

DAFTAR PUSTAKA

- BPDPKS. (2024). Direktorat Jenderal Perbendaharaan Badan Pengelola Dana Perkebunan Kelapa Sawit. In *Youngster Physic Journal* (Vol. 1, Issue 3, p. 7).
- Budianta, D., Wiralaga, A. Y. A., & Lestari, W. (2010). *Changes in Some Soil Chemical Properties of Ultisol Applied by Mulch from Empty Fruit Bunches in an Oil Palm Plantation*. *Jurnal Tanah Tropika (Journal of Tropical Soils)*, 15(2), 111–118. <https://doi.org/10.5400/jts.2010.15.2.111>
- FAO, A. (2019). *Sustainable Agricultural Mechanization*.
- Fauzana, H., Sutikno, A., & Salbiah, D. (2019). *Population Fluctuations Oryctes rhinoceros L. Beetle in Plant Oil Palm (Elaeis guineensis Jacq.) Given Mulching Oil Palm Empty Bunch*. *Cropsaver - Journal of Plant Protection*, 1(1), 42. <https://doi.org/10.24198/cropsaver.v1i1.16998>
- Hunt, D. (2001). *Farm Power and Machinery Management* (10th Editi). Iowa State University Press.
- Judijanto, L. (2024). *Analysis of the Economic Feasibility of Using Modern Agricultural Machinery in Oil Palm Plantations in South Sumatra*. *West Science Agro*, 2(03), 99–108. <https://doi.org/10.58812/wsa.v2i03.1201>
- Khayroiyyah, S., Melati, I., Amelia, F., Hartanti, F., Fatmawati, P. A., & Al-washliyah, U. M. N. (2025). *Education Achievment: Journal of Science and Research*. 6(2), 637–646.
- Mankiw, N. G. (2018). *Principles of Economics* (8th ed.). Cengage Learning.
- Manurung, H., & Wiraguna, E. (2025). Analisis Efisiensi Metode Panen Manual dan Mekanisasi pada Produksi Kelapa Sawit. *Botani: Publikasi Ilmu Tanaman Dan Agribisnis*, 2(2), 01–11. <https://doi.org/10.62951/botani.v2i2.288>
- Mindarta, E. I. D. P. V. L. D. (2023). *Efisiensi Pengelolaan Limbah Pertanian: Teknologi Portable Chopping Machine Pada Grandong*. 7(2), 193–200.
- Pandiangan, Y., Rizal, A., Harahap, S., Studi, P., & Perkebunan, P. (2023). *Studi Komparatif Panen kelapa Sawit Menggunakan Dodos Mekanis Dan Dodos Manual*. 21(2), 199–206.
- Pramana, Y. A., Afrillah, M., Program, M., Agroteknologi, S., Pertanian, F., Umar, U. T., Program, D., Agroteknologi, S., Pertanian, F., Umar, U. T., & Info, A. (2022). *Fertilization Management Of Palm Oil (Elaeis Guineensis Jacq) Matur Plants (TM) In Division II PT. Socfindo Seunagan Gardens*. 4(1), 46–54.
- Rahayu, D. E. (2025). *Utilization of oil palm empty fruit bunches biomass through slow pyrolysis process Utilization of oil palm empty fruit bunches biomass through slow pyrolysis process. Purpose-Led Publishing*. <https://doi.org/10.1088/1755-1315/913/1/012018>

- Rohman, F. (2017). Uji Kinerja Bongkar Muat Tandan Kelapa Sawit Secara Manual Dan Mekanis Di Perkebunan Kelapa Sawit. *Jurnal Agromast*, 2(1), 20–29.
- Sari, M. (2019). Perbandingan Biaya Panen Antara Metode Panen Manual Dengan Metode Panen Mekanisasi Pada PT Gawi Bahandep Sawit Mekar. *10*, 7873709.
- Satibi, M., Nasamsir, & Hayata. (2019). Pembuatan Rorak pada Perkebunan Kopi Arabica (*Coffea arabica*) Untuk Meningkatkan Produktivitas. *4*(2), 74–80. <https://doi.org/10.33087/jagro.v4i2.85>
- Siregar, K. R. F., Nurkhoiry, R., Nasution, Z. P. S., Agustira, M. A., & Amalia, R. (2025). Pemanfaatan Mekanisasi dalam Proses Pengangkutan Hasil Produksi di Perkebunan Kelapa Sawit Utilization of Mechanization in the Process of Yield Transporting in Oil Palm Plantations. *Jurnal Penelitian Kelapa Sawit*, 33(1), 17–32.
- Sofyani, H. (2023). Penentuan Jumlah Sampel pada Penelitian Akuntansi dan Bisnis Berpendekatan Kuantitatif. *7*(2). <https://doi.org/10.18196/rabin.v7i2.19031>
- Wathoni, N., & Nursan, M. (2025). Buku Ajar Ekonomi Produksi Pertanian (K. Khatima (ed.)).
- Yam, J. H., & Taufik, R. (2021). Hipotesis Penelitian Kuantitatif. Perspektif: Jurnal Ilmu Administrasi. *3*(2), 96–102.

