Improving the utilization of palm oil mill through fulfillment of fresh fruit bunch

Muntashir Masril, Nazaruddin and Juliza Hidayati*
Master of Industrial Engineering Department, Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155

*Email: rivaijuliza@gmail.com

Abstract. Asahan District consists of Sei Dadap Estate, Bandar Selamat Estate, Sei Silau Estate, Pulau Mandi Estate, Ambalutu Estate, Hutapadang Estate, and Sei Silau Palm Oil Mill. Asahan District has a factory capacity of 50 tons of FFB per hour. The analysis was carried out using the Food Supply Chain Networking (FSCN) method. The FSCN method is carried out by discussing six aspects of the supply chain in the form of supply chain objectives, supply chain structure, supply resources, chain management, chain business processes, and supply chain performance. This study aims to design the fulfillment of FFB supply needs at PTPN III in the district of asahan with a factory installed capacity of 50 tons of FFB per hour based on the projected calculation of the availability of FFB from the supplier's farm. The number of FFB available based on the calculation of production results for the next five years for 2019-2023 is 337,156 tons, 328,885 tons, 323,296 tons, 311,253 tons and 300,401 tons. Based on the target if as much as 92% of factory utilities, plantation production will decrease by around 3% per year, in the third to the fifth year of Sei Silau POM will experience a shortage of FFB supply, so an additional third party is needed. the composition of the mature plant is not balanced, namely in juvenile palm by 35% whereas for young palm FFB production will increase by 13%, FFB production will decrease in adolescents by 42% and for the palm of old age will start in Replanting by 9%.

1. Introduction

1.1. Background of the problem

PT. Perkebunan Nusantara III, or abbreviated as PTPN III, is one of the plantation companies that produce potential Crude Palm Oil (CPO) and Palm kernel (Kernel) commodities in North Sumatra. In addition to meeting the national market, PTPN III also exports its products abroad. The strategic value of the CPO commodity has also encouraged PTPN III to improve company performance to achieve competitive advantage.

Based on the target set by the company, the minimum processing capacity of 90%, while in reality the company has not been able to reach the target. Figure 1 shows a comparison between factory utility targets and company achievements from 2014 to 2018. Figure 1 shows the achievements of PTPN III utilization, where utilization targets have not been able to be achieved during the past 4 years. Factory utilization continues to decline and the lowest point in 2017 is only around 75%. Unfulfilled POM processing capacity causes idle capacity. The main factor that is indicated to cause this decline is the number of FFB supplies that continue to decline.

This research will focus on looking at the imbalance in the capacity of POM with FFB supply in PTPN III, to get the design concept of meeting the supply of FFB both from their own plantations and from outsiders, so as to meet company targets and minimize idle capacity. The design concept that will be examined by taking into account the constraints of the estate itself that affects the amount of FFB production, namely land area, land class, plant age, and plant density.
1.2 Problem formulation

The problem to be solved in this research is the supply of FFB that is unable to meet the processing capacity of the Palm Oil Mill in PTPN III. As a result of this imbalance production capacity cannot be utilized maximally, so the output produced cannot meet company targets. To overcome these problems, it is necessary to design a concept of FFB supply to meet the capacity of manufacturing plants in PTPN III so that the utilization of POM in PTPN III can be increased.

1.3 Research objectives and objectives

The objective to be achieved in this study is to obtain a concept of FFB supply to meet the capacity of the POM in PTPN III. The design is expected to be able to maximize the capacity of PKS in PTPN III, which is a minimum of 1100 tons per day.

2. Methodology

This research is included in the type of descriptive research in the case study group. According to Hidayat (2010), descriptive research is a research method used to find the widest possible knowledge of the object of research at a particular time. This research is classified as descriptive research because this study describes each variable that influences the current problem systematically and actually based on existing data that includes variables that affect the PTPN III FFB supply. The conceptual framework in this study can be seen in Figure 2.
Figure 2. Conceptual framework for research.

Figure 2 shows the conceptual framework of the research to be carried out. Variable area of plantations, age of plants, density of plants and land class then the amount of FFB production in the estate is known. Local plantation production will supply FFB to every POM in PTPN III. The allocation of supply of FFB to POM has been predetermined by the company. In addition to the results of the POM production in PTPN III, they also receive FFB from outside parties.

