

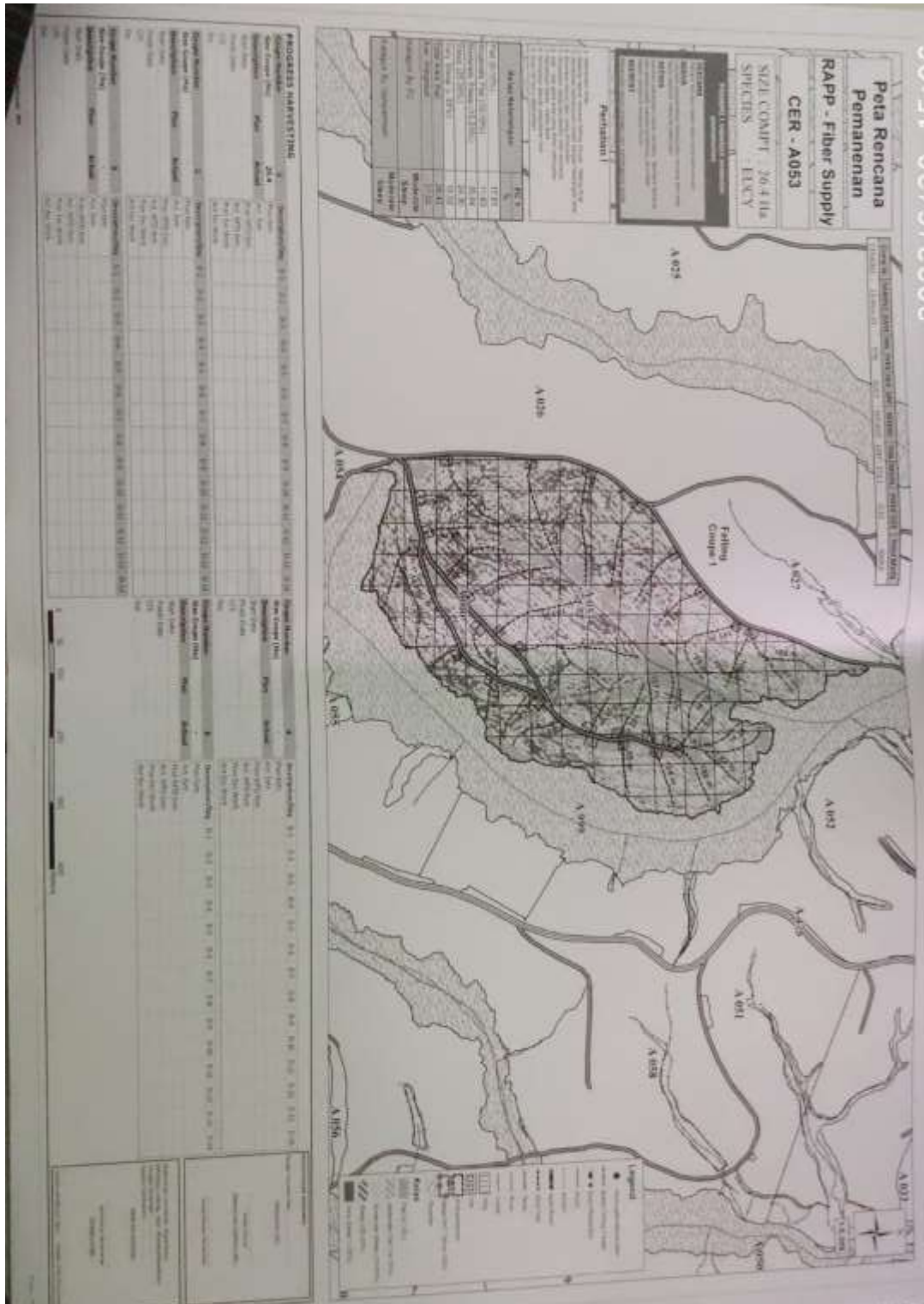
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LAMPIRAN

Lampiran 1. Peta Kompartemen A053



Lampiran 2. Data APO Kompartemen A053

The image is a screenshot of a software-generated report titled 'Annual Plan of Operation (Harvesting) Report'. At the top right, there is a logo for 'APRIL' and the report title. Below the title, there are two main data sections. The first section is for 'Sector : CER Estate : A' with 'Lic Expire : 31-Dec-23'. The second section is for 'Sector : CER Estate : A' with 'Lic Expire : 31-Dec-23'. Each section contains a table with columns for 'Plant Spc', 'Harv Hstr', 'Sample', 'DBH', 'HT', 'Yrs', 'Mentz', 'F size', '1st Est.', 'Qr', 'DBH', 'HT', 'Yrs', 'Mentz', 'F size', '1st Est.', 'Qr'. The tables list various tree species and their harvesting details. At the bottom of the page, there is a footer with user information: 'User: JAVENDOM', 'Date: 06/01/2023 2:18:40 PM', and 'Page: 2'.

