

# Design Simulation of Black Beach / Chain of Custody Material Pulp With COC - FSC Scheme in Paper Industry : Case Study IKPP

Yoppy M. Hartiwo<sup>1</sup>, Erry Rimawan<sup>2</sup>, Dana Santoso<sup>3</sup>, Puspita Eka Rohmah<sup>4</sup>  
 Magister Teknik Industri, Fakultas Teknik, Universitas Mercu Buana

**Abstract:-** PT. Indah Kiat Pulp & Paper (IKPP) is one of paper industry that has the largest market for export. The demand for today's paper consumers has led to sustainable manufacture covering the environment, economy and social. One part of the implementation of Sustainable manufacture is the environment of wooden track / Chain of Custody application with Forest Stewardship Council (COC - FSC) method. This research is aim to design simulation of production process with 3 method of FSC Control Process that is Transfer System, Percentage System and Credit System. The results of the simulation of the three methods then compared in accordance with the application of production process in IKPP. Credit system is a method that is in accordance with the business process undertaken in IKPP which is a recommendation in the application of COC - FSC in IKPP.

*Keywords:- Chain of Custody, Forest Stewardship Council.*

## I. PRELIMINARY

The growth of the pulp & paper industry in sustainable manufacturing era is experiencing a very strong competition among producers. They compete in seizing competitive global markets by implementing three aspects of economic and social environment. The implementation is done to run the business process in the company.

IKPP as the paper industry with the main material comes from the forest and in implementing Sustainable Manufacture from the environment side has concern for the sustainability of forest products by the application of Chain of Custody. In the application of legality of forest products in accordance with the regulations of the director general of sustainable production forest management No. P.14 / PHPL / SET / 4/2016 on standards and guidelines on the implementation of performance assessment of sustainable production forest management (SFM) and timber legality verification (VLK).

From the economic side to face the challenges of global competition in the implementation of sustainable industry in IKPP as a color paper producer with export market 90% and local market 10% have to increase paper sales more than 4% in the previous year.

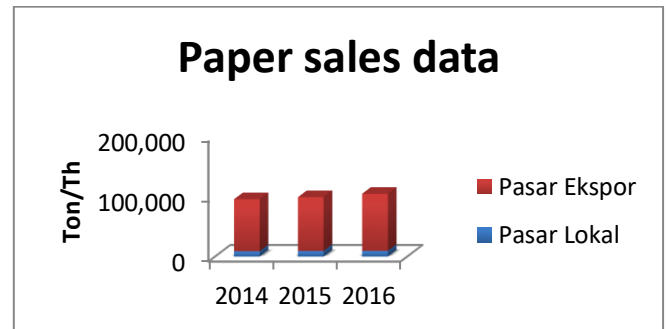


Fig. 1:- Paper Sales Data Graph

To increase paper sales by meeting the demand of paper consumers will need ecolabel. This is because the consumer awareness of responsible management of the industry is getting higher. The following paper requests in IKPP are based on certification requests as follows:

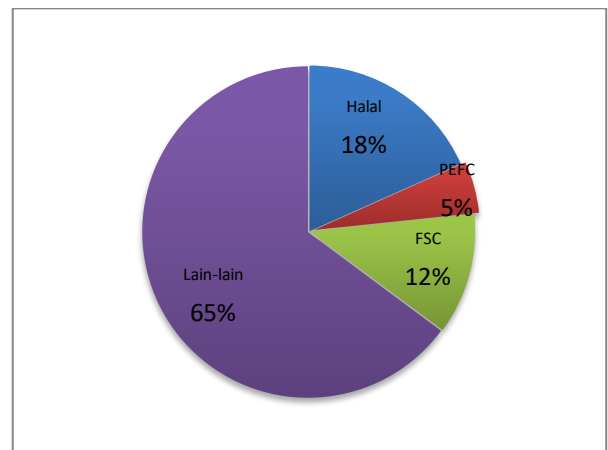


Fig. 2:- Paper Requests in ITP under Certification

From various requests such as Halal, the Indonesian Ecolabelling Institute, the Program of Endorsement Forest Certification (PEFC), the Sustainable Forest Initiative (SFI), and the Forest Stewardship Council (FSC) there are 2 unrealized requests for certification, FSC and SFI.

The benefits of applying COC - FSC is: to increase producedpaper quality, this is because in COC identify each stage of the process from getting pulp until the product is sent to the consumer. Automatically if any incompatibility will be fixed.

From the economic and business benefits of COC - FSC certification that there are still many opportunities for the

global COC - FSC market, this is based on the growing number of FSC - certified forests and FSC certificates issued by FSC certification bodies. Based on data sources extracted at <https://ic.fsc.org/en> 2017 COC-FSC certified forests as follows:

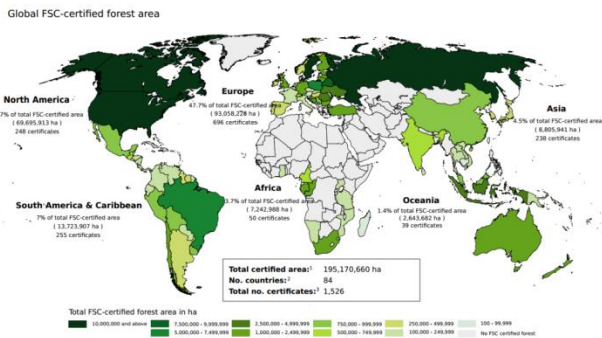


Fig. 3:- FSC certified forest zone

For total COC - FSC certificates issued by certification bodies sourced from <https://ic.fsc.org/en> year 2017 are as follows:

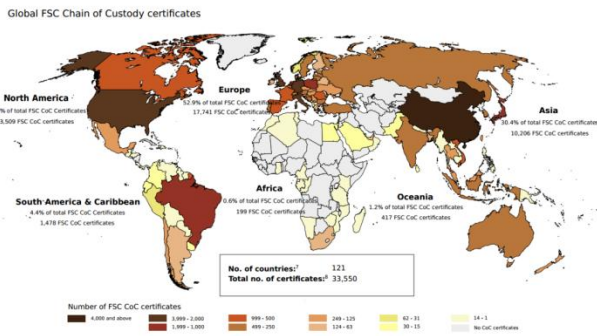


Fig. 4:- Total issued COC - FSC certificate.

The most important environmental aspects of COC - FSC implementation are to reduce social and environmental risks. In the application of COC - FSC certification it is ensured that industry has a role in forest conservation, as well as reducing global emissions pollution. In the application of the factory environment this will affect responsible waste treatment, while for industrial environments, COC - FSC ensures that there is no social conflict between management and employees and the surrounding community. In addition to employee welfare derived from its application also in COC - FSC ensures the safety of its workers in the production process.

Business processes in the COC - FSC are traceable forest products to the forest and with responsible management in accordance with FSC provisions. Below is the Business Process Diagram of COC - FSC in IKPP:

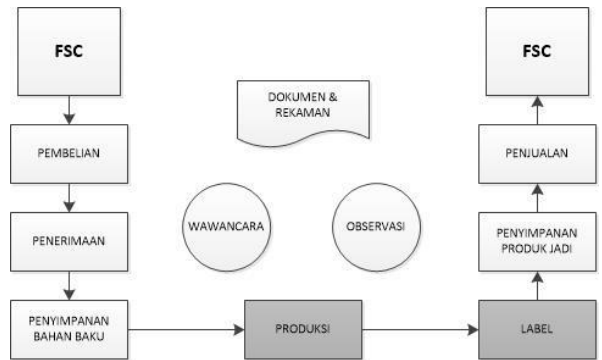


Fig. 5:- Business process of COC – FSC

II. LITERATURE REVIEW

A. Forest Stewardship Council Traceability System

FSC in regulating wood trace verification system in industry, so that the product can be traceable in production process.

