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FEASIBILITY STUDY BUILDING MATERIAL OF SOIL PEAT CENTRAL KALIMANTAN

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Abstract

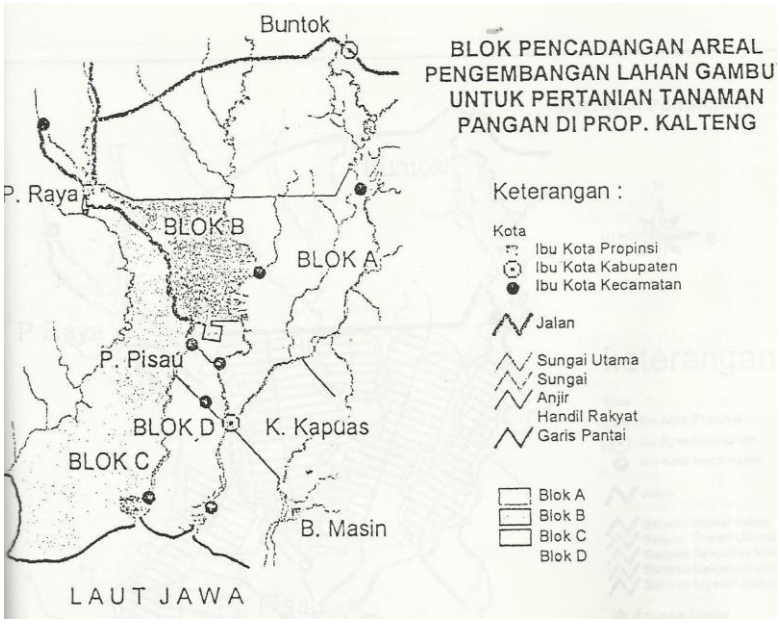
I have done research about using soil peat from Central Kalimantan as local building material in making red brick and tile ceramic, conclude : (a) Potency building material from mining material group C shaped soil peat generally stock enough and from 6 (six) sample that tested in laboratory as red brick and ceramic tile, fulfill technical requirements based on characeristics ; (b) Potency building material from mining material group C shaped quartz sand stock enough and can utilized as mortar plester ; (c) Location has choosen unit production red brick and ceramic tile that can developed technical ways is Lamunti, Palem Bahem, and Pulau Telo ; (d) Potency building material shaped soil peat stock enough and can utilized as red brick and tile ceramic, still need to do trial test production in field, that is means society around can spare transfer technology so hopefully can grow and develop new industries ; and (e) Utilization building material sand as building material, need to do testing in laboratory first before used.

This research is to continue that research result, by calculate how much the cost was needed to produce red brick and tile ceramic from soil peat Central Kalimantan, that cost will be cheaper or more expensive, compare with the cost of red brick and tile ceramic that have been sold in market.

This research also to calculate feasibility study if that red brick and tile ceramic from soil peat Central Kalimantan was produced by mass.

Keywords: feasibility study, red brick, tile ceramic.

INTRODUCTION



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Province Central Kalimantan have wide area 153.564 km^2 with geography position between 0'45° North Latitude and 3'30° South Latitude and between 111°-115° East Longitude contains 14 district and 1 sub district /city. Specifically, Project Development Peat Area 1 million hectare area block A and B is in District Kapuas (38.400 km^2), District Pulang Pisau (8.997 km^2) and District Barito Selatan (12.664 km^2).

Any location taken sample clay that possible can developed technical or economical way :

Transmigration settlements SP-2 – SKP-A, sub district Dadahup (area A), that is towards headwaters Kapuas river, sampling soil peat ± 10 m from river-bank with depth ± 1 m above land level, transportation can go through as long as 2 hours from Kapuas city by speed boat.

Sub district Lamunti (area B), that is towards headwaters Kapuas river. Sampling soil peat ± 50 m from river-bank with depth ± 1 m under soil peat level, can go through as long as 2 hours from Kapuas by speed boat.

Village Palem Bahem (area D), Village Pangkuh – sub district Pandihbatu, that is towards downstream Kapuas river also sampling soil peat ± 50 m from river-bank with depth ± 1 m under soil peat level. Time to go to that location as long as 3 hours from Kapuas regency by speed boat.

