International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 9, Issue 1, 2019

Comparative Analysis of Wet and Dry Season Rice Cropping

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Rice crop production almost always depends on the season, which can influence production activity. The research concerning the comparative study of wet and dry season rice, aimed to know the impact both of planting seasons on farmer production yield, cost, revenue, and income. The research method used a case study on farmer group Chandrapati at Pejaten, Sidamulih District Pangandaran by the census to all of the members as respondents of 25 persons. We collected the primary and secondary data and analysed it with the Wilcoxon test from August until November 2015. The result showed that there were three significant differences among production, cost, revenue, and income of wet and dry season rice crop production. Wet season rice crop production was higher than the dry season (2.011 ton/0.4 acre or 5.0275ton/acre Vs. 1.765 ton/0.4 ha or 4.4125 ton/acre. In contrast to the total production cost, the dry season (2,709,472IDR) was higher than the wet season (2.597.272 IDR). Revenue and income of rice crop production were higher in the dry season than in a wet season as well. Dry season revenue was 7.943.400 IDR, and wet season revenue was 7,641,496IDR, while dry season income was 5,233,928 and wet season income 2,597,244.

Key words: *Diversification, Wet season, Dry Season.*

Introduction

Rice is the essential staple food for almost 85 percent of Indonesian people. Generally, Food security in Indonesia has been in the medium category from 1983 until 2011, with an index average of 0.984. Although food diversification from rice to any carbohydrate-containing matter has excellent progress in the consumption aspect, the aggregate rice consumption per capita has not emerged with significant change yet due to becoming a strategical commodity (Sastraatmadja, 2007 in Wiwik Ambasari, at al. 2014). This matter texted on agriculture development blueprint, that indicated the target of the staple commodity of food crops until 2006 and rice-based government food stock (Dwidjono H. Darwanto, 2005).

Varying rice policy and production improving program has been carried out seriously by the Agricultural Ministry. Nevertheless, the challenges and problems are getting heavy due to uneasy constraints that could not be coped with by technology, such as weather and climate (Pendleton & Lawson, 1988 in Miqdad Anwarie, 2015). According to Muklasin and Syahnen (2014), the effect of climate change on the agricultural sector that results in the loss directly was flood, drought, pest, and disease attack.

Sheika Dayenne R. (2010) assumed that rice production almost depends on the season that affects product activity. In the wet season, the height of rainfall and made the ready-harvested rice crop flooded, and if the flood was not lessened for several days, it caused the rice crop to blast. Whereas, it is often that the dry season's rice crop is planted late, due to lack of rainfall, and irrigation water stock is limited. The price of the wet season rice crop went down in contrast to the dry season, which went up. It would impact farmer yield, cost, revenue, and income.

FAO's study (2005) indicated that the impact of variabilities and climate change could decrease crop production (cereal) 2.5 percent – 7.8 percent in South East Asia (Fischer et al., 2002 in Miqdad Anwarie, 2015). According to Anjak (2012), recently, rice crop productivity is in a high enough category, yield 4.98 tons milled dry grain/acre/season surrounding 2.8 – 9 ton/acre/season. The technical efficiency level is high enough reached 0.78 (maximum 1), range 0.23 – 0.99.

Due to those, the research was conducted, to compare wet and dry season rice crops, to determine the impact on both wet and dry season on farmer production, cost, revenue, and income. Therefore, this could become the information material for the farmer to cultivate rice crop production and as consideration matter for government policy in the agriculture sector at once.

Method

The research method used a case study of farmer group Chandrapati in Pejaten, Sidamulih Pangandaran. The research used the census method to all 25 members of the farmer group as respondents. According to Moehar Daniel (2003), a case study is comprehensive data collecting in order to gain information needed for analysis, with more detail. The data consisted of primary data collected by direct interview with the respondent and was focused on production input, cost, output, and price per unit — the secondary data was collected by literature study and linked institution to the research.

