PLANTING INDEX 400: INNOVATION IN ACHIEVING RICE SELF - SUFFICIENCY

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Abstract

The higher population affects increasing national rice consumption, but it is not balanced with the land area due to shrinking. This has prompted the government to implement various policies, one of which is the Plantation Index 400 (IP 400). An example of a successful form of the 400 Crop Index is Sukoharjo Regency, harvested during the January-March period covering an area of 2,088 hectares producing 45,422 tons of grain. Currently, the planted area of the 400 Planting Index has reached 10,000 hectares. This paper aims to analyze the 400 Planting Index innovation efforts in realizing food self-sufficiency. The method in this study is a qualitative method using pre-existing secondary data sources, such as journals, online articles, data from the Central Statistics Agency, and related books or guidelines. The results of this study are to analyze the role of the agricultural sector as a food supplier for the community, the application of the 400 Cropping Index innovation, the adaptation of Indonesian farmers to the 400 Planting Index innovation, and analyze the 400 Planting Index innovation in increasing the amount of rice production to achieve rice self-sufficiency. The realization of the 400 Planting Index application is carried out by planting the first rice in the rainy season, then followed by the second planting of rice in the dry season, and the fourth rice before the rainy season the following year.

Keywords: rice production, rice self-sufficiency, agricultural innovation, Plantation Index 400

1 INTRODUCTION

The amount of Indonesian rice consumption is very high, this is evidenced by data from the 2019 Central Statistics Agency, which shows the total rice consumption of the Indonesian population is 103.62 kg per capita per year. This figure is higher than the standard set by the FAO (Food And Agricultural Organization), which is 60-65 kg per capita per year, so Indonesia occupies the third largest position in the world after China and India in terms of the amount of national rice consumption [1]. The high consumption of national rice is caused by the majority of Indonesian people's staple food is rice and the population continues to increase. Data from the Directorate General of Dukcapil of the Ministry of Home Affairs shows that Indonesia's population will reach 273 million people in the second semester of 2021, while according to Worldmeter data, Indonesia's population in April 2022 will reach 278 million people, meaning that Indonesia's population is 3.51 per cent of the world's total population [2]. Thomas Robert Malthus in 1978, had predicted that the population would grow faster than the increase in the amount of food. This is a challenge for the Indonesian people to meet the population's food because food is a human right for every citizen and is an obligation that must be carried out by the government. As stipulated in the 1945 Constitution Article 281 paragraph, 4 which reads "Protection, promotion, enforcement, and fulfilment of human rights are the responsibility of the state, especially the government." Thus, various government efforts are needed to formulate and implement food security programs to ensure that food needs and affordable and adequate nutrition are met. However, providing rice for the population with a high growth rate will not be able to rely on land area and rice harvest area, which currently tends to shrink. Data from the Central Statistics Agency for 2022 states that in 2021 the total rice harvested area will decrease by 2.30% compared to 2020 [3]. Increasing land area is not an easy job and requires a lot of time and money, so it is necessary to increase the harvested area to achieve self-sufficiency. According to FAO 1999, a country is self-sufficient if its total production can meet 90% of national

