Multidisciplinary Output Research For Actual and International Issue(MORFAI Journl) ISSN (e): 2808-6635
Volumes 5 No. 2 (2025)

IDENTIFICATION OF PALM OIL PROCESSING AT PT. ASAM JAWA PKS

Febri Handika[1]*, Khairul Rizal[2], Yudi Triyanto[3], Hilwa Walida[4]
[1]Student of Agrotechnology Study Program, Faculty of Science and Technology, Universitas Labuhanbatu
[234]Lecturer of Agrotechnology Study Program, Faculty of Science and Technology, Universitas Labuhanbatu
Corresponding E-mail: febryahaam@gmail.com[1*]

Received	: 15 February 2025	Published	: 25 April 2025
Revised	: 27 February 2025	DOI	: https://doi.org/10.54443/morfai.v5i2.2804
Accepted	: 14 March 2025	Link Publish	: https://radjapublika.com/index.php/MORFAI/article/view/2804

Abstract

This study aims to determine the analysis of the palm oil processing identification process at PT. Asam Jawa in South Labuhanbatu Regency. The determination of the research location was done intentionally (purposive). The subjects of the study were the parties involved in the study, namely PT. Asam Jawa and the object of the study was the production of crude palm oil. Data collection was carried out using historical data methods and literature studies. The results of the study showed that the palm oil processing process starts from (a) fruit harvesting; (b) transportation of FFB; (c) receipt and sorting of FFB; (d) boiling station (Sterilizer); (e) threshing station; (f) pressing station; and (g) purification station (Clarification Station)

Keywords: ***Identification, Processing, Palm Oil***

INTRODUCTION

Palm (Elaeis guineensis Jacq.) is a strategic commodity that plays an important role in the national economy, both as a source of foreign exchange and a provider of employment. Diversification of products from the plantation sub-sector produced and the competitiveness of the products are expected to provide added value, as well as the management of natural resources in each region so that they are optimized sustainably and continuously according to the characteristics of the potential of each region (Syaifullah, 2021). Oil palm plantations in Indonesia have a very important role strategic from an economic perspective, including as an export commodity, absorbing job opportunities, reducing the number of poor people, encouraging regional growth centers, meeting consumption needs in country, and others. The Crude Palm Oil (CPO) processing industry and its derivatives are one example of an industrial sector that makes a large contribution to state revenue. In Developing and improving this industry requires knowledge and mastery of technology so that the Indonesian nation is able to compete with other countries.

The benefits of Crude Palm Oil (CPO) and Palm Kernel (IKS) are numerous. CPO is widely used as raw material for industries such as butter, soap, cosmetics, textiles, biodiesel, and others. If we look at the need for palm oil in the world, it is certain that demand will increase every year along with the increase in the world's population. The prospects for developing palm oil in Indonesia are generally very good. It is estimated that demand for palm oil products will remain high in the future. Business opportunities for palm oil farming and its derivative products are very promising for the development of agricultural land and the construction of palm oil factories. The tropical climate and sufficient rainfall allow oil palm plants to grow well in Indonesia.

Palm oil mills are one of the most important agricultural industries in Indonesia and are industrial companies engaged in the processing of Fresh Fruit Bunches (FFB) of oil palm with the aim of producing Crude Pulm Oil (CPO) and Palm Kernel (PK) as the main products (semi-finished products/raw materials for downstream industries). The food, cosmetics, soap and paint industries are industries that use palm oil as the basic material. In fact, recently there have been efforts use of palm oil as a raw material for making alternative fuels. The increase in the amount of CPO (Crude Palm Oil) production from processed FFB has resulted in an increase in the amount of liquid waste produced. Palm oil is one of the largest commodities in several regions in Indonesia. It is necessary to pay attention to the pollution burden that will arise if it is not carried out properly. Each ton of fresh fruit bunches processed produces liquid waste of around 50% compared to the total other waste, while empty bunches are 23% (Candra Hutasoit, 2021).

Palm oil plantation waste is waste that comes from plant residue left behind when opening a plantation area, rejuvenating and harvesting palm oil. This waste is classified into three types, namely solid, liquid and gas waste. The most important concern is liquid waste or better known as POME (Palm Oil Mill Effluent). POME is wastewater produced by a palm oil mill that comes from boiled condensate, hydrocyclone water and sludge separator. Palm oil liquid waste contains quite high concentrations of organic and inorganic materials. Liquid waste that will be produced from the entire coconut oil production process. Palm oil by- products and waste have great potential as renewable energy sources. One source of renewable energy that has not been widely utilized is energy from biogas.

