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**GREENPRENEURSHIP AT THE BASE OF THE PYRAMID: A
SMALL SCALE COMMUNITY-BASED AFFORESTATION
PROJECT IN INDONESIA**

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ABSTRACT

Approximately 41% of the Earth's land surface is covered by drylands that supports 36% of the world's human population. In Yogyakarta Province, Indonesia 53% of the province is covered by drylands in which the driest regency, Gunung Kidul that occupies nearly 47% of the province, is covered by 70% agricultural dryland. Despite the phenomena of forest degradation activities for agricultural developmet by large corporation, nearly abandoned agricultural drylands such as in Gunung Kidul Regency exists all over Indonesia. Such drylands have not attracted large investors nor government to develop into agricultural activities due to economic reasons. This research explored a community based afforestation project being carried out by the support of social investors and academic researchers, virtually without involvement of the government. Among other, teak is one of only few plantations that could grow in such dryland areas and being the core competency of local farmers. The basic arrangement between the investors and farmers was mudharabah revenue sharing as an alternative to conventional pay-in-cash to land owners and smallholder farmers. The economic benefits of the program were valued by using enterprise budget method by considering the capital investment and operating expenses in which cost inflation and teakwood prices increases were incorporated. This research proved that the community-based teakwood afforestation activities along with mudharabah revenue sharing in marginal drylands could fairly improve the wealth of all stakeholders in the program.

Keywords: *afforestation, dryland agriculture, enterprise budget, mudharabah, smallholder farmers.*

INTRODUCTION

The increase in agricultural production due to population growth could lead to either agricultural expansion or agricultural intensification (Carr *et al.*, 2009). Agricultural expansion is believed to lead to deforestation and environmental degradation, whereas agricultural intensification is closely related to the

development of new technology. While smallholder farmers at the base of the pyramid are blamed to be responsible for environmental degradation, large corporations enjoy the government's support to develop large scale agricultural business. Washington-Allen *et al.* (2010) stated that 41% of the Earth's land surface was covered by drylands whereas in Yogyakarta Province Indonesia, 53% of the area is covered by unproductive dryland agriculture. Due to lack of investor's interest in developing such drylands, this research explored the involvement of social investors and academicians to encourage "from the bottom up" participatory of smallholder farmers to develop teak (*Tectona grandis L.f*) plantation. Among other, teak is one of only few plantations that could grow in such dryland areas and being the core competency of local farmers. The participation of self-organized farmers being supported by social investors and academicians are a supplement to and in line with earlier research being carried out by Alemagi (2010) and Carberry *et al.* (2011). The financial benefits relation between investors and smallholder farmers had been discussed by Sugiharto and Lestari (2014) who exercised a sukuk-based revenue sharing of teak plantation project. Further, Sugiharto (2017) and Sugiharto *et al.* (2017) quantitatively identified the existence of surplus value and determined a fair distribution of mudharabah revenue sharing between the investors (Rab al-Mal) and smallholder farmers (Mudharib). Both articles demonstrated that revenue sharing gave better result being compared to conventional fully-paid arrangement, both to investors and smallholder farmers. By using enterprise budget method, this research explored the existence of surplus value of teak plantation program and determined a fair distribution of revenue sharing for agricultural development in dryland areas.

MATERIAL AND METHODS

Yogyakarta Province, Indonesia covers an area of 3,186 square kilometers in the mid-southern part of Java island with the population of approximately 3.5 million. The province is divided into five regencies namely Gunung Kidul, Bantul, Kulon Progo, Kodya Yogyakarta, and Sleman. The land of Yogyakarta Province is covered by 53% dryland agriculture, 18% irrigated agricultural land, and 29% of non-agricultural land (Agricultural Office of DIY, 2010). Table 1 shows the portion of drylands in each of the regencies in Yogyakarta Province, its relation to population density and poverty rate.

Table 1. Portion of Drylands Related to Population Density

Regency	Dryland (%)	Population Density (persons/sqkm)	Poverty (%)
Gunung Kidul	70.1	463	22.05
Kulon Progo	59.7	675	23.15
Bantul	26.9	1,829	16.09
Sleman	29.0	1,934	10.70
Kodya Yogyakarta	5.8	12,164	9.75

*Sources: Agricultural Office of DIY (2010), and BAPPEDA DIY (2012).

The driest regency, Gunung Kidul, occupies nearly 47% area of Yogyakarta in which over 70% are dry agricultural land. Table 1 also demonstrates that Gunung Kidul Regency is the least populated area (463 persons /sqkm) with relatively highest (22.05%) poverty rate (Agricultural Office of DIY, 2010; BAPPEDA DIY, 2012). Based on these census data, Gunung Kidul Regency was selected as the location for experimental field research as can be seen on Figure 1.