needs. The achievement of the rice self-sufficiency program is closely related to the agricultural sector because the agricultural sector has an important contribution as a producer and supplier of food for the community [4]. History records that in 1984 Indonesia achieved self-sufficiency for the first time. At that time, the agricultural sector succeeded in narrowing the gap in rice demand in the midst of relatively high population growth of around 2.3 - 2.7 percent and per capita income of 4 per cent [5]. Then the record was again achieved in 2022 by getting an award from the International Rice Research Institute (IRRI) for a resilient food agriculture system and rice self-sufficiency in 2019-2021 through the application of rice technology innovations [6]. One of the rice innovations being intensified by the Minister of Agriculture Syahrul Limpo to achieve rice self-sufficiency is the Plantation Index 400 (IP 400) policy program which has been implemented in various regions in Indonesia. IP 400 is planted four times a year on the same land as planting ultra-early rice varieties. Through this policy, the government hopes to increase the harvested area without increasing the land area, and the total rice production per hectare per year can be doubled so that domestic food security can continue to be achieved [7]. To ensure the successful application of IP 400, the Agricultural Research and Development Agency determines four conditions that must be met, namely one expanse with a minimum area of 25 hectares when planting must be simultaneous, tertiary plots close to secondary canals, irrigation water available for 11 months, and land used not is a pest and disease endemic area [8]. An area of 800,000 hectares of locations in Indonesia that have been identified as suitable for planting IP 400. So to make the IP 400 program a success for the 2022 Fiscal Year, various forms of support from the regional and central governments are carried out. The Directorate General of Food Crops through the Directorate of Serelia provides support in the form of developing nutrient-rich or biofortified rice covering an area of 35,000 hectares at the provincial level using the Inpari Nutri Zinc/Inpago 13 Fortiz variety. A similar form of support was carried out by the central government covering an area of 65,000

hectares with adjacent land locations or high prevalence, as well as the development of environmentally friendly rice covering an area of 10,800 hectares using the New Superior Varieties (VUB). Currently, the IP 400 development area is 3,000 hectares [9]. Seeing the seriousness of the government in realizing rice self-sufficiency with the IP 400 innovation, the purpose of writing this article is to analyze the adaptation pattern of farmers to the application of the 400 Cropping Index innovation and analyze the 400 Planting Index innovation in increasing the amount of rice production to achieve rice self-sufficiency.

2 METHODOLOGY

This study uses a qualitative method with pre-existing secondary data sources such as journals, online articles, data from the Central Statistics Agency, and related books or guidelines and uses a simple analysis. In this qualitative research, the focus is on data collected from various literature to be processed and analyzed and then formed a conclusion. The research approach used is a comparative causal approach, namely the approach used to examine possible causal relationships between research variables [10]. In this case, it examines the causes and effects of the application of the 400 Planting Index (IP 400) innovation in increasing the amount of rice production to achieve rice self-sufficiency by taking into account the factors studied in the discussion, such as population, land area, population rice needs, government support, terms and methods of planting rice IP 400. To analyze the success of the IP 400 program in achieving self-sufficiency, it is necessary to calculate the total harvest per hectare in one year (4 times), calculation of the self-sufficiency category number and the calculation of the surplus of rice.

In order to calculate the total harvest of IP 400 in one year, data on the area of land that is eligible to be developed for IP 400 is 800,000 hectares and the assumption of the IP 400 harvest, according to the Tulungagung Agriculture Service is 9 tons per hectare. Then the

equation used for calculating the total harvest of IP 400 for one year is as follows (Equation (1)).

Total Production IP 400/year = 4 (Land Area x Total Productivity Tons/Hectare) (1)

For the calculation of self-sufficiency in Equation (2), it is to determine 90% of the total national rice consumption with the assumption that the national rice consumption per capita per year is 103.62 and the total population in 2022 is 278 million. Then compare the results with the amount of production generated from IP 400.

Self-sufficiency = 90% x National Rice Consumption (2)

With the category, if the total production of IP 400 per year is less than 90% of the national rice needs per year then it is not said to be self-sufficient. If the total production of IP 400 is more than 90% of the national rice needs per year then it can be said to be self-sufficient.
To analyze that IP 400 can improve national food security, it is necessary to calculate the rice surplus in Equation (3). According to Redjekiningrum (2011), the rice surplus is calculated from the difference between the total number of harvests in one year and the total consumption of the entire population for one year in tons [11]. The assumptions used are the average population consumption of 103.62 per capita per year and the total number of harvests.