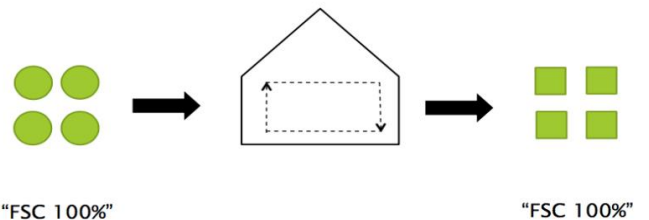
| FSC CoC | INPUT<br>Material Category  | PROSES<br>Volume Control  | OUTPUT<br>(Product Group – FSC-STD-40-004a)  |
|---------|---|---|--|
|         | <b>FSC Certified</b><br>FSC-STD-40-004<br>FSC 100%<br>FSC Mix (X%, Credit)<br>FSC Recycle (X%, Credit)<br>FSC Controlled Wood<br>FSC-STD-40-005<br><b>Non FSC Certified</b><br>Controlled Material<br>FSC-STD-40-006<br>Post-Consumer Recycled<br>FSC-STD-40-007<br>Pre-Consumer Recycled<br>FSC-STD-40-007<br>Un-Controlled Material | Transfer System<br>Input – Output Segregation<br>Percentage System<br>Input Percentage Segregation<br>Credit System<br>Credit Account | CLAIM (on invoice)<br>LABEL (on product)<br>FSC-STD-50-001 (FSC trademark)<br>FSC 100% → FSC 100%<br>FSC Mix X% → 70% → FSC Mix<br>FSC Recycle X% → 85% → FSC Recycle<br>FSC Controlled Wood<br>FSC-STD-40-005 |
|         | Evidence:<br>1) Supplier List<br>2) Invoice<br>3) Transport Document (from Supplier) linked to the invoice  | Evidence:<br>1) Conversion Factor<br>2) Material Balance & Summary  | Evidence:<br>1) Invoice: FSC Claim, Certificate Code (CB)<br>2) Transport Document (to customer) linked to the invoice<br>Evidence:<br>Label: TEXT, License Code (FSC)   |

Table 1:- Production Process Requirements Under the COC-FSC scheme

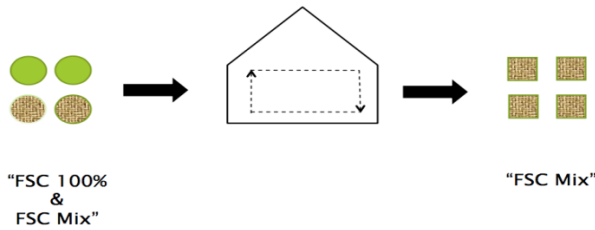
Process system used in Chain Of Custody - Forest Stewardship Council there are 3, such as

B. Transfer System

- Output claim COC where the output of the FSC product claim is the same as the category material for input.



- Mixed inputs with several different categories of materials The FSC Product Group Claim for output is the one that carries the lowest FSC claims.



In the selection of claims FSC is needed analysis based on the use of materials and products produced. Here is a table selection of claims in the COC - FSC.

| Input #2 / Input #1           | FSC 100%            | FSC Mix Credit      | FSC Mix xx%              | FSC Recycled Credit | FSC Recycled xx% <sup>1</sup> | FSC Controlled Wood |
|-------------------------------|---------------------|---------------------|--------------------------|---------------------|-------------------------------|---------------------|
| FSC 100%                      | FSC 100%            | FSC Mix Credit      | FSC Mix xx%              | FSC Mix Credit      | FSC Mix xx%                   | FSC Controlled Wood |
| FSC Mix Credit                | FSC Mix Credit      | FSC Mix Credit      | FSC Mix xx%              | FSC Mix Credit      | FSC Mix xx%                   | FSC Controlled Wood |
| FSC Mix xx%                   | FSC Mix xx%         | FSC Mix xx%         | FSC Mix xx%              | FSC Mix xx%         | FSC Mix xx% <sup>2</sup>      | FSC Controlled Wood |
| FSC Recycled Credit           | FSC Mix Credit      | FSC Mix Credit      | FSC Mix xx%              | FSC Recycled Credit | FSC Recycled xx%              | FSC Controlled Wood |
| FSC Recycled xx% <sup>1</sup> | FSC Mix xx%         | FSC Mix xx%         | FSC Mix xx% <sup>2</sup> | FSC Recycled xx%    | FSC Recycled xx%              | FSC Controlled Wood |
| FSC Controlled Wood           | FSC Controlled Wood | FSC Controlled Wood | FSC Controlled Wood      | FSC Controlled Wood | FSC Controlled Wood           | FSC Controlled Wood |

Table 2:- Selection of COC Input Claim – FSC

In the transfer system there are some that need to know that is

- Claim material input (lowest claim) used to claim the output.
- Identification and separation required at all times to the material used or recycle material.
- Required for 100% FSC group, FSC Mix, FSC Recycled & FSC CW.
- Required for finished products.
- Used by broker (trader), printer, distributor (Wholesaler) manufacture industry.

C. Presented System

Presented system is a Chain of Custody system to keep FSC material content in the minimum required percentage. The percentage system required is:

- In the production process of the FSC product group within a certain period of time, for example 12 month claims period. In a period of 12 months if the percentage is used less then in the next period will be forfeited.
- Percentage system is used in FSC product groups that are specific / or have different product variants.

In percentage system use FSC claim percentage calculation that is:

| Input                         | Explanation  |
|-------------------------------|--|
| FSC 100%                      | 100% volume as an input  |
| FSC Mix                       | FSC Mix X% = percentage X% from input volume, FSC Mix Credit = 100% volume as input              |
| FSC Recycled                  | FSC Recycled X% = percentage X% from volume as input, FSC Recycled Credit = 100% volume as input |
| PCR (post-consumer reclaimed) | All input material PCR verified  |
| Total                         | FSC + any reclaimed (post & pre) + any controlled  |

Table 3:- Explanation of COC Claim - FSC

How to calculate in percentage there are 2 categories namely:

1. Single percentage (Batch Process)

In single percentage need to be considered several things

- Only certain production, based on consumer demand.
- One calculation based on total input for a particular production.
- The claim period must be in accordance with the job order.
- FSC claims percentage is actual volume in product or group of products sold.

2. Rolling average percentage (Process Continue)

While to note in Rolling average percentage are

- the proportion of fluctuating inputs
- overlapping and continuous claims period
- the standard period includes a defined time interval for calculating FSC percentages.
- FSC claims are based on average.

D. Credit System

Claims on credit system as used in banking is to obtain credit FSC must buy FSC input material first and to spend credit then must sell product with FSC claim first. To obtain FSC credit the material inputs must meet FSC requirements, then calculate the conversion factor from input to output, then apply the conversion factor to the volume of input that has been purchased then add the amount converted to credit account.

There are 2 FSC credit calculations that are simple and not simple.

Simple calculations of FSC credits are:

$$F = P \times c$$

Where :

F = Number of FSC credits earned

P = Number of materials purchased

c = conversion factor of material (0, ..)

