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CALCULATION OF OIL PALM HARVESTER PREMIUM BASED ON SLOPE CLASS BASED ON GEOGRAPHIC INFORMATION SYSTEM IN SEI SILAU PLANTATION PT.PERKEBUNAN NUSANTARA III (PERSERO)

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Abstract

PT Perkebunan Nusantara III is a state-owned company engaged in plantation activities. Sei Silau Plantation is one of the units that manages oil palm plantations. One of the factors that determines the company's performance is the productivity of the harvesters. The amount of premium received by harvesters is a factor that affects motivation and performance, but the determination of premiums still uses general slope data for each harvest area in determining the task base. The method used in this research is spatial data processing, overlaying slope data from Demnas with regional boundaries at each level and then analysing the increase in productivity and premiums. The results showed that the slope class from the spatial analysis was divided into three parts, namely flat and undulating (0-15%) covering 114.91 ha/45.85%, hilly (15-45%) covering 110.34 ha/44.03% and hilly without terraces (>45%) covering 25.35 ha/10.12% of the total oil palm area. The slope class of each plantation is divided into three classes. There was an increase in productivity and premium after the method change, namely an increase in productivity from April to May by 214.95 kg/17.04%, May to June by 123.43/8.43% and April to June by 339.38 kg/26.90%, and an increase in premium from April to May by Rp 3,190,252/22.20%, May to June by Rp 1,642,123/9.35% and April to June by Rp 4,832,375/33.63%. This shows a clear correlation between increased productivity and increased premiums.

Keywords ***: Palmoil, Spatial, GIS, Productivity, Ptpn3***

1. INTRODUCTION

PT Perkebunan Nusantara III (Persero) is one of the state-owned plantation companies in North Sumatra and has 34 plantation units. One of the units is Sei Silau Plantation, which manages oil palm and rubber plantations. The productivity of Sei Silau Plantation is measured by the output produced by the harvesters on a daily basis. Productivity is one of the factors that affect business performance. Harvester productivity is influenced by the motivation that comes from the bonuses earned for daily performance. Premiums are measured by achieving production against a predetermined task base, but currently the determination of the task base is still based on the general slope in each area in each harvesting kapveld. therefore a detailed slope calculation method is needed in each area and harvesting kapveld to determine the task base according to the topographical details of each day, which affects the fair match between the task base and the harvester premium that each harvester receives.

2. IMPLEMENTATION METHOD

This research was carried out in April - May 2022 in Afdeling I Sei Silau plantation. The method used starts from the collection of secondary data related to harvester information, area and production, then proceed with the data analysis method which consists of remote sensing method which is for taking aerial photographs which is used as map base map, then the orthorectification method is processing aerial photograph data into earth projections, measuring the harvest area using GPS which is to spatially determine the boundaries of harvest area of each harvester every day, slope analysis method which is processing raster data from demnas and producing slope

numbers in vector form and slope classification. The geodatabase preparation method is the preparation of vector and raster data that has been processed into the project, next is the data overlay analysis method which is by overlaying the data from the slope analysis with the boundaries of the harvest area in each kapveld. This is followed by the simulation and application of the task base and harvester premiums, and the analysis of increased production productivity and harvester premiums using simple regression analysis.

3. RESULTS AND DISCUSSION

The results of the research conducted consist of several items, namely the geographic information system-based slope class, the application of task base and harvester premiums, as well as analyzing the increase in production productivity and harvester premiums and the improvement of harvester performance using the simple regression analysis method.

3.1 Determination of Geographic Information System Based Slope Class

Determination of the slope class begins with aerial photography using drones, which is then processed and combined with the orthorectification method to bring the data in line with the earth projection coordinate reference. Measurement and mapping of harvest areas using GPS to oTBain information on the spatial boundaries of the harvest area in each kapveld, then calculating the area and giving symbology in the form of colour. After the measurement, the geodatabase of the spatial data of the harvest area boundaries is created and the maps are laid out according to cartographic rules that include information on map titles, legends, scales and data sources.