Lampiran 4. Data Produktivitas Operator Chainsaw Kegiatan Felling

Perlakuan		Felling					
		Level 2			Level 3		
		Jumlah log	Waktu (menit)	Produktifitas	Jumlah log	Waktu (menit)	Produktifitas
Flat	1	99	60.1	18.78	113	63.83	20.18
	2	99	62.02	18.20	107	60.26	20.24
	3	99	60.11	18.78	105	57.75	20.73
	4	109	66.61	18.65	115	63.85	20.53
	Total	406	248.84	74.41	440	245.69	81.68
	Rata-rata	102	62.21	18.60	110.00	61.42	20.42
Moderate Flat	1	84	55.96	17.11	106	62.91	19.21
	2	92	63.41	16.54	105	63.28	18.92
	3	95	62.21	17.41	97	57	19.40
	4	89	57.91	17.52	104	61.5	19.28
	Total	360	239.49	68.58	412	244.69	76.80
	Rata-rata	90.00	59.87	17.15	103	61.17	19.20
Moderate Steep	1	71	50.85	15.92	97	60.93	18.15
	2	83	59.01	16.03	97	62.28	17.76
	3	81	55.11	16.76	98	61.01	18.31
	4	82	60.28	15.51	104	65.24	18.17
	Total	317	225.25	64.22	396	249.46	72.39
	Rata-rata	79.25	56.31	16.05	99.00	62.37	18.10
Steep	1	79	63.6	14.16	82	62.91	14.86
	2	73	59.63	13.96	80	64.9	14.05
	3	79	65.4	13.77	85	64.6	15.00
	4	74	65.48	12.88	78	60.63	14.67
	Total	305	254.11	54.77	325	253.04	58.58
	Rata-rata	76.25	63.53	13.69	81.25	63.26	14.64
Very Steep	1	68	59.38	13.05	61	51.61	13.47
	2	60	53.15	12.87	73	62.85	13.24
	3	69	60.66	12.97	74	61.03	13.82
	4	61	55.23	12.59	69	59.66	13.18
	Total	258	228.42	51.48	277	235.15	53.72
	Rata-rata	64.5	57.11	12.87	69.25	58.79	13.43

Lampiran 5. *Time Study Operator Chainsaw Level 2 Kegiatan Felling Areal Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
10	54	23	Start-Felling-Finish	62
11	31	35	Rest	
11	36	12	Start-Felling-Finish	37
11	58	6	Finish	
Jumlah log				99
Total Waktu				60 menit 6 detik

Jam	Menit	Detik	Proses	Jumah Kayu
13	58	53	Start-Felling-Finish	34
14	20	12	Rest	
14	24	43	Start-Felling-Finish	65
14	59	25	Finish	
Jumlah log				99
Total Waktu				62 menit 1 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	3	15	Start-Felling-Finish	70
11	45	54	Rest	
11	48	2	Start-Felling-Finish	29
12	16	11	Finish	
Jumlah log				99
Total Waktu				60 menit 7 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	59	2	Start-Felling-Finish	64
14	37	17	Rest	
14	39	19	Start-Felling-Finish	45
15	5	51	Finish	
Jumlah log				109
Total Waktu				66 menit 37 detik

Lampiran 6. *Time Study Operator Chainsaw Level 2 Kegiatan Felling Areal Moderate Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	31	46	Start-Felling-Finish	67
12	14	18	Rest	
12	33	31	Start-Felling-Finish	17
12	44	57	Finish	
Jumlah log				84
Total Waktu				55 menit 58 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	44	9	Start-Felling-Finish	48
13	16	15	Rest	
13	20	28	Start-Felling-Finish	44
13	49	47	Finish	
Jumlah log				92
Total Waktu				63 menit 25 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	28	21	Start-Felling-Finish	59
12	6	4	Rest	
12	27	36	Start-Felling-Finish	36
12	50	6	Finish	
Jumlah log				95
Total Waktu				62 menit 13 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	50	52	Start-Felling-Finish	25
13	4	14	Rest	
13	6	7	Start-Felling-Finish	64
13	47	32	Finish	
Jumlah log				89
Total Waktu				57 menit 55 detik