Calculation Not simple FSC credits are as follows:

$$F = (P \times t) \times c$$

Where :

F = Number of FSC credits earned

P = Number of materials purchased

t = claims percentage of FSC material purchased

c = conversion factor of material (0, ..)

In the application of credit system for each FSC product group, the credit account must be separated then the calculation is done on one product group and on one site and used on continuous production system which does not allow separation. Noteworthy in the sale of converted FSC products must not exceed the purchase of FSC materials.

### III. RESEARCH METHODS

In penelitian conducted using 2 types of data that is primary data and secondary data. Primary data is data that is directly related to the object of research conducted such as data of material usage used for simulation of FSC claim calculation, production data to calculate conversion, chain-of-custody policy, and interview with related departmental department in research of chain of custody / COC. While secondary data is data taken from book reviews and from previous research related to the application of COC-FSC chain of custody used as a reference in conducting this research.

In the research variable is the main goal as the object sought in the research. The variables sought in this research is to find the percentage of claims FSC paper products by considering from the regulation in COC - FSC in FSC-STD-40-004 V2-1EN standard. conducted using fixed or non-changeable variables of the FSC-STD-40-004 V2-1EN standard, company policy on Chain of Custody and no alteration to segregation in material warehouses that could subsequently affect claims for Recycle Broke.

The research was conducted using Chain of Custody method with Forest Stewardship Council scheme.

The scope of this research is limited to FSC-STD-40-004 V2-1EN standard, about System For Controlling FSC Claim, and the factors that influence in its implementation. The product group determination is then identified by conversion factor in each product type groove that will be used in production calculation by FSC method.

From the result of data collection in the field and got the conversion value then made group product table as reference in determining supply chain of pulp material and to make calculation by FSC method.

| FSC Product Grup | Product Type | Input      |              |
|------------------|--------------|------------|--------------|
|                  |              | Base Paper | Conv. Factor |
| Uncoated paper   | Jumbo Roll   | LBKP       | 125.00 %     |
|                  |              | NBKP       |              |
|                  | Mini Roll    | Jumbo Roll | 90.95 %      |
|                  | Big sheet    | Jumbo Roll | 88.46 %      |
|                  |              | Mini roll  |              |
|                  | Cut Size     | Big Sheet  | 94.35 %      |
|                  |              | Mini Roll  |              |

Table 4:- Conversion Group Product

### IV. RESULTS AND DISCUSSION

#### A. Group Products

The group product is a set of products that will be certified and sold under the FSC scheme. The product of the group is made to determine the origin of the production chain of the materials used on the basis of FSC Product Certification FSC-STD-40-004a V2-1 EN. Production requirements entered in the group product are from consumer demand for FSC certified products.

#### B. Calculation of FSC Claims

In the simulation of COC - FSC calculation in PT. Indah Kiat Pulp & Paper - Tangerang Mill is done based on conditions in particular in Mill such as

- The pulp materials used are: 100% FSC, FSC Mix x%, and FSC Controlled Wood.
- Material storage space in narrow IKPP makes it impossible to segregate the recycle broke, so the FSC broke will be claimed as FSC Controlled Wood not as FSC Recycled.

The simulation of FSC calculation system will be done using pulp data usage data from June - Septemeber 2017.

#### C. Transfer System

The system transfer method is a COC system where the output of the FSC product group claims equals the material for its input or a mixture of input materials with different materials is the claim of the FSC product group for the output that carries the lowest claim. The pulp material used for the simulation is: 100% FSC, FSC Mix X%, FSC Controlled Wood, The following is the simulation of production for the transfer system:

1. Material pulp NBKP FSC 100% & LBKP FSC Mix 70%

The pulp material used is NBKP with 100% FSC claims and LBKP Pulp with 70% FSC Mix Claim, following simulation calculation



| Month     | Product    | NBKP  | Claim         | LBKP   | Claim        | Total Output PM |
|-----------|------------|-------|---------------|--------|--------------|-----------------|
|           |            | A     | FSC 100%<br>B | C      | FSC Mix<br>D |                 |
| Juny      | QPR IT 11A | 7,37  | 100%          | 38,80  | 70%          | 57,71           |
|           | CWF IT100  | 13,38 | 100%          | 221,81 | 70%          | 294,24          |
|           | CPC IT 170 | 30,22 | 100%          | 322,10 | 70%          | 440,41          |
| July      | QPR IT 154 | 19,59 | 100%          | 109,39 | 70%          | 161,23          |
|           | CPC IT 110 | 10,48 | 100%          | 160,40 | 70%          | 213,60          |
|           | CPC IT 200 | 10,15 | 100%          | 126,26 | 70%          | 170,51          |
| August    | QPR IT 198 | 2,84  | 100%          | 49,06  | 70%          | 64,88           |
|           | CWF IT 140 | 7,53  | 100%          | 149,99 | 70%          | 196,90          |
|           | CWFIT 185  | 4,35  | 100%          | 72,28  | 70%          | 95,79           |
| September | CWF IT 115 | 10,71 | 100%          | 172,62 | 70%          | 229,16          |
|           | HWF IT 149 | 16,97 | 100%          | 200    | 70%          | 271,21          |
|           | CWF IT 200 | 3,98  | 100%          | 74,1   | 70%          | 97,60           |

Table 5 :-Transfer System FSC 100 % & FSC Mix Calculation

| Month     | Product    | Total Output Finishing |            | Total Output Converting |               | Claim FSC<br>J |
|-----------|------------|------------------------|------------|-------------------------|---------------|----------------|
|           |            | Mini Roll              | Big Sheet  | Cut Size (mr)           | Cut Size (bs) |                |
|           |            | F=E*90.95%             | G=E*88.46% | H=F*94.35%              | I=G*94.35%    |                |
| Juny      | QPR IT 11A | -                      | 51.05      | -                       | -             | 70%            |
|           | CWF IT100  | 267.61                 | -          | 252.49                  | -             | 70%            |
|           | CPC IT 170 | 400.55                 | -          | -                       | -             | 70%            |
| July      | QPR IT 154 | -                      | 142.62     | -                       | -             | 70%            |
|           | CPC IT 110 | 194.27                 | -          | 183.29                  | -             | 70%            |
|           | CPC IT 200 | 155.08                 | -          | -                       | -             | 70%            |
| August    | QPR IT 198 | -                      | 57.39      | -                       | -             | 70%            |
|           | CWF IT 140 | -                      | 174.18     | -                       | 164.34        | 70%            |
|           | CWFIT 185  | 87.12                  | -          | -                       | -             | 70%            |
| September | CWF IT 115 | -                      | 202.72     | -                       | 191.26        | 70%            |
|           | HWF IT 149 | -                      | 239.91     | -                       | 226.36        | 70%            |
|           | CWF IT 200 | 88.77                  | -          | -                       | -             | 70%            |

Table 6:- Transfer System FSC 100 % & FSC Mix Calculation(Continue)

FSC product claims for system transfer calculations with 100% FSC materials & 70% FSC Mix is 70% taken from the lowest claim.