Village Buntoi, village Pulang Pisau – sub district Kahayan Hilir, that is towards downstream Kapuas river. Sampling soil peat ± 150 m from river-bank with depth ± 1 m, time to go to the location need 1,5 hours from Kapuas by speed boat.

Sub district Kahayan Hilir – Pulang Pisau (area F) – village Gohong – km 7 from Pulang Pisau, sampling ± 400 m from bridge Palangkaraya.

Village Kahayan also taken 2 sample soil peat with kinds black soil peat and reddish white soil peat.

Potency sand generally be found at stream flow Kapuas river. Sampling sand from location mining in stream flow river be located in village Keladan, sub district Mentangai. Mining method sand that be in the bottom of the river sucked by pump at depth ± 6 m. Capacity production mining ± 60 m^3 /day by boat.

To go to location mining need time ± 2 hours from Kapuas regency by speed boat. Result mining sand carried to Kapuas city.

The sand used as mortar, concrete, conblock, paving block, etc.

Location exploition Barito river be in a place 100 m from side of the highway – village Hilir Sper – village Kampel – South barito. In 1 day produce 1 ½ m^3 sand. Before sold the sand gradation done sieve using sieve 0,5 cm.

METHODOLOGY

This research is to calculate feasibility study red brick and tile ceramic from soil peat Central Kalimantan was produced by mass.

RESEARCH RESULTS

Only soil peat from Pulau Telo that have SiO_2 content 51.79 %, include category clay. Soil peat from other location still under limit content SiO_2 that required for clay. But the value almost same, means soil peat from other location also have chemical characteristic closer to clay.

Soil peat from six location have chemical content Al_2O_3, Fe_2O_3, CaO, MgO same with chemical content of clay.

Soil peat from Palem Bahem and Pulau Telo have SO_3 content 0, same with chemical content clay. Soil peat from Dadahup, Lamunti, Handel Usang, and Buntoi have SO_3 content above SO_3 content of clay.All sample soil have dry shrinkage value between 8 % - 11 %, so include category soil very sensitive to drying, so need special treatment on process drying after produce by no crack and no break of production results.

Similarly from test results on sensitivity value to drying /DSE 3 sample have DSE value between 1 – 2 and 3 sample soil peat have DSE value above 2, than sample soil taken in general can categorized sensitive to drying.

Test results to index plasticity value shows that 2 sample have IP value between 20 % - 30 % and 4 sample soil above 30 %, than the sample soil include plastis and very plastis loam.

Based on analysis large grain was described in diagram Winkler, generally the sample soil can be described as material ceramic tile and red brick.

While based on flexure strength dry condition whole sample soil have flexure strength above 10 kg/cm^2 so generally have base strength good enough.

Next done fire test with various temperature, that is 800˚C, 850˚C, and 900˚C to know temperature maximum or burning temperature was needed so obtained best results by flexure strength was obtained from sample test after burned.

From the testing founded optimal burning temperature, that is 900˚C with result optimal flexure strength and fulfill technical requirements of sample test to all location.

From sample soil peat was taken from the field, next doing test to make tile ceramic and red brick to know technical properties as base its development.

From testing result of soil peat, obtained data :

Shape tile ceramic : curve flat type M-20 ;

Table 1. Nominal size tile ceramic

Size	Total	Utilized	Hook
Length, cm	32,2	24,2	3,2
Width, cm	23,5	20,0	1,5
Wide, cm	1,45	-	0,8
Weight, kg	2,5	-	-

Water absorption : not absorp.

Tile curve flat is tile with cross section middle part flat and the sides curved.

Tile ceramic for whole quality level must resistance to water absorption. At testing water absorption, water can not dripping from bottom part of tile in less than 2 hours.

Tile ceramic of soil peat resistance to water absorption or not absorp water, because at the time testing water absorption, water not dripping from bottom part of tile in less than 2 hours.

