### Financial Feasibility of Deveral Agricultural Equipment and Machinery Business Unit Services in Lampung Province

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# FINANCIAL FEASIBILITY OF SEVERAL AGRICULTURAL EQUIPMENT AND MACHINERY BUSINESS UNIT SERVICES IN LAMPUNG PROVINCE

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#### **ABSTRACT**

Paddy production continues to increase through intensification, extensification, rehabilitation and infrastructure development. Therefore, land productivity, planted area and cropping index increase annually. It is expected that sustainable self sufficiency in rice can be achieved. However, one of the obstacles faced by rice farmers is the limitation of labor force, especially for cultivating the soil, planting simultaneously and harvesting rice. In addition, during dry season, the farmers have to dest with limited water for paddy field; therefore, they must rent water pump. This study aims to analyze financial feasibility of several services unit of agricultural equipment and machinery and how the appropriate institutional form of services unit of agricultural equipment and machinery can be sustainably operated. This research was analyzed by quantitative descriptive analysis using measurement criteria of financial viability and sensitivity analyzes. The research was conducted in 2016 with a case study method. The sample of water pumps, soil cultivating machines and paddy planting machines was taken purposively at the center of paddy production areas in Lampung Province. The result showed that water pump service unit, soil cultivating service unit and paddy planting machines unit are financially feasible. Non formal institutions (family businesses) dominate the institutional form of agricultural equipment and machinery business unit reflected by the rules that are still simple but vulnerable to conflicts regarding work area and business sustainability.

**K ey w ords:** machinery, financial, institution

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#### INTRODUCTION

Background

RPJM N 2015-2019 states that an increase in rice production (rice) is necessary to realize sustainable rice self-sufficiency (Bappenas, 2015). Increased rice production is not only done on irrigated rice fields but also on swamp and dryland areas (Aidilla, 2015 and Balitbangtan, 2013). Increased rice production is achieved through intensification, extensification, and rehabilitation and upgrading of infrastructure resulting in increasing land productivity, planting area, and cultivation index.

Lampung Province (with 3,64 million tons of rice production) is the 7th largest rice production center in Indonesia (4,85% share of national production) (BPSLampung Province, 2015). In 2016 and 2017, Lampung Province is targeted to increase 1 million tons of dry milled grain to support national rice self-sufficiency.

Evidences in the field indicate that many obstacles faced by farmers in rice farming namely the limited availability of labor to cultivate the soil, irrigation during drought, simultaneous planting, and harvest and post-harvest. In order to increase production and income, the policy related to subsidy of production facility, basic price and mechanization are necessary (Bappenas, 2015).

Tambunan and Sembiring (2007) stated that agricultural development today cannot be separated from the development of agricultural equipment and machinery technology. Various studies conclude that the functions of agricultural machinery and machinery, among others, are to address the scarcity of human labor, increasingly expensive wages, and at the same time to increase labor productivity, improve farming efficiency and save yields and improve the quality of agricultural products through reducing energy, time and production costs.

Lampung Province is one of areas that faces drought every year even in the rainy season. Therefore, to increase the supply of water, irrigation is necessary to pump ground or surface water. For irrigation, farmers usually hire a water pump machine (Reiza, 2015).

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Furthermore, in cultivating rice, farmers generally experience a shortage of labor. The use technology for transplanting rice can save time and reduce the number of labor required, so that farming is more efficient regarding time and cost.

At the time of post harvest, farmers have difficulty in the processing of paddy crops because limited access to milling machines. Farmers also have difficulties to bring the harvest to the grinding machine because of transportation costs. Therefore, farmers prefer to use a mobile grinding machine that can process rice directly nearby their houses.

The performances of the agricultural equipment and machinery business unit varies widely and are determined by the manager's credibility, effectiveness and efficiency of tools and machinery, and the existing institutional system (Williamson, 2000).

The main factors that determine the operating cost of agricultural equipment and machinery are the cost of subsidized fuel (premium and diesel). The problem is that the fuel price is fluctuating, affecting labor cost, the cost of repairment and the cost of engine lubricant. The costs influence revenues and profits of business unit in providing rental service of tools and agricultural machinery (Mulyadi and Nur, 2013) and (Tambunan and Sembiring, 2007).

In addition, the absence of clear institutional (rules of play) in regulating the boundaries of work, the amount of rental rates, and law enforcement leads to conflict between business actors, and unhealthy competition that causes a decrease in the number of service users. These problems result in declining revenue, so business owners are at risk of losing financial profits (Nort, 1991 and Williamson, 1985 and 2000).

