.06	3.98	8.22	2.65	1.59	2.65
Nov-24	159	10.53	7.58	6.06	3.98	8.22	2.65	1.59	2.65
Dec-24	186	12.32	8.87	7.09	4.65	9.61	3.10	1.86	3.10
Jan-25	107	7.09	5.10	4.08	2.68	5.53	1.78	1.07	1.78
Feb-25	133	8.81	6.34	5.07	3.33	6.87	2.22	1.33	2.22
Mar-25	161	10.67	7.67	6.14	4.03	8.32	2.68	1.61	2.68
Apr-25	161	10.67	7.67	6.14	4.03	8.32	2.68	1.61	2.68
May-25	189	12.52	9.01	7.21	4.73	9.77	3.15	1.89	3.15
Jun-25	243	16.10	11.58	9.27	6.08	12.56	4.05	2.43	4.05
Jul-25	270	17.89	12.87	10.30	6.75	13.95	4.50	2.70	4.50

[a] Source: MS Excel Data Processing

Table 13. Required Capacity for Cacao Mass Production (Hours)

Month	MPS (kg)	WS1 (hour)	WS2 (hour)	WS3 (hour)	WS4 (hour)	WS5 (hour)
Aug-24	600	0.5	72.0	12.0	24.0	15.0
Sep-24	600	0.5	72.0	12.0	24.0	15.0
Oct-24	600	0.5	72.0	12.0	24.0	15.0
Nov-24	600	0.5	72.0	12.0	24.0	15.0
Dec-24	600	0.5	72.0	12.0	24.0	15.0
Jan-25	600	0.5	72.0	12.0	24.0	15.0
Feb-25	600	0.5	72.0	12.0	24.0	15.0
Mar-25	600	0.5	72.0	12.0	24.0	15.0
Apr-25	600	0.5	72.0	12.0	24.0	15.0
May-25	600	0.5	72.0	12.0	24.0	15.0
Jun-25	600	0.5	72.0	12.0	24.0	15.0
Jul-25	600	0.5	72.0	12.0	24.0	15.0

[a] Source: MS Excel Data Processing

Feasibility Test for Production Capacity

After calculating the required capacity and the available capacity, the two figures can be compared to see if the main production schedule is feasible. The comparison is expressed as the percentage of load capacity (%LC). If the %LC is negative, there is a temporary shortage of capacity, and vice versa. The capacity feasibility test compares the available and required capacity. Here is the formula and calculation example for %LC (Wijaya et al., 2021) (Abdullah et al., 2024):

$$\%LC = \frac{available\ capacity - capacity\ required}{available\ capacity} \times 100\%$$

% LC (WS1 Aug '24) = ((Available capacity Aug '24 – Capacity required Aug '24)/Available capacity Aug '24) x 100 %
% LC (WS1 Aug '24) = ((71.1 hours – 59.0 hours)/71.1 hours)) x 100 %
% LC (WS1 Aug '24) = 17 %

Based on the calculation example above, it can be concluded that the production capacity for work station 1 for the production of fermented cocoa beans is not experiencing obstacles because the available capacity exceeds the required capacity by 17%. Below are the results of the calculation using the formula above for all production lines of PT. UIH:

Table 14. Recapitulation of Load Capacity Percentage for Cocoa Fermented Beans

Month	MPS (kg)	WS1 (%)	WS2 (%)	WS3 (%)	WS4 (%)	WS5 (%)
Aug-24	5636	-2.86	-13.97	-8.27	-8.27	-2.86
Sep-24	1674	66.90	63.33	65.16	65.16	66.90
Oct-24	1761	69.05	65.71	67.42	67.42	69.05
Nov-24	4050	26.09	18.10	22.20	22.20	26.09
Dec-24	4186	20.55	11.97	16.37	16.37	20.55
Jan-25	4827	15.17	6.01	10.71	10.71	15.17
Feb-25	911	81.99	80.04	81.04	81.04	81.99
Mar-25	779	85.78	84.25	85.03	85.03	85.78
Apr-25	7774	-41.88	-57.20	-49.34	-49.34	-41.88
May-25	7502	-31.84	-46.08	-38.78	-38.78	-31.84
Jun-25	7361	-39.71	-54.81	-47.07	-47.07	-39.71
Jul-25	7250	-41.18	-41.18	-34.12	-34.12	-27.41