2. 100% FSC NBKP pulp material & LBKP FSC Controlled Wood (CW)

The material used by the next system transfer system calculation is Pulp NBKP FSC 100 and Pulp LBKP Controlled Wood. Here's a simulation for the calculation:

| Bulan     | Produk     | NBKP  | Klaim 100% | LBKP   | Klaim FSC | Total Output PM |
|-----------|------------|-------|------------|--------|-----------|-----------------|
|           |            | A     | FSC<br>B   | C      | CW<br>D   |                 |
| Juny      | QPR IT 11A | 7,37  | 100%       | 38,80  | CW        | 57,71           |
|           | CWF IT100  | 13,38 | 100%       | 221,81 | CW        | 294,24          |
|           | CPC IT 170 | 30,22 | 100%       | 322,10 | CW        | 440,41          |
| July      | QPR IT 154 | 19,59 | 100%       | 109,39 | CW        | 161,23          |
|           | CPC IT 110 | 10,48 | 100%       | 160,40 | CW        | 213,60          |
|           | CPC IT 200 | 10,15 | 100%       | 126,26 | CW        | 170,51          |
| August    | QPR IT 198 | 2,84  | 100%       | 49,06  | CW        | 64,88           |
|           | CWF IT 140 | 7,53  | 100%       | 149,99 | CW        | 196,90          |
|           | CWFIT 185  | 4,35  | 100%       | 72,28  | CW        | 95,79           |
| September | CWF IT 115 | 10,71 | 100%       | 172,62 | CW        | 229,16          |
|           | HWF IT 149 | 16,97 | 100%       | 200    | CW        | 271,21          |
|           | CWF IT 200 | 3,98  | 100%       | 74,1   | CW        | 97,60           |

Table 7 :-Transfer System FSC 100% & FSC CW Calculation

| Month     | Product    | Total Output Finishing |           | Total Output Converting |               | ClaimProduk FSC |
|-----------|------------|------------------------|-----------|-------------------------|---------------|-----------------|
|           |            | Mini Roll              | Big Sheet | Cut size (mr)           | Cut size (bs) |                 |
|           |            | F                      | G         | H                       | I             |                 |
| Juny      | QPR IT 11A | -                      | 51.05     | -                       | -             | FSC CW          |
|           | CWF IT100  | 267.61                 | -         | 252.49                  | -             | FSC CW          |
|           | CPC IT 170 | 400.55                 | -         | -                       | -             | FSC CW          |
| July      | QPR IT 154 | -                      | 142.62    | -                       | -             | FSC CW          |
|           | CPC IT 110 | 194.27                 | -         | 183.29                  | -             | FSC CW          |
|           | CPC IT 200 | 155.08                 | -         | -                       | -             | FSC CW          |
| August    | QPR IT 198 | -                      | 57.39     | -                       | -             | FSC CW          |
|           | CWF IT 140 | -                      | 174.18    | -                       | 164.34        | FSC CW          |
|           | CWFIT 185  | 87.12                  | -         | -                       | -             | FSC CW          |
| September | CWF IT 115 | -                      | 202.72    | -                       | 191.26        | FSC CW          |
|           | HWF IT 149 | -                      | 239.91    | -                       | 226.36        | FSC CW          |
|           | CWF IT 200 | 88.77                  | -         | -                       | -             | FSC CW          |

Table 8 :-Transfer System FSC 100%, FSC CW Calculation (Continue)

In the determination of product claims using Transfer System method, the lowest claim used in the simulation is LBKP material with Controlled Wood claim so that the product claim is FSC CW.

#### D. Percentage System

Presented system of COC FSC whose purpose is to keep FSC material content in minimum required on FSC product group production process within 12 month period and on FSC product group with specific order. For paper manufacture in PT. Indah Kiat Pulp & Paper - Tangerang Mill with Percentage System method, materials that can be used are: 100% FSC material and FSC Mix X%.

The calculation simulation with Percentage System method is done in accordance with the conditions in IKPP Tangerang Mill. There are 2 variables used to perform the simulation are:

##### 1. NBKP FSC 100% Material & LBKP FSC Mix 70%

The material used for the simulation is 100% NBKP FSC pulp and LBKP 70% pulp, following calculation for percentage system:

| Month     | Product    | NBKP  | Claim FSC | LBKP   | Claim FSC | Total Pulp |
|-----------|------------|-------|-----------|--------|-----------|------------|
|           |            | A     | B         | C      | D         | E          |
| Juny      | QPR IT 11A | 7,37  | 100%      | 38,80  | 70%       | 46.17      |
|           | CWF IT100  | 13,38 | 100%      | 221,81 | 70%       | 235.39     |
|           | CPC IT 170 | 30,22 | 100%      | 322,10 | 70%       | 352.32     |
| July      | QPR IT 154 | 19,59 | 100%      | 109,39 | 70%       | 128.98     |
|           | CPC IT 110 | 10,48 | 100%      | 160,40 | 70%       | 170.88     |
|           | CPC IT 200 | 10,15 | 100%      | 126,26 | 70%       | 136.41     |
| August    | QPR IT 198 | 2,84  | 100%      | 49,06  | 70%       | 51.90      |
|           | CWF IT 140 | 7,53  | 100%      | 149,99 | 70%       | 157.52     |
|           | CWFIT 185  | 4,35  | 100%      | 72,28  | 70%       | 76.63      |
| September | CWF IT 115 | 10,71 | 100%      | 172,62 | 70%       | 183.33     |
|           | HWF IT 149 | 16,97 | 100%      | 200    | 70%       | 216.97     |
|           | CWF IT 200 | 3,98  | 100%      | 74,1   | 70%       | 78.08      |

Table 9 :- Percentage System FSC 100% &amp; FSC Mix Calculation

| Month     | Product    | FSC Input     |               |                       | Output PM<br>K=(A+C+E)*125% |
|-----------|------------|---------------|---------------|-----------------------|-----------------------------|
|           |            | NBKP<br>G=A*B | LBKP<br>H=C*D | Total Pulp<br>J=G+H/I |                             |
| June      | QPR IT 11A | 7.37          | 27.16         | 34.53                 | 57.71                       |
|           | CWF IT100  | 13.58         | 155.27        | 168.85                | 294.24                      |
|           | CPC IT 170 | 30.22         | 225.47        | 255.69                | 440.41                      |
| July      | QPR IT 154 | 19.59         | 76.57         | 96.16                 | 161.23                      |
|           | CPC IT 110 | 10.48         | 112.28        | 122.76                | 213.60                      |
|           | CPC IT 200 | 10.15         | 88.38         | 98.53                 | 170.51                      |
| August    | QPR IT 198 | 2.84          | 34.34         | 37.18                 | 64.88                       |
|           | CWF IT 140 | 7.53          | 104.99        | 112.52                | 196.90                      |
|           | CWFIT 185  | 4.35          | 50.60         | 54.95                 | 95.79                       |
| September | CWF IT 115 | 10.71         | 120.83        | 131.54                | 229.16                      |
|           | HWF IT 149 | 16.97         | 140.00        | 156.97                | 271.21                      |
|           | CWF IT 200 | 3.98          | 51.87         | 55.85                 | 97.60                       |

