FINANCIAL ANALYSIS ON ROTAN INDUSTRIAL WASTE UTILIZATION FOR CEMENT BOARD PRODUCTION

by Adi Rahmadi

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FINANCIAL ANALYSIS ON ROTAN INDUSTRIAL WASTE UTILIZATION FOR CEMENT BOARD PRODUCTION

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Abstract

Rattan wool waste in rattan carpet industry in South Borneo is approximately 347,256 tons per year. This high amount of waste material will be great potential to be manufactured as a new useful product. The aim of this research was to analyze the possibility of the use of waste material in forest product industry for cement board manufacturing with lime pozzolan cement. The composition between the waste material weight and composition cementing agent was determined based on SNI 03-2104-1991. The economic value of this new product was also considered: B/C Ratio, NPV, IRR dan *pay back period*. This research resulted in the best ratio of 225 gr rattan wool and lime cement for cement board production was cement 225 gr and lime 150 gr. This ratio meets the cement board manufacturing standard. Besides, this ratio was the most economically cheap in raw material, and alternatively comparable with other similar product in the market. B/C ratio in the *discount rate* 15 % = 1,082 (feasible) , the *discount rate at* 25 % = 1,015 (feasible) and the *discount rate* at 35 % = 0,956 (unfeasible). NPV in the *discount rate* 15 % = + IDR.105.101.568,00 (positive) , the *discount rate* at 25 % = + IDR.3.978.560,00 (positive) and the *discount rate* at 35 % = - IDR.10.414.720,00 (negative). Value IRR % = 27,764. Time capital repayment (*pay back period*) only less more 2 years 7 months

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Keywords: financial analysis, B/C Ratio, NPV, IRR, pay back period, cement board

INTRODUCTION

Natural forests as timber major producers are being questioned their capability of supplying wood materials required by the national wood industries in sufficient and sustainable numbers, while the most expected industrial plant forests are called into doubt of success. It is reasonable since natural forest management is so far still considered out of sustainable yield forest management-based criterion and under high effect of certain interventions that causes adequately high natural forest destructions in several regions. Even after the reformation era, the demand of people around the forest and the forest tenure action reveal drastically high increasing frequency of increasing scale.

On the other hand, Indonesia involvement in the World Trade Organization (WTO) has a consequence to strictly obey the tariff/non-tariff regulations in the free trade era. Those regulations, such as environmental quality management guarantee (ecolabelling) outlined in the provision of International Tropical Timber Organization (ITTO) and Foreward Stewardship Council (FSC), whose implementation internationally started on January 1st, 2003.

The development of non-timber forest product has also been developed by the government and the private sectors. One of non-timber forest products is rattan whose raw material potential in south Kalimantan was estimated as nany as 1,484 tons per year (Regional Office of Industrial and Trade Department of south Kalimantan, 2012).

Rattan caIDRet is one of the non-oil exports di south Kalimantan. Rattan product previously occupied the third rank of the highest foreign exchange earner, but it has recently shifted to the fourth rank since its export realization for the last 10 years tended to decline. This decline does not result from decreased volume of rattan caIDRet exported, but the selling price development is worse from year to year. During the last several years, rattan enteIDRreneurs/exporters have started to their production to product diversification due to market limitation and high competition to win the market. Hence, beside producing rattan caIDRet, the company also, in general, produces other products, such as rattan mat, bag, mat beater, *rattan decorative*, *rattan seat*, ajiro jabutan, *rattan ring*, *rattan furniture*, *rattan sabrina*, *webbing*, *cushion*, rattan pillow, tray and others. From January to December, 2011, the realization of rattan product export was US $5.888,545.54 with a volume of 2,134,257.59m^3 (Industrial and Trade Department of south Kalimantan, 2012).

Increase in development will raise the cement demand including those used in housing and residential development that continuously rise every year. It causes a deficit of cement supply, for instance in 2014, the cement consumption was 60 million tons per year. Indonesia cement consumption per capita of only 300 kg per year is still categorized the lowest of other Asian countries like Malaysia (600 kg per year). In realtion with increasing physical development growth, the insufficience of cement supply will occur in the next years. This insufficience could cause development termination because the cement price will rise up to 200% of the established price.

To cover the shortfall, various efforts were done by the government and the private sectors through production capacity development, either import or new manufacture development plan. In relation with the efforts to reduce the construction costs, particularly simple and very simple houses development, other appropriate types of cement need to

develop, so that dissipation of its implementation does not occur. Therefore, several producershave tried to develop and produce new type of cement or specific cement type.

