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Study Of Optimal Time For Replanting Arabica Coffee With Capital Budgeting Approach Case Study At Kalisat Jampit Estate PT Perkebunan Nusantara XII, East Java, Indonesia

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Abstract:
Background*: Kalisat Jampit Estate is one of the plantations specializing in Arabica coffee cultivation as its primary resource. The total area of Arabica coffee in Kalisat Jampit Estate was 1,905 hectares in 2021. Most coffee plants are considered old (>30 years), comprising 57%. The average production per hectare of Arabica coffee in Kalisat Jampit Estate fluctuates, with a yearly average below 500 kg/ha, falling short of the Permentan standard for large Arabica coffee plantations in Indonesia, 595 kg/ha/year. This study aims to assess the optimal age for replanting Arabica coffee plants. Replanting at the right time will maintain the company's production and income sustainability while preventing losses due to unproductive plants.*
Materials and Methods*: The research was conducted at PT. Perkebunan Nusantara XII, Kalisat Jampit Estate, Sempol District, Bondowoso Regency. The study was carried out from February 2023 to April 2023. The research is an exploratory business/investment feasibility study. Secondary data were used in this research, obtained from the management reports of Kalisat Jampit Estate from 2003 to 2021. The variables in this study include production, selling price, production cost, selling cost, general and administrative expenses, and investment costs. The data analysis methods used in this study include historical data analysis, Monte Carlo simulation, ARIMA forecasting model, cash flow calculation, and Net Present Value (NPV) analysis. The simulation was performed 1000 times. The NPV calculation used two schemes: self-financing and financing with loans.*
Results*: The results of the NPV analysis with a rate of return of the cost of the equity scheme is 7.7%, indicating that the optimal replanting time is more than 40 years old. The results of NPV analysis with a rate of return the cost of debt scheme is 9.4%, indicating that Arabica coffee becomes unproductive at 39 years old. The results of NPV analysis with a combine capital scheme, the weighted average cost of capital is 9.1 %, indicating that Arabica coffee becomes unproductive at 40 years old.*
Conclusion: *The capital funding source negatively correlates with the age of Arabica coffee plants. A higher capital cost is associated with a shorter lifespan for the plants. Conversely, a lower capital cost is linked to a longer plant lifespan. It indicates that the cost of capital significantly impacts the economic viability and longevity of Arabica coffee plantations. Lower capital costs enable a longer investment horizon, whereas higher capital costs may result in shorter-term investments.*
Key Word*: Replanting, Arabica Coffee, Capital Budgeting, Monte Carlo Simulation*

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I. Introduction

Coffee is one of the plantation commodities that play a significant role in economic activities in Indonesia. It is also one of Indonesia's essential export commodities, contributing to its foreign exchange earnings and oil and gas. Based on data from the Central Bureau of Statistics [1], the total area of Indonesian coffee plantations is 1,238,466 hectares. These plantations consist of state-owned, private, and smallholder plantations. The most significant area composition is located on the island of Sumatra, with 776,165 hectares, accounting for 62.67% of the total coffee area in Indonesia. Most of the coffee area is dominated by smallholder plantations.

Kalisat Jampit is one of the plantations owned by PT Perkebunan Nusantara XII, which cultivates Arabica coffee in the mountainous area of Ijen, Bondowoso, East Java, Indonesia. The plantation location is situated between 1000-2000 meters above sea level. The Arabica Coffee Area in the Kalisat Jampit in 2021 is 1,905 Ha. Most plants are >30 years old, or 57% of the population. Kalisat Jampit Arabica coffee is produced with cultivation and processing techniques that adhere to the quality assurance systems of Rainforest Alliance, good agriculture practices, and good manufacturing practices. This ensures the product's specific characteristics and competitive advantage as a specialty Arabica coffee registered in the United States under "Java coffee." Arabica coffee investment activities include the Next Year Plants (TTAD), This Year Plants (TTI), and Immature Plants (TBM1-3). Arabica coffee plant operation activity is at the stage of producing plants (TM).

Nugraha Akbar, Hadi Paramu, and Nurhayati [2] explained that research aims to determine rubber plants' life in rubber plantations using capital budgeting analysis. The analysis was based on data indicated in the company's management report from 2007 to 2016. The estimation of cash flows for the capital budgeting analysis (i.e., NPV analysis) was based on the Monte Carlo simulation. The discount rate in the study was based on the cost of equity and the cost of debt. The results of the NPVs simulation has demonstrated that the rejuvenation time of a rubber plant depends on the source of fund in the rubber plantation investment. Considering the variability of the components of NPVs analysis, which were simulated using the Monte Carlo method, the rejuvenation time of the rubber plant is correlated negatively with the cost of capital or discount rate used in NPVs analysis.