Lampiran 7. *Time study Operator Chainsaw Level 2 Kegiatan Felling Areal Moderate Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	39	17	Start-Felling-Finish	55
12	17	34	Rest	
12	21	52	Start-Felling-Finish	16
12	32	26	Finish	
Jumlah log				71
Total Waktu				50 menit 51 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	16	31	Start-Felling-Finish	41
13	42	6	Rest	
13	46	17	Start-Felling-Finish	42
14	15	43	Finish	
Jumlah log				83
Total Waktu				59 menit 1 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	32	46	Start-Felling-Finish	56
12	9	35	Rest	
12	12	9	Start-Felling-Finish	25
12	28	27	Finish	
Jumlah log				81
Total Waktu				55 menit 7 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	9	23	Start-Felling-Finish	57
13	50	6	Rest	
13	56	43	Start-Felling-Finish	25
14	14	17	Finish	
Jumlah log				82
Total Waktu				60 menit 17 detik

Lampiran 8. *Time study* Operator Chainsaw *Level 2* Kegiatan *Felling Areal Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	43	12	Start-Felling-Finish	49
12	21	32	Rest	
13	14	21	Start-Felling-Finish	30
13	37	37	Finish	
Jumlah log				79
Total Waktu				63 menit 36 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	37	42	Start-Felling-Finish	25
13	56	51	Rest	
14	1	19	Start-Felling-Finish	48
14	39	48	Finish	
Jumlah log				73
Total Waktu				59 menit 38 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	44	5	Start-Felling-Finish	21
12	0	56	Rest	
12	4	16	Start-Felling-Finish	28
12	25	37	Rest	
13	11	5	Start-Felling-Finish	30
13	35	17	Finish	
Jumlah log				79
Total Waktu				65 menit 24 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	36	39	Start-Felling-Finish	18
13	50	15	Rest	
13	53	19	Start-Felling-Finish	37
14	25	48	Rest	
14	29	52	Start-Felling-Finish	19
14	46	16	Finish	
Jumlah log				74
Total Waktu				65 menit 29 detik

Lampiran 9. *Time study Operator Chainsaw Level 2 Kegiatan Felling Areal Very Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	46	24	Start-Felling-Finish	46
12	25	41	Rest	
13	7	34	Start-Felling-Finish	22
13	25	37	Finish	
Jumlah log				68
Total Waktu				59 menit 23 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	25	46	Start-Felling-Finish	23
13	45	38	Rest	
13	50	45	Start-Felling-Finish	37
14	22	2	Finish	
Jumlah log				60
Total Waktu				53 menit 9 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	51	25	Start-Felling-Finish	43
12	27	31	Rest	
13	11	34	Start-Felling-Finish	26
13	34	37	Finish	
Jumlah log				69
Total Waktu				60 menit 40 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	35	23	Start-Felling-Finish	20
13	53	8	Rest	
13	58	15	Start-Felling-Finish	41
14	34	44	Finish	
Jumlah log				61
Total Waktu				55 menit 14 detik

Lampiran 10. *Time study* Operator Chainsaw *Level 3* Kegiatan *Felling Areal Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	47	6	Start-Felling-Finish	79
12	29	54	Rest	
12	56	2	Start-Felling-Finish	34
13	15	4	Finish	
Jumlah log				113
Total Waktu				63 meit 50 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	15	43	Start-Felling-Finish	36
13	36	36	Rest	
13	39	54	Start-Felling-Finish	71
14	17	17	Finish	
Jumlah log				107
Total Waktu				60 menit 16 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	34	54	Start-Felling-Finish	78
12	16	27	Rest	
12	19	6	Start-Felling-Finish	27
12	33	18	Finish	
Jumlah log				105
Total Waktu				57 menit 45 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	58	4	Start-Felling-Finish	43
13	21	16	Rest	
13	25	38	Start-Felling-Finish	72
14	21	17	Finish	
Jumlah log				115
Total Waktu				63 menit 51 detik