Requirements size of tile ceramic according to SNI 03-2095-1991 “Quality and test method tile ceramic” :

Table 2. Size of tile ceramic

No.	Description	Tile Ceramic			Explanation
		Small	Medium	Large	
1	Length utilized (reng distance, mm)	200	250	333	Penyimpangan
2	Width utilized, mm	200	200	200	
3	Distance cover longitudinal, min, mm	40	50	67	
4	Distance cover transverse, min, mm	40	40	40	
5	Hooks : Height, mm Length, mm	 10 30	 10 30	 10	

No.	Description	Tile Ceramic			Explanation
		Small	Medium	Large	
	Width, mm				

Tile ceramic of soil peat have medium sized.
Shape red brick : rectangular (massive) with nominal size :
Length, cm 19,4 ; wide, cm : 4,8
Width, cm 9,7 ; weight, kg : 1,5

Table 3. Characteristics of red brick[)]

No.	Location	Water Content Average (%)	Water Absorption (%)	Furnace Absorption (gr /dm^2 /minute)	Density	Pressure Strength Average (kg /cm^2)	Salt Content
1	Lamunti	0,34	19,16	58	1,68	27,62	No
2	Palem Bahem	0,48	17,96	50	1,70	23,27	No
3	P. Telo	0,34	18,51	42	1,68	-	No

Outside view red brick of soil peat must have sides that sharp and angle, the field of flat side not indicate any crack and changing the form of excessive.

Red brick size according to SNI 15-2094-1991 : [7)]

Length : maximal 240 mm and minimal 230 mm.

Width : maximal 15 mm and minimal 110 mm.

Height : maximal 52 mm and minimal 50 mm.

Pressure strength red brick must fulfill requirements according to SNI 15-2094-1991 "Quality and test method red brick massive" :

Quality Level	Average Pressure Strength (kg /cm^2)
I	> 100
II	80 - 100
III	60 - 80

Red brick of soil peat have average pressure strength very low, not fulfill requirements SNI 15-2094-1991, under average pressure strength quality III. To increase average pressure strength red brick of soil peat, must go through combustion process beforehand.

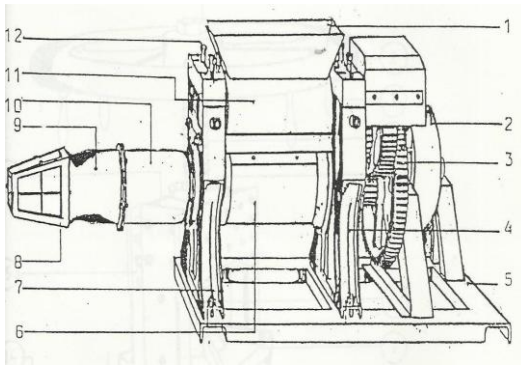
Salt content can not show signs that according test result represented hazard, that is if the red brick soaked in water with standing position half soak, for at least 3 days, has seems white spots on the surface.

If less than 50 % called not hazard, but if more than 50 % hazard.

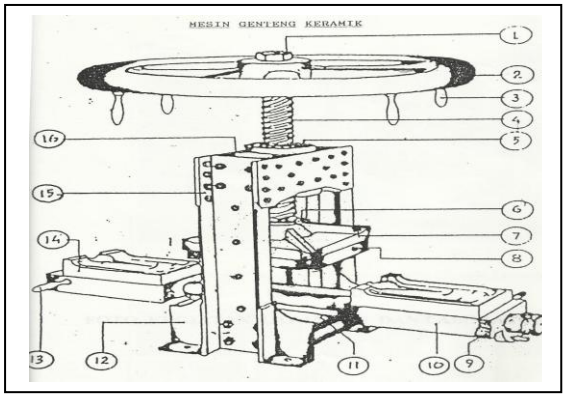
Red brick of soil peat does not contain salt content, so not hazard.

ANALYSIS AND DISCUSSION

Machine was used in making red brick and tile ceramic :



Extruder, machine to make red brick



Machine to make tile ceramic

ESTIMATION INVESTATION AND COST PRODUCTION RED BRICK

List Price Unit Tools Production Red Brick

Capacity : **288.000** **pieces/year**

960 **pieces/day**

No.	Kind of Tools	Quantity	Unity	Price Rp.	
				Unit	Total
1	Extruder machine	2	Unit	20.000.000,00	40.000.000,00
2	Mixer machine	1	Unit	20.000.000,00	20.000.000,00
3	Tool assist	1	Unit	5.000.000,00	5.000.000,00
				T o t a l	**65.000.000,00**