[a] Source: MS Excel Data Processing

Table 15. Recapitulation of Load Capacity Percentage for Cocoa Mass

Month	MPS (kg)	WS1 (%)	WS2 (%)	WS3 (%)	WS4 (%)	WS5 (%)	WS6 (%)	WS7 (%)	WS8 (%)
Aug-24	237	53.4	53.4	53.4	64.6	53.4	64.6	64.6	64.6
Sep-24	211	55.0	55.0	55.0	65.8	55.0	65.8	65.8	65.8
Oct-24	159	69.9	69.9	69.9	77.1	69.9	77.1	77.1	77.1
Nov-24	159	68.7	68.7	68.7	76.2	68.7	76.2	76.2	76.2
Dec-24	186	62.0	62.0	62.0	71.1	62.0	71.1	71.1	71.1
Jan-25	107	79.7	79.7	79.7	84.6	79.7	84.6	84.6	84.6
Feb-25	133	71.7	71.7	71.7	78.5	71.7	78.5	78.5	78.5
Mar-25	161	68.3	68.3	68.3	75.9	68.3	75.9	75.9	75.9
Apr-25	161	68.3	68.3	68.3	75.9	68.3	75.9	75.9	75.9
May-25	189	64.2	64.2	64.2	72.8	64.2	72.8	72.8	72.8
Jun-25	243	50.3	50.3	50.3	62.2	50.3	62.2	62.2	62.2
Jul-25	270	48.9	48.9	48.9	61.1	48.9	61.1	61.1	61.1

[a] Source: MS Excel Data Processing

Table 16. Recapitulation of Load Capacity Percentage for Cocoa Mass

Month	MPS (kg)	WS1 (%)	WS2 (%)	WS3 (%)	WS4 (%)	WS5 (%)
Aug-24	600	32.1	28.6	16.2	32.1	30.4
Sep-24	600	26.5	22.6	9.2	26.5	24.6
Oct-24	600	34.7	31.2	19.3	34.7	33.0
Nov-24	600	32.1	28.6	16.2	32.1	30.4
Dec-24	600	29.4	25.7	12.9	29.4	27.6
Jan-25	600	34.7	31.2	19.3	34.7	33.0
Feb-25	600	26.5	22.6	9.2	26.5	24.6
Mar-25	600	32.1	28.6	16.2	32.1	30.4
Apr-25	600	32.1	28.6	16.2	32.1	30.4
May-25	600	34.7	31.2	19.3	34.7	33.0
Jun-25	600	29.4	25.7	12.9	29.4	27.6
Jul-25	600	34.7	31.2	19.3	34.7	33.0

[a] Source: MS Excel Data Processing

Table 14 shows the results of the % LC calculation for the fermented cocoa bean production line. The results of the study show that in August 2024, the % Loading Capacity calculation results at all workstations showed negative figures at all workstations. This shows that there is excess work capacity at these workstations if they are to produce 5,636 kg of dry fermented beans. This is also evident in the % LC calculations from April 2025 to July 2025, with a production plan exceeding 7,000 kg, showing that the % LC calculations for all workstations are negative. Therefore, it is necessary to increase the capacity of all workstations to meet customer demand. In the LC% calculation simulation, a production volume of 5,200 kg is required to achieve a positive LC% value across all workstations. Therefore, it can be concluded that a production volume of 5,200 kg represents the current maximum monthly production capacity for fermented cocoa beans.

Table 15 and Table 16 show the calculated %LC values for the production of cacao mass and chocolate bar products all show a positive %LC, the average %LC number of all product production lines is above 50% so that the production unit utility is low. UIH is currently implementing a Just in Time (JIT) production system to reduce production costs due to the low utilization of production capacity for both products.