Lampiran 11. *Time study* Operator Chainsaw *Level 3* Kegiatan *Felling Areal Moderate Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	23	47	Start-Felling-Finish	69
12	0	25	Rest	
12	4	19	Start-Felling-Finish	37
12	28	36	Finish	
Jumlah log				106
Total Waktu				62 menit 55 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	5	18	Start-Felling-Finish	73
13	46	52	Rest	
13	50	25	Start-Felling-Finish	32
14	10	8	Finish	
Jumlah log				105
Total Waktu				63 menit 17 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	35	3	Start-Felling-Finish	28
11	50	58	Rest	
11	53	19	Start-Felling-Finish	69
12	32	24	Finish	
Jumlah log				97
Total Waktu				57 menit

Jam	Menit	Detik	Proses	Jumlah Kayu
13	1	51	Start-Felling-Finish	71
13	42	7	Rest	
13	45	16	Start-Felling-Finish	33
14	4	30	Finish	
Jumlah log				104
Total Waktu				61 menit 30 detik

Lampiran 12. *Time study Operator Chainsaw Level 3 Kegiatan Felling Areal Moderate Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	13	7	Start-Felling-Finish	69
11	55	10	Rest	
11	59	41	Start-Felling-Finish	28
12	16	34	Finish	
Jumlah log				97
Total Waktu				60 menit 56 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	16	58	Start-Felling-Finish	29
12	34	10	Rest	
13	14	19	Start-Felling-Finish	68
13	57	24	Finish	
Jumlah log				97
Total Waktu				62 menit 17 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	3	12	Start-Felling-Finish	69
11	45	30	Rest	
11	48	25	Start-Felling-Finish	29
12	5	8	Finish	
Jumlah log				98
Total Waktu				61 menit 1 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	5	49	Start-Felling-Finish	40
12	29	15	Rest	
13	11	25	Start-Felling-Finish	64
13	51	23	Finish	
Jumlah log				104
Total Waktu				65 menit 24 detik

Lampiran 13. *Time study* Operator Chainsaw Level 3 Kegiatan *Felling Areal Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	3	15	Start-Felling-Finish	66
11	43	42	Rest	
11	48	56	Start-Felling-Finish	26
12	9	12	Finish	
Jumlah log				82
Total Waktu				62 menit 55 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	9	43	Start-Felling-Finish	19
12	23	10	Rest	
13	9	19	Start-Felling-Finish	44
13	44	24	Rest	
13	47	19	Start-Felling-Finish	17
14	0	43	Finish	
Jumlah log				80
Total Waktu				64 menit 56 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	54	13	Start-Felling-Finish	49
11	30	41	Rest	
11	34	17	Start-Felling-Finish	36
12	0	25	Finish	
Jumlah log				85
Total Waktu				64 menit 36 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	16	58	Start-Felling-Finish	29
12	37	25	Rest	
12	42	41	Start-Felling-Finish	49
13	20	53	Finish	
Jumlah log				78
Total Waktu				60 menit 38 detik

Lampiran 14. *Time study Operator Chainsaw Level 3 Kegiatan Felling Areal Very Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
11	15	25	Start-Felling-Finish	14
11	26	38	Rest	
11	29	41	Start-Felling-Finish	47
12	8	5	Finish	
Jumlah log				61
Total Waktu				51 menit 37 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
12	12	49	Start-Felling-Finish	28
12	35	21	Rest	
13	16	3	Start-Felling-Finish	45
13	54	22	Finish	
Jumlah log				73
Total Waktu				62 menit 51 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
11	17	5	Start-Felling-Finish	42
11	50	21	Rest	
11	56	4	Start-Felling-Finish	21
12	12	35	Rest	
12	16	47	Start-Felling-Finish	11
12	25	16	Finish	
Jumlah log				74
Total Waktu				61 menit 2 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
13	14	25	Start-Felling-Finish	49
13	55	13	Rest	
13	58	47	Start-Felling-Finish	20
14	15	39	Finish	
Jumlah log				69
Total Waktu				59 menit 40 detik