To know how much cost, revenue, and income of wet and dry season rice crop Analysis outline (Soekartawi, 2000) was used, as follows:

$$\boldsymbol{TC_{R-G} = (TFC_{R-G} + TVC_{R-G})}$$

Note:
$\boldsymbol{TC_{R-G}}$ = *Total Cost* Wet/DrySeason
$\boldsymbol{TFC_{R-G}}$ = *Total Fixed Cost* Wet/Dry Season
$\boldsymbol{TVC_{R-G}}$ = *Total Variable Cost* Wet/Dry Season

Revenue is Total production average times sell price per unit production. Generally, the total revenue expressed as the following equation:

$$\boldsymbol{TR_{R-G} = (TP_{R-G}.HP_{R-G})}$$

Note:
$\boldsymbol{TR_{R-G}}$ = Total Revenue Wet/DrySeason
$\boldsymbol{TP_{R-G}}$ = Total Production Wet/Dry Season
$\boldsymbol{HP_{R-G}}$ = Rice Unit price Wet/Dry Season

Farming income is the difference in revenue and total cost. The formula is as follows:

$$\boldsymbol{Pd_{R-G} = (TR_{R-G}.TC_{R-G})}$$

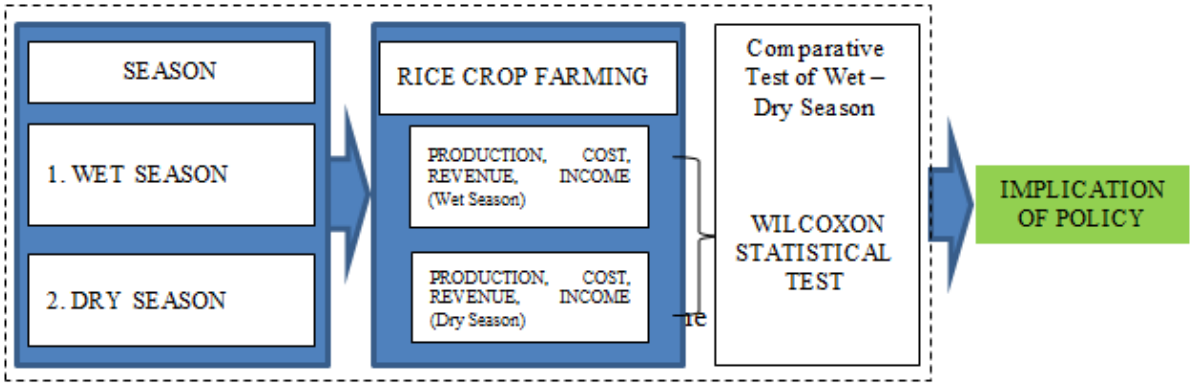
Note:
$\boldsymbol{Pd_{R-G}}$ = Rice Farming Income Wet/Dry Season
$\boldsymbol{TR_{R-G}}$ = Total Revenue Wet/Dry Season Rice
$\boldsymbol{TC_{R-G}}$ = Total Cost Wet/Dry Season Rice

Comparative analysis of cost, production, revenue, and income of the wet season rice crop and dry season used the Wilcoxon test (Sukawana, 2008). Hypothesis s followed:
$H_0: d = 0$ (No significant difference between both treatments)
$H_1: d \neq 0$ (Significant difference between both treatments)

The d value is the difference between both treatments. The formula as followed:

$$Z = \frac{T - [\frac{1}{4N(N+1)}]}{\sqrt{\frac{1}{24N(N+1)(2N+1)}}}$$

Noted:
N = Number of data are given different treatments.
T = Number of rank from the negative difference (if the decisive difference is more than negative) or the number of ranks from the positive difference (if the negative difference is more than positive). The critical area refused H_0 if the absolute value of Z is higher than Z 2/α



The main target/goal of agricultural development is to increase farmer production and income. Sheika Dayenne R. (2010) stated that rice production depends on the season with their production activities. Besides, the price of rice in the wet season was going down because of harvest time. The price of rice in the dry season was going up because of a lack of season come. This condition has an impact on farmer revenue and income due to those who need the policy to deal with rice price stabilisation (Suswono, 2008).