Table 10 :-Percentage system FSC 100% &amp; FSC Mix Calculation (Continue 1)

| Month     | Product    | Total Produksi Finishing |                         | Converting             |                        | Claim Produk<br>FSC<br>P=J/(A+C+E)<br>% |
|-----------|------------|--------------------------|-------------------------|------------------------|------------------------|---|
|           |            | Mini Roll<br>L=K*90.95   | Big Sheet<br>M=K*88.46% | Cut Size<br>N=L*94.35% | Cut Size<br>O=M*94.35% |   |
| June      | QPR IT 11A | -                        | 51.05                   | -                      | -                      | 74.79%                                  |
|           | CWF IT100  | 267.61                   | -                       | 252.49                 | -                      | 71.73%                                  |
|           | CPC IT 170 | 400.55                   | -                       | -                      | -                      | 72.57%                                  |
| July      | QPR IT 154 | -                        | 142.62                  | -                      | -                      | 74.56%                                  |
|           | CPC IT 110 | 194.27                   | -                       | 183.29                 | -                      | 71.84%                                  |
|           | CPC IT 200 | 155.08                   | -                       | -                      | -                      | 72.23%                                  |
| August    | QPR IT 198 | -                        | 57.39                   | -                      | -                      | 71.64%                                  |
|           | CWF IT 140 | -                        | 174.18                  | -                      | 164.34                 | 71.43%                                  |
|           | CWFIT 185  | 87.12                    | -                       | -                      | -                      | 71.70%                                  |
| September | CWF IT 115 | -                        | 202.72                  | -                      | 191.26                 | 71.75%                                  |
|           | HWF IT 149 | -                        | 239.91                  | -                      | 226.36                 | 72.35%                                  |
|           | CWF IT 200 | 88.77                    | -                       | -                      | -                      | 71.53%                                  |

Table 11 :-Percentage system FSC 100 % &amp; FSC Mix Calculation (Continue 2)

FSC product claims for calculations on the percentage system vary depending on pulp usage input and pulp claims purchased. From the calculation data of FSC product claim with Percentage System method then recapitulation of the product is produced, the claim based on the month is produced. Recapitulation is made Stock Balance Products table to be monitored in and out of each product produced as follows

#### A. Mini Roll

FSC production for Mini Roll is then recapitulated into Stock Balance of product, following Stock Balance of Mini Roll product are as follows:

| Month     | Product    | Claim  | Label   | Beginning Stock (ton) | Production (ton) | Sales (ton) | End Stock (ton) |
|-----------|------------|--------|---------|-----------------------|------------------|-------------|-----------------|
| June      | CPC IT 170 | 72.57% | FSC Mix | 0.00                  | 400.55           | 0.00        | 400.55          |
| July      | CPC IT 170 | 72.57% | FSC Mix | 400.55                | 0.00             | 0.00        | 400.55          |
|           | CPC IT200  | 72.23% | FSC Mix | 0.00                  | 155.08           | 0.00        | 155.08          |
| August    | CPC IT 170 | 72.57% | FSC Mix | 400.55                | 0.00             | 0.00        | 400.55          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 0.00                  | 87.12            | 0.00        | 87.12           |
| September | CPC IT 170 | 72.57% | FSC Mix | 400.55                | 239.91           | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 0.00                  | 88.77            | 0.00        | 88.77           |
| Oktober   | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| November  | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| Desember  | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| January   | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| February  | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| March     | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| April     | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |
|           | CWF IT 200 | 71.53% | FSC Mix | 88.77                 | 0.00             | 0.00        | 88.77           |
| May       | CPC IT 170 | 72.57% | FSC Mix | 640.46                | 0.00             | 0.00        | 640.46          |
|           | CPC IT200  | 72.23% | FSC Mix | 155.08                | 0.00             | 0.00        | 155.08          |
|           | CWFIT 185  | 71.70% | FSC Mix | 87.12                 | 0.00             | 0.00        | 87.12           |

Table 12 :- Stock Balance Product

**B. Big Sheet**

FSC production for Big Sheet is then recapitulated into Stock Balance of product, following Stock Balance of Big Sheet product is as follows:



| Month     | Product    | Claim  | Label   | Beginning Stock (ton) | Production (ton) | Sales (ton) | End Stock (ton) |
|-----------|------------|--------|---------|-----------------------|------------------|-------------|-----------------|
| Juny      | QPR IT 11A | 74.79% | FSC Mix | 0.00                  | 51.05            | 0.00        | 51.05           |
| July      | QPR IT 11A | 74.79% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 74.56% | FSC Mix | 0.00                  | 142.62           | 0.00        | 142.62          |
| August    | QPR IT 11A | 74.79% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 74.56% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 0.00                  | 57.39            | 0.00        | 57.39           |
| September | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| Oktober   | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| November  | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| Desember  | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| January   | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| February  | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| March     | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| April     | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |
| May       | QPR IT 11A | 74.56% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
|           | QPR IT 154 | 71.64% | FSC Mix | 142.62                | 0.00             | 0.00        | 142.62          |
|           | QPR IT 198 | 71.64% | FSC Mix | 57.39                 | 0.00             | 0.00        | 57.39           |

Table 13 :- Stock BalanceBig Sheet Product

### C. Cut Size from Base Paper Mini Roll

The result of FSC production for Cut Size is then recapitulated into Stock Balance of product, following Stock Balance of Cut Size product are as follows:

| Month     | Product    | Claim  | Label   | Beginning Stock (ton) | Production (ton) | Sales (ton) | End Stock (ton) |
|-----------|------------|--------|---------|-----------------------|------------------|-------------|-----------------|
| June      | CWF IT100  | 71.73% | FSC Mix | 0.00                  | 267.61           | 0           | 267.61          |
| July      | CWF IT100  | 71.73% | FSC Mix | 267.61                | 0.00             | 0           | 267.61          |
|           | CPC IT 110 | 71.84% | FSC Mix | 0.00                  | 194.27           | 0           | 194.27          |
| August    | CWF IT100  | 71.73% | FSC Mix | 267.61                | 0.00             | 0           | 267.61          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| September | CWF IT100  | 71.73% | FSC Mix | 267.61                | 202.72           | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| Month     | Product    | Claim  | Label   | Beginning Stock (ton) | Production (ton) | Sales (ton) | End Stock (ton) |
| Oktober   | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| November  | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| Desember  | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| January   | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| February  | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| March     | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| April     | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |
| May       | CWF IT100  | 71.73% | FSC Mix | 470.33                | 0.00             | 0           | 470.33          |
|           | CPC IT 110 | 71.84% | FSC Mix | 194.27                | 0.00             | 0           | 194.27          |

Table 14 :- Stock Balance Cut Size Product from mini roll base paper

*D. Cut Size from Base Paper Big Sheet*

The result of FSC production for Cut Size is then recapitulated into Stock Balance of product, following Stock Balance of Cut Size product are as follows:

| Month     | Product    | Claim  | Label   | Beginning Stock (ton) | Production (ton) | Sales (ton) | End Stock (ton) |
|-----------|------------|--------|---------|-----------------------|------------------|-------------|-----------------|
| June      | QPR IT 11A | 74.79% | FSC Mix | 0.00                  | 51.05            | 0.00        | 51.05           |
| July      | QPR IT 11A | 74.79% | FSC Mix | 51.05                 | 0.00             | 0.00        | 51.05           |
| August    | CWF IT 140 | 71.43% | FSC Mix | 0.00                  | 174.18           | 0.00        | 174.18          |
| September | CWF IT 140 | 71.43% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | CWF IT 115 | 71.75% | FSC Mix | 0.00                  | 202.72           | 0.00        | 202.72          |
|           | HWF IT 149 | 72.35% | FSC Mix | 0.00                  | 239.91           | 0.00        | 239.91          |
| Oktober   | CWF IT 140 | 72.35% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | CWF IT 115 | 71.64% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
|           | HWF IT 149 | 71.43% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
| November  | CWF IT 140 | 71.43% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
|           | CWF IT 115 | 71.64% | FSC Mix | 239.91                | 0.00             | 0.00        | 239.91          |
|           | HWF IT 149 | 71.43% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
| Desember  | CWF IT 140 | 71.43% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
|           | CWF IT 115 | 71.64% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | HWF IT 149 | 71.43% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
| January   | CWF IT 140 | 71.43% | FSC Mix | 239.91                | 0.00             | 0.00        | 239.91          |
|           | CWF IT 115 | 71.64% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | HWF IT 149 | 71.43% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
| February  | CWF IT 140 | 71.43% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | CWF IT 115 | 71.64% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |
|           | HWF IT 149 | 71.43% | FSC Mix | 239.91                | 0.00             | 0.00        | 239.91          |
| March     | CWF IT 140 | 71.43% | FSC Mix | 174.18                | 0.00             | 0.00        | 174.18          |
|           | CWF IT 115 | 71.64% | FSC Mix | 202.72                | 0.00             | 0.00        | 202.72          |