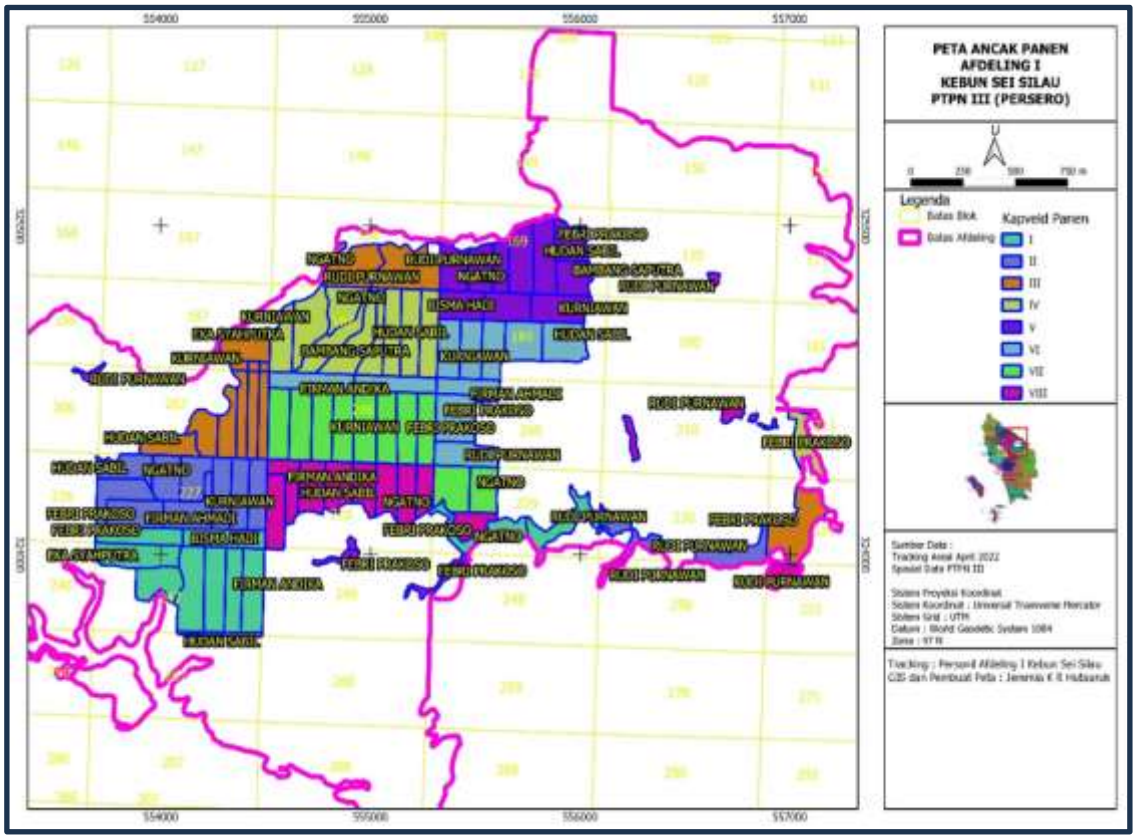

Figure 1. Map of Harvest Area Layout of Afdeling I Sei Silau Plantation

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Spatial analysis of the DEMnas raster data was carried out using a GIS application with the Add Contour function and exporting the raster to vector in shapefile format, resulting in pixel numbers with elevation values to an accuracy of 10-20 metres per pixel.

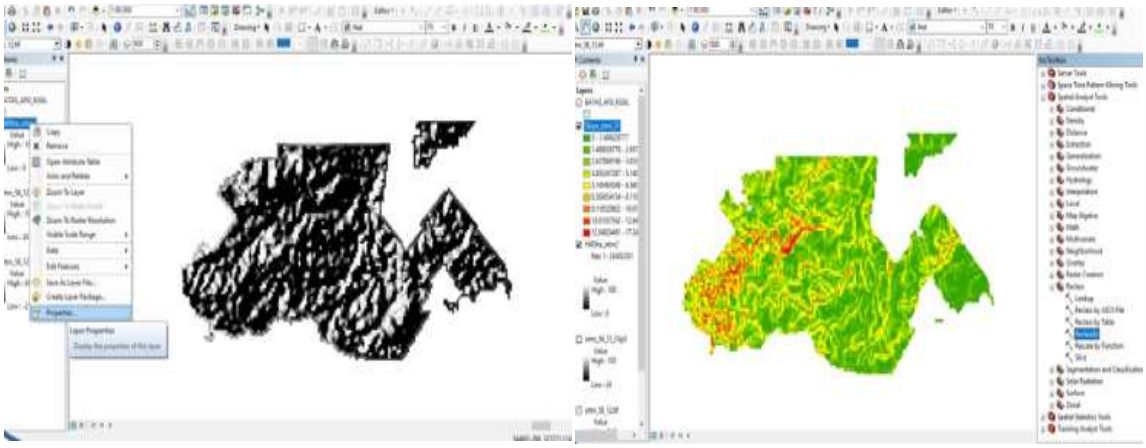

Figure 2. Demnas raster analysis results and raster to vector export.

The results of the data processing are then further classified into 4 (four) slope classes based on the slope value, as shown in Table 1.

Table 1. Slope Classes

Slope Class	Slope Depth (%)	Area (ha)	%
Flat Hilly	0-15 %	114,91	45.85
Hilly	15-45 %	110,34	44,03
Hilly without terraces/contours	>45 %	25,35	10,12
Swamp	-		
Total		**250,60**	**100,00**

The results of the analysis of the contour raster data and the measurement of the harvest area boundaries were then overlaid using the intersection method in the GIS application. The slope classification value for each harvest area in each plot was oTBained. The detailed slope data for each harvest area in each cap field can be seen in the Appendix.

