Analysis of rice profitability and marketing in Jakarta

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Abstract. Jakarta as a metropolitan area has rice fields spread across three urban areas. The rice marketing was usually conducted directly over harvest time, either to collectors who come to the harvest location or sell them to Subang or Indramayu. The aim of the study was to examine rice profitability and marketing in Jakarta. The study was carried out in three regions of Jakarta, namely North, West and East of Jakarta, through survey method. The respondents were 46 farmers with direct interview techniques. The profitability of rice farming was analyzed by using cost and revenue analysis, while rice marketing was analyzed by using qualitative descriptive. The results showed that rice farming in Jakarta was still profitable with the R/C ratio greater than one. The marketing chain of rice in Jakarta was generally very short. The farmers mostly sold the rice directly to large traders (Jakarta-Outside Trader; 85%), only a small proportion (15%) sold to regional collectors. As much as 90% of the grain was sold to the traders and 10% was used as seed or consumption. The selling price of rice was determined by traders based on quality of grain. The non-hulled rice price ranged Rp 4200-4500 per kg.

1. Introduction

As the staple food Indonesia, rice can be found in all regions of Indonesia, not only in rural areas but also in urban areas. In Jakarta (the capital city), there are also areas for rice cultivation, even though the it is limited. The rice fields are spreads across three areas of Jakarta, i.e. North, West and East Jakarta. Approximately 80% of rice fields in Jakarta belongs to property developers. The land has not been utilized yet and it can be used by the farmers to cultivate lowland rice. In the last five years, the planted area of rice field in Jakarta has been decreased. The average annual decrease of rice field area in Jakarta is approximately 12% [1]. One of the reasons is that the land has been used by developers to build housing or others.

The farmers who cultivated rice in Jakarta were originated from outside of Jakarta, such as Subang, Indramayu, Karawang, etc. There are several considerations for them to cultivate rice in Jakarta, one of which is due to production cost, especially cost of land rent. There are three systems of land usage for rice fields in Jakarta, i.e. with a profit-sharing system, rent or free usage without rent. Nevertheless, if the land is going to be used by the owner, the farmer has to be willing to release the land without any compensation. That was encouraging the farmers from outside Jakarta to conduct rice farming in

Jakarta. In addition, the marketing chain of rice in Jakarta was simple and easy. The aim of this study was to analyze lowland rice profitability and marketing in DKI Jakarta.

2. Research methods

2.1. Sampling techniques, location and research respondent

The study was conducted within June-July 2018 in three areas of DKI Jakarta, i.e. North, West and East Jakarta. The research location determined as location of rice fields cultivation in Jakarta. As a consideration in choosing a research location was that location rice fields planted in Jakarta. The research respondents were 46 farmers (20 farmers from North Jakarta, eight farmers from East Jakarta, and 18 farmers from West Jakarta). The method of determining the research respondents was simple random sampling.

2.2. Data collection

The collected data were primary and secondary data. Primary data was collected through direct interviews with respondents using a structured questionnaire. Secondary data were collected from related agencies, such as Center for Agricultural Data and Information System, Ministry of Agriculture.

2.3. Data analysis

Rice farming income was calculated by used the following formula [2]:

$$I = Q.pQ - (\sum Xi.pXi - \sum Yi.pYi) \quad (1)$$

Where I = Income
Q = Total production (Kg / Ha)
pQ = production price per unit (IDR / kg)
Xi = The quantity of input variable Xi (i = 1,2,3, ...)
pXi = The Variable input price (IDR / kg)
Yi = The quantity of fixed input Xi (I = 1,2,3, ...)
pYi = Fixed input price (IDR / kg)

To calculate the feasibility of lowland rice farming was used the following formula [2]:

$$\frac{R}{C} = \frac{TR}{TC} = \frac{(Q.pQ)}{(\sum_{i=1}^{n} Xi.\ pXi)} \quad (2)$$

Where TR = Total Revenue (IDR)
TC = Total Cost (IDR)
Q = Quantum (Total Production) = Kg
pQ = Production price (IDR)
Xi = Total input X ith (i = 1,2,3, ...)
pXi = input price X ith (IDR / kg)

Decision rule:
R / C > 1 means that the farming is efficient.
R / C <1 means that the farming is not efficient.
R / C = 1 means that the farming is breaking even.