Ari Saputri Novita Anggraini and Bayu Surindra [3] discuss the feasibility of investing in medicinal plants in Kediri using capital budgeting. This research was conducted in response to the difficulties faced by business actors in budgeting for business capital. The research approach employed a quantitative approach with descriptive analysis. The investment analysis in this study utilized four components, namely Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR), and Payback Period (PP). The findings indicate that investing in medicinal plants in Kediri is feasible, as all four investment components meet the required criteria. The obtained NPV value is IDR 31,910,637.64, the PI value is 5.56, the IRR value is 35.07%, and the PP value is one year and five days. These results suggest that investment in medicinal plants in Kediri can be realized.

Umi Suswati Risnaeni *et al*. [4] discussed the application of at-risk NPV in the financial feasibility analysis of PT Agri Halba Kedungjajang Lumajang's dairy cattle cultivation. PT Agri Halba aims to expand its business through dairy cattle cultivation, with an estimated value of IDR 2,836,283,000. Making this investment decision requires careful consideration, considering various potential future conditions. Therefore, it is necessary to evaluate the financial feasibility using the following investment assessment models: (1) Net Present Value (NPV), (2) Payback Period (PP), (3) Internal Rate of Return (IRR), and (4) Profitability Index (PI). The analysis yielded the following results: NPV∞ = IDR 953,285,175.00, Payback Period = 3 years 1 month 26 days, IRR = 17.00%, and PI = 1.13. Based on these findings, it can be concluded that this investment is feasible. Furthermore, considering the uncertainty, a Monte Carlo simulation approach was applied 100 times to calculate the financial feasibility of the investment, resulting in a probability of NPV∞ = 77.64%.

Ilham Syata *et al*. [5] discussed the use of Monte Carlo Simulation for forecasting crop demand. They were using Monte Carlo Simulation, the study aimed to forecast the market for ornamental plants (cacti) for the next 100 days for Yuliah Cactus' home business amid the COVID-19 pandemic. The study results concluded that the simulated demand for ornamental cactus plants for the next 100 days is projected to be 76 cacti with a Mean Squared Error (MSE) value of 2.06. Therefore, based on the obtained results, the Monte Carlo Simulation method can assist in forecasting the demand for ornamental cactus plants.

Arabica coffee business is a plantation venture with a high level of uncertainty. Factors affecting the production and growth of the plants include climate, altitude, soil type, plant varieties, fertilization, pest and disease control, and cultivation techniques. On the one hand, cultivation costs tend to increase over time, while the price of Arabica coffee fluctuates depending on market demand and supply.

This study aims to examine the optimal age of arabica coffee. The optimal age is when plant production sales can no longer cover operational costs. At this stage, the company can prevent losses by not incurring costs for plant maintenance, but instead, it chooses to replant Arabica coffee to maintain the continuity of plant production. This research utilizes NPV (Net Present Value) analysis with a simulation approach. The optimal age for replanting Arabica coffee is when the NPV analysis indicates a value that is less than or equal to zero.

II. Material And Methods

This research was exploratory. The exploratory study involves gathering, exploring, and analyzing data by applying theoretical calculations with objective data to provide descriptions of facts and characteristics, deepen knowledge, and understand the relationships of the investigated phenomenon.

Study Design: Exploratory research focusing on the feasibility study of business/investment

Study Location: PT. Perkebunan Nusantara XII Kalisat Jampit Estate, Sempol District, Bondowoso Regency, East Java, Indonesia.

Study Duration: February 2023 to April 2023.

Types and Sources of Data: Secondary data was obtained from annual management reports of the Kalisat Jampit Estate from 2003 to 2021.

Research variables: Production, selling price, production costs, sales costs, general and administrative costs, and investment costs.

Procedure methodology

The data analysis in this research consists of four stages: historical data analysis, Monte Carlo simulation, forecasting with ARIMA, and NPV analysis. The historical data was obtained from the annual management reports of Kalisat Jampit Estate, PT Perkebunan Nusantara XII, from 2003 to 2021. Monte Carlo simulation uses variables with historical data movements that fluctuate or show no trend. The Monte Carlo simulation variables include production, selling price, and investment cost. The ARIMA model forecasting is conducted for a variable with data behavior that exhibits a trend. The variables forecasted using the ARIMA model include production costs, sales costs, and general and administrative costs. The results from the Monte Carlo simulation and forecasting with the ARIMA model are used as the basis for NPV analysis. The optimal age of Arabica coffee is when NPV is less than or equal to 0.

III. Result and Discuss

Production of Arabica Coffee

Arabica coffee begins production at age 4, after the investment stage. The production in this study refers to the sale of dried coffee during the day. The yield per hectare is calculated by dividing the annual crop production by the cultivation area in a given year. Table no. 1 illustrates the annual crop yield per hectare of cultivation. The use of "per year of cultivation" is justified due to the varying production capabilities of Arabica coffee per year of cultivation, aiming to achieve simulation results that closely approximate actual yields. There is a noticeable variation in per-hectare production from 1973 to 2014.

Table no 1: Production per Hectare per Year of Cultivation.