Total Machines and Tools **= Rp.** **65.000.000,00**

Depreciation per year **= Rp.** **6.500.000,00**

Depreciation per piece product **= Rp.** **22,57**

Investation Unit Production Red Brick

Capacity **288.000** **pieces/year**

No.	COST OF INVESTATION	PRICE (Rp.)
1	TOOLS PRODUCTION RED BRICK	65.000.000,00
2	COST INSTALLATION ELECTRICITY AND WATER	5.000.000,00
3	LAND FACTORY & CONCESSION (250 m2)	125.000.000,00
4	BUILDING PRODUCTION (125 m2)	125.000.000,00
5	EQUITY WORK 3 MONTHS	54.000,00
	TOTAL INVESTATION	**320.054.000,00**

Source Payment

Credit bank **75 %** **240.040.500,00**

Self equity	**25 %**	**80.013.500,00**
T O T A L		**320.054.000,00**

Estimation Cost Production Red Brick

Capacity : 288.000 pieces/year

Salary worker

No.	Explanation	Salary/month (Rp)	Worker	Total Salary (Rp)
1	**Direct Salary**			
	Worker	1.700.000,00	3	5.100.000,00
	Assistance	1.500.000,00	3	4.500.000,00

Direct Salary

Salary/month	Rp.	**9.600.000,00**
Salary/year	Rp.	**115.200.000,00**
Allowance 1 Month Salary	Rp.	**9.600.000,00**
Total Salary & Allowance	Rp.	**124.800.000,00**
Salary & Allowance/piece	Rp.	**433,33**

Estimation Cost Production Red Brick

Capacity Production : **9.600** pieces/10 days
Mixture composition 1 : 3
Day work : **300** days/year
Capacity per year : **288.000** pieces/year

Direct Cost :

Explanation	Unity	Volume	Unit Price (Rp)	Total Price (Rp)
Solar and Olie	Ltr	288	6.700,00	1.929.600,00
Sand	Gr	151.200.000	0,75	113.400.000,00
Clay peat	Gr	550.800.000	0,50	275.400.000,00
Electricity	Kwh	2.400	4.200,00	10.080.000,00
Material and energy				400.809.600,00
Salary				-
			T o t a l	**400.809.600,00**

Indirect Cost :

Explanation	Unity	Volume	Unit Price (Rp)	Total Price (Rp)
Depreciation	%	5	65.000.000,00	3.250.000,00
Overhead	%	5	-	-

Maintenance	Ls	0,05	65.000.000,00	3.250.000,00
Salary				-
				T o t a l 6.500.000,00

Payment + Equity Bank per year 190.677.004,26

TOTAL (1+2+3) 597.986.604,26

MAIN PRICE PER PIECE 2.076,34

Profit 20 % **415,27**

Taxes 10 % **207,63**

SELL PRICE PER PIECE 2.699,25

Break Event Point (BEP)

Unit Production Red Brick Capacity : 9.600 pieces/10 days

288.000 pieces/year

No.	Explanation	Rp./piece
1)	**Fixed Cost :** - Salary	-
	- Payment + Equity Bank	662,07
	- Depreciation	22,57
	- Overhead	-
	- Maintenance	11,28
	Total 1 =	**695,93**
2)	**Variable Cost :** - Salary	433,33
	- Material and overhead	35,00
	Total 2 =	**468,33**
3)	**Main Price**	**2.076,34**
4)	**Sell Price**	**2.699,25**

$$\textbf{BEP} = \frac{\text{Fixed Cost}}{\text{Sell price - Var. Cost}} \times 100\ \% = \textbf{31,19 \%}$$

Cash flow unit production red brick

No.	Explanation	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	Balance cash beginning	0	0	179.395.981	376.731.561	593.800.698	832.576.749	1.095.230.405	1.384.149.427	1.701.960.351	2.051.552.367
2	Income	320.054.000	777.382.586	855.120.844	940.632.928	1.034.696.221	1.138.165.843	1.251.982.428	1.377.180.671	1.514.898.738	1.666.388.611
3	Outcome	320.054.000	597.986.604	657.785.265	723.563.791	795.920.170	875.512.187	963.063.406	1.059.369.747	1.165.306.721	1.281.837.393
4	Difference cash (2-3)	0	179.395.981	197.335.579	217.069.137	238.776.051	262.653.656	288.919.022	317.810.924	349.592.016	384.551.218
5	Balance cash ending	0	179.395.981	376.731.561	593.800.698	832.576.749	1.095.230.405	1.384.149.427	1.701.960.351	2.051.552.367	2.436.103.586

