INTERNATIONAL SEMINAR

ON SUSTAINABLE BIOMASS PRODUCTION AND UTILIZATION: CHALLENGES AND OPPORTUNITIES

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PROCEEDING

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Preface

Environmental issues and uncertainly in the future of fossil based energy sources have stimulated global interest in the development of alternative and renewable fuels. In this context, biomass has been identified as a promising resource because of it is abundantly available and convertible into different forms of bio-energy which suits various needs. In addition, bio-energy is acknowledged as environmental friendly because it produces less CO2. There is also a high potential benefits from C-sink for carbon trade in line with Kyoto protocol. However, during the past few years, several controversies have complicated bio-energy development. It has been implicated for exacerbating climate change rather than mitigating and also been cited as a major factor in rising food prices. Such different views reflect that in addition to technical issues, socio-economic issues should be taken into account in pursuing of bio-energy development.

Recognizing the important roles of biomass, The University of Lampung placed biomass development as one of the priorities. In line with this commitment, currently The University of Lampung has established The Biomass Laboratory, under the management of Research Institution. This particular laboratory is devoted to biomass development in a board sense related to biomass utilization, including development of alternative energies. Further development is projected to up-grade this laboratory into A Centre of Excellent on Biomass Research in the next few years. As a part of development plan toward establishment of the centre, Lampung University and Yokohama National University are planning to collaboratively host international seminar on biomass utilization and management, in order to gain more insight on biomass utilization impacts on Green House Gas Emission (GHGE).

The seminar is planned to be carried out to pursue the following three main goals (1) to improve knowledge and understanding of Indonesian scientists (participants) on the ongoing development of science and technology in the field of biomass, (2) to enhance the capacity of the participants in carrying out research on various aspects of biomass, and (3) to enhance understanding on the impacts of biomass utilizations and related issues of C-sink issues for carbon trade in line with Kyoto Protocol and Green House Effects due to CO2 emission.

In this opportunity, on behalf of the Organizing Committee and The University of Lampung, I would like to thank all the participants for their presentation. I would like to extent our sincere thanks and highest appreciation to Yokohama National University for invaluable supports, including financial support for the seminar. Our appreciation also extent to the Government of the Province of Lampung, PT Gunung Madu Plantation, BNI 46, Directorate General of Higher Education Department of National Education, and many others for their supports.

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Proceeding
International Seminar on Sustainable Biomass Production and Utilization
Challenges and Oppurtunities (ISOMASS)
August, 3-4, 2009

PROFTITABILITY OF JATROPHA FARMING TO SUPPORT DESA MANDIRI ENERGI (VILLAGE SELF RELIANCE ON ENERGY) IN LAMPUNG PROVINCE

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ABSTRACT

Government policy on promoting Rural Self Sufficiency on Energy or Desa Mandiri Energi (DME) intends to encourage the use of local resource in fulfiling community's needs on domestic energy consumption. Jatropha curcas L is one of the plant promoted in that policy for Lampung Province. This research intends to figure out the economic efficiency of planting Jatropha curcas L for farmers and to identify constrainst of undertaking such initiatives. This research employs Policy Analysis Matrix and the study site is in Desa Babatan, Kecamatan Tanjungan, Kabupaten Lampung Selatan. This village is chosen as the pilot project of the DEM program in Lampung Province. The study suggests that planting Jatropha curcas L. is barely profitable in the long run. However, compare to other commodities, such as corn or cassava, the total profit for venturing Jatropha curcas is too inferior, resulting farmers' reluctant to expand this commodity. The DME program itself was suffered from lack of supporting factors such as local processing industries, integrity of the market, technological advancement for equipment for processing and utilizing jatropha, as well as insitutional facility. Hence, domestically family has not utilized equipment being supplied by the government, and leading to the failure of achieving DME's objective in the first place.

Keywords: policy analysis matrix, profit.

I. INTRODUCTION

Various initiatives for biofuel development has been carried out by numerous stakeholders, private, NGO, government, as well as communities. Desa Mandiri Enerji (Village Selfreliance on Energy) is government initiative in recent year. The ultimate goal of DME is to achieve 60% of energy needs from local resources. This will increase economic

productivity of village, improve welfare through provision of renewable and affordable energy, and increase labor absorption in rural and relatively poor area.