Table 2. Slope Data per Harvested Plot in Afdeling I

Kapveld	Slope Depth (ha)			Total
	0-15%	15-45 %	>45 %	
I	13,78	20,83	0,27	34,87
II	14,91	14,71	1,81	31,43
III	6,59	11,48	14,36	32,43
IV	13,06	15,99	3,28	32,33
V	12,00	11,05	5,34	28,38
VI	20,91	9,73	0,00	30,63
VII	20,52	11,42	0,00	31,94
VIII	13,16	15,13	0,29	28,58
Total	**114,91**	**110,34**	**25,35**	**250,60**

3.2. Application of task base and harvester premium

The detailed contour data per harvest area is used as the basis for determining the tax base according to the weight of the tax base per slope class for the calculation of fresh fruit bunches and loose fruit. The tax base is calculated using the following formula = Target tax base for one year = TB (potential tonnes/ha and topography) x actual HK for one year. The known 2005 TM oil palm t/ha potential and topography data are as follows 2005 TM Potential/Ha: 17-21 tonnes/ha, with a tax base of 850 in flat hilly areas, a tax base of 700 in hilly areas, 600 in hilly areas without terraces and 550 in swampy areas. Known data on potential t/ha and topography of palm oil TM 2010 are as follows Potential/Ha TM 2010: 17-21 tons/ha, with a base allocation of 850 in flat hilly areas, 700 in hilly areas, 600 in hilly areas without terraces and 550 in swampy areas. Known data on tonnage/ha potential and topography of TM 2011 oil palm are as follows TM 2011 Ton/Ha potential: < 12 tons/ha, with a tax base of 500 in flat hilly areas, 400 in hilly areas, 350 in hilly areas without terraces and 350 in swamp areas, the formula according to the above data is as follows:

- **In TM 2005 (flat hilly area) :**
  Target tax base for one year = 850 x 296
  = 251.600
- **In TM 2005 (hilly area) :**
  Target tax base for one year = 700 x 296
  = 207.200
- **In TM 2005 (hilly without terraces)**
  Target tax base for one year = 600 x 296
  = 177.600
- **In TM 2005 (swamp area) :**
  Target tax base for one year = 850 x 296
  = 162.800
- **In TM 2010 (flat hilly area) :**
  Target tax base for one year = 850 x 296
  = 251.600
- **In TM 2010 (hilly area) :**
  Target tax base for one year = 700 x 296
  = 207.200
- **In TM 2010 (hilly without terraces) :**
  Target tax base for one year = 600 x 296
  = 177.600
- **In TM 2010 (swamp area) :**
  Target tax base for one year = 850 x 296
  = 162.800
- **In TM 2011 (flat hilly area) :**
  Target tax base for one year = 500 x 296
  = 148.000
- **In TM 2011 (hilly area) :**
  Target tax base for one year = 400 x 296
  = 118.400
- **In TM 2011 (hilly without terraces) :**
  Target tax base for one year = 350 x 296
  = 103.600
- **In TM 2011 (swamp area) :**
  Target tax base for one year = 350 x 296
  = 103.600

In this study, the premium calculation used for comparison is in the first half of the year, so the formula for the tax base in the semester 1 of the year is as follows:

$$\textbf{Tax base Semester I} = \frac{\textbf{Tax base target for the year x VYC semester I)}}{\textbf{Effectif working day (EWD) in Semester I}}$$

The calculation of the formula in semester I per planting year can be detailed as follows, knowing that VYC semester I: 1,903,200 kg divided by 4,571,000 kg multiplied by 100% equals 45.64% (data from the KSSIL Company Budget Work Plan for 2022 is attached).

Calculation of Tax Base in semester I TM 2005 in flat hilly area is :

- **TB I TM 2005 (flat hilly area) : 251.600 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2005 (flat hilly area) : 803 kg**

Calculation of Tax Base in semester I TM 2005 in hilly area is :

- **TB Semester I TM 2005 (hilly area) : 207.200 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2005 (hilly area) : 661 kg**

Calculation of Tax Base semester I TM 2005 in hilly without terraces is :

- **TB Semester I TM 2005 (hilly without terraces) : 177.600 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2005 (hilly without terraces) : 567 kg**

Calculation of Tax Base semester I TM 2005 in swamp area is :

- **TB Semester I TM 2005 (swamp area) : 162.800 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2005 (swamp area) : 520 kg**

From the calculation of the TM 2005 task base above, it can be seen in Table 3.3.

Table 3.3 Task Base Recapitulation TM 2005 Semester I

Plant Year	Flat Hilly	Hilly	Hilly without Terraces	Swamp
2005	803 kg	661 kg	567 kg	520 kg

Calculation of Tax Base in semester I TM 2010 in flat hilly area is :

- **TB I TM 2010 (flat hilly area) : 251.600 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2010 (flat hilly area) : 803 kg**

Calculation of Tax Base in semester I TM 2010 in hilly area is :

- **TB Semester I TM 2010 (hilly area) : 207.200 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2010 (hilly area) : 661 kg**

Calculation of Tax Base semester I TM 2010 in hilly without terraces is :

- **TB Semester I TM 2010 (hilly without terraces) : 177.600 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2010 (hilly without terraces) : 567 kg**

Calculation of Tax Base semester I TM 2010 in swamp area is :

- **TB Semester I TM 2010 (swamp area) : 162.800 x 45,64 %**
  EWD Sem I (143)
- **TB Semester I TM 2010 (swamp area) : 520 kg**