Lampiran 15. Data Produktivitas Operator Chainsaw Kegiatan *Bucking*

Perlakuan		Matriks Skill					
		Level 2			Level 3		
		Jumlah log	Waktu (menit)	Produktifitas	Jumlah log	Waktu (menit)	Produktifitas
Flat	1	131	59.96	24.91	140	59.63	26.77
	2	142	66.28	24.42	151	65.66	26.22
	3	133	61.05	24.84	150	63.18	27.07
	4	126	58.65	24.49	146	61.9	26.89
	Total	532	245.94	98.66	587	250.37	106.94
	Rata-rata	133	61.485	24.66	146.75	62.59	26.73
Moderate Flat	1	134	66.03	23.13	136	63.48	24.42
	2	122	60.98	22.81	125	58.9	24.19
	3	140	68.98	23.14	145	66.53	24.85
	4	111	55.73	22.71	126	58.81	24.42
	Total	507	251.72	91.79	532.00	247.72	97.89
	Rata-rata	126.75	62.93	22.95	133.00	61.93	24.47
Moderate Steep	1	111	61.26	20.66	134	67.93	22.49
	2	103	57.75	20.33	115	59.15	22.16
	3	123	67.36	20.82	120	60.01	22.80
	4	93	52.23	20.30	118	59.98	22.43
	Total	430	238.60	82.10	487	247.07	89.88
	Rata-rata	107.50	59.65	20.53	122	61.77	22.47
Steep	1	91	55.96	18.54	112	63.05	20.25
	2	68	42.6	18.20	112	64.08	19.93
	3	86	54.63	17.95	107	58.61	20.81
	4	62	40.55	17.43	105	58.11	20.60
	Total	307	193.74	72.11	436	243.85	81.59
	Rata-rata	76.75	48.44	18.03	109.00	60.96	20.40
Very Steep	1	89	57.21	17.73	100	62.35	18.28
	2	77	50.76	17.29	96	60.9	17.97
	3	84	55.18	17.35	108	67.61	18.21
	4	93	62.2	17.05	100	63.75	17.88
	Total	343	225.35	69.43	404	254.61	72.35
	Rata-rata	85.75	56.34	17.36	101.00	63.65	18.09

Lampiran 16. *Time study* Operator Chainsaw *Level 2* Kegiatan *Bucking Areal Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	28	34	Start-Bucking-Finish	16
8	34	45	Rest	
8	36	8	Start-Bucking-Finish	76
9	10	16	Rest	
9	13	52	Start-Bucking-Finish	39
9	30	31	Finish	
Jumlah log				131
Total Waktu				59 menit 58 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	31	7	Start-Bucking-Finish	54
9	55	24	Rest	
9	59	2	Start-Bucking-Finish	22
10	8	16	Rest	
10	10	13	Start-Bucking-Finish	37
10	26	31	Rest	
10	28	38	Start-Bucking-Finish	29
10	41	6	Finish	
Jumlah log				142
Total Waktu				66 menit 17 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	30	48	Start-Bucking-Finish	30
8	43	34	Rest	
8	45	18	Start-Bucking-Finish	44
9	4	26	Rest	
9	7	37	Start-Bucking-Finish	59
9	33	8	Finish	
Jumlah log				133
Total Waktu				61 menit 3 detik

Lampiran 17. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
9	35	46	Start-Bucking-Finish	24
9	46	12	Rest	
9	48	37	Start-Bucking-Finish	62
10	15	7	Rest	
10	18	45	Start-Bucking-Finish	40
10	37	28	Rest	
Jumlah log				126
Total Waktu				58 menit 39 detik

Lampiran 18. *Time study Operator Chainsaw Level 2 Kegiatan Bucking Areal Moderate Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	32	28	Start-Bucking-Finish	28
8	44	31	Rest	
8	49	9	Start-Bucking-Finish	49
9	12	55	Rest	
9	15	13	Start-Bucking-Finish	56
9	42	27	Finish	
Jumlah log				134
Total Waktu				66 menit 2 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	42	53	Start-Bucking-Finish	24
9	53	17	Rest	
9	55	27	Start-Bucking-Finish	62
10	25	54	Rest	
10	29	3	Start-Bucking-Finish	36
10	46	11	Finish	
Jumlah log				122
Total Waktu				60 menit 59 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	33	3	Start-Bucking-Finish	37
8	44	14	Rest	
8	46	5	Start-Bucking-Finish	68
9	19	24	Rest	
9	21	13	Start-Bucking-Finish	35
9	37	42	Finish	
Jumlah log				140
Total Waktu				68 menit 59 detik

Lampiran 19. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
9	38	53	Start-Bucking-Finish	27
9	51	45	Rest	
9	54	23	Start-Bucking-Finish	84
10	35	15	Rest	
Jumlah log				111
Total Waktu				55 menit 44 detik

Lampiran 20. Time study Operator Chainsaw Level 2 Kegiatan Bucking Areal Moderate Steep

