SOLAR FUEL'S ENERGY EFFICIENCY ESTIMATION OF RICE MILLING FACTORY WITH LEVEL VARIATIONS

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ABSTRACT

In order to reach out to the people of this country, they had been able to use the milling of the solar panels, but they did not have enough solar energy. It needed fuel was very variation at each level of Rice Milling Factory (RMF) such as were Small Capacity of Rice Milling Factory (SCRMF), Medium Capacity of Rice Milling Factory (MCRMF), and Big Capacity of Rice Milling Factory (SCRMF). In this research consisted of 3 levels and 9 samples, there were 3 samples of Small Capacity of Rice Milling Factory (SCRMF), 3 samples of Medium Capacity of Rice Milling Factory (MCRMF), and 3 samples of Big Capacity of Rice Milling Factory (SCRMF). The research system took a research for one year. In order to achieve the highest level of fuel. The MCRMF was being used efficient for the purpose of solar energy. In the current year, MCRMF has been used of solar fuel to 9.30 liters per hour per 0.60 ton of rice products, SCRMF of solar fuel to 13.97 liters per hour per 1.00 ton of rice products, BCRMF of solar fuel to 18.02 liters per hour per 2.00 tons of rice products.

Keywords: Solar fuel, energy efficiency, Rice Milling Factory (RMF), Small Capacity of Rice, Milling Factory (SCRMF), Medium Capacity of Rice Milling Factory (MCRMF), Big Capacity of Rice Milling Factory (BCRMF), rice products.

1. Introduction

In Lampung Province, particularly in Pesawaran and Pringsewu Regencies, Rice Milling Factory (RMF) are found. The study was conducted over 9 months from January 20, 2017 - October 20, 2017. Site selection in this research was done purposively in Pesawaran and Pringsewu Regencies, considering that there are many Rice Milling Factories based on data obtained from BULOG Drive V Lampung Office.

2. Reseacrh Method

The research was conducted on 3 types of capacity of RMF, each consists of 3 Rice Milling Mill (Small Capacity, Medium Capacity and Large Capacity) with 3 replications. Small Capacity of Rice Milling Factory (SCRMF) consists of 3 locations in Pesawaran Rigency, Medium Capacity of Rice Milling Factory (MCRMF) consists of 2 locations in Pesawaran Regency and 1 location in Pringsewu Regency, Big Capacity of Rice Milling Factory (BCRMF) of 2 locations in Pesawaran Regency and 1

Method of Collecting Data

a) Primary Data
Primary data obtained through survey of solar energy efficiency in Rice Milling Factory.

b) Secondary Data
Secondary data is obtained through the Office of BULOG Drive V Lampung Province, Scientific Journal, and other Reference Book.

Milling energy still uses human energy to move rice from the crusher machine (husker) to the polishing machine (polisher). Human energy SCRMF is still valued with cheap services (main) and human energy MCRMF and BCRMF is handling (complementary). RMF operationalization has not utilized energy optimization in accordance with standard engine specifications. Inefficient energy risks always occur, and this needs to be addressed in the future.
Energy Analysis of Rice Milling Factory

location in Pringsewu Regency.
Energy engine generator (Emgn):E solar = l solar

mpdi

How:
Record of brand generator machine, year of factory production, duration of use (year), rice load capacity (kg/day), diesel fuel demand (liter/hour), and solar calorific value (38.66 mJ/liter).

Information:
Empg : Energy milling machine
Esolar: The heating value of diesel fuel (38.66 mJ/
liter)
lsolar : The need for diesel fuel (liter /hour)
mpdi : Milled paddy load capacity (kg/day)

3. Discussion

Comparison of Solar Fuel Efficiency on Variations in Levels

a) Small Capacity of Rice Milling Factory (SCRMF)

Tabel 1. Average Milling Energy of SCRMF

No.	Type of Energy	Average Load (kg/day)	Average Fuel (kJ/kg)	Averave Fuel (liter/hour
1.	Human Energy *(handling)*	961,81	10,45	
2.	Machine Grinding Energy	3.577,53	136,37	**13,97**
Average		**4.539,33**	**146,82**	

The conclusion of comparison: the average of milling energy SCRMF146,82 kJ/kg is smaller than MCRMF milling energy 158,62 kJ/kg, the average of MCRMF milling energy 158,62 kJ/kg smaller the average of MCRMF milling energy of 159.72 kJ/kg can be seen in Figure 1.

As for some of the formulas used in this study as follows:

d) Medium Capacity Rice Milling Plant (MCRMF)

Tabel 2. Average Milling Energy of MCRMF

No.	Type of Energy	Average Load (kg/day)	Average Fuel (kJ/kg)	Averave Fuel (liter/hour
1.	Human Energy *(handling)*	1.088,71	10,45	
2.	Machine Grinding Energy	2.424,37	148,20	**9,30**
Average		**3.513,09**	**158,65**	

e) Big Capacity of Rice Milling Factory (BCRMF)

Tabel 3. Average Milling Energy of BCRMF

No.	Type of Energy	Average Load (kg/day)	Average Fuel (kJ/kg)	Averave Fuel (liter/hour
1.	Human Energy *(handling)*	1.148,47	10,45	
2.	Machine Milling Energy	4.662,87	149,27	**18,02**
Average		**5.811,34**	**159,72**	