From the calculation of the TM 2010 task base above, it can be seen in Table 3.4

Table 3.4 Task Base Recapitulation TM 2010 Semester I

Year Plant	Flat Hilly	Hilly	Hilly Without	Swamp

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			Terraces	
2010	803 kg	661 kg	567 kg	520 kg

Calculation of Tax Base in semester I TM 2011 in flat hilly area is :

- **TB I TM 2011 (flat hilly area) : $\frac{148.000 \times 45,64\ \%}{\text{EWD Sem I (143)}}$**
- **TB Semester I TM 2011 (flat hilly area) : 472 kg**

Calculation of Tax Base in semester I TM 2011 in hilly area is :

- **TB Semester I TM 2011 (hilly area) : $\frac{118.400 \times 45,64\ \%}{\text{EWD Sem I (143)}}$**
- **TB Semester I TM 2011 (hilly area) : 378 kg**

Calculation of Tax Base semester I TM 2011 in hilly without terraces is :

- **TB Semester I TM 2011 (hilly without terraces) : $\frac{103.600 \times 45,64\ \%}{\text{EWD Sem I (143)}}$**
- **TB Semester I TM 2011 (hilly without terraces) : 331 kg**

Calculation of Tax Base semester I TM 2011 in swamp area is :

TB Semester I TM 2011 (swamp area) : $\frac{103.600 \times 45,64\ \%}{\text{EWD Sem I (143)}}$

- **TB Semester I TM 2011 (swamp area) : 331 kg**

From the calculation of the TM 2011 task base above, it can be seen in Table 3.5

Table 3.5 Task Base Recapitulation TM 2011 Semester I

Year Plant	Flat Hilly	Hilly	Hilly Withour Terraces	Swamp
2011	472 kg	378 kg	331 kg	331 kg

The recapitulation of the TM 2005, 2010 and 2011 duty base of oil palm afdeling I in semester I can be seen in Table 3.6..

Table 3.6 Task Base Recapitulation TM 2011 Semester I in Afdeling I KSSIL

Year Plant	Hilly	Hilly	Hilly Without Terraces	Swamp
2005	803 kg	661 kg	567 kg	520 kg
2010	803 kg	661 kg	567 kg	520 kg
2011	472 kg	378 kg	331 kg	331 kg

3.3. Analysis of increased crop productivity and harvester premiums and improved harvester performance with simple regression analysis

From the details of the premium calculation in the Appendix for April, May and June 2022, the recapitulation of the harvester productivity data and the harvester premiums can be seen in Table 3.7.

Table 3.7 Recapitulation of Production and Premiums of Afd I KSSIL Harvesters for the Period of April - June 2022

No	Harvester Name	Calculation Still Using General Slope					alculations Using GIS-Based Detailed Slopes									
		April					Mei					June				
		Production (Kg)	Working Days (WD)	Kg/WD	Premi (Rp)	Premi/days (Rp)	Production (Kg)	Working Days (WD)	Kg/WD	Premi (Rp)	Premi/days (Rp)	Production (Kg)	Working Days (WD)	Kg/WD	Premi (Rp)	Premi/days (Rp)
1	Bambang Saputra	42770	29	1.474,83	1.687.906	58.203,66	43139	28	1.540,68	1.793.030	64.036,78	51.908	30	1.730,27	1.953.586	65.120
2	Bisma Hadi	33577	29	1.157,83	1.371.559	47.295,14	39096	28	1.396,29	1.555.148	55.540,99	46.689	30	1.556,30	1.744.455	58.148
3	Eka Syahputra	33347	29	1.149,90	1.205.573	41.571,48	39914	28	1.425,50	1.780.336	63.583,41	45.096	30	1.503,20	1.999.440	66.648
4	Febri Prakoso	31541	29	1.087,62	930.367	32.081,62	36903	28	1.317,96	1.611.920	57.568,57	48.585	30	1.619,50	2.035.204	67.840
5	Firman Ahmadi	38452	29	1.325,93	1.379.722	47.576,62	43449	28	1.551,75	1.733.680	61.917,15	45.752	30	1.525,07	1.720.875	57.363
6	Firman Andika	31187	29	1.075,41	1.206.038	41.587,52	37192	28	1.328,29	1.429.226	51.043,78	44.680	30	1.489,33	1.641.752	54.725
7	Hudan Sabil	39492	29	1.361,79	1.272.276	43.871,59	40107	28	1.432,39	1.708.311	61.011,10	46.921	30	1.564,03	1.812.181	60.406
8	Kurniawan	44114	29	1.521,17	2.088.624	72.021,52	46904	28	1.675,14	2.012.414	71.871,93	48.909	30	1.630,30	1.970.453	65.682
9	Ngatno	29671	29	1.023,14	1.433.656	49.436,41	40113	28	1.432,61	1.656.972	59.177,56	49.212	30	1.640,40	1.903.100	63.437
10	Rudi Purnawan	41677	29	1.437,14	1.794.158	61.867,52	46582	28	1.663,64	2.279.095	81.396,26	52.505	30	1.750,17	2.421.208	80.707
	Total	**365.828**	**29**	**1.261,48**	**14.369.879**	**495.513,07**	**413.399**	**28**	**1.476,43**	**17.560.131**	**627.147,53**	**480.257**	**30**	**1.600,86**	**19.202.254**	**640.075**

The summary data shows the results of the increase in productivity of each harvester from April to June 2022, as well as the total of all harvesters in afdeling I. Comparative data on the increase in production per month can be seen in Table 3.8.