|       |            |        |         |        |      |      |        |
|-------|------------|--------|---------|--------|------|------|--------|
| April | HWF IT 149 | 71.43% | FSC Mix | 174.18 | 0.00 | 0.00 | 174.18 |
|       | CWF IT 140 | 71.43% | FSC Mix | 202.72 | 0.00 | 0.00 | 202.72 |
|       | CWF IT 115 | 71.64% | FSC Mix | 239.91 | 0.00 | 0.00 | 239.91 |
| May   | HWF IT 149 | 71.43% | FSC Mix | 174.18 | 0.00 | 0.00 | 174.18 |
|       | CWF IT 140 | 71.43% | FSC Mix | 202.72 | 0.00 | 0.00 | 202.72 |
|       | CWF IT 115 | 71.64% | FSC Mix | 174.18 | 0.00 | 0.00 | 174.18 |
|       | HWF IT 149 | 71.43% | FSC Mix | 202.72 | 0.00 | 0.00 | 202.72 |

Table 15 :- Stock Balance cut size product from big sheetbase paper

In Percentage System the products stored in the Inventory are limited to a maximum of 1 year so that after a period of 1 year stored then the claims of FSC products will be lost and can only be sold without a claim. Use of Percentage System to maintain the wood content used in paper.

Percentage System is used in industry based on consumer demand so that the product is directly delivered to the consumer or only temporary Inventory.

**E. Credit System**

In the calculation of Credit System where Mill must have been first to determine output claims. There are 2 Claims in the credit system method: FSC Mix Credit and FSC Recycled Credit. In the calculation of the credit system simulation will be used claim FSC Output Mix Credit.

Following Simulation calculations for Credit System:

1. Material NBKP FSC 100% and LBKP 70%.

Material used Pulp NBKP FSC 100% and Pulp LBKP FSC 70%, The following calculation for Credit System:

| Mo<br>nth | Product    | Input FSC |        |             | Output FSC |
|-----------|------------|-----------|--------|-------------|------------|
|           |            | NBKP      | LBKP   | Total Input | K=J*125%   |
|           |            | G=A*B     | H=C*D  | J=G+H+I     |            |
| Juny      | QPR IT 11A | 7.37      | 27.16  | 34.53       | 57.71      |
|           | CWF IT100  | 13.58     | 155.27 | 168.85      | 294.24     |
|           | CPC IT 170 | 30.22     | 225.47 | 255.69      | 440.41     |
| July      | QPR IT 154 | 19.59     | 76.57  | 96.16       | 161.23     |
|           | CPC IT 110 | 10.48     | 112.28 | 122.76      | 213.60     |
|           | CPC IT 200 | 10.15     | 88.38  | 98.53       | 170.51     |
| August    | QPR IT 198 | 2.84      | 34.34  | 37.18       | 64.88      |
|           | CWF IT 140 | 7.53      | 104.99 | 112.52      | 196.90     |
|           | CWFIT 185  | 4.35      | 50.60  | 54.95       | 95.79      |
| September | CWF IT 115 | 10.71     | 120.83 | 131.54      | 229.16     |
|           | HWF IT 149 | 16.97     | 140.00 | 156.97      | 271.21     |
|           | CWF IT 200 | 3.98      | 51.87  | 55.85       | 97.60      |

Table 16 :-Credit system material FSC 100% & FSC 70% Calculation

| Month     | Product    | Total Produksi Finishing |            | Converting            | Claim Produk<br>FSC<br>P=J/(A+C+E) |
|-----------|------------|--------------------------|------------|-----------------------|------------------------------------|
|           |            | Mini Roll                | Big Sheet  | Cut Size              |                                    |
|           |            | L=K*90.95%               | M=K*88.46% | N=L*94.35% O=L*94.35% |                                    |
| Juni      | QPR IT 11A |                          | 51.05      |                       | 74.79%                             |
|           | CWF IT100  | 267.61                   |            | 252.49                | 71.73%                             |
|           | CPC IT 170 | 400.55                   |            |                       | 72.57%                             |
| Juli      | QPR IT 154 |                          | 142.62     |                       | 74.56%                             |
|           | CPC IT 110 | 194.27                   |            | 183.29                | 71.84%                             |
|           | CPC IT 200 | 155.08                   |            |                       | 72.23%                             |
| Agustus   | QPR IT 198 |                          | 57.39      |                       | 71.64%                             |
|           | CWF IT 140 |                          | 174.18     | 164.34                | 71.43%                             |
|           | CWFIT 185  | 87.12                    |            |                       | 71.70%                             |
| September | CWF IT 115 |                          | 202.72     | 191.26                | 71.75%                             |
|           | HWF IT 149 |                          | 239.91     | 226.36                | 72.35%                             |
|           | CWF IT 200 | 88.77                    |            |                       | 71.53%                             |

Table 17:-Credit system material FSC 100% & FSC 70% Calculation (Continue 2)

From the calculation data of FSC product claim with Credit System method then done recapitulation to the use of material, product produced by product type. Recapitulation is made table of Credit Volume based on month produced, batch production, volume of credit for production (purchasing FSC pulp material), volume of credit used / sales data of FSC product according to product type. Credit volume to monitor in and out of each product generated, the following loan volume based on each group product as follows:

| Month          | Batch | Production Volume Kredit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 267.61                   | 267.61  | 267.61          | 0.00               |
| July 2017      | 2     | 155.08                   | 422.69  | 422.69          | 0.00               |
| August 2017    | 3     | 87.12                    | 509.81  | 509.81          | 0.00               |
| September 2017 | 4     | 88.77                    | 598.58  | 598.58          | 0.00               |

Table 18 :- Mini Roll Volume Credit

| Month          | Batch | Production Volume Kredit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 51.05                    | 51.05   | 51.05           | 0.00               |
| July 2017      | 2     | 142.62                   | 193.67  | 193.67          | 0.00               |
| August 2017    | 3     | 57.39                    | 251.06  | 251.06          | 0.00               |
| September 2017 | 4     | 0.00                     | 251.06  | 200.01          | 0.00               |

Table 19 :- Big Sheet Volume Credit

| Month          | Batch | Production Volume Kredit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 252.49                   | 252.49  | 252.49          | 0.00               |
| July 2017      | 2     | 183.29                   | 435.78  | 435.78          | 0.00               |
| August 2017    | 3     | 0.00                     | 435.78  | 435.78          | 0.00               |
| September 2017 | 4     | 0.00                     | 435.78  | 435.78          | 0.00               |