Year of Data	Annual Crop Production (Kg/Ha)																						
	1973	1979	1980	1981	1982	1983	1985	1986	1988	1989	1990	1991	1992	1993	1997	1998	1999	2000	2001	2007	2010	2011	2012	2014
2003	795	815	777	712	779	720	774	800	547	585	578	304	904	358	290	52	68							
2004	1175	2224	1170	1076	1277	1349	1108	1100	997	1531	612	356	737	468	268	258	110	132						
2005	909	1286	707	927	1107	932	750	676	619	792	745	332	864	351	225	97	350	306	101					
2006	1391	871	1312	1375	1211	1566	1431	1174	1036	1594	1212	918	1039	587	805	1255	881	758	740					
2007	565	364	268	588	417	388	314	248	253	313	274	239	225	302	130	102	375	259	123					
2008	993	1154	873	1511	1504	1341	1162	1196	1107	1521	1164	674	739	556	593	684		1222	668					
2009	453	544	500	549	458	572	477	191	341	388	260	364	211	233	138	227		420	476					
2010	1082	764	393	1103	112	917	1122	752	806	1205	839	736	941	455	438	567		283	694					
2011	916	506	457	929	736	600	629	513	566	885	589	366	436	269	376	505		297	575	180				
2012	1223	1174	1339	1190	1241	1119	1308	966	905	1383	706	797	761	370	815	848		844	827	812				
2013	493	425	233	278	370	455	297	266	188	214	464	249	242	222	411	265		201	225	117				
2014	1217	1574	491	959	1160	892	1035	834	923	1574	727	527	1106	406	278	748		555	728	854	658			
2015	594	836	579	578	647	770	480	531	456	642	536	282	588	295	365	407		241	664	525	512	330		
2016	129	257	328	349	302	424	232	187	286	201	340	177	217	362	207	186		165	507	257	250	220	168	
2017	455	718	630	543	595	545	583	513	447	716	419	378	225	245	209	505		445	384	562	554	518	319	
2018	797	705	572	816	808	583	645	569	531	801	613	712	126	472	376	650		133	509	595	639	452	571	424
2019	630	667	468	851	549	314	510	487	404	664	362	365	1010	283	508	772		397	168	427	456	358	262	468
2020	490	479	503	498	522	341	434	398	383	509	502	553	380	274	548	371		244	314	330	437	309	679	542
2021	1025	529	385	495	472	357	498	474	241	328	355	262	356	373	493	400			272	267	348	421	507	514

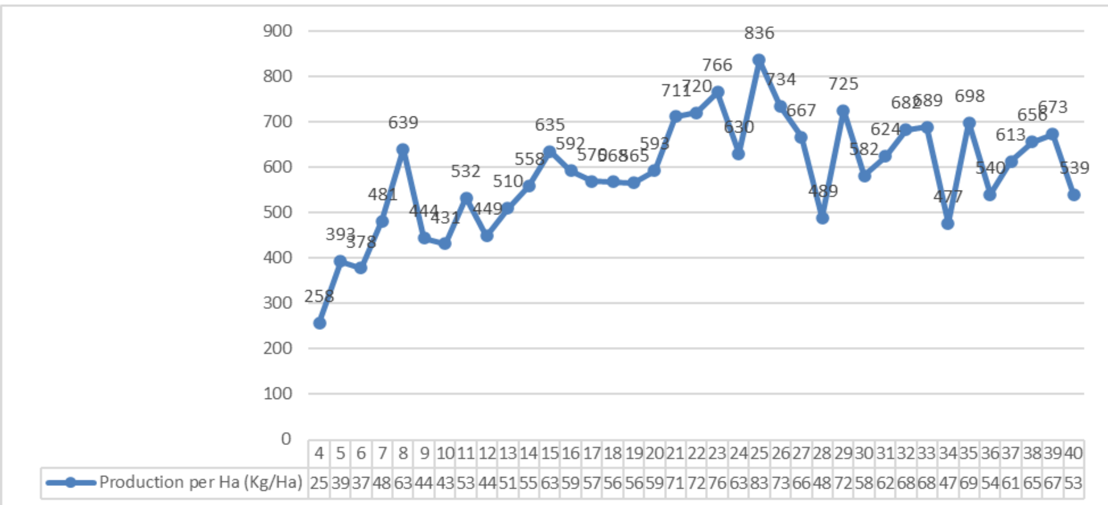
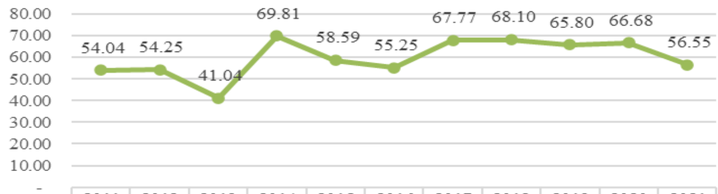


Figure 1: Production of Arabica Coffee per Hectare

Figure 1 illustrates the average production per hectare at different stages of plant age. Arabica coffee enters the production stage at the age of 4 years or TM-1. The graph above indicates a tendency to form a sigmoid curve, where the initial entry into the TM-1 stage results in relatively low production, followed by an increase as the age progresses. The peak production per hectare occurs at the age of 25 years, after which it gradually decreases until the age of 40 years.