Main price red brick Rp. **2.076,34** /piece

Sell price red brick Rp. **2.699,25** /piece

Capacity production **288.000** pieces/year

Cost production red brick estimation increase as much as : **10** %/year

Total investation Rp. **320.054.000**,-

Calculation Internal Rate of Return (IRR) Production Red Brick

Capacity Prod.: **288.000** pieces/year

Sell Price : **2.699,25** rupiah/piece

Main Price : **2.076,34** rupiah/piece

Investation : **320.054.000,00** rupiah

Year	0	1	2	3	4	5
Income	0	777382586	777382585,5	777382586	777382586	777382585,5
Outcome	320054000	597986604	597986604,3	597986604	597986604	597986604,3
Net Cash Flow :	-320054000	179395981	179395981,3	179395981	179395981	179395981,3
NPV 50 % :	1	0,6666667	0,444444444	0,2962963	0,19753086	0,131687243
NPV 40 % :	1	0,7142857	0,510204082	0,36443149	0,2603082	0,185934432
NPV 30 % :	1	0,7692308	0,591715976	0,45516614	0,3501278	0,269329074
NPV 20 % :	1	0,8333333	0,694444444	0,5787037	0,48225309	0,401877572

Total NPV 50 % : **-8510361,732** rupiah

Total NPV 40 % : **45.046.228,45** rupiah

Total NPV 30 % : **116.877.425,66** rupiah

Total NPV 20 % : **216.449.799,46** rupiah

IRR = **46,27** %

Pay Back Period = **1,78** year

Profit = **20,00** %

No.	Explanation	2016	2017	2018	2019	2020	2021	2022	2023
1	Income	777.382.586	855.120.844	940.632.928	1.034.696.221	1.138.165.843	1.251.982.428	1.377.180.671	1.514.898.738
2	Cost Production	597.986.604	657.785.265	723.563.791	795.920.170	875.512.187	963.063.406	1.059.369.747	1.165.306.721
3	Profit before equity & tax	179.395.981	197.335.579	217.069.137	238.776.051	262.653.656	288.919.022	317.810.924	349.592.016
4	Equity loan + payment	119.342.552	119.342.552	119.342.552	119.342.552	119.342.552	0	0	0
5	Profit before tax	60.053.429	77.993.027	97.726.585	119.433.499	143.311.104	288.919.022	317.810.924	349.592.016
6	Tax	68.768.459	75.645.305	83.209.836	91.530.820	100.683.902	110.752.292	121.827.521	134.010.273
7	Profit netto	(8.715.030)	2.347.722	14.516.749	27.902.679	42.627.203	178.166.730	195.983.403	215.581.743

Sell price Rp. **2.699,25** /piece

Main price Rp. **2.076,34** /piece

Capacity production **288.000** piece/year

Investation Rp. **320.054.000**

Loan Rp. **240.040.500**

Equity loan (Flat) **29,72** %/year = Rp. **247,69** /piece

Payment Rp. **167** /bh

Taxes **10,0** % = Rp. **238,78** /piece

Cost production estimation

ESTIMATION INVESTATION AND COST PRODUCTION TILE CERAMIC

List Price Unit Tools Production Tile Ceramic

Capacity : 288.000 pieces/year

No.	Kind of Tools	Quantity	Unity	Price Rp.	
				Unit	Total
1	Machine to make tile ceramic	2	Unit	20.000.000,00	40.000.000,00
2	Mixer machine	1	Unit	20.000.000,00	20.000.000,00
3	Tool assist	1	Unit	5.000.000,00	5.000.000,00
			T o t a l		**65.000.000,00**

Total Machines and Tools = Rp. 65.000.000,00

Depreciation per year = Rp. 6.500.000,00

Depreciation per piece product = Rp. 22,57

Investation Unit Production Tile Ceramic

Capacity : 288.000 pieces/year

No.	COST OF INVESTATION	PRICE (Rp.)
1	TOOLS PRODUCTION TILE CERAMIC	65.000.000,00
2	COST INSTALLATION ELECTRICITY AND WATER	5.000.000,00
3	LAND FACTORY & CONCESSION (250 m^2)	125.000.000,00
4	BUILDING PRODUCTION (125 m^2)	125.000.000,00
5	EQUITY WORK 3 MONTHS	54.000,00
	TOTAL INVESTATION	**320.054.000,00**