Table 20 :- Cut Size Volume Credit from Mini Roll base paper

| Month          | Batch | Production Volume Kredit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 0.00                     | 0.00  | 0.00            | 0.00               |
| July 2017      | 2     | 0.00                     | 0.00  | 0.00            | 0.00               |
| August 2017    | 3     | 164.34                   | 164.34  | 164.34          | 0.00               |
| September 2017 | 4     | 417.62                   | 581.96  | 581.96          | 0.00               |

Table 21 :-Cut Size Volume Creditfrom Big Sheetbase paper

2. Material NBKP FSC 100% & LBKP FSC CW%

Material used by NBKP with Claim FSC 100 and LBKP with FSC Controlled Wood claim. Here's the calculation for system credit:

| Month     | Product    | NBKP  | Claim FSC | LBKP   | Claim FSC | Total Pulp |
|-----------|------------|-------|-----------|--------|-----------|------------|
|           |            | A     | B         | C      | D         | E          |
| June      | QPR IT 11A | 7.37  | 100%      | 38.80  | 0%        | 46.17      |
|           | CWF IT100  | 13.58 | 100%      | 221.81 | 0%        | 235.39     |
|           | CPC IT 170 | 30.22 | 100%      | 322.10 | 0%        | 352.32     |
| July      | QPR IT 154 | 19.59 | 100%      | 109.39 | 0%        | 128.98     |
|           | CPC IT 110 | 10.48 | 100%      | 160.40 | 0%        | 170.88     |
|           | CPC IT 200 | 10.15 | 100%      | 126.26 | 0%        | 136.41     |
| August    | QPR IT 198 | 2.84  | 100%      | 49.06  | 0%        | 51.90      |
|           | CWF IT 140 | 7.53  | 100%      | 149.99 | 0%        | 157.52     |
|           | CWFIT 185  | 4.35  | 100%      | 72.28  | 0%        | 76.63      |
| September | CWF IT 115 | 10.71 | 100%      | 172.62 | 0%        | 183.33     |
|           | HWF IT 149 | 16.97 | 100%      | 200.00 | 0%        | 216.97     |
|           | CWF IT 200 | 3.98  | 100%      | 74.10  | 0%        | 78.08      |

Table 22 :-Credit system material FSC 100% & FSC CW Calculation

| Month     | Product    | Total Input FSC |               |                        | Total Output PM |
|-----------|------------|-----------------|---------------|------------------------|-----------------|
|           |            | NBKP<br>G=A*B   | LBKP<br>H=C*D | Total Input<br>J=G+H+I | K=J*125%        |
| June      | QPR IT 11A | 7.37            | 0.00          | 7.37                   | 57.71           |
|           | CWF IT100  | 13.58           | 0.00          | 13.58                  | 294.24          |
|           | CPC IT 170 | 30.22           | 0.00          | 30.22                  | 440.41          |
| July      | QPR IT 154 | 19.59           | 0.00          | 19.59                  | 161.23          |
|           | CPC IT 110 | 10.48           | 0.00          | 10.48                  | 213.60          |
|           | CPC IT 200 | 10.15           | 0.00          | 10.15                  | 170.51          |
| August    | QPR IT 198 | 2.84            | 0.00          | 2.84                   | 64.88           |
|           | CWF IT 140 | 7.53            | 0.00          | 7.53                   | 196.90          |
|           | CWFIT 185  | 4.35            | 0.00          | 4.35                   | 95.79           |
| September | CWF IT 115 | 10.71           | 0.00          | 10.71                  | 229.16          |
|           | HWF IT 149 | 16.97           | 0.00          | 16.97                  | 271.21          |
|           | CWF IT 200 | 3.98            | 0.00          | 3.98                   | 97.60           |

Table 23 :-Credit system material FSC 100% FSC CW Calculation (Continue 1)



| Month     | Product    | Total Finishing Production                              |           | Converting | Claim Produk FSC |
|-----------|------------|---|-----------|------------|------------------|
|           |            | Mini Roll   | Big Sheet | Cut Size   |                  |
|           |            | L=K*90.95% M=K*88.46% N=L*94.35% O=L*94.35% P=J/(A+C+E) |           |            |                  |
| Juny      | QPR IT 11A |   | 51.05     |            | 15.96%           |
|           | CWF IT100  | 267.61  |           | 252.49     | 5.77%            |
|           | CPC IT 170 | 400.55  |           |            | 8.58%            |
| July      | QPR IT 154 |   | 142.62    |            | 15.19%           |
|           | CPC IT 110 | 194.27  |           | 183.29     | 6.13%            |
|           | CPC IT 200 | 155.08  |           |            | 7.44%            |
| August    | QPR IT 198 |   | 57.39     |            | 5.47%            |
|           | CWF IT 140 |   | 174.18    | 164.34     | 4.78%            |
|           | CWFIT 185  | 87.12   |           |            | 5.68%            |
| September | CWF IT 115 |   | 202.72    | 191.26     | 5.84%            |
|           | HWF IT 149 |   | 239.91    | 226.36     | 7.82%            |
|           | CWF IT 200 | 88.77   |           |            | 5.10%            |

Table 24 :- Credit system material FSC 100% & FSC CW Calculation(Continue 2)

| Month          | Batch | Production Volume Credit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| Juny 2017      | 1     | 267.61                   | 267.61  | 267.61          | 0.00               |
| July 2017      | 2     | 155.08                   | 422.69  | 422.69          | 0.00               |
| August 2017    | 3     | 87.12                    | 509.81  | 509.81          | 0.00               |
| September 2017 | 4     | 88.77                    | 598.58  | 598.58          | 0.00               |

Table 25 :- Mini Roll Volume Credit

| Month          | Batch | Production Volume Credit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1} - [F]_{i-1} + [C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| Juny 2017      | 1     | 51.05                    | 51.05   | 51.05           | 0.00               |
| July 2017      | 2     | 142.62                   | 193.67  | 193.67          | 0.00               |
| August 2017    | 3     | 0.00                     | 435.78  | 435.78          | 0.00               |
| September 2017 | 4     | 0.00                     | 435.78  | 435.78          | 0.00               |

Table 26 :- Big Sheet Volume Credit

| Month          | Batch | Production Volume Credit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1}-[F]_{i-1}+[C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 51.05                    | 51.05   | 51.05           | 0.00               |
| July 2017      | 2     | 142.62                   | 193.67  | 193.67          | 0.00               |
| August 2017    | 3     | 57.39                    | 251.06  | 251.06          | 0.00               |
| September 2017 | 4     | 0.00                     | 251.06  | 200.01          | 0.00               |

Table 27:- Cut Size Volume Credit From Mini Roll Base Paper

| Month          | Batch | Production Volume Credit | Volume Akun Credit  | Max akun Credit | Volume Credit Used |
|----------------|-------|--------------------------|---|-----------------|--------------------|
| A              | B     | C                        | D   | E               | F                  |
|                | i     |                          | $[D]_{i-1}-[F]_{i-1}+[C]_i$<br>Kondisi :<br>$[D]_i < [5]_i$ |                 |                    |
| May 2017       | 0     | 0                        | 0   | 0               | 0                  |
| June 2017      | 1     | 0.00                     | 0.00  | 0.00            | 0.00               |
| July 2017      | 2     | 0.00                     | 0.00  | 0.00            | 0.00               |
| August 2017    | 3     | 164.34                   | 164.34  | 164.34          | 0.00               |
| September 2017 | 4     | 417.62                   | 581.96  | 581.96          | 0.00               |

Table 28 :- Cut Size Volume Credit From Big Sheetbase paper

In the calculation of credit system the Credit Volume used (sold) must not exceed the volume of Credit for production (Purchase of FSC pulp material).