Gunung Kidul Regency is located between $7^{\circ} 46' - 8^{\circ} 09'$ south latitude and $110^{\circ} 21' - 110^{\circ} 50'$ east longitude. An area of five hectares was selected to the south-eastern part of Gunung Kidul Regency, approximately 80 kilometers to the south-east of Kodya Yogyakarta. This research was conducted between June 2008 and December 2016 using both the primary and secondary data.

The main plantation for afforestation is teakwood that has been grown by farmers in Gunung Kidul since 1960's as the main source of long term saving out of their drylands (Pramono *et al.* 2010). Perdana (2011) stated that in 2007, the private teak forest occupied over 58,000 hectares of land in Yogyakarta Province – half of it (over 29,000 hectares) was located in Gunung Kidul Regency representing over 70% of teak trees in Yogyakarta Province.

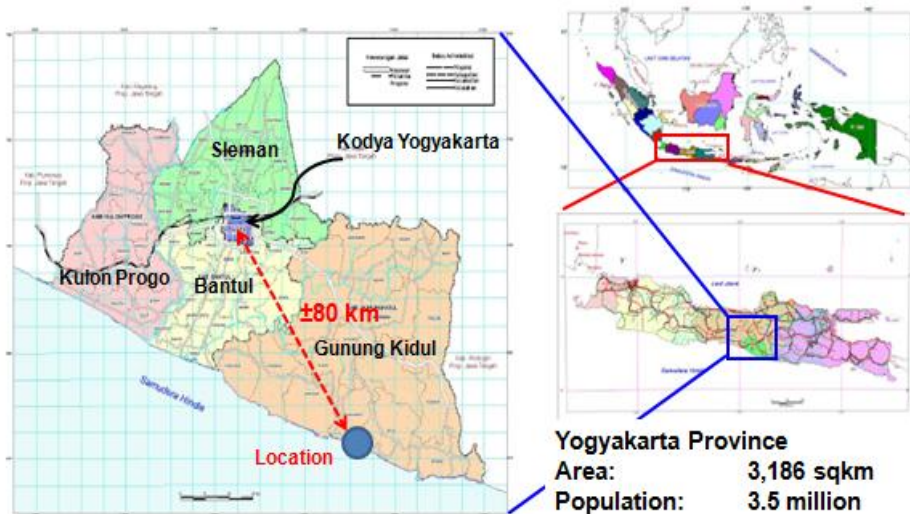


Figure 1: Research Location

For most smallholder farmers, however, teak plantation is not the main business activity since the harvesting time requires a relatively long period of time. The teak density is 1,100 trees per hectare at grid plantation spacings of 3x3 meters.

Agroforestry appraisal process was carried out by using enterprise budget method with three main components namely capital investment, operating expenses, and revenue (Godsey, 2008; Kay *et al.*, 2012) as can be seen in Figure 2. For the purpose of this research, tax had not been incorporated.

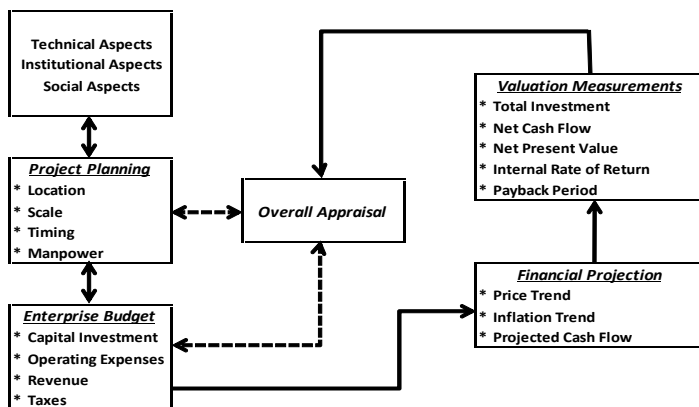


Figure 2: Enterprise Budget Framework

Several aspects of technical, institutional, and social issues were briefly reviewed. A project planning were reviewed by considering the location, scale, timing, and manpower issues. Teak price increase of 15% per year and inflation rate of 6% per year were considered to arrive at finalcial projection (Sugiharto, 2013). The main valuation criteria being analyzed was total investment, net cash flow, net present value, internal rate of return and payback period.

RESULTS AND DISCUSSION

The capital investment for teak plantation is demonstrated in Table 2. The useful life of car, water well, small office, and chainsaw were 10, 25, 15, and 10 years respectively. The operating costs is shown in Table 3. It is assumed that teakwood will be harvested starting at year 9 at a maximum of 10% standing trees per year.