Source Payment

Credit bank = 75 % = 240.040.500,00

Self equity = 25 % = 80.013.500,00

T O T A L = 320.054.000,00

Estimation Cost Production Tile Ceramic

Capacity : 288.000 pieces/year

Salary worker

No.	Explanation	Salary/month (Rp)	Worker	Total Salary (Rp)
1	**Direct Salary**			
	Worker	1.700.000,00	3	5.100.000,00
	Assistance	1.500.000,00	3	4.500.000,00

Direct Salary

Salary/month = Rp. **9.600.000,00**

Salary/year = Rp. **115.200.000,00**

Allowance 1 Month Salary = Rp. **9.600.000,00**

Total Salary & Allowance = Rp. **124.800.000,00**

Salary & Allowance/piece = Rp. **433,33**

Estimation Cost Production Tile Ceramic

Capacity Production : **9.600** pieces/10 days

Mixture composition 1 : 3

Day work : **300** days/year

Capacity per year : **288.000** pieces/year

Direct Cost :

Explanation	Unity	Volume	Unit Price (Rp)	Total Price (Rp)
Solar and Olie	ltr	288	6.700,00	1.929.600,00
Sand	gr	136.573.517		102.430.137,60

			0,75	
Clay peat	gr	497.517.811	0,50	248.758.905,60
Electricity	Kwh	2.400	4.200,00	10.080.000,00
Material and energy				363.198.643,20
Salary				-
			T o t a l	**363.198.643,20**

Indirect Cost :

Explanation	Unity	Volume	Unit Price (Rp)	Total Price (Rp)
Depreciation	%	5	65.000.000,00	3.250.000,00
Overhead	%	5	-	-
Maintenance	Ls	0,05	65.000.000,00	3.250.000,00
Salary				-
			T o t a l	**6.500.000,00**

Payment + Equity Bank per year = 190.677.004,26

TOTAL (1+2+3) = 560.375.647,46

MAIN PRICE PER PIECE = 1.945,75

Profit = 20 % = **389,15**

Taxes = 10 % = **194,57**

SELL PRICE PER PIECE = 2.529,47

Break Event Point (BEP)

Unit Production Tile Ceramic Capacity : 9.600 pieces/10 days

288.000 pieces/year

No.	Explanation	Rp./piece
1)	**Fixed Cost :** - Salary	-
	- Payment + Equity Bank	662,07
	- Depreciation	22,57
	- Overhead	-
	- Maintenance	11,28
	Total 1 =	**695,93**
2)	**Variable Cost :** - Salary	433,33
	- Material and overhead	35,00
	Total 2 =	**468,33**
3)	**Main Price**	**1.945,75**
4)	**Sell Price**	**2.529,47**

$$\textbf{BEP} = \frac{\text{Fixed Cost}}{\text{H. jual - Var. Cost}} \times 100\ \% = \textbf{33,76 \%}$$

Cash flow unit production tile ceramic

No.	Explanation	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	Balance cash beginning	0	0	168.112.694	353.036.658	556.453.018	780.211.014	1.026.344.810	1.297.091.985	1.594.913.878	1.922.517.959
2	Income	320.054.000	728.488.342	801.337.176	881.470.893	969.617.983	1.066.579.781	1.173.237.759	1.290.561.535	1.419.617.689	1.561.579.457
3	Outcome	320.054.000	560.375.647	616.413.212	678.054.533	745.859.987	820.445.985	902.490.584	992.739.642	1.092.013.607	1.201.214.967
4	Difference cash (2-3)	0	168.112.694	184.923.964	203.416.360	223.757.996	246.133.796	270.747.175	297.821.893	327.604.082	360.364.490
5	Balance cash ending	0	168.112.694	353.036.658	556.453.018	780.211.014	1.026.344.810	1.297.091.985	1.594.913.878	1.922.517.959	2.282.882.450

