Increasing Livelihood Strategy of Rice Farmer by Developing New Rice Variety "Inpago Unsoed 1" in Central Java, Indonesia

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Increasing Livelihood Strategy of Rice Farmer by Developing New Rice Variety "Inpago Unsoed 1" in Central Java, Indonesia

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ABSTRACT
The livelihood approach is a popular concept for identifying the nexus between environmental and social entities. Strategies for sustainable livelihoods are usually used to achieve successful rural development related to food security, realize social equity and sensitivity to environmental integrity. The research uses the livelihood strategy approach to assess the farmer's acceptance in cultivating new rice variety "Inpago Unsoed 1," to increase the national rice productivity and community empowerment. The research was conducted in three sub-districts in Banyumas District, Central Java, Indonesia, from March 2nd until 28th 2021. The results show that economic and social components need to be increased since these components play an essential role in the success of farmers' development in accepting new rice varieties "Inpago Unsoed 1". In contrast, the other components, i.e., biophysical, cultural, and psychological, have less concern. Nevertheless, the effort of farmers to strive from poverty and hunger is not only done by providing their needs but also the surrounding environment that supports livelihood.

Keywords: *community empowerment, Inpago Unsoed 1, livelihood strategy, rice productivity.*

1. INTRODUCTION

Indonesia faces obstacles in providing food to reach every corner of the region [1]. Availability of strategic food, including rice, can be met partly from domestic production and imports. One of the critical elements in producing food is the availability of land for agriculture. Agricultural land can be broadly divided into dry land and paddy fields [2]. Based on [3], 46 percent of rice fields in Indonesia are non-irrigated rice fields, including rain-fed rice fields. The rice productivity on this land is generally lower than the rice yield in irrigated rice fields. Data on the area of agricultural land in Indonesia for 2016 - 2018 can be seen in Table 1.

Table 1. Data on the area of agricultural land in Indonesia 2016-2018 (Ha).

Land Type	2016	2017	2018
Rice field	8,187,734	8,164,045	7,105,145
- Irrigation Rice	4,782,642	4,745,809	3,804,391
- Non-irrigated rice field	3,405,092	3,418,236	3,301,053
Tegal/Garden	11,539,826	11,704,769	11,697,807
Farm/Huma	5,074,223	5,248,488	5,256,223
Temporarily Uncultivated Land	11,941,741	12,168,012	10,770,888
Amount	36,743,524	37,285,314	34,830,063

The increasing Indonesian population is creating the need for national rice as the leading staple food of the Indonesian people. The national rice consumption rate per capita in 2019 was 94.9 kg/cap/year, while the

consumption contribution of the grain group was 64.4 percent of the total consumption. The level of consumption of these grains has exceeded the recommended composition of 50 percent [4].

On the other hand, rice production shows a decline from year to year. The publication of the Central Bureau of the Statistics Republic of Indonesia shows that rice production in 2019 amounted to 31.31 million tons, decreased by 2.63 million tons or 7.75 percent compared to 2018. Harvested area in 2019 of 10.68 million hectares, a decrease of 700.05 thousand hectares or 6.15 percent compared to 2018 [5]. The high rate of conversion of rice fields has implications for the decline in the availability of rice for the population. This rate will decrease rice production, which can threaten the population's food security [6]. Data from [7] shows that raw rice fields decreased from 8.16 million hectares in 2017 to 7.10 million hectares in 2018 or decreased by 12.97 percent. These areas spread around Indonesia, especially on Java Island.

Banyumas District is a district in Java Island with several areas that rely on rainwater for irrigation or called rainfed rice fields. The sub-districts with the highest rainfed rice fields are Purwojati, Lumbir, Gumelar, Wangon, and Ajibarang.

Problems often encountered in rainfed rice fields include degraded soil conditions, high evaporation, drought, flooding, and lack of water management [8]. This condition causes rainfed rice fields in general to only plant one to two times a year. This condition significantly affects the amount of rice production or less high yielding on rainfed rice fields and income earned by the rainfed farmer to meet the basic needs of the farmer family. The lack of income earned by farmers makes them do the non-farm to meet their daily needs [9].

Relying on the unavailability of high-yielding on rainfed rice fields, Jenderal Soedirman University (Unsoed) has implemented an assembly program for rainfed rice varieties with high yields and quality, i.e., Inpago Unsoed 1. This cross between high-yielding dry tolerant upland rice and aromatic rice is expected to produce rainfed rice of increased products, resistance to pests and diseases, a shorter harvest time, and a flavorful sauce and rice that consumers are interested in.