Table 2. Capital investment for Five Hectares of Teak Plantation

	Unit	Price/unit (IDR)	Useful live (years)
Car	1	150,000,000	10
Water well	1	25,000,000	25
Field office	1	25,000,000	15
Chainsaw	2	7,000,000	10

Table 3. Operating Costs for Five Hectares of Teak Plantation

	Unit	Costs /unit (IDR)
Establishment		
Field survey and socialization	/ha	1,000,000
Land clearing	/ha	2,000,000
Planting expenses	/ha	1,000,000
Planlet price	/tree	12,500
Maintenance		
Professionals: 1 person	/person /month	2,500,000
Farmers: 10 persons	/person /month	600,000
Land rental	/ha /year	250,000
Fertilizer: 1 kg	/tree /month	1,000
Harvesting	/m3	300,000

One of the critical issues is the determination of cost of capital in which interest rate to calculate the discount rate by using capital asset pricing model (*CAPM*) was not allowed in mudharabah Islamic finance. As an alternative, the trend of gold prices in the last 10 years were used as can be seen in Figure 3 which indicated an average of 11% price increases per year.



Figure 3. Gold Prices Trend

Total Investment before receiving any positive cash flow of this project is IDR 1,738 million. In an attempt to reach a fair distribution of outcome and equal risk of the project, revenue sharing instead of receiving pay-in-cash was applied to professional salary, land rental, and farmers. With this arrangement, the total investment of investors is reduced to IDR 394 million instead of IDR 1,738 million. Assuming that there was equal investment opportunity to spend, to receive the same amount of Net Cash Flow of IDR 23,238 million, the investors (Rab al-Mal) requires 21.20% revenue sharing only. Similarly the Mudharib (professional, land rental, and farmers) requires a revenue sharing of 10.40%. Total revenue sharing to arrive the same amount of net cash flow would only be 31.60% leaving the remain 68.40% as surplus value. By considering time value of money, to arrive the same amount of net present value for both Rab al-Mal and Mudharib should receive revenue sharings of 23.12% and 29.70% respectively. Total profit sharing of 52.82% leave a surplus value of 47.18%. Figure 4 demonstrates to arrive at the same amount of net cash flow, line “AC” represents the minimum revenue share being received by mudharib whereas line “CB” represent minimum revenue share being received by Rab al-Mal. Line “AB” is the net cash flow surplus value line in which any revenue sharing along this line will result a better value to both Rab al-Mal and Mudharib. To arrive at the same amount of net present value, line “XZ” represents the minimum revenue share being received by Mudharib whereas line “ZY” represent minimum revenue share being received by Rab al-Mal. Line “XY” is the net present value surplus value line in which any revenue sharing along this line will result a better value to both Rab al-Mal and Mudharib.

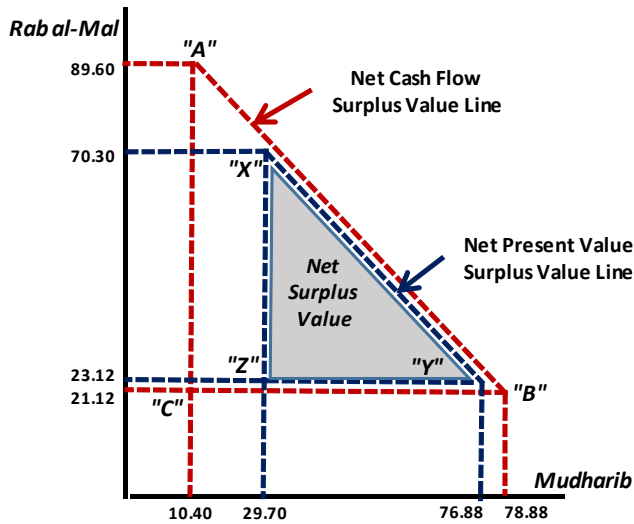


Figure 4. Determination of Profit Sharing and Surplus Value

The surplus value of 47.18% should be distributed proportionally to Rab al-Mal (20.65%) and Mudharib (26.53%) so that the final revenue sharing would be 43.77% for Rab al-Mal and 56.23% for Mudharib. Using the same amount investment of IDR 1,738 million and a revenue sharing of 43.77%, the valuation comparison between conventional and mudharabah arrangements of Rab al-Mal is demonstrated in Table 4.

Table 4. Valuation Comparison of Rab al-Mal (Investor)

		Conventional	Mudharabah
Net Cash Flow	IDR Million	23,238	50,469
NPV @11%	IDR Million	1,861	4,934
IRR	%	18.1	20.6
Pay Back Period	Years	16.9	13.6

CONCLUSION

This research proved that dryland areas could be developed into profitable investment by the support of social investors and smallholder farmers at the based of the pyramid. Instead of pay-in-cash arrangement to Mudharib, to arrive at the same amount of financial valuation criteria, the total required revenue sharing of 52.82% is less than 100% indicating the existence of surplus value to an amount of 47.18%. This surplus value should be distributed to all stakeholders. The final revenue sharing of Rab al-Mal (investors) would be 43.77% and the final revenue sharing of Mudharib (professional and smallholder farmers) would be 56.23%. It was also resolved that with the same amount of investment, Rab al-Mal received better outcome in terms of Net Cash Flow, Net Present Value, Internal Rate of Return, and Pay Back Period through revenue sharing mudharabah arrangement compare to conventional pay-in cash arrangement.

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