Selling Price

The selling price per kilogram is calculated by dividing the sales value by the sales quantity of green bean Arabica coffee. Figure 2 presents the data for the selling price per kilogram from 2011 to 2021. The highest selling price was recorded in 2014 at 69,810 per kilogram, while the lowest selling price was observed in 2013 at 41,037 per kilogram. Based on historical data, Arabica coffee prices fluctuate depending on market demand.



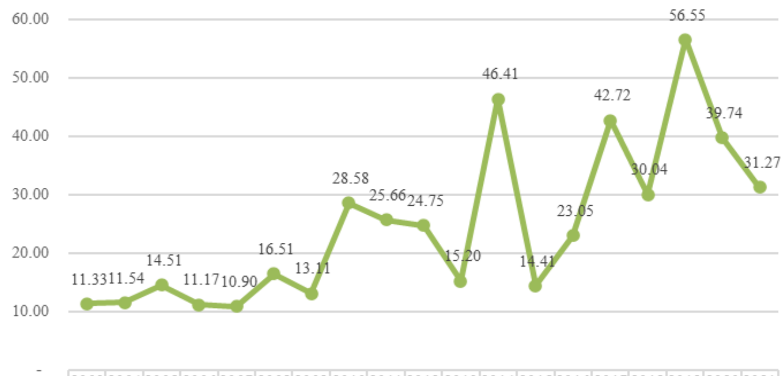
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Selling Price (In Thousand Rp/Kg)	54.04	54.25	41.04	69.81	58.59	55.25	67.77	68.10	65.80	66.68	56.55
Sales Value (In Billion Rp)	37	52	37	34	60	31	41	64	31	38	34
Sales Quantity (Ton)	688	968	901	487	1,018	564	606	944	476	565	601

Figure 2.Selling Price per Kilogram

Figure 2 depicts the fluctuating selling price per kilogram on an annual basis. There was a significant decrease in the selling price per kilogram in 2013, amounting to 24.3%, due to a decline in sales value compared to the previous year. In 2014, there was a relatively significant increase in the selling price per kilogram by 70% because the sales value remained relatively stable while the quantity of sales decreased. There appears to be a sideways movement as the costs fluctuate from 2011 to 2021

Production Costs

Production costs are the expenses incurred from activities such as cultivation, harvesting, transportation, and processing at the factory. The production cost per kilogram is obtained by dividing the total production costs per year by the sales quantity of production per year. Figure 3 presents the production costs per kilogram from 2003 to 2021. The most minor production cost was recorded in 2007 at 10,902 per kilogram. The most significant production cost was observed in 2019 at 56,552 per kilogram. There is a noticeable upward trend in production costs from 2003 to 2021.



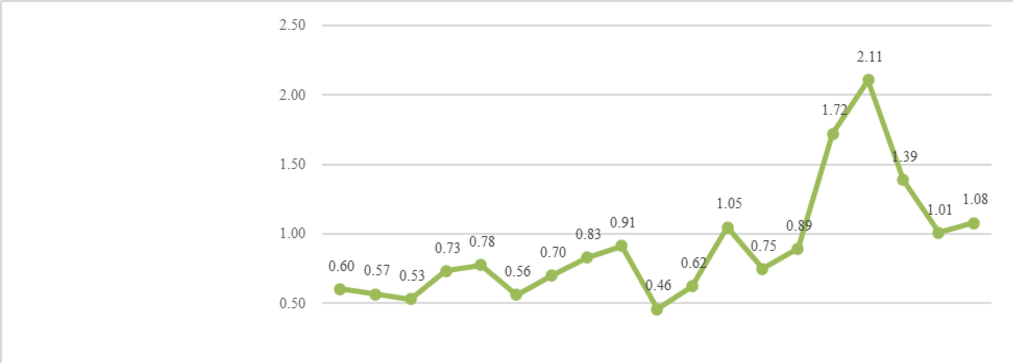
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Production Cost (In Thousand Rp/Kg)	11.33	11.54	14.51	11.17	10.90	16.51	13.11	28.58	25.66	24.75	15.20	46.41	14.41	23.05	42.72	30.04	56.55	39.74	31.27
Total Production Cost (In Billion Rupiah)	10	15	14	19	14	22	15	19	18	24	14	23	15	13	26	28	27	22	19
Sales Quantity (In Million Kg)	0.9	1.3	1.0	1.7	1.3	1.4	1.1	0.7	0.7	1.0	0.9	0.5	1.0	0.6	0.6	0.9	0.5	0.6	0.6

Figure 3. Production Cost per Kilogram

Figure 3 illustrates the fluctuation of production costs per kilogram on an annual basis. There was an increase in production costs per kilogram in 2014 by 205% and in 2019 by 88%. This was due to a decrease in the quantity of sales in both 2014 and 2019, while the production costs in 2014 were relatively high and remained relatively stable in 2019. From 2003 to 2021, the production costs per kilogram increased by 176%.