In several studies, types of alternative adhesive materials, such as lime pozzolan cement, mixed portland cement, and pozzolan portland cement could laboratorily be applied in the development, particulasrly for light load construction in simple house development. Based on the economic analysis, the price of alternative cement or cement material was lower than portland cement dominant applied in construction industry. With developing the alternative cement, the use of portland cement possessing very superior performance and more expensive price could be replaced, especially for the lightweight construction work. The objective of the study was to determine the economic value of rattan lampit industrial waste and cement industrial waste utilization to make new timber panel with financial indicators of B/C ratio, NPV, IRR, and payback period.

The outcome of the study is expected to be able to obtain alternative material of simple/very simple house development through the use of surrounding wastes, the cement board product from the industrial wastes of forest and the cement industrial wastes using lime pozzolan adhesive, to encourage the property industries through financial projection, and to socialize the use of alternative materials for simple/very simple house development.

METHOD

This study was carried out in Banjarbaru, south Kalimantan in September 2014. Raw materials used for cement board production consisted of a) rattan (*Calamus caesius* Blume) shavings collected from rattan caIDRet industry, PT Sarikaya Sega Utama, Banjarbaru, which were wastes of rattan processing using a trimmed side machine; b) hydrated lime "Kuas" of lime industrial production in Ulin river, Banjarbaru, from marble industrial wastes of PT Mohusindo, Banjarbaru; c) clean water from drinking water company of Banjarbaru. The composition used 150 g of shaving material, 225 g of cement adhesive, and 150 g of lime (Rahmadi, 2015). Data analysis applied financial projection with very simple analysis to describe it into small-scaled industrial form. Variables considered were raw material, production cost, and marketting prospects
(Mahfuz et al., 1999).

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RESULTS AND DISCUSSION

Preliminary Study

Preliminary study was carried out before test sample production. It included chemical analysis of the hydrated lime in the laboratory of Miniing and Energy Services of south Kalimantan. The hydrated lime used has met the requirements to make lime pozzolan cement, at least 65% of active CaO + MgO (Residential Research and Development Center, 1996a). the analysis found 70.89%, categorized as quality 1, according to Indonesia National Standard of 03-2097-1991 with 0% of fine particle remnants on the 4.76 mm sieve.

Cement board Economic Calculation of Cementboard

Technological Aspect

The cement board of 03-2014-1991 Indonesia National Standard has maximum water content of 14%, minimum density of 0.57 gr/cm^3, minimum static supple firmness of 17 kg/cm^2, i.e. the rattan shaving cementboard applying 150 gr of shavings with 225 g of cement adhesive and 150 g of lime (Rahmadi, 2015).

The most influential factor on the decision making to choose the cementboard used is the MoR value. Nevertheless, only one treatment met the requirements of cementboard production, the composition of shavings of 150 gr with cement adhesive of 225 gr and lime of 150 gr (A1B1), 48.82 kg/cm^2, its economic aspect was studied under raw material purchasing and statistical analysis considerations.

Financial Aspect

Financial projection in this study used very simple analysis on small-scaled industry. Variables studied covered raw material cost, production cost, and marketting prospects (Mahfuz et al., 1999).

Raw Material Cost

Rattan demand of PT Sarikaya Sega Utama, Banjarbaru, was 40 tons per month. Industrial wastes were about 45%, meaning that total monthly wastes were 18 tons. The wastes are not economically beneficial because these are directly burnt after the production process. The price of hydrated lime "Cap Kuas" from lime industry in Ulin river, Banjarbaru, is IDR 7,500.00/50 kg-bag, IDR 150.00/kg or IDR 150,000.00 per ton.

Manufaturing Cost

There were several variables measured in production cost calculation as follows:

A. Investment

1. Fixed Cost		
a. Land procurement of 1000m^2		IDR 30,000,000.00
b. semi-permanent building		IDR 25,000,000.00
c. equipment		
(5 clamps, 10 printing tools, 3 balances, 2 mixers, etc.)		IDR 10,000,000.00
d. Equipment installation		IDR 5,000,000.00
	Total =	**IDR 70,000,000.00**
2. Working capital (a month)		
a. raw materials and additives		
1) raw materials (60 cm x 240 cm long of 1 cm thick) Need about 1.25 kg of rattan shavins, 10 kg of fly ash, and 5 kg of hydrated lime		IDR 1,750,000.00
2) Additives (water, plastic, etc.)		IDR 50,000.00
	Total =	IDR 1,800,000.00
b. Salary and wage		
1) salary (5 owrkers under local minimum wages)		IDR 3,000,000.00
2) wage (loading and unloading, etc.)		IDR 1,000,000.00
	Total =	IDR 4,000,000.00
c. Others		IDR 580,000.00
	Total =	**IDR 6,380,000.00**
Total Investment		**IDR 76,380,000.00**

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B. Production cost calculation