Tabel 4. Average grinding energy specification SCRMF, MCRMF and BCRMF

No.	Grinding Energy Specification	Average SCRMF	Average MCRMF	Average BCRMF	Unit
1.	Average Load Capacity	4.539,33	3.513,09	5.811,34	kg/day
2.	Average Fuel Requirement	13,97	9,30	18,02	liter/hour
3.	Average Milling Time	5,91	4,04	7,77	hour/day
4.	Average Rice Milling	324,95	377,57	322,53	kg/liter

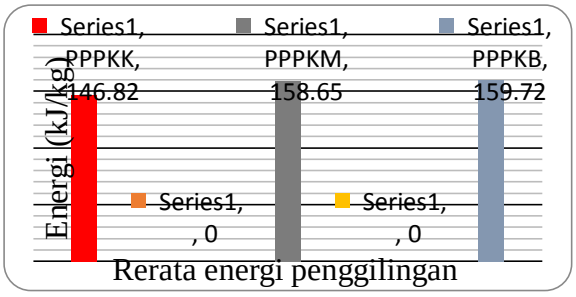

Figure 1: Average Energy Comparison RMF Energy Specification Milling

a) Average Fuel Requirement

The average SCRMF fuel requirement (13.97 liter/hour), MCRMF (9.30 liter/hour), BCRMF (18.02 liter/hour) can be seen in Table 4.

b) Average Milling Time

The average SCRMF milling time (5.91 hours/day), MCRMF (4.04 hour /day), BCRMF (7.07 hour/day) can be seen in Table 4.

c) Average Rice Milling

The mean of SCRMF rice milling (324.95 kg/liter), MCRMF (377,57 kg/liter), BCRMF (322,53 kg/liter) can be seen in Table 4.

Tabel 6. Aveage Recapitulation and Operational Energy Total SCRMF, MCRMF and BCRMF

.	Factory Type	Energy P1 (kJ/kg)	Energy P2 (kJ/kg)	Energy P3 (kJ/kg)	Energy P4 (kJ/kg)	Energy P5 (kJ/kg)	Energy Total total energi (kJ/kg)
1.	SCRMF	35,97	20,90	146,82	10,55	10,45	224,69
2.	MCRMF	48,65	20,90	158,65	10,59	10,45	249,24
3.	BCRMF	48,83	38,25	159,72	10,59	29,78	287,17

Average Maximum Load Capacity

The rice milling machine has a maximum

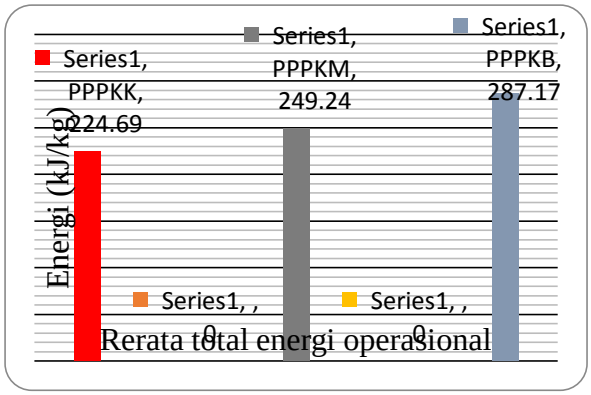

Figure 2: Average Total Operational Energy SCRMF, MCRMF and BCRMF

Energy Efficiency of Rice Milling Factory (RMF)

Energy efficiency referred to in this research is the less energy spent / used, it will be more efficient in the operation of the Rice Milling Factory (RMF).

Tabel 5. Specification of Milling Machine SCRMF, MCRMF and BCRMF

No.	Specification of Milling Machine	SCRMF	MCRMF	BCRMF	Unit
1.	Average Maximum Load Capacity	0,60	1,00	2,00	ton/jam
2.	Average Operating Load Capacity	0,77	0,87	0,75	ton/jam
3.	Average Operating Expense Percentage	127,99	86,96	37,40	%
4.	Average Load Capacity	5.392,61	9.554,20	10.941,30	kg/hari

Hypotheses

Hypothesis rejected, that based on the calculation of SCRMF more efficient even the percentage of operating expenses reached 127.99%. SCRMF uses the smallest energy compared to MCRMF. energy in the transfer of rice to be milled through a grinding machine. For example, the removal of rice from the process of rupture the skin with two repetitions, and with the grinding machine with two replications.

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SCRMF maximum capacity (0.60 ton / hour), MCRMF (1.00 ton/hour), and BCRMF (2.00 ton/hour) can be seen in Table 5.

Mean of SCRMF milling energy (146,82 kJ/kg) consists of: mean of human energy (handling) (10,45 kJ/kg), average energy of grinding machine (136,37 kJ/kg) can be seen in Table 5. This is because human energy is mostly used, as most rice milling machines still require human

4. Conclusion

The average of total operational energy: the average total SCRMF operational energy in the first (1) is smaller than the MCRMF in the second (2), and smaller than the BCRMF in third (3) can be seen in Table 5.

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(224.69 kJ / kg) is smaller than the MCRMF (233,89 kJ / kg), and smaller than BCRMF (258.77 kJ / kg) can be seen in Table 5.

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