PT. Asam Jawa was established by Notarial Deed No. 37 dated January 16, 1982 from Notary Barnang Armino Pulungan, SH in Medan. Then legalized by the Minister of Justice of the Republic of Indonesia with Decree No. C2 3259 HT.01.01.Th.84 dated June 6, 1984 which was published in the State Gazette of the Republic of Indonesia No. 797 of 1984. Based on the decree of the Minister of Agriculture, Director General of Plantations, PT. Asam Jawa was declared a large plantation as PMDN obtained based on the SPT of the Central Domestic Investment Coordinating Board No. 261 / I / PMDN / 1983 dated December 13, 1983. Land clearing and nurseries were intensified starting in 1982, as well as the construction of infrastructure and preparation of requirements for investment credit applications to Bank Indonesia. The first plants were started in 1983 on peat land that was quite dry and relatively did not supply significant obstacles.

In further development, it turned out that most of the land faced was wet or swampy peatlands that required an effective drying system. The factory construction work contract was signed with PT. Star Treec in 1983. However, due to some circumstances, starting in early 1987 the work was continued with a self- management system. After 9 months, the factory with a first-stage capacity of 30 tons/hour, was inaugurated on December 21, 1987. In addition to capital and from the founder's funds, preliminary credit from the Indonesian Export Import Bank could be given in the media in 1983 and actual investment credit in 1985. In January 2004, a restructuring of the overall management of both the Palm Oil Mill and the Plantation was carried out where each top leader in each section was responsible to the General Manager. Until now, the land area is 10,000 Ha. The entire area is divided into 10 divisions, both those classified as maintenance areas and development areas plus emplacement divisions.

The purpose of building a factory at PT. Asam Jawa is to process fruit produced from the garden with the smallest processing cost or as efficiently as possible with the use of effective labor and / or as little as possible to obtain Crude Palm Oil (CPO) and Kernel in the right amount and good quality. PT. Asam Jawa is a large private plantation company engaged in oil palm plantations and processing plants. Palm oil is processed into Crude Palm Oil (CPO) and Kernel (Palm Kernel). And sold to the company's consumers. at PT. Asam Jawa consists of two units, namely the palm oil processing unit and the palm oil plantation unit. Currently, the palm oil processing that is carried out only processes raw materials produced by the plantation itself and from community plantations (Munte, 2020).

METHOD

The research was conducted at the Palm Oil Factory of PT. Asam Jawa, Pengarungan Village, Torgamba District, South Labuhanbatu Regency, North Sumatra Province. Data collection took place during January - February 2025.

Materials Used

The materials used in this study were daily information data on palm oil quality during production in the form of free fatty acid content data, water content data and dirt content data.

Research Tools

Research tools in the form of computers/laptops which will be used to process the data that has been collected implemented into numerical form.

Data Types

The types and sources of data used in writing this article include the following: (1) Quantitative data is data that can be calculated or data in the form of numbers resulting from questionnaires distributed to respondents, (2) Qualitative data is data obtained from interviews with interested parties in the form of oral data with an explanation of the discussion.

Data Source

To support the completeness of the discussion in writing this research, the author obtained data from sources such as:

1. Primary data

Primary data is data obtained directly from the company in the form of observation results from analysis carried out by laboratory analysis and obtaining company documents as well as direct interviews with management.

2. Secondary data

Secondary data is data that is not directly obtained from documents.In this case, it is sourced from research that includes reading books related to the research title and collected data. It is data obtained from interviews with interested parties in the form of oral data with an explanation of the discussion.

Data Collection Methods

The data needed in this study are variable data, namely oil quality data sampled from the distribution pipe from the transfer tank to the storage tank. Data collection in this study uses the following methods:

1. Documentation The documentation method in this study is intended to obtain data by means of documentation, namely studying documents related to all data needed in the study. Documentation comes from the origin of the word document which means written objects. In implementing the documentation method.
2. Observation To obtain research data, the author conducted observations of the process. processing that takes place at the Palm Oil Mill.
3. Interview Data collection was conducted by interviewing operators of various processing stations involved. In addition to operators who were directly involved, interviews were also conducted with workers who were not directly related to the production process. This method is used to support data accuracy.

