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Status of Rice Food Security of Small Farmer Households under Intermediate Level of Mechanization in Kampar Region, Indonesia

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Abstract

Rice is the most important staple food in Indonesia and it has become a key indicator of food security across the country. In Kampar Region, most small farmers are facing challenges to meet their household's rice food security due to shrink size of rice farm and stagnate rice productivity resulting limited application of mechanization technology. This paper attempts to examine the status of rice food security of small farmer households under intermediate level of mechanization in Kampar Region, Indonesia. Field surveys were conducted in two districts, i.e. Bangkinang and Kuok of Kampar region during April to June 2018. A total of 50 small farmers, consisting of 25 small farmers from each of the districts, were purposively selected for samples. Data were collected through personal interview and analyzed by using descriptive – quantitative techniques. Under current level of mechanization, the rice production was found to average 1,376 kg with cultivated area of 3,699 m^2 on average. Based on the rice production and per capita rice consumption of 114.6 kg/year, about 56% of small farmers could fulfill a rice food need of their households as long as 12 months or more. However, about 44% of small farmers could fulfill the rice food need less than 12 months and even 22% of them could only suffice for less or equal to 6 months. It was also found that it was required about 487 m^2 to fulfill the annual per capita rice consumption under the present rice productivity of 3,75 ton/ha. There is a need to increase the level and application of mechanization technology in order to enhance rice productivity and eventually effect to rice food security of small farmer households in survey area.

Keyword: *Rice Food Security, Small Farmer Households, Mechanization, Kampar Region*

Introduction

Rice is one of the most remarkable of cultivated crops in the world (Fonjong and Athanasia. 2007). It is because the rice is the most important staple food for more than 50% of the world's population and will continue to increase in the coming decades together with increasing population that is estimated to be more than 9 billion in 2050. Rice is also the critical source of livelihood for one billion people around the world, with

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production dominated by rural and resource-poor households. Therefore, growth in agricultural productivity in real terms has a positive impact on rice production and eventually ensures household food security (Morioka and Kondo, 2017). It is become important that the advancements in agricultural productivity play a critical role in promoting food security at the individual and household levels.

Sustained increases in agricultural production and productivity require the continuous development of mechanization technology to meet the production challenges in various agro-climatic regions and encourage adoption by farmers. Machine use in agricultural production, for instance, plays an important role in the increase in productivity and reduction of unit cost of production resulting profitable making farming viable. The impact of machine use on the production, productivity, cost and profitability in paddy production was reported (Basu and Nandi, 2014).

Present level of mechanization and crop yield in many countries are quite low and varies significantly from crop to crop and in big countries it varies from region to region in the same country (Singh and Zhao, 2016). According to Lantin (2016), there are four levels of mechanization based on power source and degree of control by human intervention, namely low, intermediate, high and full mechanization levels. The intermediate level is the operation that is carried out by a mechanical power sources in combination with a non-mechanical source and controlled by human, e.g. threshing using stationery axial-flow thresher where feeding of straw-and-grain materials, supplementary cleaning and bagging are performed by human power.

Food security is the ability to secure an adequate daily supply of food that is affordable, nutritious and hygienic (Mamba and Peter, 2016). The major elements of food security are food availability, food access, food utilization and protection of access. Food availability for farm households in rural areas means assurance that they can access sufficient food through their own production or through purchase from markets, given sufficient purchasing power (Agada and Igbokwe, 2016). The lack of resources and little market accessibility are among the major factors that affect small farming household food security. In addition, Family size, monthly income, food prices, health expenses and debt are main factors influencing the food security status of rural households (Ahmed et al, 2017).

Like in many other developing countries, rice in Indonesia is also one of the most important food crops as a source of livelihood and the staple food for the majority of population. The rice need will continue to increase in the future together with increasing population and developing food industries. Currently, one of the major challenges of Indonesia is to ensure its rice production to produce enough amount to feed the population. Accordingly, majority of rice farms that are managed farmers is small in scale with relatively low productivity. The conditions can make difficulty to fulfill the need of rice consumption that achieves as much as 114.6 kg per capita per year on average in the country.