3. Results and discussion

3.1 Potential FFB of Asahan District from 2019-2023

The calculation of the FFB yield of the Asahan District Gardens is based on the area of the land, the planting year and the soil class for the next five years.

Table 1. Calculation of FFB production results in the entire Asahan district plantation.

| Farm   | Garden Area (Ha) | 2019 (Ton) | 2020 (Ton) | 2021 (Ton) | 2022 (Ton) | 2023 (Ton) |
|--------|------------------|------------|------------|------------|------------|------------|
| KDBSL  | 3.570            | 89.323     | 86.273     | 83.389     | 79.064     | 75.486     |
| KSSIL  | 2,412.46         | 49.549     | 48.056     | 46.346     | 44.395     | 42.220     |
| KHTPD  | 4,102.37         | 107.277    | 105.863    | 103.823    | 100.599    | 96.331     |
| KAMBT  | 2,471.96         | 64.170     | 62.403     | 61.007     | 58.857     | 56.701     |
| KPMIDI | 3,122.32         | 63.696     | 60.927     | 60.238     | 58.446     | 56.820     |
| KSDDP  | 3,351.53         | 56.272     | 56.330     | 58.150     | 56.380     | 56.481     |
| Total  | 19,031           | 430.286    | 419.851    | 412.953    | 397.742    | 384.039    |
The data in the above table is a calculation with 100% potential, which is a situation where the tree density reaches 143 per ha according to the norm. The number of FFB available based on the calculation of the results of the next five years for 2019 is 337,156 tons, in 2020 is 328,885 tons, in 2021 is 323,296 tons, in 2022 is 311,253 tons and in 2023 is 300,401 tons. From the above results FFB production continues to decline every year.

3.2. Analysis of availability of suppliers plantation FFB
The results of various old planting years in 1991 and the youngest were planted in 2014, the total area of the plantation was 19,030.98 ha and the total number of trees in the whole garden was 2,224,775 trees and the total yield of trees/ha was 2,576.62.

From the above composition, it is seen that the potential to produce the most FFB is in juvenile palm by 35% while for young palm FFB production will increase by 13%, FFB production will decrease in adolescents by 42% and for palm which is of old age will start in Replanting by 9%. Sei Dadap and Pulau Mandi estate increase every year, for Ambalutu estate they have increased from 2014 to 2016 and production has declined again in 2017 and 2018, for Hutapadang estate FFB production has increased quite well in 2014 - 2017 but has decreased slightly in 2018, for the Sei Silau plantation there will be a decline every year from 2014 – 2018, and for the Bandar Selamat estate there will be an increase from 2014 - 2016, then production will decline again in 2017 and 2018.

3.3 Design of fulfillment of asahan district FFB supply
The supply shortage of FFB in 2019 was 66,004, the shortage in 2020 was 74,315, the shortage of FFB in 2021 was 79,904, the shortage of FFB in 2022 was 91,947 and the shortage of FFB in 2023 was 102,799. The supply of FFB from the plantation itself is still insufficient to process factory utilities by 92% so that the fulfillment of the Asahan District FFB at Sei Silau PKS requires additional supply of FFB from third parties.

4. Conclusions
1. Structure of supply of fresh fruit bunches in Asahan District consists of Sei Silau POM, Bandar Selamat estate, Sei Dadap estate, Sei Silau estate, Pulau Mandi estate, Ambalutu estate, Hutapadang estate and Third Party.
2. Area of supplier estate originating from Asahan District has an area of 19,031 Ha. In calculation Asahan District has a FFB capacity of 50 tons of FFB per hour.
3. It takes need for coordination between the plantation and the factory, so that in the future Sei Silau POM can meet its FFB supply.
4. Based on the projected calculation of the potential for FFB production for the next five years, starting from 2019 until 2023, plantation production will decrease by around 3% per year, in the third and fifth year of the Sei Silau POM, there will be a shortage of FFB supply. This is due to the composition of the mature plant is not balanced, namely in juvenile palm by 35% whereas for young palm FFB production will increase by 13%, FFB production will decrease in adolescents by 42% and for palm of old age will start in Replanting by 9%.

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