Based on this background, research is needed to analyze the feasibility the business units in providing their services in several locations in Lampung Province.

Research Purpose

This study aims to determine and analyze the financial feasibility and institutional form of the business units.

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#### RESEARCH METHODOLOGY

Location and Time of Research

A case study method is applied in this study. Data are collected from January until June 2016. The research location was determined purposively.

#### Research M ethods

Primary data is obtained through interviews with machine owners. Secondary data is obtained from literature studies, reports, publications, related articles and literature and related. The method used for data analysis is tabulation and computation method. The qualitative data obtained are analyzed descriptively.

Financial analysis is used to assess the financial feasibility whereas descriptive analysis is used to analyze institutional aspects of the management of the business units that provide services for agricultural equipment and machinery. Respondents in this study were the owners and managers of the business units. The financial viability of agricultural tools and machinery is indicated by several investment feasibility measurement criteria. A coording to Kadariah (2001), the tools used to analyze business feasibility are Net Present Value, Internal Rate of Return, Gross Benefit Cost Ratio, Net Benefit Cost Ratio and Payback Period. In the feasibility analysis of agricultural tools and machinery, the interest rate is based on The bank of Indonesia's (BI) of investment per year, which are 6,50%; 6,00%; 5,75%; 7,50% and 7,75% (BI, 2016).

Sensitivity analyzes is used to see the reality of a project based on the fact that projections are strongly influenced by uncertainty about what happens in the future (Gittinger, 1993). The uncertainties considered include changes in factors affecting revenue and costs.

Institutionalization is important because it is the institution that underlies the decision to produce, investment and economic activity, and there are formal and informal rules governing the behavior and actions of individuals in achieving the goals (Pakpahan, 1989). Factors taken into consideration based informal and formal rules developed

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in the field including the division of work areas and the determination of the rate of rent of agricultural equipment and machinery at a farm level.

#### **RESULT AND DISCUSSION**

General condition of respondents

Financial feasibility analysis is an analysis that aims to determine whether the investment is feasible or not. The results showed that agricultural equipment and machinery service business unit which indudes water pump machine, planting machine, rice milling machine provide financial benefits (Table 1).

Table 1. Financial feasibility analysis of agricultural equipment and machinery in Lampung Province

	Triacritici y III Ec					
No	Tools <mark>and</mark> M achines	NPV (Rp)	IRR (%)	G ross B/C	Net B/C	PP (thn)
1	Water pump machine	329.864.982,14	76,95%	1,53	5,39	2,39
2	Machine Planting Paddy	51.926.625,69	34,00%	1,31	1,86	3,61
3	Rice milling machine	107.042.745,32	126,18%	1,40	5,39	1,71

Table 1 shows that at the 9%interest rate, the NPV is positive, the IRR above the loan interest rate, gross and net B / C is greater than one and the payback period is less than the machine's economic life (10 years). This means that the three business units are financially profitable and have shorter payback period compared to the project's economic life. The three business units are therefore feasible to be developed. This finding is in line with the studies of Muchtar (2002), Mulyadi and Nur (2013) and Suhendrata (2006).

The conditions of each tool and machines are described more details as follows:

1. Irrigation pumps business unit

The pump irrigation system for surface water was built in 2009, consisting 6 inch pump machine (one unit), diesel engine measuring 24 PK suction tube, water distribution pipes and 250 meter ven cement

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channels located entirely in Mekar Mulya Village, Palas Subdistrict, South Lampung Regency as rice production center in Lampung Province. The source of irrigation water comes from the flow of Way Sekampung River with the distance from the river to the farmland that is as far as 15 meters. The water is distributed from the river to a reservoir through a 10-inch diameter pipe. From the reservoir, the water flowed through a 250 meter ferrous cement channel to the farm land. The total area of irrigation is 25 ha.

Engine investment, pumps and all pumping irrigation system equipment are worth 56.820.000,00 rupiahs. Since 2010, this machine operates 15 to 20 hours per day for 30 working days (450 hours) from July to November on MT 1 (rainy season) and 75 days (1500 hours) from January to May on MT 2 Dry season) because the water requirement on MT2 is more than MT1. The amount of Solar fuel needed is 35 liters per day multiplied by the price of Solar Fuel Rupiahs 4.500,00 to 7.500,00 Rupiahs per liter. In addition, the oil costs range between 140.000,00 to 165.000,00 Rupiahs.