Therefore, rainfed rice farmers must have appropriate livelihood strategies for their survival. As stated by [10] that rainfed rice farmers who apply the livelihood concept have higher incomes and welfare. [11] argues that livelihood strategies consist of capabilities, assets (including material and social resources), and activities for means of living. A livelihood is sustainable if it can cope with and recover from stresses and shocks, maintain or enhance capabilities and assets, and damage the existing natural resource base. The choice of a livelihood strategy for rainfed rice farmers that includes the rainfed rice fields as one of its assets is a form of local wisdom. [12] explains that local wisdom is an order of human life that cannot be separated from the culture amid local communities living in an area.

Fighting for sustainable livelihoods and overcoming vulnerabilities related to water availability, most people who make a living as farmers must carry out strategies for their livelihoods. Livelihood strategies describe the efforts made by the community in achieving an adequate livelihood. Livelihood strategy approaches are concerned with how communities manage or combine available or owned livelihood assets, respond to changes that occur, and determine priorities for maintaining or improving livelihoods [13][14]. The livelihood strategy approach is anything of value or a collection of capital used to make a living. The livelihood strategy approach consists of 5 (five) components, namely Biophysical, Economic, Social, Cultural, and Psychological [15][16].

From the things that have been described, it is necessary to study the livelihood strategy approach of "Inpago Unsoed 1" rice farmers in Purwojati, Lumbir, and Ajibarang Sub-districts, Banyumas District, Central Java, Indonesia. The research objective is to assess the farmer's acceptance in cultivating new rice varieties "Inpago Unsoed 1.

2. MATERIAL AND METHODS

This research was conducted in Purwojati, Lumbir, and Ajibarang Sub-districts. These areas were determined purposively based on the sites with the highest number of rainfed rice fields and cultivated with new rice variety "Inpago Unsoed 1". This research was conducted from March 2nd until 28th, 2021. This research method uses descriptive qualitative research methods. Key informants were determined using the purposive sampling method, which consisted of 20 farmers of "Inpago Unsoed 1". Supporting informants in this study were determined using the snowball sampling method.

The data collection method was carried out using 3 (three) methods: interviews, non-participant observations, and document studies. The data analysis method uses Miles and Huberman interactive data analysis, consisting of stages, namely data collection, data reduction, data presentation, and drawing conclusions and verification. The validity of the data in this study was tested using source and technical triangulation. Triangulation of data sources was carried out on the farmers of "Inpago Unsoed 1", while technical triangulation was carried out by searching for data using different data collection techniques. Researchers used data collection methods with interview techniques, non-participant observation and simultaneously documented studies on research subjects. The non-participant observation method was used to see the conditions and

general picture that happened in the field. On the other hand, the interview method was conducted to seek and find answers from 25 research subjects interviewed.

The research objectives were analyzed using internal and external factor analysis and SWOT analysis. Analysis of internal and external factors using IFAS and EFAS matrices. Internal factors consist of strengths and weaknesses, while external factors consist of opportunities and threats, as shown in Table 1 below:

Table 1. *Internal Factor Analysis Summary* (IFAS) Matrix and *External Factor Analysis Summary* (EFAS) Matrix

Internal Factors	Weight	Rating	Score (Weight X Rank)
Strength:			
Weakness:			
Sub-Total	**1.00**		
Opportunity:			
Threat:			
Total	**1.00**		

Source: [17]

Based on the IFAS and EFAS matrices to find out the position of the program based on the current condition of the program, it is continued with an analysis using an internal-external matrix (IE). The IE matrix can be seen in Figure 1 below:

EFE	*good* 3.00-4.00	*Average* 2.00-2.99	*Weak* 1.00-1.99
good 3.00-4.00	I *Growth and Build*	II *Growth and Build*	III *Hold and Maintain*
Average 2.00-2.99	IV *Growth and Build*	V *Hold and Maintain*	VI *Harvest and Divest*
Weak 1.00-1.99	VII *Hold and Maintain*	VIII *Harvest and Divest*	IX *Harvest and Divest*

Source: [18]

Figure 1. The External-Internal matrix

The result from the IE matrix is then combined with the model from Stubbs and Cocklin [19], which introduces the sustainability phase model to know the sustainability level from each component of the livelihood strategy approach.