Production cost was done for one year

1. Fixed costs
   a. Salary IDR. 36,000,000,00
   b. general expenditures (10% for wages) IDR. 300,000.00

   c. Capital interest
      1) 15% of the fixed cost IDR. 10,500,000.00
      2) 20% of the working capital IDR. 1,276,000.00
   d. Equipment depreciation (10%) IDR. 1,000,000.00
   e. Maintenance
      (2% of building and equipment) IDR. 700,000.00

   Total = IDR. 49,776,000.00
2. Variable costs
   a. Raw material and additives IDR 21,600,000.00

total production cost = IDR 71,376,000.00

C. Cost of sold good price

= amount of production cost for one year (IDR) /production capacity per year (number of sheets)

= 71,376,000.00 / 12,000

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= 5,948

= IDR 5,948.00 per sheet

If a sheet of 600 mm x 2400 mm x 10 mm cementboard of rattan shaving with cement adhesive and hydrated lime is sold for IDR 8,500.00/sheet, it is cheaper than other product in the market, for instance:

1. 1 sheet of 1200 mm x 2400 mm x 3 mm plywood = IDR 44,000.00
2. 1 sheet of 1200 x 2400 mm x 4 mm calsiboard = IDR 52,000,000.00
3. 1 sheet of 600 mm x 1200 mm x 15 mm yumen board = IDR 42,500.00
4. 1 sheet of 600 mm x 1200 mm x 90 mm gypsom panel = IDR 47,000.00, the profit assessment is as follows:
   a. Product sales per year = 12,000 sheets x IDR 8,500.00
      = IDR 102,000,000.00
   b. Number of production cost per year = IDR 71,376,000.00

One year profit = IDR 102,000,000.00 – IDR 71,376,000.00

= IDR 30,624,000.00

D. Cost and Benefit Analysis

Cost benefit analysis calculation covers B/C Ratio, NPV and IRR to determine whether the business is feasible to develop (Purba, 1997).

This calculation used several assumptions:

1. Production plan is done for 5 years
2. Total cost and benefit is considered constant
3. Discount factors used is 15%, 25% and 35%

4. The investment of the first year is 12% interest
= IDR 70,000,000.00 + 12% x IDR 70,000,000.00
= IDR 78,400,000.00

The present value calculation at the discount factor of 15%, 25% and 35% can be seen in Table 1, 2 and 3.

Table 1. Present value calculation at the discount factor of15%

Year	Cost (IDR)	Benefit (IDR)	df	PresentValue Cost (IDR)	PresentValue Benefit (IDR)
1	71,376,000	102,000,000	0.877	62,596,752	89,454,000
2	71,376,000	102,000,000	0.769	54,888,144	78,438,000
3	71,376,000	102,000,000	0.675	48,178,800	68,850,000
4	71,376,000	102,000,000	0.592	42,254,592	60,384,000
5	71,376,000	102,000,000	0.519	37,044,144	52,938,000
Total (IDR)	356,880,000	510,000,000		244,962,432	350,064,000

Table 2. Present value calculation at the discount factor of 25%

Year	Cost (IDR)	Benefit (IDR)	df	PresentValue Cost (IDR)	PresentValue Benefit (IDR)
1	71,376,000	102,000,000	0.800	57,100,800	81,600,000
2	71,376,000	102,000,000	0.640	45,680,640	65,280,000
3	71,376,000	102,000,000	0.512	36,544,512	52,224,000
4	71,376,000	102,000,000	0.410	29,264,160	41,820,000
5	71,376,000	102,000,000	0.328	23,411,328	33,456,000
Total (IDR)	356,880,000	510,000,000		192,001,440	274,380,000

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Table 3. Present value calculation at the discount factor of 35%

Year	Cost (IDR)	Benefit (IDR)	df	PresentValue Cost (IDR)	PresentValue Benefit (IDR)
1	71,376,000	102,000,000	0.741	52,889,616	75,582,000
2	71,376,000	102,000,000	0.549	39,185,424	55,998,000
3	71,376,000	102,000,000	0.406	28,978,656	41,412,000
4	71,376,000	102,000,000	0.301	21,484,176	30,702,000
5	71,376,000	102,000,000	0.223	15,916,848	22,746,000
Total (IDR)	356,880,000	510,000,000		158,454,720	350,064,000

At the discount rate of 15%
NPV = IDR 350,064,000.00 – (IDR 244,962,432.00 + IDR 78,400,000.00)
= + IDR 105,101,568.00 (positive)
B/C Ratio = IDR 350,064,000.00 / (IDR 244,962,432.00 + IDR 78,400,000.00)
= 1.082 (*feasible*)
At the discount rate of 25%
NPV = IDR 274,380,000.00 – (IDR 192,001,440.00 + IDR 78,400,000.00)
= + IDR 3,978,560.00 (positive)
B/C Ratio = IDR 274,380,000.00 / (IDR 192,001,440.00 + IDR 78,400,000.00)
= 1.015 (*feasible*)