Table 3.8 Productivity Improvement Comparison Data (kg/wd)

No	Harvester Name	April	Mei	June	Increase					
					April vs Mei		Mei vs June		April vs June	
					Kg/WD	%	Kg/WD	%	Kg/WD	%
1	Bambang Saputra	1474,83	1540,68	1.730,27	65,85	4,46	189,59	12,31	255,44	17,32
2	Bisma Hadi	1157,83	1396,29	1.556,30	238,46	20,60	160,01	11,46	398,47	34,42
3	Eka Syahputra	1149,90	1425,50	1.503,20	275,60	23,97	77,70	5,45	353,30	30,72
4	Febri Prakoso	1087,62	1317,96	1.619,50	230,34	21,18	301,54	22,88	531,88	48,90
5	Firman Ahmadi	1325,93	1551,75	1.525,07	225,82	17,03	(26,68)	(1,72)	199,14	15,02
6	Firman Andika	1075,41	1328,29	1.489,33	252,87	23,51	161,05	12,12	413,92	38,49
7	Hudan Sabil	1361,79	1432,39	1.564,03	70,60	5,18	131,64	9,19	202,24	14,85
8	Kurniawan	1521,17	1675,14	1.630,30	153,97	10,12	(44,84)	(2,68)	109,13	7,17
9	Ngatno	1023,14	1432,61	1.640,40	409,47	40,02	207,79	14,50	617,26	60,33
10	Rudi Purnawan	1437,14	1663,64	1.750,17	226,50	15,76	86,52	5,20	313,03	21,78
	Total	**1.261,48**	**1.476,43**	**1.600,86**	**214,95**	**17,04**	**124,43**	**8,43**	**339,38**	**26,90**

Recapitulation data of harvester premium increase from the results of task base calculation based on GIS analysis topography can be seen in Table 3.9.

Table 3.9 Comparative Data on Increase in Harvester Premium (IDR/Harvester)

No	Harvester Name	April	Mei	June	Increase					
					April vs Mei		Mei vs June		April vs June	
					IDR/Harvester	%	IDR/Harvester	%	IDR/Harvester	%
1	Bambang Saputra	1.687.906	1.793.030	1.953.586	105.124	6,23	160.556	8,95	265.680	15,74
2	Bisma Hadi	1.371.559	1.555.148	1.744.455	183.589	13,39	189.307	12,17	372.896	27,19
3	Eka Syahputra	1.205.573	1.780.336	1.999.440	574.763	47,68	219.104	12,31	793.867	65,85
4	Febri Prakoso	930.367	1.611.920	2.035.204	681.553	73,26	423.284	26,26	1.104.837	118,75
5	Firman Ahmadi	1.379.722	1.733.680	1.720.875	353.958	25,65	(12.805)	(0,74)	341.153	24,73
6	Firman Andika	1.206.038	1.429.226	1.641.752	223.188	18,51	212.526	14,87	435.714	36,13
7	Hudan Sabil	1.272.276	1.708.311	1.812.181	436.035	34,27	103.870	6,08	539.905	42,44
8	Kurniawan	2.088.624	2.012.414	1.970.453	(76.210)	(3,65)	(41.961)	(2,09)	(118.171)	(5,66)
9	Ngatno	1.433.656	1.656.972	1.903.100	223.316	15,58	246.128	14,85	469.444	32,74
10	Rudi Purnawan	1.794.158	2.279.095	2.421.208	484.937	27,03	142.113	6,24	627.050	34,95
	Total	**14.369.879**	**17.560.131**	**19.202.254**	**3.190.252**	**22,20**	**1.642.123**	**9,35**	**4.832.375**	**33,63**

The correlation between increased harvester productivity and harvester premiums is shown in Table 3.10.

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Table 3.10 Correlation between increased harvester productivity and harvester premiums

No	Harvester Name	% Increase April to Mei		% Increase April to June	
		Kg/HK	Rp Premi	Kg/HK	Rp Premi
1	Bambang Saputra	4,46	6,23	17,32	15,74
2	Bisma Hadi	20,60	13,39	34,42	27,19
3	Eka Syahputra	23,97	47,68	30,72	65,85
4	Febri Prakoso	21,18	73,26	48,90	118,75
5	Firman Ahmadi	17,03	25,65	15,02	24,73
6	Firman Andika	23,51	18,51	38,49	36,13
7	Hudan Sabil	5,18	34,27	14,85	42,44
8	Kurniawan	10,12	(3,65)	7,17	(5,66)
9	Ngatno	40,02	15,58	60,33	32,74
10	Rudi Purnawan	15,76	27,03	21,78	34,95
	Total	**17,04**	**22,20**	**26,90**	**33,63**

From the table above, it can be seen that:

1. There was an increase in production from April to May of 47,571 kg or 13.00% increase in kg of production.
2. There was an increase in production from April to June which was 114,429 kg or 31.27% increase in kg of production
3. There was an increase in production from May to June which was 66,858 kg or 16.17 % increase in kg production 3.