Data analysis

Data analysis was conducted using descriptive analysis method to find out how the crude palm oil production process works and using statistical quality control method to find out the quality control of crude palm oil using Statistical Quality Control method. The data used is variable data, namely data based on characteristics that are actually measured. The data taken is the level of Free Fatty Acid (FFA), water content, and dirt content contained in Crude Palm Oil (CPO). Maintaining the quality of the products produced is also influenced by the quality costs incurred by the company. Quality costs are one of the measuring tools that can be used by companies to measure the success of quality improvement programs. In addition increasing CPO production capacity, companies are required to produce CPO with good quality in order to increase the company's competitiveness. CPO quality is said to be good if it meets the established quality standards (Wawan et al, 2017). Ransun (2016) stated that the better the determination of the use of quality costs, the better the quality of a product that will be produced.

RESULTS AND DISCUSSION

Researchers found that the crude palm oil production process goes through the following processes: (a) fruit harvesting; (b) transportation of fresh fruit bunches (FFB); (c) receiving and sorting of fresh fruit bunches (FFB); (d) boiling station *(Sterilizer);* (e) threshing station; (f) pressing station; and (g) *clarification station.* In carrying out the production process to produce quality products, usually a company or industry creates standard specifications and limits of product deviations that are still acceptable to determine whether a product is declared good or not. Production of fresh fruit bunches (FFB) of oil palm is processed in a palm oil mill (PKS) owned by PT. Asam Jawa.

According to Nur (2020) the production process is said to be good if the process produces products that meet the established standards. However, in reality, in the production process, various deviations and obstacles often occur which result in the product being considered defective. Therefore, quality control is very necessary so that the company can correct errors or deviations in its production. Harvesting, loading and transportation of FFB are often critical stages in the management of oil palm plantations, which then affect the quality of palm oil. A good harvesting and transportation system is needed in order to provide FFB for PMKS in maximum quantities and minimum quality degradation. The accuracy of the harvesting method will guarantee the quantity of production, while the accuracy of the harvest time will produce FFB with good quality (Krisdiarto et al, 2017).

This palm oil mill has a capacity of 45 tons of FFB/hour. PT Asam Jawa's palm oil mill is used to process its own FFB and purchase FFB from plasma parties with a production target of 1,000 to 1,200 tons of FFB. The main raw material for the CPO production process at PT Asam Jawa's palm oil mill is fresh oil palm fruit. The raw materials processed must be raw materials that meet processing criteria such as ripe harvest criteria, not affected by plant pests, not rotten fruit and rejected fruit. Problems that often arise in the production process and can affect quality are damaged products, so steps or efforts are needed to solve these problems so that product quality can be maintained

properly (Hariyanto, 2017). The ripeness of the palm fruit greatly determines the yield of oil produced. Various fruit quality standards will certainly be a benchmark in designing the processing of palm oil factories.

By looking at the appropriate harvest pattern will boost the quality level of the fruit. The harvested fruit should be distributed to the processing plant as soon as possible so that it is not oxidized by enzymes and air that increase the acidity value (one of the product parameters). The distribution system, harvest pattern and the unavailability of adequate processing plant capacity result in waste fruit and fallen fruit.

Harvest Process

Factors that support successful harvesting are harvest preparation, harvest maturity criteria, harvest rotation, harvest system, harvest facilities, harvest supervision, and transportation of fruit bunches, all of which have a significant effect on both the quantity and quality of oil to be obtained (Dianto et al, 2017). Fruit is ready to be harvested when the ripeness level reaches 50-75% and the fruit is orange and there are 5-10 bunches on the plate. Harvesters must pay attention to their plates with carefully. If there are already bunches as mentioned, then the fruit is ready to be picked. Each TBS harvester is targeted to harvest 120 bunches of TBS, if it exceeds the target, it will be calculated as a premium/overtime. Harvesters are required to lower overhead fruit, attacked by rat pests and unfinished fruit. FFB that have been harvested will be taken out of the Block to the collection point (TPH) and the loose fruit will be put into sacks. Each FFB will be branded according to the harvester's name. Supervision will check the quality of the harvest, conduct grading at the TPH to select rotten, unripe and pest-infested fruit or categorized as rejected fruit.

FBS Transportation

The FFB transport unit will pass through the weighing bridge where this bridge will measure the gross weight of the FFB. This bridge uses a grounding system and will be automatically connected to the monitoring device at the weighing post. During the weighing process, the internal or external FFB name will also be checked. The amount of FFB weight will be known by re-weighing the transport unit in the state of FFB that has been unloaded at the Grading station. The formula used is weigh in-weigh out.