However, the question is how small farms can become viable and sustainable in the face of various challenges to fulfil rice food security. This research attempts to examine the status of rice food security of small farmer households under intermediate level of mechanization in Kampar Region, Indonesia.

Materials and Methods

Field surveys were conducted in two districts, i.e. Bangkinang and Kuok of Kampar region during April to June 2018. The locations are rice production centers in Kampar Region and the application of farm machines for rice operations is relatively high. A total of 50 small farmers, consisting of 25 small farmers from each of the districts, were purposively selected for samples. The selected farmers used farm machines in rice farming operations. Primary data were collected through personal interview with farmers by using questionnaires. The data collected were tabulated and analyzed by using descriptive – quantitative approach and simple regression technique.

Results and Discussion

Small farmer's characteristics and paddy field profile

Most small farmers interviewed were women and aged from 28 to 29 years old with an average of 45 years. Woman has a dominant role to manage rice farming operations. Their formal education ranged from 2 to 12 years with an average of 8 years. They had an adequate experience to cultivate rice as long as 16 years on average with ranging from 2 to 45 years. Family member of farmer sample ranged from 2 to 8 person with an average of 5 person. The number of family members has an effect on rice consumption and household expenditure. The bigger family members tends to require more rice and much more family expenditure.

Most small farmers are cultivated rice on rain-fed paddy field. Consequently, frequency of rice growing depends extremely on season. Generally, there are two seasons for growing rice i.e., wet and dry seasons. If rain falls along year without dry season, the rice can be grown twice a year. However, cultivating rice on wet season is most common because water supply is sufficient for tillage operation as well as rice growing until harvesting. For growing rice on dry season, farmers always face some difficulties primarily insufficient water supply into the paddy field, so rice production and productivity may become lower. Therefore, some farmers prefer to grow soybean, maize or green bean during the dry season.

Famers have a small scale of paddy field area at arrange of 0.11 to 1 hectare with an average of 0.37 hectares. The paddy field is mostly owned by farmers themselves that previously was accepted from legacy or bought from other farmers. Most farmers (31 farmers) then divided the paddy field into a smaller plot to facilitate for supplying water into the field primarily having a slightly inclined surface. The plot of owned farmers ranged from 2 to 30 plots with an average of 13 plots.

Mechanization development and level

The major farm machines in Kampar region consists of 4-wheel tractors, 2-wheel tractors, irrigation pumps, combine harvesters, power threshers and rice milling units as presented in Fig. 1. The largest number of available farm machines in the region is power threshers, followed by irrigation pumps and 2-wheel tractors. They have significantly increased during the period of 2010-2018. The smallest one is 4-wheel tractors with total number in 2018 is only 12 units and increased from 1 unit in 2010. The rice milling units have increased from 66 units in 2010 to be 73 units 2018 or increased as 10% during the period. While, combine harvesters have been available since 2017 and the machines have reached as 19 units in 2018. The combine harvester is more important in the future because the machine can concurrently perform harvesting and threshing operations.