Rental rates charged to farmers for water pump are 300.000,00 to 350.000,00 Rupiahs per 0,25 hectare in the rainy season (MT1) and 600.000,00 to 650.000,00 to 700.000,00 Rupiahs per 0,25 ha in season Drought (MT2). The annual revenue is 64 million to 135 million Rupiahs. The development of the surface water irrigation system can increase the farming and land productivity index from 100% and 4.856,88 kg of gkg / ha (before July 2014) to 200% and 6.657,07 kg kgk / ha on MT1 and in July 2014 to May 2015.

#### 2. The rice-planting business unit

The rice transplanter unit started in 2015 by purchasing a 5,5 horse power (HP) engine worth 62 million Rupiahs (owned by individual farmers). The working area of this machine is in Seputih Raman Subdistrict. The machine is operated twice a year during the rainy season (October to November) and dry season (May to July). In one year Solar fuel used is 1614 liters, engine oil 2 liters per season or 4 liters per year with the price of 30.000,00 Rupiahs / liter. A xel oil 2

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liters per season at a price of 45.000,00 Rupiahs/ liter. Hydraulic oil planting machine is 5 liters per season or 10 liters per year with the price of 35.000,00 Rupiahs/ liter.

Labor costs include a machine operator with a wage of 100.000,00 Rupiah/ day and an assistant with a wage of 80.000,00 Rupiah/ day. Revenues in 2015 equaled to 284.650.000,00 Rupiah scovering 474,25 hectares of lands with average rental price of machine equal to 600.000,00 Rupiah / hectare.

#### 3. Business unit of rice milling

Rice milling business is a business engaged in services, where the output produced is a rice mill service. Rice milling machines are generally owned by individual farmers. Farmers buy rice milling machines at workshops that are used to assemble rice milling machines consisting of husker and polisher machines totaling 45 million Rupiah.

This rice milling machine operates almost every day, either in growing season or harvest season. This is because farmers need the services for daily rice consumption. However, out of the rice planting season the intensity of work decreases, but increase again in the harvest season for 2 months.

The costs of engine operation consist of fuel costs (fuel), oil / engine lubricant costs, labor costs, and machine service costs. Fuel is one of the important factors that must be available in every production. Fuel is purchased from subscribers at a retail price of 5.000 Rupiahs / liter in 2010 - 2012, 6.000 Rupiahs/ liter in 2013 and 6.500 Rupiahs/ liter in 2014. Solar fuel needed equal to 2.700 liters per year. Engine lubricants are used to prevent the engine from lack of oil caused by friction between parts of the engine. In one year it takes 58 liters of lubricant (price per liter equals to 19.000,00 Rupiahs) and 18 liters of axeloil at (price per liter is 18.000,00 Rupiahs).

A verage cost of diesel engine service per year is 453.968,26 Rupiahs; 442.857,14 Rupiahs for the cost of skin remover service and Rp 500.000,00 for polishing machine service cost. Roll replacement cost of 857.142,86 Rupiah sand wheel replacement cost of 750.000,00

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Rupiahs and replacement belt of 150.000 Rupiahs. In addition, the tax pay able to Ambarawa subdistrict is 250.000 Rupiahs/ year for each grinding machine and other cost of 400.000,00 Rupiahs per year. The man power used in the business of rice milling machines in Kecamatan Ambarawa consists of an operator and a helper with a share value of 12 million Rupiahs for operators and 10 million Rupiahs for helper in a year of operation. Revenues are earned from a rice grinding wage (bawon system) of 460 million 500 million Rupiahs per year.

Sensitivity Analysis of Agricultural Machinery and Equipment Services

To ensure that the business unit can operate on an on going basis, a sensitivity analysis is conducted to determine whether the business unit is sensitive to changes in internal and external factors. Internal factors that are expected to affect the financial feasibility are the price of solar fuel and / or the increase of operational cost while the external factor is the decrease of revenue (Table 2).

Table 2 shows that all agricultural equipment and machinery service business units are sensitive to the decrease in revenues and increase operational costs. The rice planting machine business unit is one of business units that is vulnerable to the decline in the demand for rice cultivation services (decreased planting area) or the decrease of the rental price and the increase of operational cost.