Result and Discussion

Comparative Analysis of Rice Crop Production between Wet and Dry Season

Rice variety Ciherang was used by the respondent farmer to plant in the wet and dry season as Seed Institution of Rice Sukamandi Subang Bambang Suprihatno, et al., 2009) that Variety of Ciherang is the suitable variety to plant at both season, either wet or dry season, below 500 m on sea level. The farmer cultivated Rice crop by Jajar Legowo system 50 cm x 25 cm x 15 cm within 1 – 3 seedlings per plant hole. The cultivation technique accorded to the suggestion of Agriculture, Fisheries, and Forestry Extention Institution Sidamulih District Pangandaran.

Rice crop production needs money to fund the whole crop production activity. The total cost for these wet and dry seasons consisted of fixed and variable costs (Rahim dan Hastuti, 2007 in Eni Yulinda, 2012). The sum of both costs as followed:

Table 1: The Total Cost Rice Crop Production between Wet and Dry Season on 0,4 acre

No	Details	Wet Season Value (Rp)	Wet Season Value (Rp)
1	Fixed Cost	134,472.00	134,472.00
2	Variable Cost	2,462,800.00	2,575,000.00
Total Cost		**2,597,272.00**	**2,709,472.00**

Resource: Processed Primary Data, 2015

The Wilcoxon analysis test indicated the significance of total cost between the wet season and dry season. Dry season required a higher total cost than the wet season. Prihantoro (2008) explained that the high cost was for stabilising crop production on the monsoon period of climate change, for example, by adding irrigation facilitation and input productions.

Tabel 2: The fixed Cost Wet and Dry Season Rice Crop Production in 0.4 Acre.

No	Detail	Wet season Rice Cost (Rp)	Padi Gadu Nilai (Rp)
1	Tax	70,000.00	70,000.00
2	Equipment Depreciation	64,472.00	64,472.00
Jumlah Biaya Tetap		**134,472.00**	**134,472.00**

Resource: Processed Primary data, 2015

If seen further, the fixed cost of wet and dry season rice crop production was similar: 134,472.00 IDR. It was caused by the fixed cost component which did not influence production size. The fixed cost component included taxes and depreciation costs (Table 2). The variable cost component was the same, and some were different between wet and dry season (Table 3).

Table 3: Variable Cost of Wet and Dry Season Rice Crop Production on 0,4 acre

No	**Detail**	**Wet Season Rice Crop Cost (IDR)**	**Dry Season Rice Crop Cost (IDR)**
A	**Sarana Produksi**		
1	Seed	56,000.00	56,000.00
2	Fertiliser		
	- Ureum	72,000.00	72,000.00
	- NPK	276,000.00	276,000.00
3	Organic Fertiliser	340,000.00	340,000.00
4	Pesticide	9,000.00	9,000.00
B	**Labour force Cost**		
1	Tillage:		
	a. Tractor	560,000.00	560,000.00
	b. Labour force	203,000.00	194,000.00
2	Planting	253,000.00	194,000.00

3	Fertilising	172,000.00	169,000.00
4	Weeding	172,000.00	169,000.00
5	Harvesting	253,000.00	214,000.00
6	Post-Harvest	96,800.00	96,800.00
C	**Biaya lain-lain**		
1	Irrigation I	-	114,400.00
2	Irrigation II	-	114.400.00
Total variable cost		**2,462,800.00**	**2,575,000.00**

Resource: Processed Primary data, 2015

The cost for seed, inorganic, and organic fertiliser were the same for both seasons, but more pesticides were needed in the wet season. It caused the wet season to be vulnerable to pest and disease attack, due to humid climate trigger pest, and disease emerged more than in dry season. Therefore, more money was needed to control these intensively.