Sales Costs

Sales costs are the expenses incurred from sales activities. The cost of sales per kilogram is obtained by dividing the total sales costs per year by the sales quantity of production per year. Figure 5 presents the sales costs per kilogram from 2003 to 2021. The highest selling cost was recorded in 2018 at 2,105 per kilogram. The lowest sales cost was observed in 2012 at 459 per kilogram. There is a noticeable upward trend in costs from 2003 to 2021.



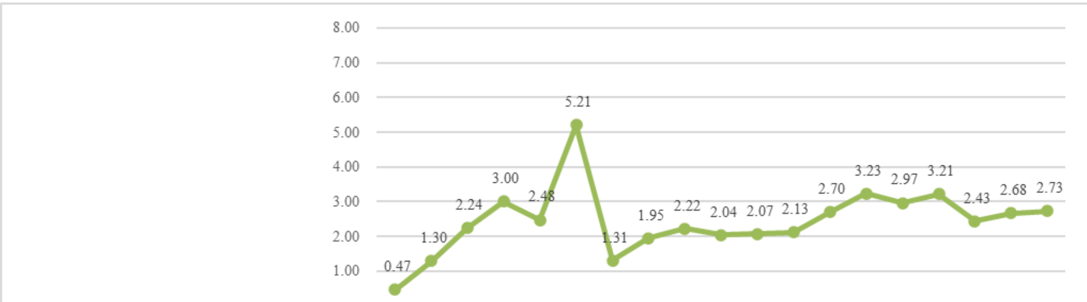
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Sales Cost (In Thousand Rp/Kg)	0.60	0.57	0.53	0.73	0.78	0.56	0.70	0.83	0.91	0.46	0.62	1.05	0.75	0.89	1.72	2.11	1.39	1.01	1.08
Total Sales Costs (In Billion Rupiah)	0.5	0.7	0.5	1.2	1.0	0.8	0.8	0.6	0.6	0.4	0.6	0.5	0.8	0.5	1.0	2.0	0.7	0.6	0.6
Sales Quantity (In Million Kg)	0.9	1.3	1.0	1.7	1.3	1.4	1.1	0.7	0.7	1.0	0.9	0.5	1.0	0.6	0.6	0.9	0.5	0.6	0.6

Figure 4. Sales Cost per Kilogram

Figure 4 depicts the fluctuation of selling expenses per kilogram annually. Significant sales expenses per kilogram increased in 2017, 2018, and 2019. This was due to an increase in selling expenses not offset by an increase in sales quantity. From 2003 to 2021, the selling expenses per kilogram increased by 79%.

Administrative and general costs

Administrative and general costs are associated with administrative activities, employee salaries, and other general expenses. The administrative and general costs per hectare are obtained by dividing the total administrative and general expenses by the Arabica coffee area per year. Table 5 presents the administrative and general costs from 2003 to 2021. The highest administrative and general expenses were recorded in 2008 at 5,205,549 per hectare. The lowest administrative and general costs were observed in 2003 at 468.640 per hectare. There is a noticeable upward trend in costs from 2003 to 2021.



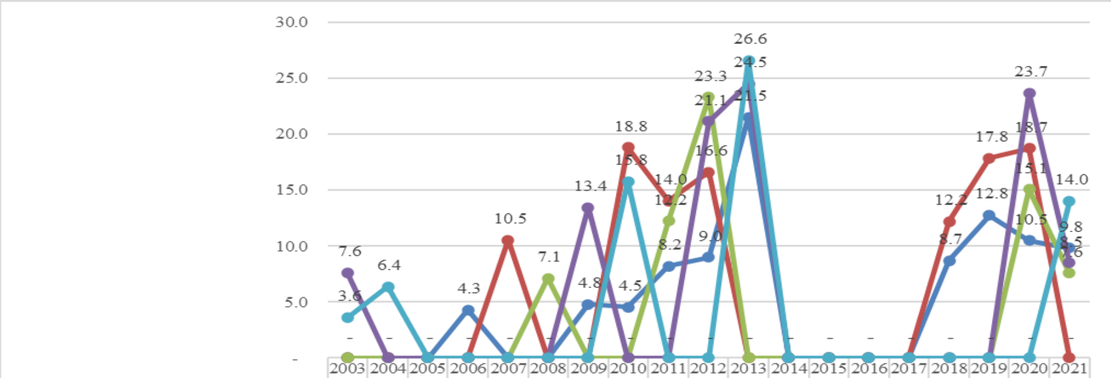
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Administrative and General Cost (in Million Rp/Ha)	0.47	1.30	2.24	3.00	2.48	5.21	1.31	1.95	2.22	2.04	2.07	2.13	2.70	3.23	2.97	3.21	2.43	2.68	2.73
Total Administrative and General Cost (In Billion Rp)	0.70	1.95	3.16	4.50	3.66	6.82	1.75	2.67	3.13	2.87	2.87	2.99	3.81	4.57	4.19	4.52	3.56	3.79	3.79
Arabica Coffee Area (In Thousand Ha)	1.50	1.50	1.41	1.50	1.47	1.31	1.34	1.37	1.41	1.41	1.39	1.41	1.41	1.41	1.41	1.41	1.46	1.42	1.39