Receiving and Sorting of Fresh Fruit Bunches

Before entering the storage *(Loading Ramp)* FFB will be sorted. This sorting aims to separate dirt, rotten fruit, unripe and pest-infected fruit. Unripe fruit contains a small yield, while rotten fruit contains poor quality oil or high water and FFA content, and FFB stalks that are too long will also reduce the yield of oil palm fruit during the boiling process, so it is necessary to sort the fruit by the factory so that high yields with good oil quality are achieved (Yulistriani et al, 2018). After that, the selected FFB is put into the storage, Loading Ramp also functions as a temporary storage tool. Inside the container there is a hole that is useful for re-sorting the FFB dirt so the cleaning process is carried out twice, this process is useful for minimizing the presence of fruit that does not meet quality standards.

Figure 1. Sorting of FFB

Figure 1 shows the sorting process *(Loading Ramp).* Sorting is done to minimize the level of dirt in Fresh Fruit Bunches. At PT Asam Jawa there are two storage facilities with a capacity of 1000 tons each. At this stage, sorting

is carried out on incoming FFB, because the quality of the processed FFB greatly affects the yield and production quality of the CPO produced. The purpose of sorting is to determine the level of ripeness of the fruit and assess the quality that enters the factory.

Boiling Station *(Sterilizer)*

The sorted FFB is put into a boiling lorry made of perforated iron/steel plates (Cage) and immediately put into a Sterilizer, a boiling vessel that uses pressurized water vapor between 2.6 to 3.0 Kg/ cm2. The boiling process usually lasts for 90 minutes using water vapor with a strength of between 280 to 290 Kg/ ton FFB. This process can produce Condensate (liquid) containing about 0.5% oil. The purpose of boiling in this process includes: (a) reducing the increase in free fatty acids (FFA), (b) facilitating the process of releasing oil palm fruit in the thresher, (c) reducing the water content of oil palm fruit, and (d) softening the oil palm fruit flesh, so that the oil palm fruit flesh is easily separated from the seeds (nuts).

Threshing Station

After boiling, the boiled lorry is pulled out, then transported upwards by a hoisting crane. With this transport tool, the truck containing the boiled fruit is turned over on a stripping machine *that* functions to release the fruit from the bunch. The loose fruit (loose fruit) falls down and through the conveyor and elevator is taken to the mixing kettle *(Digester)*. In the digester, the fruit or loose fruit that is already full will be rotated or stirred using a stirring knife attached to the shaft, while the bottom knife is used to throw or remove the palm fruit from the digester to the screw press. The functions of the digester include: (a) crushing the palm fruit flesh; (b) separating the palm fruit flesh from the seeds (nuts), (c) preparing Feeding into the screw Press machine, (d) facilitating the oil pressing process in the PKS screw Press machine, and (e) the heating process / softening the palm fruit.

Figure 2. *Threshing Station*

Pressing Station

In this pressing process, the aim is to remove oil and liquid. The oil that comes out will be immediately collected with a gutter and flowed into the Crude Oil Tank through a vibrating filter (Vibro Separator). The function of the Vibro Separator is to filter CPO from fibers that can interfere with the oil separation process. The working system of the filtering machine itself is with a vibration system (symmetrical).

Clarification Station

Through the last station (Clarification Station), the oil is gradually refined to produce crude oil (CPO). The process of separating oil from water and dirt is carried out using a sedimentation, centrifugal and evaporation system, then the CPO is stored in a storage tank (CPO Storage). The clarification station is useful for purifying the CPO produced by removing dirt, water content, sludge contained in the CPO (Zein et al, 2019). The CPO refining station can be seen in Figure 3.

Figure 3. *Clarification Station*

Figure 3 shows the final stage of the palm oil processing process at PT. Asam Jawa where CPO will be stored in a storage tank with a capacity of 1000 m3. The CPO will be sent to Medan and then exported.

CONCLUSION

Based on the research that has been done, it can be concluded that the Crude Palm Oil production process starts from:

1. Fruit Harvesting. The fruit is ready to be harvested when the ripeness level reaches 50-75% and the fruit is orange and there are 5-10 bunches on the plate. Harvesters must pay close attention to their plates. If there are bunches as mentioned, then the fruit is ready to be taken.
2. Transportation of FFB. The FFB transport unit will pass through the weighing bridge where this bridge will measure the gross weight of the FFB.
3. Receiving and sorting of FFB. Before entering the storage (Loading Ramp) FFB will be sorted. This sorting aims to separate dirt, rotten fruit, raw and pests.
4. Sterilizer Station . The sorted FFB is put into a boiling lorry made of perforated iron/steel plates (Cage) and directly put into the Sterilizer, which is a boiling vessel that uses water vapor under pressure of between 2.6 to 3.0 Kg/cm2.
5. Threshing Station . After boiling, the boiled lorry is pulled out, then transported upwards with a hoisting crane. With this transport tool, the lorry containing the boiled fruit is turned over on the threshing machine (Stripping) which functions to remove the fruit from the bunch.
6. Clarification Station . Through this last station (Clarification Station), oil is gradually refined to produce crude oil (CPO). The process of separating oil from water and dirt is carried out using a sedimentation, centrifugal and evaporation system.