LAMPIRAN

Descriptives

Metode Aplikasi			Statistic	Std. Error	
Tonase Aplikasi	mekanis	Mean	128,2083	10,59893	
		95% Confidence Interval for Mean	Lower Bound	107,0073	
			Upper Bound	149,4093	
		5% Trimmed Mean	124,4570		
		Median	120,5400		
		Variance	6852,579		
		Std. Deviation	82,78031		
		Minimum	,00		
		Maximum	417,36		
		Range	417,36		
		Interquartile Range	102,75		
		Skewness	,724	,306	
		Kurtosis	1,175	,604	
		manual	Mean	86,9090	6,45543
	95% Confidence Interval for Mean		Lower Bound	73,9962	
			Upper Bound	99,8218	
	5% Trimmed Mean		86,2216		
	Median		90,5400		
	Variance		2542,030		
	Std. Deviation		50,41855		
Minimum	,00				
Maximum	220,59				
Range	220,59				
Interquartile Range	50,28				
Skewness	-,190	,306			
Kurtosis	-,004	,604			

Group Statistics

Metode Aplikasi		N	Mean	Std. Deviation	Std. Error Mean
Tonase Aplikasi	mekanis	61	128,2083	82,78031	10,59893
	manual	61	86,9090	50,41855	6,45543

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Tonase Aplikasi	Equal variances assumed	12,803	,001	3,328	120	,001	41,29930	12,41008	16,72821	65,87038
	Equal variances not assumed			3,328	99,130	,001	41,29930	12,41008	16,67541	65,92318

Descriptives

Metode			Statistic	Std. Error		
Waktu	mekanis	Mean	4,6453	,15353		
		95% Confidence Interval for Mean	Lower Bound	4,3313		
			Upper Bound	4,9593		
		5% Trimmed Mean	4,6054			
		Median	4,6250			
		Variance	,707			
		Std. Deviation	,84090			
		Minimum	3,28			
		Maximum	7,17			
		Range	3,89			
		Interquartile Range	1,36			
		Skewness	,736	,427		
		Kurtosis	1,180	,833		
		manual	manual	Mean	4,1720	,18686
				95% Confidence Interval for Mean	Lower Bound	3,7898
Upper Bound	4,5542					
5% Trimmed Mean	4,1598					
Median	4,1700					
Variance	1,047					
Std. Deviation	1,02346					
Minimum	2,10					
Maximum	6,53					
Range	4,43					
Interquartile Range	1,26					
Skewness	,253			,427		
Kurtosis	-,151			,833		

Group Statistics

Metode		N	Mean	Std. Deviation	Std. Error Mean
Waktu	mekanis	30	4,6453	,84090	,15353
	manual	30	4,1720	1,02346	,18686

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Waktu	Equal variances assumed	,992	,323	1,957	58	,055	,47333	,24184	-,01076	,95743
	Equal variances not assumed			1,957	56,897	,055	,47333	,24184	-,01115	,95782

Descriptives

Metode		Statistic	Std. Error	
Jarak	mekanis	Mean	,2787	
		95% Confidence Interval for Mean	Lower Bound	,2408
			Upper Bound	,3166
		5% Trimmed Mean	,2717	
		Median	,2600	
		Variance	,010	
		Std. Deviation	,10153	
		Minimum	,14	
		Maximum	,57	
		Range	,43	
		Interquartile Range	,12	
		Skewness	1,033	,427
		Kurtosis	1,111	,833
		manual	manual	Mean
95% Confidence Interval for Mean	Lower Bound			,1209
	Upper Bound			,1671
5% Trimmed Mean	,1415			
Median	,1400			
Variance	,004			
Std. Deviation	,06173			
Minimum	,05			
Maximum	,28			
Range	,23			
Interquartile Range	,07			
Skewness	,754			,427
Kurtosis	,413			,833

Group Statistics

Metode	N	Mean	Std. Deviation	Std. Error Mean
Jarak mekanis	30	,2787	,10153	,01854
manual	30	,1440	,06173	,01127

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Jarak	Equal variances assumed	4,135	,047	6,207	58	,000	,13467	,02169	,09124	,17809
	Equal variances not assumed			6,207	47,864	,000	,13467	,02169	,09104	,17829

KEBUTUHAN BIAYA OPERASIONAL 2 PERIODE							
Metode	JUMLAH TK/Hari	Tenaga Kerja (Rp)	Depresiasi Alat (Rp)	Bahan Bakar/Perawatan (Rp)	TOTAL BIAYA	total aplikasi (Ton)	Biaya per Ton (Rp/ton)
MEKANIS	7	Rp 136,031,271	Rp 17,923,333	Rp 28,689,200	Rp 182,643,804	7820.7	Rp 23,354
MANUAL	45	Rp 204,269,200	-	-	Rp 204,269,200	5106.73	Rp 40,000

ALAT	TRAKTOR	GRABBER	WINTOR	Total
Harga	Rp 400,000,000	Rp 77,700,000	Rp 210,000,000	Rp 687,700,000
Umur ekonomis (th)	8	5	5	-
DEPRESIASI (1 th)	Rp 50,000,000	Rp 15,540,000	Rp 42,000,000	Rp 107,540,000
DEPRESIASI (1bln)	Rp 4,166,666.67	Rp 1,295,000.00	Rp 3,500,000.00	Rp 8,961,667
DEPRESIASI (2 bln)	Rp 8,333,333.33	Rp 2,590,000.00	Rp 7,000,000.00	Rp 17,923,333

UNIT	periode	Total unit	Total BBM	Harga BBM	Total biaya BBM (2 bln)
Grabber & Wintor	2 Periode	20	4219	Rp 6,800	Rp 28,689,200