3. Result and discussion

3.1. Rice farming in DKI Jakarta

3.1.1. The area and frequency of planting. The average of lowland rice in the research location was 24.2 hectares, the largest area in North Jakarta of 13.9 hectares, followed by West Jakarta (5.5 hectares) and East Jakarta (4.7 hectares). Most of the rice fields in DKI Jakarta owned by developers that have not used that land yet. They allowed the farmers to use the land, but if they want to use it, the farmers should hand it back without compensation. There were three systems to use the land: rent system, profit sharing between the farmers and the owner, or freely use system without rent. Most of the farmers could use the land with profit sharing. In North Jakarta, most of the rice fields were rented (50%), in East Jakarta it was profit-sharing (54%), and in West Jakarta without rent (46%).

The frequency of rice cultivation in Jakarta generally 1-3 times a year, but the average rice planting index in Jakarta was only 2.09, which means that rice cultivation was less than three times a year. It was influenced by the availability of water to irrigate rice fields. In several locations, the farmers have been able to cultivate three times a year, but in some locations it was unable. During the rainy season, the rice fields were submerged in water, while in the dry season, it was a drought. the cultivation can be conducted only once a year. However, according to Muslim [3], there was no relationship between rice productivity and planting index. Increasing the rice Planting Index (IP) can be carried out under several aspects, i.e. from a technical aspect namely: (a) introduction of very early maturity of lowland rice varieties; (b) making the nursery outside the location of rice fields; (c) good soil cultivation; (d) introduction of decomposer technology to accelerate the weathering of straw and maintaining soil quality; and (e) more intensive monitoring of pests and diseases. From an economic aspects: a) increasing the efficiency of production costs and applying fertilizers based on Rice Field Test Kit; (b) build the readiness of the harvesting group so that the harvest will be on time; (c) it is necessary to have a policy to maintain the stability of the selling non-hulled rice either through National Logistical Supply Organization or farmers groups. The last from the institutional aspects: (a) institutional design of farmer groups and pest control, as well as crop management; (b) availability of support for adaptive microfinance institutions that are easily accessible by farmers or farmer groups; (c) assistance from the Agricultural Research and Development Agency [4]. In Tanzania, the constraints for economic viability of rice production were weather variability, lack of access to irrigation services, rice price instability, lack of access to agricultural information and technology, and poor access to the key production inputs [5].

Generally, there were three seasons of planting rice. The first planting season was carried out in January/February, the second planting season was in May/June and the third planting season was in September/November. The planting system was still conventional, in accordance with the habits practiced by farmers from their hometown. The planting system was monoculture system, without being mixed with fish (*minapadi*), even though mixed farming rice and fish provide more income[6,7]. Rice-fish farming provides a higher income than non- Rice-fish (monoculture). However, the Rice-fish farming system cannot be implemented in Jakarta, because there are several requirements on *minapadi* system, including: the water used have to meet standard quality for cultivation and sanitation; no pollution either by physical, chemical or biological contaminants from nature, industry, settlement and agriculture; as well as has a good water management system. Thus, the water is easy to control. Moreover, the location must be flood-free and in accordance with the spatial and regional planning [8]. The rice fields in Jakarta have not fulfilled the requirements.

In Jakarta, not all farmers cultivated rice simultaneously. Only in East Jakarta the farmers have simultaneous cultivation. They were considered that simultaneously cultivation will have an effect on the intensity of pests' attack. The pest attack will not only focus on one plot, but also spread over one stretch. Then the intensity of the pest attack or pest population will be decreased. Moreover, the losses incurred if cultivation were not carried out simultaneously. Several reasons of non-simultaneous cultivation were:

1. The limited of labor. During the cultivation season, the amounts of labors were not proportional to the field. Thus, the planting interval between one farmer and another was long or more than two weeks. The ideal interval is one week at the same time.
2. Limited availability of water in several locations, especially during the dry season. Rice fields in West Jakarta were rain fed system. Thus, rice fields cannot fully plant in the dry season.
3. Several locations prone to flooding. Therefore, the farmers unwilling to plant during the peak of the rainy season.