REFERENCES

Candra Hutasoit, 2021. (2021). Alat dan proses pengolahan kelapa sawit pt. tasik raja anglo eastern plantation laporan praktek kerja lapangan ii. *Jurnal Alat Dan Proses Pengolahan Kelapa Sawit*, *3*(8), 1–11.

Dianto, Fajar. Darda Efendi, dan Ade Wachjar. (2017). Pengelolaan Panen Kelapa Sawit (Elaeis guineensis Jacq.) Pelantaran Agro Estate, Kota Waringin Timur, Kalimantan Tengah. Bul. Agrohorti 5(3): 410–417.

Gultom, K., Kesehatan, I., Masyarakat, K., Ramadhani, S., Herdinda, S., & Hasibuan, A. (2023). Analisis Sistem Pengolahan Kelapa Sawit Dan Pemanfaaatan Limbah Kelapa Sawit Di Pt. Perkebunan Nusantara Iv Unit Dolok Ilir. *Cross-Border*, *6*(2), 1167–1174.

Hance, N., Herdhiansyah, D., & Syukri Sadimantara, M. (2022). Analisis Pengolahan Kelapa Sawit pada PT XYZ di Kabupaten Morowali Utara Analysis of Palm Oil Processing at PT XYZ in North Morowali Regency. *Jurnal Teknologi Dan Manajemen Industri Pertanian*, *3*, 202–209.

Hariyanto, Agus. M. (2017). Pengendalian Kualitas Produk Roti Tawar "Della" Menggunakan Metode Statistical Process Control. Simki – Economic, 1(5): 1- 15.

Krisdiarto A. W., Sutiarso L., dan Widodo K. H. (2017). Optimasi Kualitas Tandan Buah Segar Kelapa Sawit dalam Proses Panen-Angkut Menggunakan Model Dinamis. AGRITECH. 37(1):101-107

Ma'sum, Z., Lorenza, K. M., & Ratna, K. (2023). Analysis of Processing Palm Oil Fruit Into Crude Palm Oil At Pt.

Sedjahtera Indo Agro Bukit Ajong Factory, Sanggau District. *Jurnal ATMOSPHERE*, *4*(1), 22–28. https://doi.org/10.36040/atmosphere.v4i1.6738

Munte, S., & Delvika, Y. (2020). Laporan Kerja Praktek PT Asam Jawa Desa Pengarungan Kecamatan Torgamba Kabupaten Labuhanbatu Selatan Sumatera Utara. *Lkm Uma*, 1–105.

Nur, M., Dasneri, Y. E. P., & Masari, A. (2020). Pengendalian Kualitas Crude Palm Oil (CPO) di PT. Sebanga Multi Sawit. Jurnal Teknik Industri: Jurnal Hasil Penelitian dan Karya Ilmiah dalam Bidang Teknik Industri, 5(2): 148-155.

Ransun, Kristina, M., Saerang, D.P.E., dan Warongan, J.D.L. (2016). Pengaruh Biaya Kualitas dan Biaya Produksi terhadap Peningkatan Kualitas Produk pada Trinity Percetakan Manado. Jurnal Berkala Ilmiah Efisiens, 16 (4): 79 – 90.

Syaifullah, A. (2021). *Proses Pengolahan Kelapa Sawit Pt Perkebunan Nusantara Xiv Unit Usaha Pks Luwu*. 10–52. https://lib.atim.ac.id/uploaded_files/temporary/DigitalCollection/NjgzODQ0MjE0YmIzZmUyYTMwMmQxNTdhNWJlNDI1YjVlZmQ3NTEwMA==.pdf

Wawan Kurniawan, Dedy Sugiarto dan Ricky Saputera. (2017). Usulan Penerapan Metode Six Sigma untuk Meningkatkan Mutu Crude Palm Oil (Cpo) Di PT. X. Jurnal Ilmiah Teknik Industri, 5(2): 85 – 91.

Yulistriani, Cindy Paloma, Hasnah. (2018). Analisis Risiko Pasca Panen Tandan Buah Segar (FFB) Kelapa Sawit di Kabupaten Dharmasraya. Jurnal AGRIFO, 3(1):