Productivity data (kg/wd) also showed an increase from April to May and June for almost all harvesters, as shown in Table 3.8. from the table.

The data table and graph above show that :

1. There was an increase in productivity from April to May of 214.95 kg or 17.04% for the cumulative average productivity of all harvesters.
2. There was an increase in productivity from April to June of 339.38 kg or 26.90% for the cumulative average productivity of all the harvesters.
3. There was an increase in productivity from May to June of 124.43 kg or 8.43% for the cumulative average productivity of all harvesters.
4. The harvester with the highest increase in productivity from April to May is Ngatno with 409.47 kg or 40.02% on the same area.Pemanen dengan peningkatan produktivitas tertinggi dari bulan April ke bulan Juni adalah atas nama Ngatno yaitu sebesar 617,26 kg atau sebesar 60,33 % dengan areal yang sama.
5. The harvester with the highest productivity in April was Kurniawan with a productivity of 1521.17 kg, in May was Kurniawan with a productivity of 1675 and in June was Rudi Purnawan with a productivity of 1750.17 kg.
6. The harvester with the lowest productivity in April was Ngatno with a productivity of 1023.14 kg, in May was Febri Prakoso with a productivity of 1317.96 kg, and in June was Firman Andika with a productivity of 1,489.33 kg.
7. The lowest kg/hk value in April was 1,023.14 kg, a difference of 238.34 kg or 18.89% from the average productivity of all harvesters and a difference of 498.03 kg or 32.74% from the highest productivity harvester. The lowest kg/hk value in May was 1,317.96 kg, a difference of 158.47 kg or 10.73% from the average productivity of all harvesters

and a difference of 357.18 kg or 21.33% from the harvester with the highest productivity. The lowest kg/hk value in June is 1,489.33 kg, which is 111.53 kg or 6.96% different from the average productivity of all harvesters and 260.84 kg or 14.90% different from the harvester with the highest productivity. From the data it can be seen that there is an even distribution of productivity between harvesters and a relative increase in productivity in almost all harvesters each month. Judging by the decreasing percentage gap between the highest and lowest productivity harvesters each month.

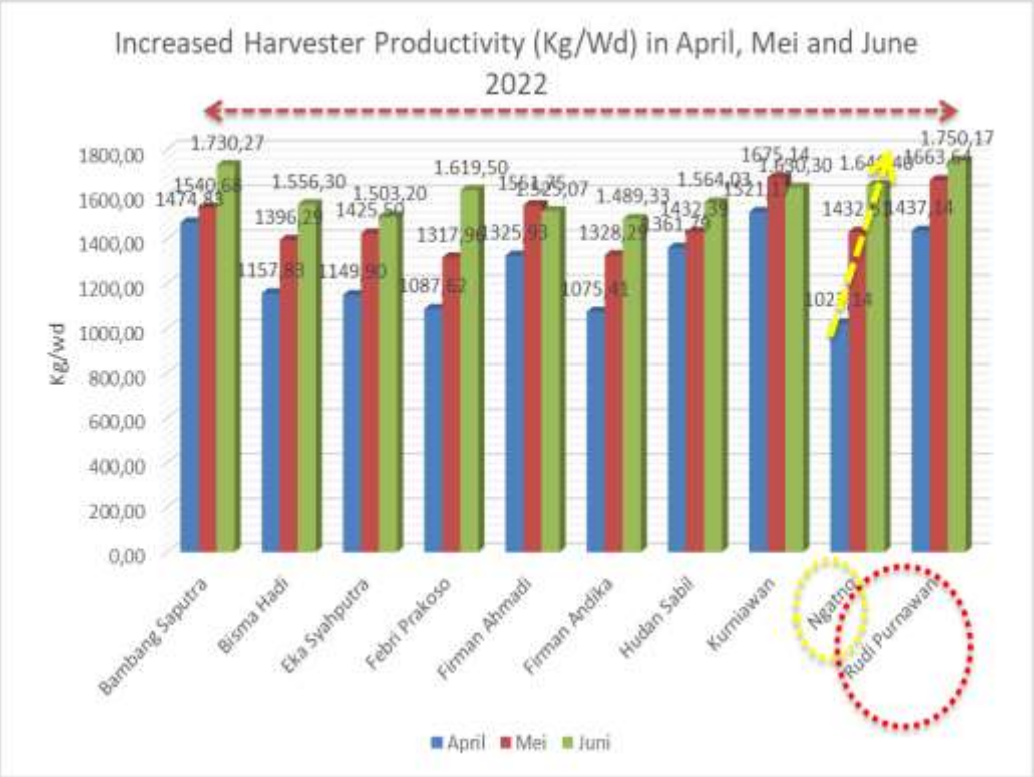

Figure 3. Increased Harvester Productivity Chard

The harvester premium data also shows an overall increase in harvester electricity flow from April to May and June as shown in Table 3.9.