Figure 5. Administrative and General Cost

Figure 5 illustrates the fluctuation of administrative and general costs per hectare. The administrative and general expenses show an upward trend. From 2003 to 2021, the administrative and general costs per kilogram increased by 483%.

Investment costs

Arabica coffee investment activities include the Next Year Plants (TTAD), This Year Plants (TTI), and Immature Plants (TBM1-3). Arabica coffee plant operation activity is at the stage of producing plants (TM). Figure 6 shows investment costs (TTAD, TTI, TBM-1, TBM-2, and TBM-3) per hectare from 2003 to 2021. The investment cost is obtained by calculating the total cost of each investment stage divided by the area of the investment stage per year. The increase in investment costs occurred in 2014 due to high investment cost activities, while the investment area was relatively small. Due to management policies, PT Perkebunan Nusantara XII does not invest annually. The behavior of investment costs fluctuates with no trend tendency.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TTAD Cost (in billion Rp/Ha)	-	-	-	4.3	-	-	4.8	4.5	8.2	9.0	21.5	-	-	-	-	8.7	12.8	10.5	9.8
TTI Cost (in billion Rp/Ha)	-	-	-	-	10.5	-	-	18.8	14.0	16.6	-	-	-	-	-	12.2	17.8	18.7	-
TBM 1 Cost (in billion Rp/Ha)	-	-	-	-	-	7.1	-	-	12.2	23.3	-	-	-	-	-	-	-	15.1	7.6
TBM 2 Cost (in billion Rp/Ha)	7.6	-	-	-	-	-	13.4	-	-	21.1	24.5	-	-	-	-	-	-	23.7	8.5
TBM 3 Cost (in billion Rp/Ha)	3.6	6.4	-	-	-	-	-	15.8	-	-	26.6	-	-	-	-	-	-	-	14.0

Figure 6. Investment Cost per Hectare

Cumulative Cash Flow

The cumulative cash flow in this study results from accumulating the Arabica coffee cash inflow and cash outflow simulations from the age of 4 to the age of 40. Cash inflow is obtained by multiplying the production simulation with the Arabica coffee price simulation. Cash outflow is obtained by summing the results of forecasting production costs, sales costs, and general administrative costs.

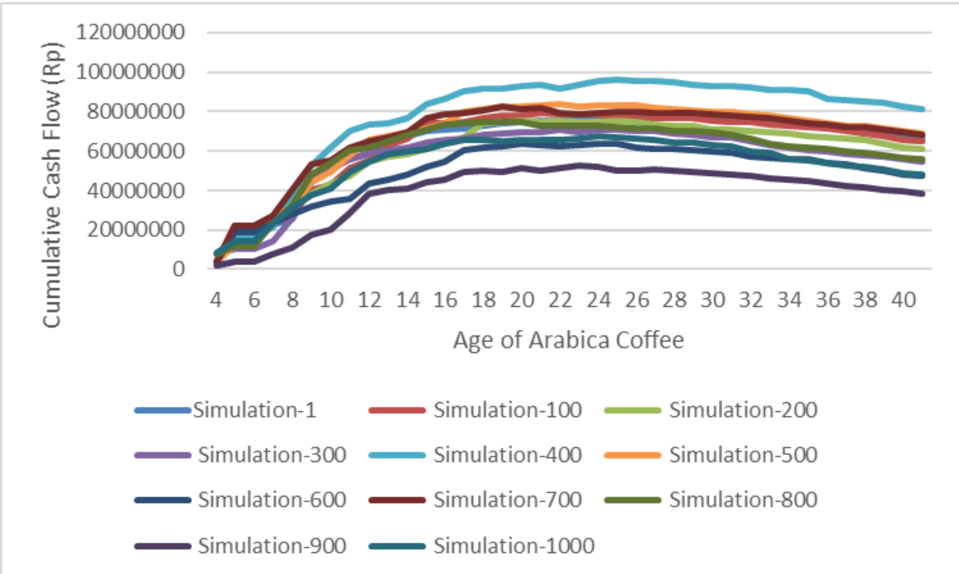
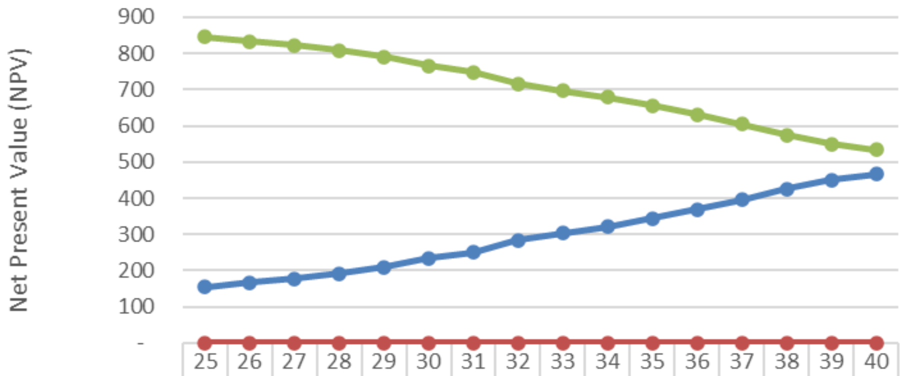