CONCLUSIONS AND IMPLICATIONS

In this study it can be concluded that almost the entire production line of the three products of PT. UIH occurred excess available capacity, only in the production of fermented beans for 4 months experienced a lack of available capacity. With the results of capacity analysis with the RCCP method, MPS needs to be revised so that the production capacity of PT UIH can be optimized.

For fermented cocoa bean products, in months where production capacity is still very low, PT UIH needs to create a strategy to obtain raw material supply so that production capacity can be optimized. Anticipating potential production bottlenecks in the previous two work stations, production facilities need to be upgraded, such as the drying floor needs to be upgraded to a drying machine, as well as the addition and repair of fermentation boxes.

Cacao mass and chocolate bar products have a very high %LC, therefore PT UIH needs to make a good marketing strategy in the future. These two products need to be encouraged so that demand from customers and the market can meet the installed production capacity.

REFERENCES

Abdullah, A. K., Lahay, I. H., & Uloli, H. (2024). Penjadwalan Kapasitas Produksi Roti Menggunakan Metode Rough Cut Capacity Planning Di Umkm Cita Rasa Gorontalo. *Jurnal Teknik Industri Terintegrasi*, *7*(1), 394–403. Https://Doi.Org/10.31004/Jutin.V7i1.24933

Aisyah, S., Hardi Purba, H., & Dewarani, R. F. (2020). Production Capacity Planning Using Rccp Method With Cpof Approach: A Case Study In An Automotive Industry. *Iop Conference Series: Materials Science And Engineering*, *885*(1), 012028. Https://Doi.Org/10.1088/1757-899x/885/1/012028

Barbosa, N. De P., S.Christo, E. D., & Costa, K. A. (2015). Demand Forecasting For Production Planning In A Food Company. *Arpn Journal Of Engineering And Applied Sciences*, *10*(16), 7137–7141.

Damara, A., & Yusuf, K. (2020). Analisis Kapasitas Produksi Dengan Metode Crp (Capacity Requirement Planning) Pada Usaha Kecil Menengah Sehati Di Kota Banjar. *Jig :Jurnal Industri Galuh*, *2*(1).

Hanke, J. E., & Dean, W. W. (2005). *Business Forecasting (8th Edition)*.

Irawan, Nasiatin, T., Adha, S., Julyanto, O., Rani, C. P., & Dimas, R. P. (2020). Analysis Of Production Capacity Planning And Control In Pt. Krakatau Wajatama With Rought Cut Capacity Planning (Rccp). *Journal Industrial Engineering & Management Research (Jiemar)*, *1*(2). Https://Doi.Org/Https://Doi.Org/10.7777/Jiemar.V1i2

Lawi, A., & Gunawan, J. (2022). Analisis Kapasitas Produksi Pada Lini Produksi Baru Dengan Pendekatan Rough Cut Capacity Planning. *Jurnal Manajemen Rekayasa Dan Inovasi Bisnis*, *1*(1), 62--74. Https://Journal.Iteba.Ac.Id/Index.Php/Jmrib/Article/View/15

Meirizha, S. N., & Ardiansyah, A. (2017). Analisis Kelayakan Kapasitas Produksi Dengan Metode Rccp (Studi Kasus Pt. Sewangi Sejati Luhur). *Jurnal Surya Teknika*, *5*(01), 49–54.