Jam	Menit	Detik	Proses	Jumlah Kayu
9	30	7	Start-Bucking-Finish	48
9	55	16	Rest	
9	58	38	Start-Bucking-Finish	63
10	32	55	Finish	
Jumlah log				111
Total Waktu				61 menit 26 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	35	28	Start-Bucking-Finish	73
11	15	16	Rest	
11	21	8	Start-Bucking-Finish	30
11	37	5	Finish	
Jumlah log				103
Total Waktu				57 menit 45 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	28	57	Start-Bucking-Finish	69
10	4	40	Rest	
10	5	23	Start-Bucking-Finish	32
10	22	21	Rest	
10	24	31	Start-Bucking-Finish	22
10	36	12	Finish	
Jumlah log				123
Total Waktu				67 menit 22 detik

Lampiran 21. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
10	36	58	Start-Bucking-Finish	16
10	45	16	Rest	
10	47	8	Start-Bucking-Finish	45
11	11	5	Rest	
11	15	23	Start-Bucking-Finish	32
11	32	4	Finish	
Jumlah log				93
Total Waktu				52 menit 14 detik

Lampiran 22. *Time study* Operator Chainsaw Level 2 Kegiatan *Bucking Areal Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
9	55	14	Start-Bucking-Finish	20
10	6	6	Rest	
10	10	21	Start-Bucking-Finish	44
10	37	5	Rest	
10	39	56	Start-Bucking-Finish	27
10	55	18	Finish	
Jumlah log				91
Total Waktu				55 menit 58 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	55	36	Start-Bucking-Finish	36
11	17	28	Rest	
11	20	45	Start-Bucking-Finish	20
11	32	8	Rest	
11	34	51	Start-Bucking-Finish	12
11	41	12	Finish	
Jumlah log				68
Total Waktu				42 menit 36 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	48	55	Start-Bucking-Finish	54
10	22	13	Rest	
10	25	42	Start-Bucking-Finish	32
10	45	2	Rest	
Jumlah log				86
Total Waktu				54 menit 38 detik

Lampiran 23. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
10	59	25	Start-Bucking-Finish	20
11	11	29	Rest	
11	16	5	Start-Bucking-Finish	42
11	42	34	Rest	
Jumlah log				62
Total Waktu				40 menit 33 detik

Lampiran 24. *Time study Operator Chainsaw Level 2 Kegiatan Bucking Areal Very Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
9	46	32	Start-Bucking-Finish	22
9	59	13	Rest	
10	1	26	Start-Bucking-Finish	37
10	24	57	Rest	
10	29	15	Start-Bucking-Finish	30
10	41	12	Finish	
Jumlah log				89
Total Waktu				57 menit 13 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	42	14	Start-Bucking-Finish	10
10	47	51	Rest	
10	48	29	Start-Bucking-Finish	24
11	2	54	Rest	
11	4	12	Start-Bucking-Finish	43
11	31	56	Finish	
Jumlah log				77
Total Waktu				50 menit 46 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	36	13	Start-Bucking-Finish	38
10	0	5	Rest	
10	3	35	Start-Bucking-Finish	20
10	15	57	Rest	
10	20	15	Start-Bucking-Finish	26
10	36	12	Finish	
Jumlah log				84
Total Waktu				55 menit 11 detik

Lampiran 25. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
10	37	6	Start-Bucking-Finish	19
10	48	23	Rest	
10	52	47	Start-Bucking-Finish	58
11	30	16	Rest	
11	32	4	Start-Bucking-Finish	16
11	41	30	Finish	
Jumlah log				93
Total Waktu				62 menit 12 detik

Lampiran 26. *Time study* Operator Chainsaw Level 3 Kegiatan *Bucking Areal Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
9	2	44	Start-Bucking-Finish	85
9	39	16	Rest	
9	42	25	Start-Bucking-Finish	55
10	3	31	Finish	
Jumlah log				140
Total Waktu				59 menit 38 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	7	45	Start-Bucking-Finish	32
10	20	28	Rest	
10	24	35	Start-Bucking-Finish	97
11	5	23	Rest	
11	7	33	Start-Bucking-Finish	22
11	16	42	Finish	
Jumlah log				151
Total Waktu				65 menit 40 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	57	42	Start-Bucking-Finish	92
9	35	13	Rest	
9	59	51	Start-Bucking-Finish	58
10	7	31	Finish	
Jumlah log				150
Total Waktu				63 detik 11 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	7	54	Start-Bucking-Finish	46
10	35	13	Rest	
10	38	11	Start-Bucking-Finish	100
11	29	46	Finish	
Jumlah log				146
Total Waktu				61 menit 54 detik