According to Tim Nasional Pengembangan BBN or National Team for Biofuel Development (2006), DME is designed to:

1. promote labor absorption, inclusión of the poor, and to satisfy local energy resources.
2. include poor fishermen village, remote area, and transmigration villages.
3. obtain supporting institution dan cooperative unit, small and medium scale entrepreneurs
4. have additional additional support by local government, such as subsidy on seeds, seedlings unit, and other facilities, shown by approved local (province and district) budget.

In the Blue Print and Roadmap of Bioenergy Development of Lampung Province (2006), *Jatropha curcas* was targetted as prime commodity due to several considerations, such as::

1. Unlike other potential biofuel sources such as: palm oil. cassava, corn, or sugarcane this crop is in no competition with other uses primarily foods. Therefore, all jatropha products will be designated for biofuel production only.
2. This plant is additional plant intercropped with other traditional crops existing farmers agricultural land production. This means land use competition is avoided.
3. This plant has been well publized and public has relatively sufficient knowledge, therefore efforts to socialize this plant will be minimized.
4. This plant is easy to grow in many types of lands, which reduce the needs for extentive extension services.
5. This plant could grow even in poor/marginal land. A study in India by Francis, G., R. Edinger, and K. Becker. (2005) concludes that jatropha farming is beneficial when it is incorporated in development strategy for marginal land.

According to Tim Nasional Pengembangan BBN (2007) Lampung Province is targetted to grow 53.000 ha of Jatropha spread within 8 districts in Lampung Province in which Kabupaten Lampung Selatan has the most potential (Balitbangda Provinsi Lampung, 2007). However, Jatropha farming is directed to be cultivated in arable land or marginal land rather than in already cultivated food crop lands. In fact, company such as Wellable Indonesia prefers that Jatropha is only for extra earnings through mix or intercropping with other main crops.

The problems are (1) whether jatropha farming is an efficient venture in Lampung Province, especially in area of DME, (2) whether jatropha farming could be used for energy source for family domestic needs, and (3) what types of constraints in promoting jatropha farming.

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This study intends to (1) figure out the economic benefits of jatropha farming, and (3) identify constraints in prmoting jatropha farming for DME.

II. METHODOLOGY

Research Model

This study is using survey method involving 39 farmers Jatropha Farmer Association with 117 ha of Jatropha farming in Babatan Village, South Lampung District. This research site is selected purposively as DME program was settled in this village. In addition, South Lampung has the highest potential in Jatropha farming according to Balitbangda (2007) among 8 districts in Lampung Province. Jatropha Farmer Associoation (2007) suggested that there are 1.7 million Jatropha plants have been planted in 5 sub-districts in South Lampung district. This research was carried out from June to December 2008 involving three main activities: preparation, field data collection, and reporting.

Data Analysis

This research use Policy Analysis Matrix (PAM) with basic model as follows.

Table 1. Basic Structure of PAM

Description	Revenues	Costs		Profit
		Tradable Input	Non-Tradable Input	
Private	A	B	C	D=A-B-C
Social	E	F	G	H=E-F-G
Divergence	1=A-E	J=B-F	K=C-G	L=I-J-K=D-H

Surce : Monke and Pearson, 1989.*The Policy Analysis Matrix For Agricultural Development*. Ithaca dan Londol, Cornell University Press.

This model has been widely used in study of agricultural policy analysis (Abidin, 2007, Abidin, 2006, and Abidin and Ismono, 2005)

Further analysis derived from the above table includes:

1. Domestic Resource Cost Ratio (DRCR) analysis

Dampak kebijakan pemerintah dalam penggunaan sumberdaya dikenal dengan Domestic resource cost ratio dirumuskan sebagai berikut

$$DRCR = \frac{G}{E - F}$$

G = Social cost of nontradable input, E = Social revenues, F = Tradable social cost. If DRCR < 1, jatropha farming is more efficient in terms of using domestic resources or nontradable inputs and otherwise if DRCR > 1.

2. Nominal Protection Coefficient on Input (NPCI)

$$NPCI = \frac{B}{F}$$

NPCI = Nominal Protection Coefficient on Input, B = Private cost of Tradable Input, and F = Social Cost of Tradable Input. If NPCL < 1, the government policy on tradable input provides incentives to farmers because farmers pays less than what social has to pay, and otherwise if NPCI > 1.