Https://Doi.Org/10.37859/Jst.V5i01.607

Najy, R. J. (2014). Rough Cut Capacity Planning-(Rccp)-(Case Study). *Advances In Theoretical And Applied Mechanics*, *7*, 53–66. Https://Doi.Org/10.12988/Atam.2014.4612

Nurhamidah, N., Nusyirwan, N., & Faisol, A. (2020). Forecasting Seasonal Time Series Data Using The Holt-Winters Exponential Smoothing Method Of Additive Models. *Jurnal Matematika Integratif*, *16*(2), 151. Https://Doi.Org/10.24198/Jmi.V16.N2.29293.151-157

Rachim, F., Sudirman, Ritnawati, Erdawaty, & Fitriah. (2023). Using The Arima Method With Minitab Applications For Forecasting Work Order Projects Of Casting Construction (Case Study: Pt.Bumi Sarana Beton). *Civilla: Jurnal Teknik Sipil Universitas Islam Lamongan*, *8*(2), 121–136. Https://Repository.Unifa.Ac.Id/Id/Eprint/2088

Setiabudi, Y., Afma, V. M., & Irwan, H. (2018). Perencanaan Kapasitas Produksi Atv12 Dengan Menggunakan Metode Rough Cut Capacity Planning (Rccp) Untuk Mengetahui Titik Optimasi Produksi (Studi Kasus Di Pt Schneider Electric Manufacturing Batam). *Profisiensi : Jurnal Program Studi Teknik Industri*, *6*(2). Https://Www.Journal.Unrika.Ac.Id/Index.Php/Jurnalprofisiensi/Article/View/1620

Subchan, U., & Wiwi, M. (2014). Analisis Kapasitas Produksi Dalam Mengantisipasi Kenaikan Jumlah Permintaan Pembuatan Kerangka Baja Di Pt. Ometraco Arya Samanta Dengan Metode Rought Cut Capacity Planning (Rccp). *Jurnal Teknik Mesin*, *Vol 3*, *No 02 (2014): Jtm : Volume 03 Nomor 02 Tahun 2014*. Http://Ejournal.Unesa.Ac.Id/Index.Php/Jtm-Unesa/Article/View/9930

Sugarindra, M., & Nurdiansyah, R. (2020). Production Capacity Optimization With Rough Cut Capacity Planning (Rccp). *Iop Conference Series: Materials Science And Engineering*, *722*(1), 1–7.

Sugiatna, A. (2021). Analisis Perencanaan Kapasitas Produksi Dengan Menggunakan Metoda Rought Cut Capacity Planning Pendekatan Cpof Di Pt. Xyz. *Sistemik(Jurnal Ilmiah Nasional Bidang Ilmu Teknik)*, *09*(2).

Sya'adah, A., Salim Dahda, S., & Ismiyah, E. (2023). Perbandingan Keakuratan Peramalan Produksi Obat Dengan Metode Winter Dan Metode Dekomposisi. *Jurnal Rekayasa Sistem Industri*, *9*(1), 15–20. Https://Doi.Org/10.33884/Jrsi.V9i1.8143

Syahanifadhel, M. V., Basuki, D. E., Hasna, B. A., & Azzam, A. (2023). Analisis Perencanaan Produksi Pada Produk Kemeja Pola Menggunakan Metode Forecasting Dan Master Production Scheduleuntuk Penjadwalan Produksi Pada Cv. Jodion Unggul Perkasa. *Jurnal Teknik Industri*, *9*(1). Https://Ejournal.Uin-Suska.Ac.Id/Index.Php/Jti/Article/View/21890/8883

Wibisono, A., Nugraha, Y. W., Mulyati, A., & Tatariyanto, F. (2022). Analisis Peramalan Penjualan Plate Ramp Kvy Dengan Metode Time Series Menggunakan Aplikasi Minitab 19. *Jurnal Ilmiah Perkusi*, *2*(4), 581. Https://Doi.Org/10.32493/J.Perkusi.V2i4.25291

Wiijaya, I. P. E., Indah, N. P., & Muhyiddin, Y. (2022). Analisis Komparatif Metode Trend Dalam Peramalan Produksi Kopi Indonesia. *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, *8*(2), 1465. Https://Doi.Org/10.25157/Ma.V8i2.8042

Wijaya, C., Loren, J., & Tampubolon, J. (2021). Production Planning And Control At Pt Xyz Using Manufacturing Resources Planning Method. *Jkie (Journal Knowledge Industrial Engineering)*, *8*(2).