3.1.2. Cultivated rice varieties. In Jakarta, most of the farmers used Ciherang variety in their cultivation (more than 50%). Other varieties used were Kemuning, Si Denuk, Mekongga, IR64, Cibatu and Inpari. In North Jakarta, most of farmers used Sidenuk, while in East Jakarta used Kemuning, and in West Jakarta used Cibatu. Their reasons for using those varieties were short age, more of tillers, high yields, and sold easily or preferred by the community. The origin of the seed was from the traders or from own yield. They used labeled seeds and the harvest time was on 100-120 days after planting. However, the yield was not optimal, because the seeds have been planted 2-5 times.

3.1.3. Harvest and postharvest. Harvest time was conducted on 100-120 days after planting, by using harvesting tools such as sickles. The average production was 5.8-6.2 tones/ha/season. The grain yield was relatively good with a range of 67-72%. After harvesting or two days later, the grain was sold directly to collectors or middlemen who came directly to the farmers' fields. There were no post-harvest activities carried out by the farmers, because most of the farmers did not have a drying floor. Furthermore, the rice was distributed by middlemen to the wholesalers, who live near the farmer's land or outside the farmer's area.

3.1.4. Analysis of rice farming in DKI Jakarta. The average cost for rice farming in Jakarta reached Rp. 15,954,755/ha. The highest cost was labor cost, followed by cost of fertilizers and pesticides. However, Pudaka *et. al.* [9] reported several factors that affected significantly on rice production, namely land, seeds, pesticides and labor, whereas fertilizer had no significant effect. Nonetheless, the costs of rice farming in Jakarta were still cheaper than the costs of rice farming in Pakistan. In Pakistan, the average total cost per acre spent approximately of Rs.41910.00 (IDR 20,225,614/ha), this capital inputs included fixed cost, land preparation, seed and sowing, farm inputs, harvesting and threshing marketing costs as much as Rs.15200.00, Rs.2350.00, Rs.2900.00, Rs.7460.00, Rs.7400.00 and Rs.6600.00 respectively [10]. In Bangladesh, the most important factors of rice production were irrigation, labor, fertilizer and insecticide cost whose elasticities were 0.904, 0.048, 0.045 and 0.044 respectively [11].

Table 1. Analysis of rice farming in DKI Jakarta

No	Description	North Jakarta	East Jakarta	West Jakarta	The Average
1	Variable Cost (IDR)	14,432,800	14,095,500	19,335,454	15,954,755
2	Fixed Costs (Depreciation of equipment) (IDR)	170,000	170,000	170,000	170,000
3	Production (Kg)	5,800	6,000	6,200	6,000
4	Production Price (IDR/Kg)	4,500	4,500	4,200	4,400
5	Revenue (Rp)	26,100,000	27,000,000	26,040,000	26,380,000
6	Profit (Rp)	11,667,030	12,904,330	6,704,376	10,425.245
7	R/C ratio	1.81	1.92	1.35	1.69
8	BEP Production Price (Rp)	2,488	2,349	3,119	2,652

3.2. Rice marketing in DKI Jakarta

3.2.1. Rice marketing channel in DKI Jakarta. The rice marketing chain in Jakarta was very short. Most of the farmers sold directly to outside-traders (85%). Only a small portion of farmers whom sold their rice to regional collector-traders (Figure 1). Most of the production (90%) was sold to traders and only a small portion (10%) was used for seeds. The selling price of grain was quite good, ranging from IDR 4200-4500 per kg. The selling price was determined by traders, the farmers were only the receiver of price. This showed that the bargaining position of farmers are very weak. This almost always happens to smallholders. In Nigeria, the purchase price of rice was entirely dependent on demand and supply of rice market per day [12]. The rice marketing channels in DKI Jakarta come from various regions, such as Cianjur, Karawang, Cirebon, West Java and Central Java [13,14]. The results of Trisilawatya *et al.* [15] showed that the optimal rice supply chain structure for the Jakarta area was carried out through regional procurement from West Java and South Sulawesi. Rice distribution cost was set at different rates for each distribution area. For Jakarta area, the cost of rice distribution was set at a fixed (same) tariff for each distribution area in Jakarta. The results of Febyana [16] showed that an integrated marketing chain was more efficient than other chains.