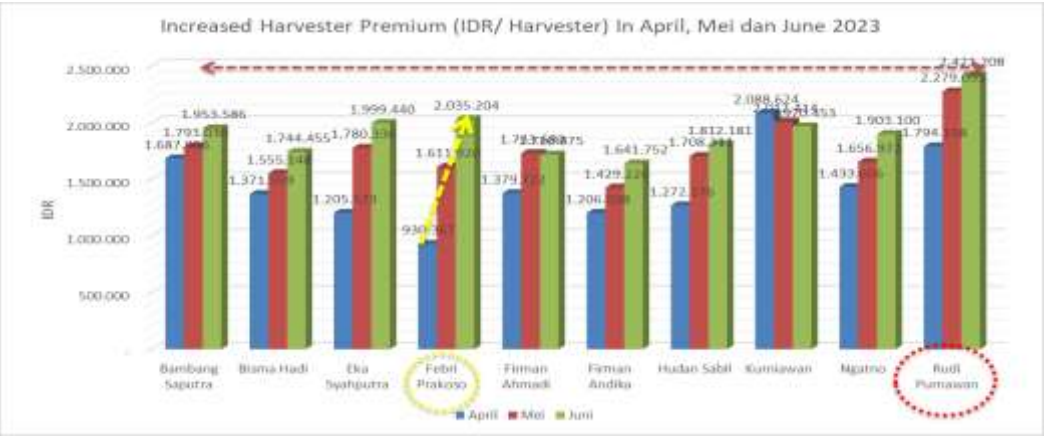

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Figure 4. Increased Harvester Premium Chart

The data table and graph above show that

1. There was an increase in the number of harvester premiums from April to May, namely Rp. 3,190,252 or 22.20%.
2. There was an increase in the number of harvester premiums from April to June, namely Rp. 4,832,375 or 33.63%.
3. There was an increase in the number of harvester premiums from May to June, namely Rp. 1,642,123 or 9.35%.
4. The harvester with the highest increase in premiums from April to May is on behalf of Febri Prakoso by Rp. 681,553 or 73.26%, from April to June is on behalf of Febri Prakoso by Rp. 1,104,837 or 118.75% and from May to June is on behalf of Febri Prakoso by Rp. 423,284 or 26.26%.
5. The harvester with the highest premium in April was Kurniawan with Rp. 2,088,624, in May was Rudi Purnawan with Rp. 2,279,095 and in June was Rudi Purniawan with Rp. 2,421,208.
6. Harvesters with the lowest premium in April is Rp. 930,367, has a difference of Rp. 1,158,257 or 55.40% of the harvesters with the highest premium, in May harvesters with the lowest premium is Rp. 1,429,226, has a difference of Rp. 849,869 or 37.28% of the harvesters with the highest premium, and in June harvesters with the lowest premium is Rp. 1,641,752, has a difference of Rp. 779,456 or 32.19% of the harvesters with the highest premium.
7. From the data it can be seen that there is an equal distribution of harvesters' premiums among harvesters and a relative increase in premiums for almost all harvesters every month. This can be seen from the decreasing percentage difference between the harvesters with the highest premium and the harvesters with the lowest premium each month. Korelasi hubungan antara data peningkatan produktivitas pemanen dengan premi pemanen menunjukkan adanya keterkaitan yang nyata dapat ditunjukkan pada Table 3.10

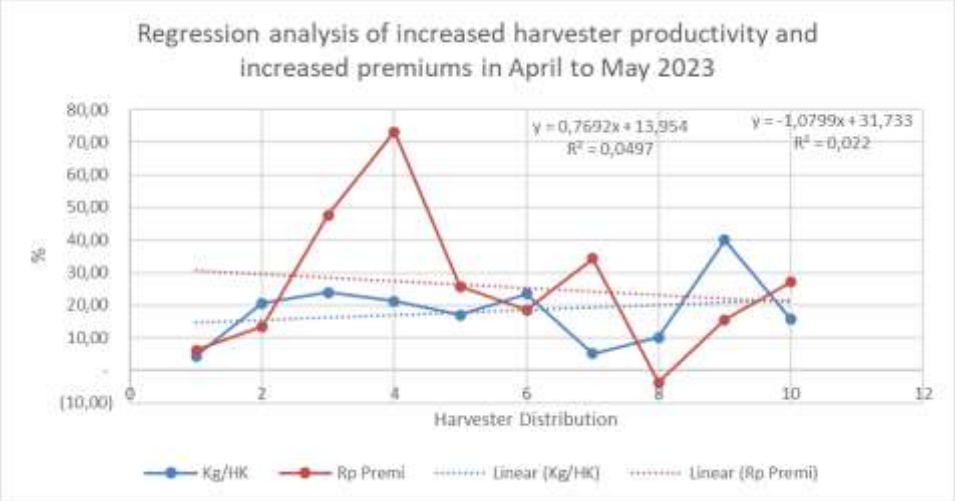

Figure 5. Regression analysis of increased harvester productivity and increased premiums in April to May 2023