Table 2. Sensitivity analysis on farm equipment and agricultural machinery rental units

No	Tools and Machines	Simulation	N PV	IRR	Gros B/C	N et B/C	PP
1	Water Pump	The increase of diesel fuel by	2,45	1,75	0,94	1,91	0,93
	Machine	66.67% Oil increase of 17.86%	1,78	1,41	0,95	1,45	0,76
2	Machine Planting Paddy	Planting area decreased 6,83%	44,17	9,69	2,65	1,00	2,11
		Price dropped 5%	31,44	8,92	2,62	1,00	2,11

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No	Tools and Machines	Simulation	NPV	IRR	Gros B/C	N et B/C	PP
		The cost rose 3.53%	45,79	32,65	19,98	9,92	3,42
3	Rice Milling	Receipts decreased by 3.29%	3,67	5,38	1,00	4,97	2,08
		The cost rose 3.53%	2,68	5,38	4,97	1,00	2,08

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#### Institutional Aspects

1. Institution of irrigation system of water pump

The business unit of surface water irrigation system emerged because the farmers in M ekar Mulya Village, Palas Subdistrict, South Lampung District often experience shortage of irrigation water during the rainy season, more severely in in the dry season. There is however still considerable water left in channel creeks. Realizing this potential, a farmer tried to raise the water with a water pump to be distributed to the farms that need water.

Gradually, businesses that provide renting services of a water pump developed. This pump business unit is the private property of individual farmers because all investment and operational costs are borne by the owner of the pump. The performance of irrigation networks determines the utilization of irrigation water that reaches the farmland. The better the irrigation system is used, the more optimal irrigation water and water loss can be minimized. The source of irrigation water comesfrom the flow of Way Sekampung River with the distances from the river to the farmland are 15 meters. The working area of the pump irrigation is determined by the extent to which service providers are able to provide sufficient water for growing crops on the farmer's land.

Until now the area served is 25 ha. The more efficient the management of the irrigation system and the more water available the more likely it will be the larger area of work. The rate of water pumping services is determined by agreement between the owner and manager of the pump irrigation and the beneficiary farmer above the operational cost plus the percentage of profit (usually 20%).

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Rent of pump irrigation services is 300.000,00 to 350.000,00 Rupiahs per 0,25 hectare in rainy season (MT1) and 600.000,00 Rupiahs to 700.000,00 Rupiahs per 0,25 ha in dry season (MT2). The obligation of the pump manager is to provide water as per the farmer's requirement while the farmer's obligation is to pay the water rent in cash at the time of booking. If farmers do have enough money to pay the pumping services, farmers usually pay 50% of the rent and the remainder is paid at harvest. There are no significant problems that occur in the process of water service transactions; this is because the farmers already know each other and have mutual trust as a form of social relationship among them (b) Institutional Rice Cultivation Machine.

The institutional manager of rice planting machine rental business unit is an individual's private business. This business unit was developed by farmers because of the limited availability of rice planting labor. Farmers own the machine by buying it using their own capital. The output generated in the form of rental service of rice planting machine. Until now there is no regulation about the boundaries of the work area. The working area of the machine depends on the location of the farmers who ask for rice planting services that are generally domiciled in the vicinity of the village where the owner of the machine is domiciled in Rama Indra Village, Seputih Raman Subdistrict, Central Lampung Regency.

The owners of rice planting machine selects farmers based on their skilled and are believed to be able to run the rice-growing machine, while the helper is picked up by the owner of the neighboring machine capable of serving the operators in the operational activities of the machine.

The machine owner is entitled to the rental price paid by the farmer and the owner of the machine is obliged to plant the rice on time agreed with the tenant. The operators and helper are responsible for performing the operational activities of the machine in the planting area. Rice value of rice planting machine

is 600.000,00 Rupiahs per hectare. The procedure of ordering services is carried out by the farmer directly to the owner or to the machine operator. Booking through the operator will first be submitted to the owner of the machine to arrange the planting schedule. The ordering is done by the farmer at the beginning of seed seedling season in the nursery that is 18 to 22 days before planting time so that the machine owner can schedule the right planting time.

Payments for machine rental services are made in cash as soon as the rice cultivation is completed, the rent is as great for both the rainy and dry seasons as high as 600.000,00 Rupiah per hectares.

#### 2. Institutional rice milling machine

Rice milling machines are privately owned by farmers by purchasing a unit of rice milling machine. The machine operates within the Ambarawa sub-district, The operational area of the machine is determined entirely by the operator of the machine with the criteria such as the number of farmers (consumers) quite a lot, no similar machines entering the area or the number of machines operating is still little or no other parties forbid. Usually the machine operators will conduct operational testing, if assessed the area is less potential then the operator will look for new operational areas. The selection of operational areas is carried out freely by the operators, so that not infrequently clashed with fellow rice mills around and not infrequently there is a dispute with rice milling machine that persists that led to peace mediated by the police. In the year 2010 ever formed Paguyuban Walking Factory initiated by one of the owners of the machine.