Main price red brick = Rp. **1.945,75** /piece

Sell price red brick = Rp. **2.529,47** /piece

Capacity production = **288.000** pieces/year

Cost production tile ceramic estimation
increase as much as =:**10** %/year

Total investation = Rp. **320.054.000**,-

Calculation Internal Rate of Return (IRR) Production Tile Ceramic

Capacity Prod.: **288.000** pieces/year

Sell Price : **2.529,47** rupiah/piece

Main Price : **1.945,75** rupiah/piece

Investation : **320.054.000,00** rupiah

Year	0	1	2	3	4	5
Income	0	728488342	728488341,7	728488342	728488342	728488341,7
Outcome	320054000	560375647	560375647,5	560375647	560375647	560375647,5
Net Cash Flow :	-320054000	168112694	168112694,2	168112694	168112694	168112694,2
NPV 50 %	1	0,6666667	0,444444444	0,2962963	0,19753086	0,131687243
NPV 40 %	1	0,7142857	0,510204082	0,36443149	0,2603082	0,185934432
NPV 30 %	1	0,7692308	0,591715976	0,45516614	0,3501278	0,269329074
NPV 20 %	1	0,8333333	0,694444444	0,5787037	0,48225309	0,401877572

Total NPV 50 %:= **-28105205,89** Rupiah

Total NPV 40 %:= **22.082.889,77** rupiah

Total NPV 30 %:= **89.396.193,04** rupiah

Total NPV 20 %:= **182.705.864,26** rupiah

IRR = **43,28** %

Pay Back Period = **1,90** year

Profit = **20,00** %

Balance Sheet Loss and Profit Production Tile Ceramic

No.	Explanation	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Income	728.488.342	801.337.176	881.470.893	969.617.983	1.066.579.781	1.173.237.759	1.290.561.535	1.419.617.689	1.561.579.457
2	Cost Production	560.375.647	616.413.212	678.054.533	745.859.987	820.445.985	902.490.584	992.739.642	1.092.013.607	1.201.214.967
3	Profit before equity & tax	168.112.694	184.923.964	203.416.360	223.757.996	246.133.796	270.747.175	297.821.893	327.604.082	360.364.490
4	Equity loan + payment	119.342.552	119.342.552	119.342.552	119.342.552	119.342.552	0	0	0	0
5	Profit before tax	48.770.142	65.581.412	84.073.808	104.415.444	126.791.244	270.747.175	297.821.893	327.604.082	360.364.490
6	Tax	64.443.199	70.887.519	77.976.271	85.773.898	94.351.288	103.786.417	114.165.059	125.581.565	138.139.721
7	Profit netto	(15.673.057)	(5.306.108)	6.097.537	18.641.545	32.439.955	166.960.758	183.656.834	202.022.517	222.224.769

Sell price = Rp. **2.529,47** /piece

Main price = Rp. **1.945,75** /piece

Capacity production = **288.000** piece/year

Investation = Rp. **320.054.000**

Loan = Rp. **240.040.500**

Equity loan (Flat) = **29,72** %/year = Rp. **247,69** /piece

Payment = Rp. **167** /bh

Taxes = **10,0** % = Rp. **223,76** /piece

Cost production estimation increase as much as = **10** % every year

Price red brick in market = Rp. 600,- per piece, while while price red brick production result = Rp. 2.700,- per piece. Price red brick production result more expensive, cause of calculation feasibility study using analyze making industry red brick, while add buying machine, buying land production, making building production, land concession for road to location production, cost of depreciation, profit, taxes, bank equity, installation electricity and water, working capital for 3 months, worker salary, and supported material.

Red brick production result have better quality, compared with red brick that sold in market, cause red brick production result using mixture composition 1 sand : 3 soil peat, while red brick that sold in market using mixture composition 1 sand : 5 clay until 1 sand : 6 clay. That matter is same with quality tile ceramic, have better quality if compared with tile ceramic that sold in market.

Price tile ceramic in market = Rp. 9.700,- more expensive from price tile ceramic that produced by production = Rp. 2,550,-. This is caused tile ceramic that sold in market have layered by glazing, and processed burning in oven. But tile ceramic production result also have burned in furnace, until 900 ˚C.

CONCLUSION

In make one house type 49 m^2, need ± 7,875 red brick and ± 3,675 tile ceramic. Or 7,875 x Rp. 2.700,- + 3,675 x Rp. 2,550,- = Rp. 30,633,750,-

Price one house type 49 m^2 = Rp. 30,633,750,-, only from price wall from red brick and price roof from tile ceramic.

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