Lampiran 27. *Time study Operator Chainsaw Level 3 Kegiatan Bucking Areal Moderate Flat*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	46	21	Start-Bucking-Finish	90
9	34	47	Rest	
9	38	13	Start-Bucking-Finish	46
9	59	16	Finish	
Jumlah log				136
Total Waktu				63 menit 29 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	59	58	Start-Bucking-Finish	42
10	18	13	Rest	
10	21	42	Start-Bucking-Finish	83
11	0	21	Finish	
Jumlah log				125
Total Waktu				58 menit 54 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	45	2	Start-Bucking-Finish	82
9	21	36	Rest	
9	25	18	Start-Bucking-Finish	63
9	59	16	Finish	
Jumlah log				145
Total Waktu				66 menit 32 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	59	54	Start-Bucking-Finish	40
10	18	6	Rest	
10	22	43	Start-Bucking-Finish	51
10	44	17	Rest	
10	46	31	Start-Bucking-Finish	35
11	2	28	Finish	
Jumlah log				126
Total Waktu				58 menit 49 detik

Lampiran 28. *Time study Operator Chainsaw Level 3 Kegiatan Bucking Areal Moderate Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	36	14	Start-Bucking-Finish	88
9	18	42	Rest	
9	21	30	Start-Bucking-Finish	46
9	44	58	Finish	
Jumlah log				134
Total Waktu				67 menit 56 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	45	27	Start-Bucking-Finish	36
10	2	42	Rest	
10	4	35	Start-Bucking-Finish	79
10	44	29	Finish	
Jumlah log				115
Total Waktu				59 menit 9 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	37	12	Start-Bucking-Finish	88
9	20	26	Rest	
9	25	44	Start-Bucking-Finish	32
9	40	31	Finish	
Jumlah log				120
Total Waktu				60 menit 1 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	40	56	Start-Bucking-Finish	43
10	1	14	Rest	
10	4	27	Start-Bucking-Finish	75
10	42	8	Finish	
Jumlah log				118
Total Waktu				59 menit 59 detik

Lampiran 29. *Time study* Operator Chainsaw Level 3 Kegiatan *Bucking Areal Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	41	13	Start-Bucking-Finish	73
9	19	25	Rest	
9	23	7	Start-Bucking-Finish	39
9	44	58	Finish	
Jumlah log				112
Total Waktu				63 menit 3 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	46	24	Start-Bucking-Finish	25
9	59	40	Rest	
10	2	31	Start-Bucking-Finish	65
10	38	45	Rest	
10	40	33	Start-Bucking-Finish	22
10	52	51	Finish	
Jumlah log				112
Total Waktu				64 menit 48 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	39	24	Start-Bucking-Finish	75
9	19	32	Rest	
9	23	47	Start-Bucking-Finish	32
9	40	16	Finish	
Jumlah log				107
Total Waktu				58 menit 37 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
9	41	13	Start-Bucking-Finish	30
9	56	55	Rest	
10	2	24	Start-Bucking-Finish	75
10	42	49	Finish	
Jumlah log				105
Total Waktu				58 menit 7 detik

Lampiran 30. *Time study Operator Chainsaw Level 3 Kegiatan Bucking Areal Very Steep*

Jam	Menit	Detik	Proses	Jumlah Kayu
8	58	27	Start-Bucking-Finish	25
9	14	41	Rest	
9	20	56	Start-Bucking-Finish	56
9	55	23	Rest	
10	0	25	Start-Bucking-Finish	19
10	12	5	Finish	
Jumlah log				100
Total Waktu				65 menit 21 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
10	12	54	Start-Bucking-Finish	50
10	43	36	Rest	
10	46	27	Start-Bucking-Finish	46
11	14	39	Rest	
Jumlah log				96
Total Waktu				60 menit 54 detik

Jam	Menit	Detik	Proses	Jumlah Kayu
8	51	5	Start-Bucking-Finish	46
9	19	26	Rest	
9	23	44	Start-Bucking-Finish	26
9	39	17	Rest	
9	44	35	Start-Bucking-Finish	36
10	5	18	Finish	
Jumlah log				108
Total Waktu				67 menit 37 detik

Lampiran 31. Lanjutan

Jam	Menit	Detik	Proses	Jumlah Kayu
10	5	26	Start-Bucking-Finish	19
10	16	22	Rest	
10	21	27	Start-Bucking-Finish	55
10	55	13	Rest	
10	58	39	Start-Bucking-Finish	26
11	14	42	Finish	
Jumlah log				100
Total Waktu				63 menit 45 detik