**V. COVER**

This study aims to determine the control of claims of Chain Of Custody products - Forest Stewardship Council at PT. Indah Kiat Pulp & Paper - Tangerang Mill by comparing 3 methods of FSC Control System.

**A. FSC Product Claim Determination**

Determination of FSC claim calculation for application at PT. Indah Kiat Pulp & Paper - Tangerang Mill is done taking into account the limitations of existing problems in PT. Indah Kiat Pulp & Paper.

**B. Control System COC – FSC**

Determination of claim calculation performed by using Control System COC - FSC is as follows

➤ *Transfer System*

- The paper production process at IKPP produces paper products that can be more and less so that it will cause problems of segregation in the Inventory. While in product transfer system produced in accordance with consumer demand and directly sent, if there is Inventory only temporary.
- The existence of segregation in each production line, whereas in IKPP the product varies from color and GSM so it will be difficult to segregate the product in every line because it takes a wide space.

- The FSC material is 100% more expensive than FSC Mix, & Controlled Wood so if it is applied based on the policy of purchasing 100% NBKP FSC pulp and LBKP Controlled Wood then the lowest.
  - Claim becomes product claim and automatic price will follow FSC Controlled Wood.
  - Percentage System
    - Material used FSC 100%, FSC Mix X% and FSC Controlled Wood, at IKPP only use 100% FBI NBKP and LBKP Controlled Wood while in Percentage System only use material with 100% FSC claim and FSC Mix X%.
    - If the resulting Product has settled more than 1 year in the warehouse and has not been sold then the COC - FSC claim will be forfeited.
  - Credit system
    - FSC product claims are determined from the beginning so that the FSC claims are unchanged, in this case IKPP uses NBKP FSC100% material and LBKP Controlled Wood so that the control of product claims is FSC Mix, so that in terms of price will be balanced.
    - FSC Credit Volume is valid for 2 years if it is still in Inventory and no transaction will be FSC claim will be forfeited.
- By comparing the three Control System COC - FSC above, the Credit System becomes a recommendation in the formulation of FSC product control claims.

FSC Chain Of Custody Control System Decision Tree. According to Kathryn F, DR. J. Bowyer, DR. S. Bratkovich, 2012, in his book "Chain-of-Custody Certification & Group Chain-of-Custody Certification" FSC product claim

determination can be done with FSC Chain Of Custody Control System Decision Tree to strengthen research. The following decision trees are analyzed based on prior research to determine the FSC product control claims.

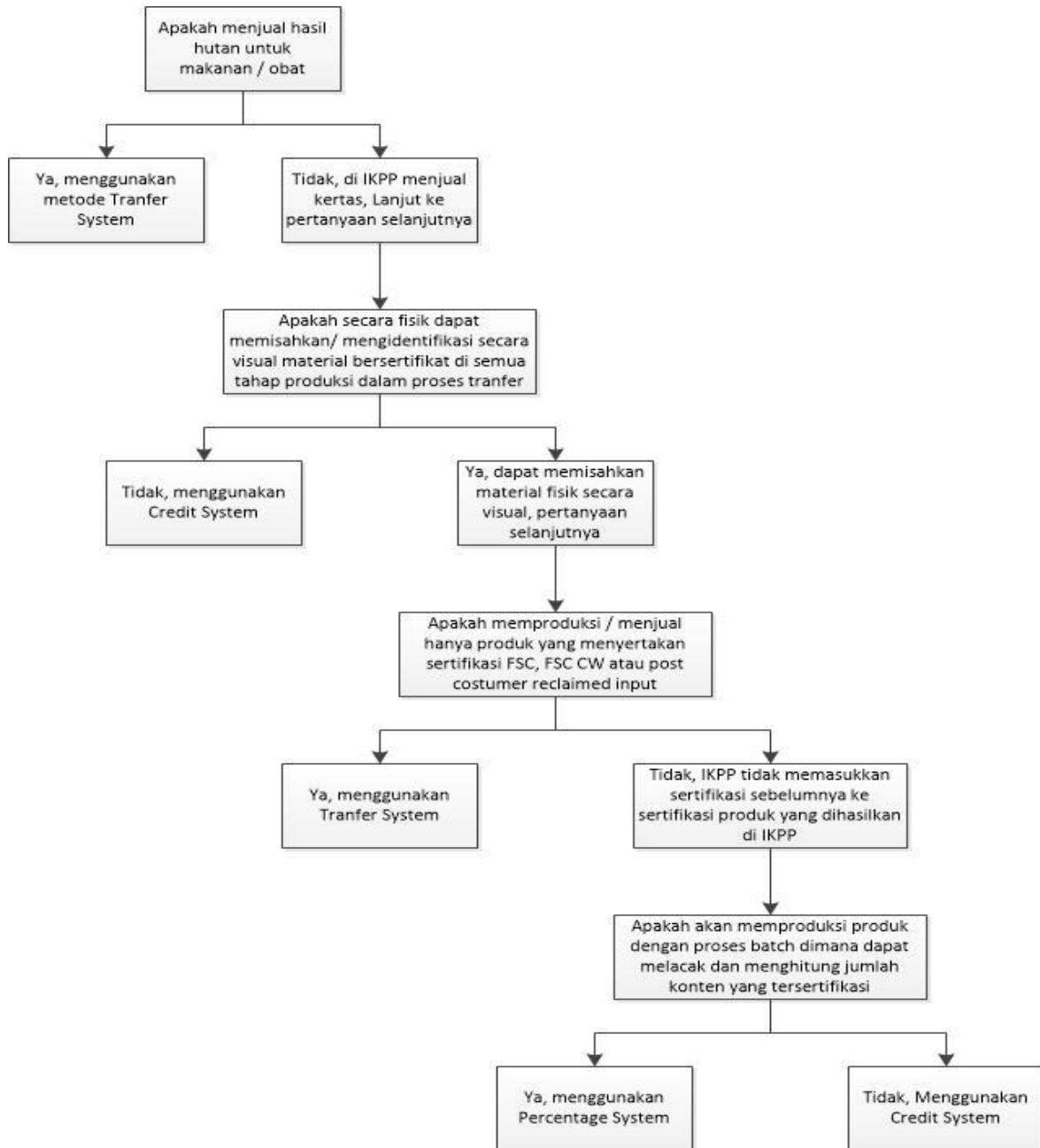


Fig. 6 :- COC – FSC Control System Decision Tree

Based on the COC - FSC Control System Decision Tree that IKPP - Tangerang Mill by looking at the conditions in the field in determining the control of FSC product claims that the Credit System is suitable to be applied in IKPP.

**VI. CONCLUSION**

Based on the research that has been done can be concluded as follows.

- Implementation of COC-FSC Control System depends on FSC claims of pulp material used, segregation of products produced in each production line and demand from consumers.
- In COC-FSC Control System used in FSC product control claims based on the analysis and discussion described above, the recommendation for controlling FSC product claims is Credit System with product claim as FSC Mix.

## VII. SUGGESTION

From this research there are several suggestions that are expected to be useful for further research, namely.

- Research can be developed by improving the use of Broke Recycle from FSC production, so broke can be claimed to be Material with FSC Recycled claim to be used in FSC production to improve paper product claim.
- Research can be continued by conducting Self Assessment / Audit on implementation of COC - FSC implementation in IKPP - Tangerang Mill to increase productivity.

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