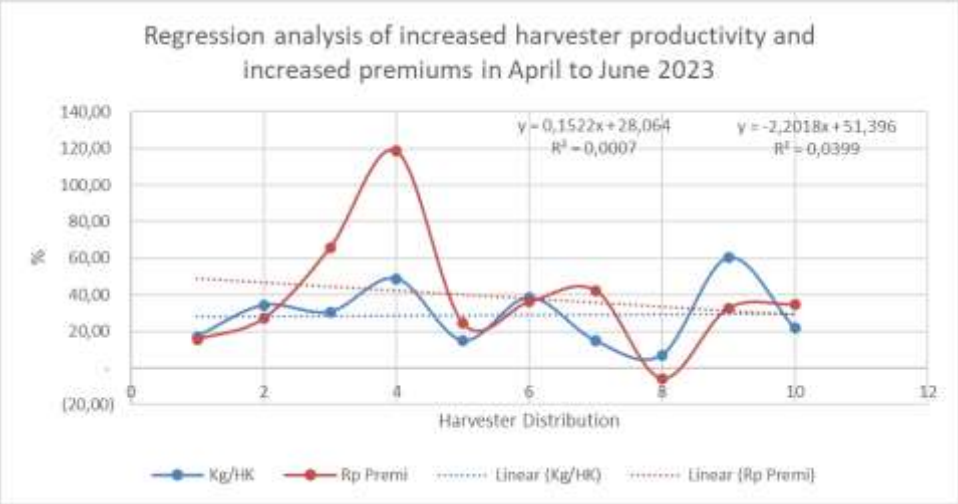

Figure 6. Regression analysis of increased harvester productivity and increased premiums in April to June 2023

From both graphs it can be seen that the regression value has a number below 0.1 and the same direction on the linear line between the kg/hk line and the Rp premium line, so it can be explained that there is a real influence between the increase in harvester productivity and the increase in harvester premiums for all harvesters in each month. The increase is due to a clearer and more detailed basis for determining the load or production target, given by the real conditions of topography and slope in each harvester area every day. This provides additional motivation for the harvester to improve performance, resulting in an increase in harvester performance and harvester premiums.

4. CONCLUSION

The conclusions of this paper are as follows:

1. Slope class in determining the basis of the premium task of oil palm harvesters based on geographic information systems obtained slope class data into 3 (three) parts in oil palm plants covering 250.60 ha in afdeling I Sei Silau plantation, namely: flat undulating (0-15%) covering 114. 91 ha or 45.85% of the total oil palm area, hilly (15-45%) covering 110.34 ha or 44.03% of the total oil palm area and hilly without terraces/contours (>45%) covering 25.35 ha or 10.12% of the total oil palm area.
2. The basic determination per cropping year for the first semester of 2022 is in TM 2005 at 803 kg for flat undulating areas, 661 kg for hilly areas, and 567 kg for hilly areas without terraces and 520 kg for swamp areas, while in TM 2010 at 803 kg for flat undulating areas, 661 kg for hilly areas, and 567 kg for hilly areas without terraces and 520 kg for swamp areas and in TM 2011 at 472 kg for flat undulating areas, 378 kg for hilly areas, and 520 kg for swamp areas, 661 kg for hilly areas, and 567 kg for hilly areas without terraces and 520 kg for swamp areas and in TM 2011 of 472 kg for flat undulating areas, 378 kg for hilly areas, and 331 kg for hilly areas without terraces and 331 kg for swamp areas.
   The variable other than the task basis in determining the premium is the slope class per harvest plot which has been classified based on spatial analysis as follows: In Plot I, 0-15% slope covers 13.78 ha, 15-45% slope covers 20.83 ha, and >45% slope covers 0.27 ha with a total area of 34.87 ha. At Level II, 0-15% slope covers 14.91 ha, 15-45% slope covers 14.71 ha, and >45% slope covers 1.81 ha with a total area of 31.43 ha. At level III, 0-15% slope covers 6.59 ha, 15-45% slope covers 11.48 ha, and >45% slope covers 14.36 ha with a total area of 32.43 ha. At level IV, 0-15% slope covers 13.06 ha,

3. There was an increase in productivity and harvesting premiums after the change in the method of calculating harvesting premiums from determining the task basis and classification of slope details per each harvesting capveld using spatial analysis, with an increase in productivity from April to May of 214. 95 kg or by 17.04%, from May to June by 123.43 kg or by 8.43% and from April to June by 339.38 kg or by 26.90%, as well as an increase in the harvesting premium from April to May by Rp. 3190,252, - or by 22.20%, from May to June by Rp. 1 642,123, - or by 9.35% and from April to June by Rp. 3190,252, - or by 22.20%, from May to June by Rp. 1,642,123, - or by 9.35%, and from April to June by Rp. 4,832,375, - or by 33.63%. This shows a real correlation between increased productivity and increased premiums for all harvesters afdeling I Kebun Sei Silau.

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