Surplus = Total Harvest/Year – Total National Consumption/Year (3)

3 RESULTS

3.1 Location Requirements and Farmer's Adaptation to IP 400 Cropping Patterns

The Agricultural Research and Development Agency determines the requirements for the IP 400 development location, namely:

a. The time used for planting must be the same four times in one year
b. Availability of water all year round
c. Rice is planted on one bed at the same time
d. The location is not a place for endemic pests and diseases

Thus, there are 800,000 hectares of land in Indonesia that meet the requirements for the IP 400 development location. Currently, 3,000 hectares of land for development have been carried out. In order to be able to plant four times a year, farmers need to adapt to cropping pattern scenarios. Based on Sudana (2010) there are three scenarios of cropping patterns four times a year that farmers can do. One scenario that can be done is the combination planted in Rainy Season 2 (MH2) is the Ciherang variety with a harvest time of 90 days after planting. After MH2 was harvested, the second rice was harvested in Dry Season 1 (MK1) using the Silugunggo variety with a harvest time of 75 days after planting. The second rice was carried out during Dry Season 2 (MK2) with the same variety and harvest time as MK1. The third rice was carried out during Rainy Season 1 (MH1) with the same variety and harvest period as MH2.

3.2 Total Production Index 400 (1P 400) Per Year

To obtain data on the total production of the Planting Index 400 (IP 400) is to multiply the number of harvests in one year (4 times) by the area of land suitable for the development of 800,000 hectares and the assumption of the total productivity of IP 400 in one hectare is 9 tons. Then the resulting total production of 28.8 million tons/hectare is presented in ***Table. 1.***

Table 1. *Total Production Index 400 (1P 400) Per Year.*

Number of Harvests Per Year (Times)	Appropriate Land Area (hectare)	Total Productivity (Tons/Year)	Total Production (Tons/Year)
4	800.000	9	28.8 thousand million

3.3 IP 400 Eligibility to Achieve Rice Self-Sufficiency

According to FAO (1999), the standard of self-sufficiency is if the amount of production can meet 90% of the total national consumption per year. So to get the IP 400 eligibility to achieve self-sufficiency, that is by multiplying 90% by the amount of rice consumption per capita per year and the total population. 90% of the total national rice consumption is 26 thousand million. With a total production of 28.8 thousand million tons per year, it can be said that IP 400 is feasible to achieve rice self-sufficiency. The results are presented in ***Table. 2.***

Table 2. *IP 400 Eligibility to Achieve Rice Self-Sufficiency.*

FAO Standard Self-Sufficiency (%)	Rice Consumption Per Capita Per Year (Kg)	Number of Population 2022 (Million)	Results (Tons)
90	103,62	278	26 thousand million

3.4 Achievable Rice Surplus with IP 400

The surplus value that can be achieved with IP 400 is by reducing the number of harvests per year and the amount of national rice consumption per year in tons. The amount of national rice consumption per year is calculated by multiplying the rice consumption per capita per year, assuming 103.62 kg, and the population in 2022

is 278 million people. Then obtained 28.8 thousand million. With a total harvest equal to the amount of national rice consumption, the IP 400 has not yet been able to reach a surplus. The results are presented in ***Table. 3.***

Table 3. *Achievable Rice Surplus with IP 400.*

Total Harvest (Tons/Year)	Total Rice Consumption National (Tons/Year)	Surplus
28.8 thousand	1.8 thousand	0

4 CONCLUSIONS

The Plantation Index 400 (IP 400) is a policy that is being intensively carried out by the Indonesian Minister of Agriculture to achieve rice self-sufficiency. To apply IP 400, location requirements and conditions for rice varieties are required. Achieving self-sufficiency in rice with an IP of 400 requires adaptation by farmers through scenario planning. In addition, various efforts have been made by the central and regional governments to support the implementation of the IP 400 program. From the analysis, it can be concluded that IP 400 can increase national rice production and achieve self-sufficiency because the total production meets 90% of national rice consumption needs. However, the surplus still has to be worked out. One of the efforts that can be made is to increase the number of harvests.

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