Labour force cost at the wet season reached 1,709,800 IDR and was lower than dry season 1,825,600 IDR. Irrigation activity addition made for a higher cost in the dry season. It influenced the total cost. However, if it concerned one by one, the variable cost for labour force at wet season rice crop production was higher than the dry season. Variable cost included the activity of tillage and weeding, and needed a higher cost in the wet season because of the fast weed growth as well. Weed could grow fast and thrive in water in the right conditions. So, it needed to add a workforce for tillage and weeding.

Planting, fertilising and harvesting cost needed more labour force in the wet than the dry season. To plant rice seedlings in the wet season, one must be more careful because of its vulnerability to flooding, resulting in the rice seedling being revealed and shifted from the plant hole. So, the labour force must fertilise more in the wet than the dry season, because there was a risk to waste and the need for suitable application, according to suggestion in order to be intake by plant cultivation. Harvest and postharvest activity also needed a high labour force, due to the humid conditions. It needed time, technique, and to be handled properly to achieve the expected yield.

The cost of rice crop production was lower in the wet season than the dry season. Because in the dry season, a watering activity was added that needs a large labour force cost to overcome the lack of water. Labour force cost due to watering was high enough, and the caused variable cost in the dry season was higher than in the wet season. Finally, the total cost of rice crop production that consisted of fixed and variable cost in the dry season was higher than the wet season.

Comparative Analysis of Rice Crop Production between Wet and Dry Season

Rice crop production carried out by respondents used Ciherang variety/line on 0.4 acres resulted in 2.011 tons of Un-milled dry rice in the wet season and 1.765 tons in the dry season. Hence, it decreased productivity by about 12.23 percent. Decreased productivity was higher than Fischer et al. (2002) statement in Miqdad Anwarie (2015), that FAO studied (2005) the impact of variability and climate change could reduce crop production (cereal) in South East Asia between 2.5 percent – 7.8 percent.

Rainfall type, according to Schmidt dan Fergusson was based on rainfall data along ten years from 2004 until 2013. The research site included rainfall type D in the medium property. That was the reason why water stock was very restrictive in the dry season than in the wet, because watering had to be done instead.

If converted to one acre, the production reached 5.0275 tons. Unmilled Dry Rice in the wet season was higher than in dry season: 4.4125 tons. Rice variety/line description released by Seed Institution of Rice Sukamandi (2009), Ciherang variety has average yields 6 ton/acre in potency to 8.5 ton/acre. Hence, the respondent's rice yield was lower than the released description from the seed institution of rice Sukamandi (2009) either in the wet or dry season.

The Wilcoxon test analysis-based stated that there were significant differences between wet and dry season rice production. Rice yield in the wet season was higher than the dry season (Table 4). According to Any Ivans, Wan Abbas Zakaria, dan Helvi Yenfika (2013), rainfall in the wet season was higher than the dry season, the utility of production factors was not efficient, and this caused crop production to be low. Prihantoro (2008) explained that climate change influenced the agricultural sector, some decline in crop productivity, yield, width irrigation, nutrient intake, pest, and disease spreading.

Table 4: The Revenue of Wet and Dry season Rice Crop Production on 0,4 acres.

No	Detail	Wet Season Rice	Dry Season Rice
1	Production (ton)	2.011	1.765
2	Price (IDR/ton)	3,800,000	4,500,000
Revenue		7,641,800	7,942,500

Resource: Processed Primary Data, 2015.

The farmer sold the unmilled dry rice either from the wet or dry season yield. The price of wet season rice was 3,700,000 IDR/ton, while dry season rice price was 4,500,000 IDR/ton. There was a 700,000 IDR difference price between wet and dry season rice prices.

The dry season rice price was higher due to this season was a national shortage from June – September, which only reached 25 – 30 percent of total national production. Whereas in the wet season, being harvest season (February – May), reached 60 – 65 percent. Both of these conditions triggered the rice price to be higher in the dry season and cheaper in the wet season.