Figure 7. Cumulative Cash Flow at 10 Simulation

Figure 7 represents a sample of 10 simulations out of the total 1000 cumulative cash flows conducted. The graph shows an upwarding trend in cumulative cash flow from 4 to 20 years. The incremental cash flow shows a slowing upward trend from 21 to 30 years. A decreasing trend in cumulative cash flow occurs from 31 to 40 years. Arabica coffee plants at the age of 40 years can still generate a positive incremental cash flow.

Net Present Value Analysis

The Net Present Value analysis in this research uses three capital source schemes for replanting Arabica coffee plants, including: a). The scheme uses equity with a discount rate is 7.7% assumed to be the same as the Feasibility Study calculation for Arabica coffee from PT. Nusantara Perkebunan Research in 2022, b). the scheme uses liabilities with a discount rate is 9,4% assumed to be the same as the realization of bank loan claims to PT Perkebunan Nusantara in 2023, and c). combined capital scheme with discount rate is 9.1% (proportion of 20% equity and 80% liabilities). The NPV analysis is performed through 1000 simulations for the age range of 25 to 40 years. The optimal age of Arabica coffee is when the NPV analysis yields less than or equal to zero in more than 50% or when more than 500 simulations result in negative values.

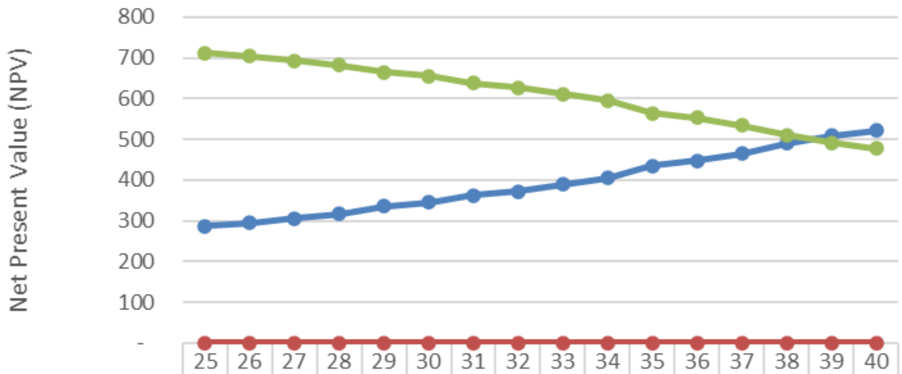


	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Negative	155	167	177	192	209	234	251	284	304	321	344	369	396	426	450	467
Zero	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Positive	845	833	823	808	791	766	749	716	696	679	656	631	604	574	550	533

Age of Arabica Coffe

Figure 8. NPV analysis with cost of equity scheme at 25 to 40 years old

Figure 8 shows the Net Present Value (NPV) analysis graph with the equity capital funding scheme at a rate of 7.7%. The graph represents a sample of 10 simulations out of the total 1000 NPV simulations conducted. Based on the results of 1000 simulations, the NPV calculation with the equity capital funding scheme yields positive NPV from the age of 25 to 40 years. Based on the NPV analysis, the optimal age for replanting Arabica coffee using equity capital with a 7.7% interest rate is more than 40 years.



	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Negative	287	295	306	317	335	345	362	372	389	405	435	447	465	490	509	522
Zero	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Positive	713	705	694	683	665	655	638	628	611	595	565	553	535	510	491	478

Age of Arabica Coffe

Figure 9. NPV analysis with cost of debt scheme at 25 to 40 years old

Figure 9 shows the Net Present Value analysis graph for the debt capital scheme with a return rate of 9.4%. NPV analysis is conducted through 1000 simulations for the age range of 25 to 40 years. The analysis results indicate more than 500 simulations with a negative NPV since Arabica coffee is 39 years old. Based on the NPV analysis results, if the company uses debt funds with a return rate of 9,4%, then Arabica coffee is no longer profitable starting from the age of 39 years.