3. Nominal Protection Coefficient on Output (NPCO)

$$NPCO = \frac{A}{E}$$

NPCO = Nominal Protection Coefficient on Output, A = Private revenues, and E = Social Revenues. If NPCO < 1, farmers recieves less than what international market could offer which means the policy offers disincentives for farmers, where as otherwise when NPCO > 1.

III. RESULTS AND DISCUSSION

State of Jatropha curcas in DME

Since the provincial government endorsed *Jatropha curcas* L. for DME, the development and expansion of jatropha has been intensified in Lampung Selatan district as well as other districts. At first, the government institution such as Dinas Perkebunan (Plantation Agency) developed partnership with farmers to grow jatropha for seeds (petani penangkar or seed farmers) for 15 ha area. Private sectors were also built partnership with farmers by distributing more than 11 million seedlings throughout Kabupaten Lampung Selatan. In fact, private sector is more aggressive in spreading jatropha, not only for Lampung Selatan districts, but also for Lampung Province. Distribution of seedlings in three sub-districts in Lampung Selatan is as follows (APJP, 2008):

1. Penengahan sub-district, 500 thousand seedlings for 164 ha
2. Sidomulyo sub-district, 766 thousand seedlings for 351.5 ha

3. Katibung sub-district, 356 thousand seedlings for 148 ha

Farmers agreed to seedlings supplie with jatropha seeds after harvest. The tentative price was relatively low ranging from Rp 1000—Rp 1500 per kilogram dry seeds causing dissatisfaction and spirit to grow jatropha further. In second year, many farmers convert their jatropha to other more attractive crop such as corn. This lead to the problem of on supply chain of jatropha beans to local industries provided by government program. In short, so far jatropha market is only for seeds propagation.

As jatropha farming began, some government agencies such as LIPI installed mini jatropha processing unit in Sidomulyo (see figure below). However, this unit remains idle due to the said reason.

As stated in Desa Mandiri Enerji (DME) platform, the primary objective of DME is that village fulfil 60% energy consumption from its own resources. Lampung detemined to develop Jatropha farming to reach that goal and Babatan village of Kecamatan Katibung, South Lampung is pioneer of the program. According to BPS (2007), Babatan village has 2.473 resident with 1.185 households. Sixty two percent of Babatan residence is conseidered poor despite the fact that this village is only 25 km from Bandar Lampung city, capital city of Lampung Province.

This village is not isolated area in many respects, such as:
1. It has public electricity served by PT. PLN
2. It has well public transport facilities as it is crossed by Sumatra Highway
3. It has good access to economic center such as Panjang port, Kalianda and Bandar Lampung cities
4. It has good education facilities including public and private high schools
5. It is closed to industrial, warehouse, and tourism centers

With those advantages, Babatan village actually should not qualify to be included in DME program.

Babatan village relies heavily on agriculture as majority of its residence works and involves in agricultural sectors. Majority of landuse is for dryland agricultural production, such as: cassava, corn, coconut, dryland paddy, etc operated by smallholder farmers. There is no big plantation established in this village.

With regards to Jatropha farming, only small area has been planted monocroppingly with size of more than 6 ha. This area was operated since 2007 when private sectors made partnership activities with some farmers to grow Jatropha. There were 38 farmers who initiated to grow Jatropha with size of 177 ha (Asosiasi Petani Jarak Pagar, 2008).

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However, when study was taken last year, the jatropha area was reduced because some farmers cut off the Jatropha trees, inconfident with the economic prospects.

In DME scheme, Babatan village has press tools, stove in 2008 in order to support the DME program. However, those tools/quipment remain idle due to several reasons: (1) difficult to operate, (2) inefficient for labor, and (3) does not serve the community's needs and problems. It is obvious that contribution of Jatropha farming is not significant.

Jatropha farming within existing farming system

The main motivation for farmers to grow jatropha was to enhance their income and to find new prospect of improving welfare using their existing land. Many farmers were lured with the prospect of jatropha in line with increase in global oil prices lately. Option for jatropha farming was also possible especially for farmers who still have fallow or uncultivated land

However, betting on new farming is also risky for some farmers. After one year, many farmers began to wonder with the prospect of this commodity compare to other commodities such as corn or cassava. In mid 2007, conversion to other crops from jatropha was apparent by and in line with price increase of food crops such as corn and cassava. The price of corn has increased almost two folds from merely around Rp 1000/kg to Rp 1800—2000 per kg.