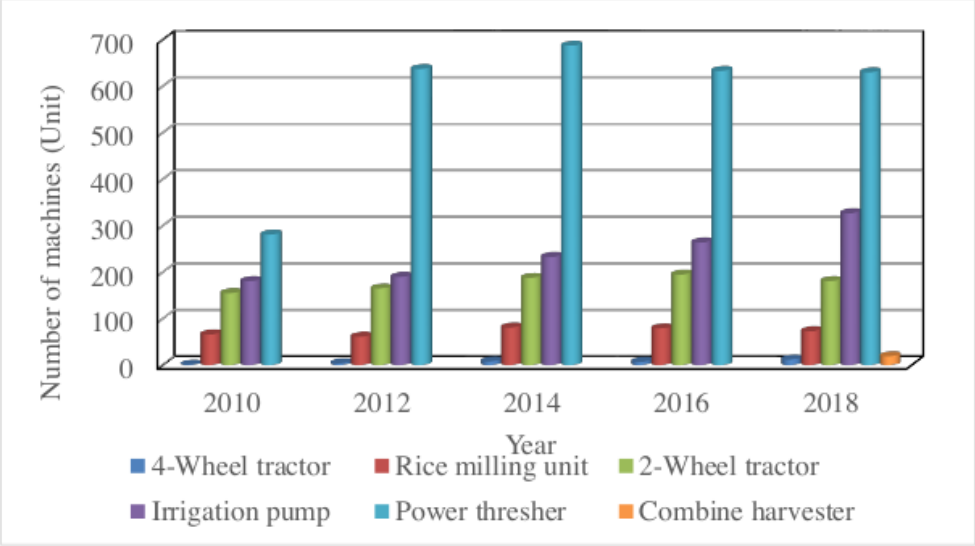

Figure 1. The development number of farm machines in Kampar Region during a period of 2010 - 2018

Figure 2 shows that the number of farm machines was not sufficient to achieve full mechanized. It is, for example for 2-wheel tractor, required at least 100 units per 1000 ha of paddy field area to reach full mechanized. While, current number of farm machines was mostly less than 100 units per 1000 ha with an average of 36 units. Power thresher has only achieved more than 100 units per 1000 ha of paddy field area, accounting for 114 units. Therefore, the current mechanization condition remains at intermediate level. Under this condition, rice productivity is difficult to reach maximum level because rice farming operations cannot be completely performed by mechanical power. It was found that rice productivity obtained small farmers was only 0.35 ton/ha on average, ranging from 0.12 to 0.62 ton/ha.

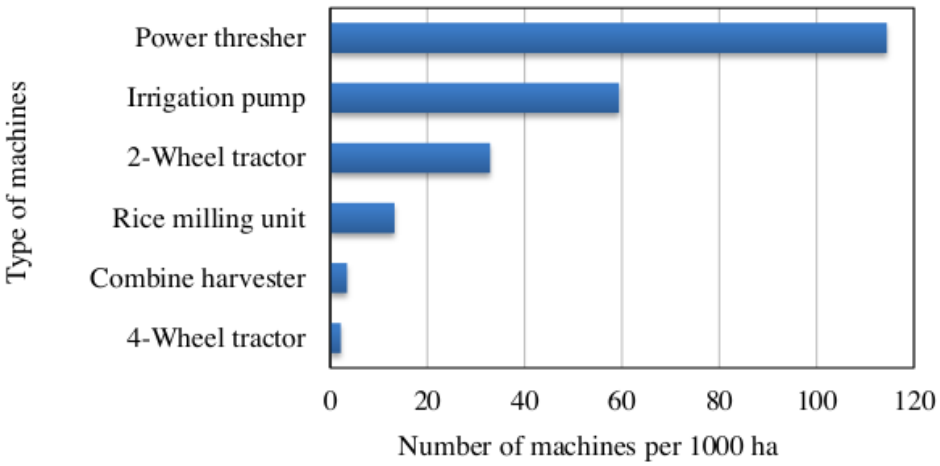

Figure 2. Number of farm machines per 1000 ha of farm area

Rice productivity may be affected by scale of rice farming cultivated area. The smaller cultivated area can make operation more effective and application of production input more appropriate. Figure 3 indicates that rice productivity tends to decrease with increasing rice farming cultivated area. Although the relationship have statistically no significant, but the scale of cultivated area had an effect on rice productivity.