Initially, this community succeeded in becoming the union of the owner of the paddy milling machine, the work area was arranged neatly, the permits were taken care of in every operational area and always able to solve the problems that arise in the field. But not until two years this community does not work

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and disbanded, especially after the chairman and initiator of the association died and the milling machine is sold. After the community is dissolved then there is no longer a party that regulates the operational area of the machine resulting in competition and seizure of unhealthy areas that often lead to conflicts among machine operators in the field.

Payment of milling service is set with bawon system. The applicable bawon system is 10:1 which means that each rice mill produces  $10 \, \mathrm{kg}$  of rice the farmer will hand over  $1 \, \mathrm{kg}$  of bawon to the owner of the machine or through the operator. The applicable bawon system follows the bawon system of the market, as is the case with a fixed rice mill.

If the farmer grinds the rice in the amount of 100 kg or multiples then the owner of the machine or the operator will give 1 to 2 kg bawon pieces so that the farmers simply pay 8 to 9 kg per 100 kg of rice produced. This is done to keep customers in order to stay subscribed and always grind the rice to the owner of the machine that member pieces of the bawon.

The workforce (operator and helper) used by the owner of the machine is an outsider worker or close relative of the machine owner. In the selection of workers there is no specific criteria that must be met workers, enough to understand and know the procedure of rice milling and able to operate and run the rice milling machine. Relatives take precedence because in this business highly demanded honesty of workers because the owner cannot monitor and know the drcumstances that occur in the field. Relatives employed include siblings, brother-in-law, cousins, nephews who are the families of the owners of these machines. Wage of labor based on profit sharing system, where labor gets 1/3 of machine operation acceptance per day, while the remaining 1/3 for machine owner and 1/3 other for operational cost and maintenance cost of rice milling machine, so if the acceptance per Day high then it will be high also part accepted by labor.

The legality of rice milling machine in Ambarawa sub-district is still very minimal, that is the operational license issued by Ambarawa Sub-district. This milling machine business does not have SIUP, SITU, and letter of ownership. As a business of course this business must have a legal business license, if seen from the form which is a motor vehicle then it should have this machine ownership letters. The driver or operator of the rice milling machine also does not have a Driver's License (SIM), although it has already been socialized from the police regarding the obligation to have a driver's license but the operators still do not have it. There is no party to the matter, so the owner only has an Operating Permit from Ambarawa Sub-district.

Constraints often encountered are the frequent disputes between the owner of the paddy milling machine and the owner of the fixed rice mill. This is because the owner of the grinding rice mill will be assessed to take all consumers or customers from the settling rice mill. The commotion is usually up to the realm of law and ends in agreement that the owner of the mobile rice milling machine is not allowed to re-enter the working area of the fixed rice mill. Another problem that arises is that if the rice milling machine enters the Highway of Sumatera Selatan and meets with the police, the machine owner must give the milling machine to the nearest Police Office, then the machine owner must pay a fine and make an agreement not to enter the highway again.

In addition, the owner of the paddy milling machine sometimes has to incur additional costs for unscrupulous persons who make illegal charges while traveling. The levy also occurs by other actors by reason of security money or running money, not to mention to give the person who is backing in the area. Therefore, there is a need for institutional arrangement of farmers and coaching by the Government so that the performance of business unit of rice milling machine is profitable sustainably in the opinion of Williamson (1985 and 2000) and Douma and Schreuder (1991).

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#### CONCLUSIONS AND RECOMMENDATIONS

#### Conclusion

- The business unit of water pumping machine, rice planting, and rice mill is a financially feasible to be developed, but all machines are very sensitive to diesel fuel price increase and other operational costs.
- Each business unit of agricultural equipment and machinery rental services is a private-owned business unit run by the owner directly or through operator and helper services with a wage or profit sharing system. The stronger the institutional system of a business unit the better the business's performance.

#### Recommendations

- The owners of business units should improve the efficiency and effectiveness of services to customers.
- The government should provide guidance and protection to every manager of the business unit and encourage entrepreneurs to create a strong organization or group and provide business legality services to owners and managers.
- Researchers need to further study the aspect of institutional role of farmers in the management of business units.

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