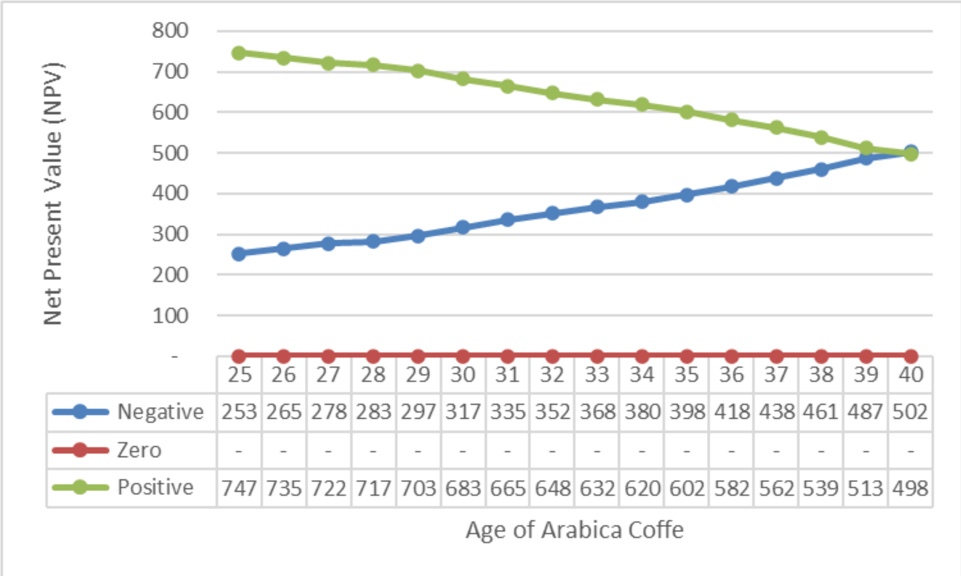


Figure 10. NPV analysis with weighted average cost of capital scheme at 25 to 40 years old

Figure 10 shows the Net Present Value analysis graph for the weighted average cost of capital scheme with a return rate of 9.1%. NPV analysis is conducted through 1000 simulations for the age range of 25 to 40 years. The analysis results indicate more than 500 simulations with a negative NPV since Arabica coffee is 40 years old. Based on the NPV analysis results, if the company uses debt funds with a return rate of 9,1%, then Arabica coffee is no longer profitable starting from the age of 40 years.

IV. Conclusion

The NPV analysis using equity capital with a return rate of 7.7% indicates that the optimal replanting time for Arabica coffee is more than 40 years. The NPV analysis using the debt capital scheme, with a return rate of 9.4%, shows that Arabica coffee becomes unproductive at the age of 39 years. The NPV analysis using the weigted average cost of capital scheme, with a return rate of 9.1%, shows that Arabica coffee becomes unproductive at the age of 40 years. The capital funding source negatively correlates with the age of Arabica coffee plants. A higher capital cost is associated with a shorter lifespan for the plants. Conversely, a lower capital cost is linked to a longer plant lifespan. This indicates that the cost of capital significantly impacts the economic viability and longevity of Arabica coffee plantations. Lower capital costs enable a longer investment horizon, whereas higher capital costs may result in shorter-term investments.

References

[1]. Central Bureau Of Statistics. 2018. Indonesian Coffee Statistics 2018. ISBN: 978-602-438-297-1

[2]. Nugraha Akbar, Hadi Paramu And Nurhayati. 2018. Determination Of Rubber Plant Life: An Application Of Capital Budgeting In The Agricultural Sector. Scholars Journal Of Economics, Business, And Management 5(3): 270-279.

[3]. Ari Saputri Novita Anggraini And Bayu Surindra. 2022. Feasibility Analysis Of Medicinal Plant Investment In Kediri Using The Capital Budgeting Method. National Seminar On Science, Health, And Learning 2022 ISSN 2963-1890: 581-589.

[4]. Ermaini, Ade Irma Suryani, Maheni Ika Sari And Achmad Hasan Hafidzi. 2021. Fundamentals Of Financial Management. Yogyakarta: Ocean Blue Publishers

[5]. Umi Suswati Risnaeni, Isti Fadah And Sumani. 2012. "Application Of NPV At-Risk In The Analysis Of Financial Feasibility In Dairy Cattle Cultivation PT Agri Halba Kedungjajang Lumajang." Unpublished. Thesis. Jember: Faculty Of Economics And Business, University Of Jember.

[6]. Ilham Syata, Try Azizah Nurman, And Airien Nabilla Baroqah Adnan. 2022. Monte Carlo Simulation In Forecasting Demand Patterns For Ornamental Plants Through Home-Based Businesses Amid The Covid Pandemic 19. Journal Of Mathematics And Statistics And Their Applications 10 (2): 79-84