At the discount rate of 35%

NPV = IDR 226,440,000.00 – (IDR 158,454,720.00 + IDR 78,400,000.00)
= – IDR 10,414,720.00 (negative)

B/C Ratio = IDR 226,440,000.00 / (IDR 158,454,720.00 + IDR 78,400,000.00)
= 0.956 (*unfeasible*)

B/C Ratio at the discount rate of 15% was 1.082 (*feasible*) and at 25% was 1.015 (*feasible*), while the B/C Ratio at discount rate of 35% was 0.956 (*unfeasible*). It means that the business wil be feasible to develop if the B/C Ratio is higher than 1. Furthermore, the NPV at the discount rate of 15% and 25% was in positive range, IDR 105,101,568.00 and IDR 3,978,560.00, but that at the discount rate of 35% was negative, – IDR 10,414,720.00. From NPV and B/C Ratio, IRR could be assessed.

The NPV at each discount rate found IRR values between 25% and 35%.

IRR = 25% + (IDR 3,978,560.00/(IDR 3,978,560.00 + IDR 10,414,720.00)) x 10%

IRR = 27.764%.

IRR value was above 27.764% indicating that the business will be feasible to do at the discount rate lower than that obtained, 27.764%.

E. Payback Investment Calculation

1. Percent profit to return the investment (profit margin)
   = (profit / investment amount) x 100%
   = (IDR 30,624,000.00 / IDR 76,380,000.00) x 100%
   = 40.05%
2. Payback period adirahmadi12@gmail.com
   = (total investment / (profit - depreciation)) x 12 months
   = (IDR 76,380,000.00 / (IDR 30,624,000.00 – IDR 1,000,000.00) x 12
   = 30.93 months

   If the business runs well, the payback period is approximately 31 months or 2 years and 7 months.

F. Break Even Point Calculation

1. Break Even Point (BEP)
   = fixed cost / (1 – (variable cost / selling cost))
   = IDR 49,776,000.00 / (1 – (IDR 21,600,000.00 / IDR 102,000,000.00)
   = IDR 631,480,656.65
2. Percent of BEP
   = (BEP / selling) x 100%
   = (IDR 63,1480,656.65/IDR 102,000,000.00) x 100%
   = 61.9%
3. BEP capacity
   = percent of BEP x one year-production capacity
   = 61.9% x 12,000 sheets
   = 742,926 sheets.

The financial assessment shows that if the cementboard of timber shavings with lime pozzolan cement adhesive is taken as a small-scaled industry, it is feasible enough to do. It is considered from break even point in selling price of IDR 63,1480,656.65 for production

capacity of 12,000 sheets per year, meaning that the business could syand with balanced cost and benefit at the BEP and at the BEP of 61.9% that reveals the that business has sufficiently good capability. According to Riyanto (1977) *In* Mahfuz, et al (1999), a business is feasible and profitable if it has a BEP below 65%.

From business profit, this finding showed that the business was very good since the profit obtained was IDR 30,624,000.00, with pay back period of about 2 years and 7 months.

Marketing Prospect

If a rattan shaving cement board with cement adhesive plus 600 mm x 2400 mm x 10 mm lime was sold with a price of IDR 8,500.00/pc, it is cheaper than other products in the market, i.e.:

1. 1 sheet of 1200 mm x 2400 mm x 3 mm plywood = IDR 44,000.00
2. 1 sheet of 1200 x 2400 mm x 4 mm calsiboard = IDR 52,000,000.00
3. 1 sheet of 600 mm x 1200 mm x 15 mm yumen board = IDR 42,500.00
4. 1 sheet of 600 mm x 1200 mm x 90 mm gypsum panel = IDR 47,000.00

The fund invested in this industrial process will have a process of rotation meaning that the investment will be returned depending upon when and how the cash flow is processed. If the residential development for simple/very simple houses could employ the cement board of this small-scaled industrial production, its production could be raised with impact on cheaper good price. Based on the economic projection, the rattan shaving cement board production with lime pozzolan cement adhesives is feasible enough to develop further.

CONCLUSION

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Based on financial projection calculation, under technological and economic aspect consideration, the cementboard of rattan shavings with a composition of shavings of 150 gr, cement adhesive material of 225 gr and lime of 150 gr could be developed in small-scaled industry because it is highly profitable. The economic indicator as cost and benefit analysis found:

1) B/C Ratio at the discount rate of 15% = 1.082 (*feasible*), at 25% = 1.015 (*feasible*), and at 35% = 0.956 (*unfeasible*)
2) NPV at the discount rate of 15% = + IDR105,101,568.00 (positive), at 25% = + IDR 3,978,560.00 (positive), and at 35% = - IDR 10,414,720.00 (negative)
3) IRR value = 27.764%
4) Pay back period was approximately 2 years and 7 months.

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