Therefore, it needed to stabilise rice prices to maintain economic stabilisation. Due to increasing rice prices influenced by increasing poor community, Ikhsan (2001) stated that raising 10% of rice prices will increase a 1% poor population proportion in Indonesia. It has become an important argument to define rice price policy.

The lowest price policy of rice milled and unmilled has been implemented since 2008, and realised by Bulog (Logistic Institution), and has the positive impact of giving intensive to produce and contributed to stabilising unmilled and milled rice (Indrawati 1997; Kasryno 1997; Timmer 1997; Prijambodo, 2001 dan Saifullah, 2001). Nevertheless, some wonder at its effectiveness when compared to the big government budget needed (Indrawati 1997). Besides, formally lowest price policy was still valid in 1997-2000 or called the economic crisis era and early reformation era, and this policy was not effective anymore due to lost policy support. (Saifullah 2001).

Wilcoxon test-based analysis indicated the difference in income between wet and dry season rice crop production was significant. Dry season reached a higher revenue than the wet season (Table 4). Therefore, although the yield was lower in the dry season, the price was higher than the rice crop production in the wet season.

Comparative Analysis of Rice Crop Income between Wet and Dry Season

Soekartawi (2000) said that crop production income is the difference between revenue and total cost. While Dumairy (1999: 50 in Ida Syamsu Roidah, 2013), said that income is received by production factors along the production process such as salary, land rent, rate, and profit. Rice Crop Production Income in the wet and dry season (Table 5).

Table 5: Rice Crop Farming Income in Dry and Wet Season on 0.4 ha Area.

No	Uraian	Revenue (IDR)	Total Cost (IDR)	Income (IDR)
1	Wet Season Rice Crop	7,641,496.00	2,597,272.00	5,044,244.00
2	Dry Season Rice Crop	7,943,400.00	2,709,472.00	5,233,928.00
Jumlah		**18,971,496.00**	**7,510,422.00**	**11,461,074.00**

Resource: Processed Primary Data, 2015.

Wilcoxon test determined the significant difference in income between the wet season and dry season rice crop. However, the dry season rice crop needs more cost but gave a higher income than the wet season. It was due to the price of the unhulled paddy in the dry season being higher than in the wet season.

Suswono (2007) stated that one of BULOG rules in national rice management is as a price stabiliser. Price stabilisation based on simple logic such as food distribution gives benefit to the producer (farmer) and consumer, so distribution management does not depend on the market mechanism. However, therefore, the state has to take active participation in managing food supply in any season.

Policy Implication

The result showed that 1) Wet season rice crop revenue was lower than a dry season; 2) Total cost in the wet season was lower than a dry season; 3) Income in the wet season was lower than the dry season.

We identified policy implication following:

1. We need the good water management in dry or wet season. Irrigation management is needed both in the rendeng season and the gadu season. In the rendeng season it is necessary to prepare against pests and diseases that have the potential to reduce yield. There is also a need to anticipate a water supply deficit.
2. There needs to be more support from the government for rice farmers in terms of irrigation infrastructure development and supporting sectors, such as access to farm finance and agricultural risk insurance.

Conclusion and Suggestion

Conclusion

The rice yield in the wet season was higher (5.0275/ha) than the dry season (4.4125 ton/ha). The total cost was 2,709,472. IDR in the dry season was 2.597.272 IDR higher than a wet season, as well. Revenue reached Rp 7.943.400 in the dry season, higher than the wet season (7,641,496 IDR). Income reached 5,233,928 IR in dry season, higher than in the wet season (2,597,244) as well.

Suggestion

Although in the dry season, the farmer could grow rice crops with government support, and deal with coping and resolving water problems in the dry season, so as to achieve increasing rice production. Then in the wet season, it could control the price to avoid high price fluctuation.

Acknowledgment

We thank Rector, Research and Community Engagement Institution and staff, and also the Dean of Agriculture Faculty of Siliwangi University who have granted this research.

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