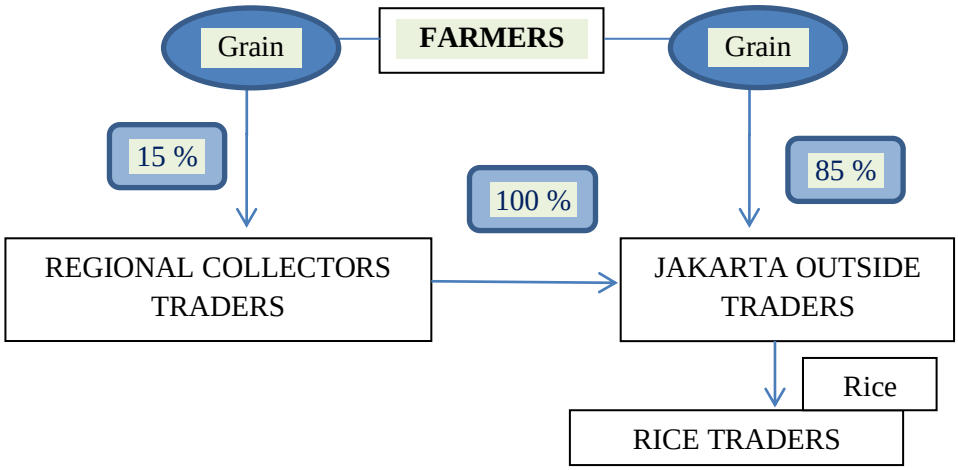

Figure 1. Rice marketing channel in DKI Jakarta

The farmers did not carry out post-harvest activities neither drying, processing, nor milling into rice. Rice was immediately sold at the time of harvesting. Sometimes collecting traders were already at the harvesting location during harvest time. Because of there were no post-harvest activities carried out, the farmers did not pay for post-harvest activities. This greatly affects the profits received by the farmers. The same as in Tanzania, traditionally, farmers sell their products to wholesalers directly and through intermediaries. Farmers were not involved in any processing, and they were sold their product as rice to intermediaries and wholesalers. Intermediaries were the key players in rural markets, buying directly as agents of wholesalers [17].

3.2.2. Rice Marketing Functions in DKI Jakarta. In the marketing process, there were marketing functions carried out by marketing actors. The functions aimed to increase product value. The marketing functions include exchange function, physical function, and facilitation function.

(1) Exchange function. In the exchange function, there was a buying function and a sales function. Purchases of grain were done by collecting traders and wholesalers (Jakarta outside traders). Price is determined by collecting traders and wholesalers. The payment system was done in cash. The sales function was carried out directly by the farmer after harvesting. The farmers sold their production directly after harvesting because they did not have the drying floor to dry their harvesting production.

(2) Physical function. In physical functions, there were functions of storage, transportation, and processing. At the farm level, the storage function was not performed. The farmers did not store in a real sense. The farmers wait for buyers for 1-2 days. The storage function was carried out by the wholesaler. The wholesaler will be processed the grain into the rice. The functions of transportation were not carried out by farmers, because farmers were waiting for buyers on the land or at home. Transportation was carried out by collectors/wholesalers. Transportation costs were paid by the wholesaler. The processing function was carried out by the wholesaler.

(3) Facilitation function. The facilitation function consists of standardization and grading functions, risk assumption functions, financing functions, and market information functions. Standardization and Grading functions were carried out by intermediate traders or wholesalers. However, standardization was only based on whether or not the rice was good (the color was yellow or white, smelly or not). The cost of good rice was more than the bad ones. The risk-bearing function was often paid by the farmers, especially during the rainy season. The production was not good enough because at the purchasing time the rice was often wet so that the color of the rice less bright. In the financing function, the costs incurred for product marketing consist of sack costs (Rp 20/piece), weight and transport costs (Rp 25), and transportation costs to wholesalers (Rp 88 / kg). All costs were paid by the wholesaler. In the market information function, farmers receive market information from intermediate traders or wholesalers. Market information was mainly: prices.

4. Conclusion

The result showed that rice farming activities in Jakarta were profitable with an R/C ratio more than 1 (1.69), which means that for every 1 IDR spent, the profit earned is IDR 1.69. The rice marketing chain in Jakarta is very short, as from farmers sold directly to wholesalers, only a small portion of which sold to collectors or middlemen. Farmers did not carry out post-harvest activities, neither drying, processing, nor milling into rice.

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