Lampiran 32. Hasil Analisis Produktivitas *Felling*

**Levene's Test of Equality of Error
Variances^a**

Dependent Variable: Produktivitas

Tebangan/Jam

F	df1	df2	Sig.
.830	9	30	.594

Tests of Between-Subjects Effects

Dependent Variable: Produktivitas Tebangan/Jam

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	256.503 ^a	9	28.500	215.657	.000
Intercept	10779.074	1	10779.074	81563.361	.000
Topografi	230.650	4	57.662	436.322	.000
Matriks	22.067	1	22.067	166.978	.000
Topografi *	3.786	4	.946	7.162	.000
Matriks					
Error	3.965	30	.132		
Total	11039.541	40			
Corrected Total	260.468	39			

1. Kelerengan

Dependent Variable: Produktivitas Tebangan/Jam

Kelerengan	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Flat	19.511	.129	19.249	19.774
Moderate Flat	18.174	.129	17.911	18.436
Moderate Steep	17.076	.129	16.814	17.339
Steep	14.169	.129	13.906	14.431
Very Steep	13.149	.129	12.886	13.411

Lampiran 33. Lanjutan

2. Level Matriks Skill

Dependent Variable: Produktivitas Tebangan/Jam

Level Matriks Skill	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Level 2	15.673	.081	15.507	15.839
Level 3	17.158	.081	16.992	17.325

3. Kelerengan * Level Matriks Skill

Dependent Variable: Produktivitas Tebangan/Jam

Kelerengan	Level Matriks Skill	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Flat	Level 2	18.603	.182	18.231	18.974
	Level 3	20.420	.182	20.049	20.791
Moderate Flat	Level 2	17.145	.182	16.774	17.516
	Level 3	19.202	.182	18.831	19.574
Moderate Steep	Level 2	16.055	.182	15.684	16.426
	Level 3	18.098	.182	17.726	18.469
Steep	Level 2	13.693	.182	13.321	14.064
	Level 3	14.645	.182	14.274	15.016
Very Steep	Level 2	12.870	.182	12.499	13.241
	Level 3	13.427	.182	13.056	13.799

Lampiran 34. Hasil Analisis Produktivitas *Bucking*

**Levene's Test of Equality of Error
Variances^a**

Dependent Variable: Produktivitas

Bucking/Jam

F	df1	df2	Sig.
.618	9	30	.772

Tests of Between-Subjects Effects

Dependent Variable: Produktivitas Bucking/Jam

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	369.217 ^a	9	41.024	437.668	.000
Intercept	18608.008	1	18608.008	198520.708	.000
Topografi	336.168	4	84.042	896.606	.000
Matriks	29.825	1	29.825	318.193	.000
Topografi *	3.224	4	.806	8.598	.000
Matriks	2.812	30	.094		
Error	18980.036	40			
Total	372.029	39			
Corrected Total					

1. Kelerengan

Dependent Variable: Produktivitas Bucking/Jam

Kelerengan	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Flat	25.701	.108	25.480	25.922
Moderate Flat	23.709	.108	23.488	23.930
Moderate Steep	21.499	.108	21.278	21.720
Steep	19.214	.108	18.993	19.435
Very Steep	17.720	.108	17.499	17.941

Lampiran 35. Lanjutan

2. Level Matriks Skill Operator

Dependent Variable: Produktivitas Bucking/Jam

Level Matriks Skill Operator	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Level 2	20.705	.068	20.565	20.845
Level 3	22.432	.068	22.292	22.572

3. Kelerengan * Level Matriks Skill Operator

Dependent Variable: Produktivitas Bucking/Jam

Kelerengan	Level Matriks Skill Operator	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Flat	Level 2	24.665	.153	24.352	24.978
	Level 3	26.737	.153	26.425	27.050
Moderate Flat	Level 2	22.948	.153	22.635	23.260
	Level 3	24.470	.153	24.157	24.783
Moderate Steep	Level 2	20.528	.153	20.215	20.840
	Level 3	22.470	.153	22.157	22.783
Steep	Level 2	18.030	.153	17.717	18.343
	Level 3	20.398	.153	20.085	20.710
Very Steep	Level 2	17.355	.153	17.042	17.668
	Level 3	18.085	.153	17.772	18.398