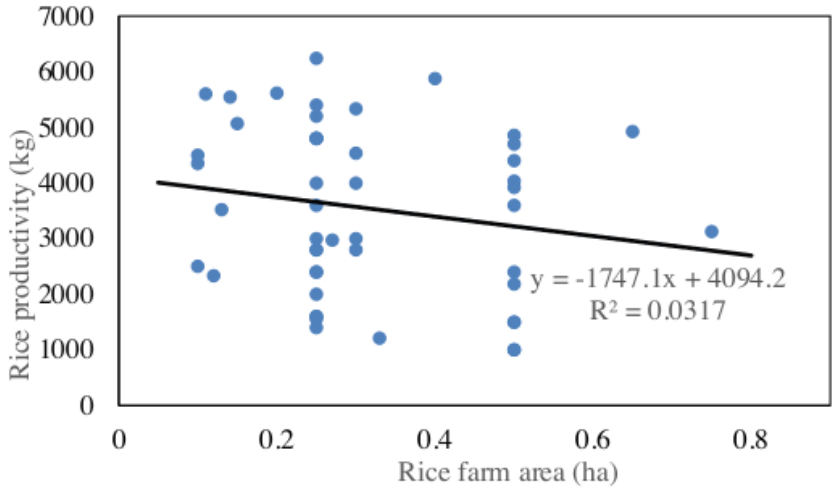

Figure 3. Relationship between farm cultivated area with rice productivity

Figure 4 shows that about 44% of small farmer households could fulfil rice need for less than one year and even 22% of them could fulfil less than 6 months. They included into insecurity level in rice food availability. It means that the deficiency of rice need will

be bought from market due to rice is staple food for small farmers in the survey area. They must increase rice productivity for two-fold or more especially for less than 6 months in order to meet rice need in sufficient level and make viable and sustainable in rice food security. The more intensive and wide range of application of farm machines into rice farming operations is the best way to increase rice yield.

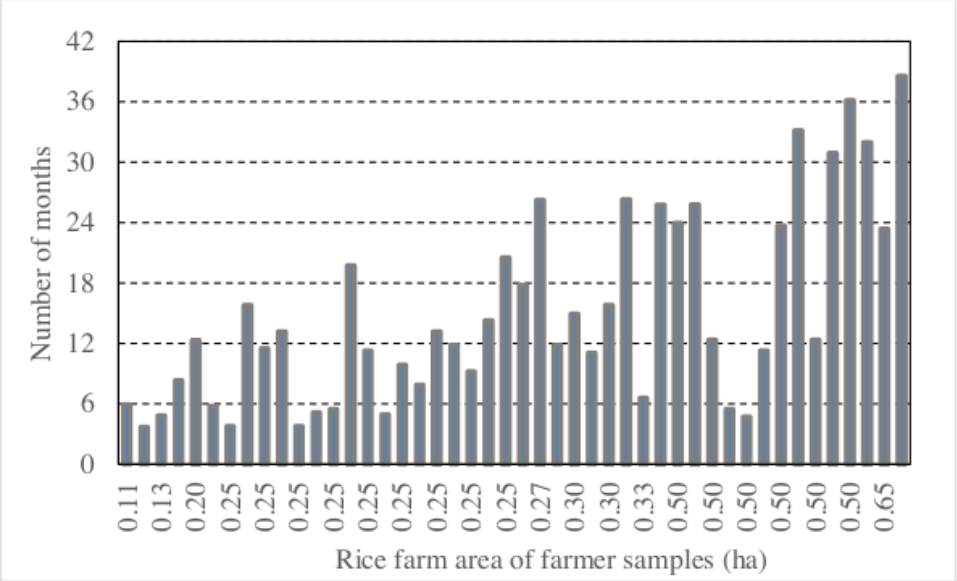

Figure 4. Rice food security of small farmer households

Conclusions

Under current level of mechanization, the rice production was found to average 1,376 kg with cultivated area of 3,699 m2 on average. There was a low correlation between rice farming area and production, although statistically is not a significant effect. Based on the rice production and rice consumption per capita of 114.6 kg/year, about 56% of small farmers could fulfill a rice food need of their households as long as 12 months or more. However, about 44% of small farmers could fulfill the rice food need less than 12 months and even 22% of them could only suffice for less or equal to 6 months. It was also found that it was required about 487 m^2 to fulfill the annual per capita rice consumption under the present rice productivity of 3,75 ton/ha. There is a need to increase the level and application of mechanization technology in order to enhance rice productivity and eventually effect to rice food security of small farmer households in survey area.

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