The conversion back to conventional crops has been predicted even by government officials. The main reason, and it is commonly agreed by farmers and government officials is lack of market certainty of jatropha.

Is jatropha farming profitable?

The study construct PAM table to determine profitability of Jatropha curcas farming. The computation is based on several assumptions:

1. Interest rate is at 18% per annum and applicable for social and private.
2. Exchange rate is applied at US$ 1 = Rp 10.500,00
3. Jatropha is cultivated for 25 years
4. Subsidy on fertilizer is not available. The prices of fertilizers at private or farmgate were Rp 2,800 / kg Urea, Rp 3,000 /kg for TSP, and Rp 3,000 /kg for KCl.
5. Assumed private price of jatropha was Rp 2,000 per kg while international price was Rp 1,483 per kg
6. Land rate is similar between private and social land rate
7. Labor cost is similar between private and social

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Since it is long term analysis, the study use Present Value for all costs and revenues incurred for this process. Using with those assumption, the study concluded PAM table as foolows.

Tabel 2. Revenue, Expenditure, and Profit status of Jatropha farming (1 ha)

Description	Revenues	Tradable	Domestic Factors				Profit
		Input	Labor	Captal	Land rate	Total	
Private	56.716.805	1.578.715	10.443.804	1.209.788	2.733.453	14.387.045	40.751045
Sosial	51.088.691	1.023.609	10.443.804	1.209.788	2.733.453	14.387.045	35.678037
Divergences	5.628.114	555.106	0	0	0	0	5.073008

The table suggests that in 25 years, jatropha farming is profitable. However, if it is averaged per year, net profit is only Rp 1,63 million per year. It is relatively low compare to other farming such as corn that could proft more than Rp 6 million per ha per year.

Hence, with low prices and profitability, farmers were reluctant to invest more money on input whilst other commodities could earn four times higher. For this venture, farmers only invested around 50 kg Urea, 50 kg TSP, and 50 kg KCl per annum.

Ratio analysis

From PAM table, further ratio analysis was constructed to develop some ratios as suggested in the following description.

1. *Domestic Resource Costs Ratio (DRCR)*

The study suggests that DRCR of jatropha farming is at 0.29 suggesting that this farming only cost 29 cent to produce $1 revenue. This suggests this farming is efficient and competitive. However, the total profit (see PAM table) is not significance in terms of total value making it less attractive than growing corn or cassava.

2. *Net Protection Coefficient on Input*

Net Protection Coefficient on input is at 1.54 suggesting that domestic farmers pays 54% higher on input. This is quite interesting because farmers have to pay lot bigger due to market failure of tradable input. This is fascinating because, as we might already aware of that agricultural input market is highly regulated by government. This regulation intends to protect farmers from input price fluctuation. However, perhaps due to distribution problems, farmers were not getting advantage instead.

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3. *Net Protection Coefficient on Output*

The study suggests that NPCO of jatropha farming was at 1.11 indicating that the government protection on output caused consumers (buyers) pay 11% higher than if no policy applied. This figure also suggests that farmers aspiration for having price protection on output gave small advantage for farmers. Should local market allows free competition from jatropha import, the jatropha farming is becoming less attractive. However, should subsidy on fossil fuels removed, the jatropha prices may increase and attract more industry to invest in.

IV. CONCLUSION AND POLICY IMPLICATION

Policy on DME has brought new opportunities for rural energy development. However, it still faces such challenges as:

(1) The site of DME is not suited with the original intention of DME policy which was to targetting poor, remote, and marginal areas. The selected site is relatively well facilities area.
(2) It is not well equipped with supporting facilities such as market infrastructure, standby buyers, etc,
(3) Cooking tools such as jatropha stove was not properly designed hence it remains idle,
(4) Industrial equipment remained idle due to lack of jatropha supply from producing farmers.
(5) Competition with other crops limits the posible expansion of jatropha farming. When prices of food commodities are increasing at they are now, jatropha is then an inferior commodity.

Although, jatropha is already well known by most farmers profitable in the longrun, it may not appropriate to grow it in monocropping pattern. It shall only be part of farmers strategic farming system, meaning it is more secured to grow it as intercropping or alley cropping only. Further análisis for jatropha as intercropped farming is imperative to find model for best resources allocation

On the other hand, supporting facilities and infrastructures, especilly market and local industry has to be developed integratively with the main ímpetus of DME program. It is import to build farmers' confident in integrating jatropha farming within its farming system.

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