3. RESULTS AND DISCUSSION

The results of data analysis show that the livelihood strategies of "Inpago Unsoed 1" rice farmers include three methods. The results also show that although there are variations in approach, they cannot be separated from agricultural activities in general. Most of them depend on agricultural activities (40%), some rely on livestock and farming activities or a mixed strategy (39%), and only a small proportion (15%) depend on commercial activities, in this case, business.

Livelihood strategies applied by farmers are, of course, followed by income earned. Most of more than half of the farmers (55%) are low-income. Others have moderate income (35%). Only a small percentage (10%) earn a high income. Although farmers have varied their livelihood strategies, most of the income levels are still low. This statement is in line with the findings of [20] that livelihood strategies impact farmers' income. The condition of "Inpago Unsoed 1" rice farmers shows that the average livelihood strategy revolves around farming with low income. This condition cannot be separated from the characteristics of the capital owned. The features of people's livelihoods in villages in Banyumas District show that the assets' unsustainability influences unsustainable conditions.

The characteristics of livelihood capital impact the income of the average livelihood strategy as a farmer. The research results by [21] show that the lack of money, primarily financial and social, impacts the low income of farmers. Thus, efforts to improve assets will impact the strategy and increase the income of "Inpago Unsoed 1" rice farmers in the Banyumas District. Improvements in livelihood assets can improve the livelihoods of "Inpago Unsoed 1" rice farmers where conditions of a decent living level can overcome various shocks and pressures [22].

The livelihood strategy approach was chosen by the household, in this case, the "Inpago Unsoed 1" rice farmers, which is influenced by the control of components [23][24]. Component of livelihood strategy approach includes Biophysical, Economic, Social, Cultural, and Psychological. The more ownership of assets by rice farmers in Banyumas District, the more varied household livelihood strategies. Improvements in livelihood assets can improve the livelihoods of "Inpago Unsoed 1" rice farmers where conditions of a decent living level can overcome various shocks and pressures [25]. We use the livelihood strategy approach to investigate the achievement of environmental and social objectives of "Inpago Unsoed 1" rice farmers in Banyumas.

Table 2. Key components of the livelihood strategy approach of "Inpago Unsoed 1" rice farmers in Banyumas District

Component	Aspects of components	Total score	Average score	Sustainability level
Biophysical	Anticipated construction; anticipated lack of maintenance and decay of existing structures and facilities; due degradation or improvement of human and biophysical health; unknowns regarding size and extent of development growth	120	1.7	Low
Economic	Anticipated alteration of the economic system; anticipated distribution of benefits and burdens from development; decline or increase in property values; speculation and investment; 'goodness of fit' between development and community	187	2.6	Middle to high
Social	Potential increase or decrease in social opportunities; anticipated maintenance or decay of social cohesion and patterns of interaction; differential construction of opportunities and threats; investment of time, money, or energy for support of or resistance to the project; organizational changes; changes in social stability	172	2.2	Middle to high
Cultural	Perceived potential of development to destroy or preserve culture; anticipated new values needed for altered livelihood; perceived impacts of initial and long-term contact with new development	76	1.5	Low
Psychological	Changes in mental health; increases/decreases in stress, anxiety, and anger (through the ability to benefit/lose); increases/decreases in perceived efficacy; the speed of change and ability to cope; degree of participation/uncertainty regarding development; pressure to conform to dominant attitude regarding the development	61	1.2	Low

Source: Own result. Adopted from [26][27]

The psychological component of "Inpago Unsoed 1" rice farmer shows an unsustainable or low level. The low psychological component certainly affects the achievement of the targeted "Inpago Unsoed 1" rice farmers' sustainable livelihoods. Following theoretical studies from [28], farmers' characteristics of high or sustainable psychological components will impact achieving goals in their lives. The psychological component will show the skills and abilities, health, experience of someone who synergizes to carry out the livelihood strategies.

In addition, the results of the study also show that the psychological component of "Inpago Unsoed 1" rice farmer is not sustainable because most farmers do not take part in unsustainable training and training. To achieve a sustainable psychological component, farmers should take a lot of ongoing and organized training. This finding is in line with [29] that ability increases along with education and training. Knowledge increases due to having access to information, and workability increases due to health, skills, and motivation.

The economic component is usually an economic asset that is a picture of household control of the ease of fulfilling the financial aspect of savings, wages, credit, and debt or goods of economic value [30][31]. The access of farmers to financial capital varies greatly depending on the type of need and openness to opportunities to take advantage of it. "Inpago Unsoed 1" rice farmers in Banyumas District have financial capital in unsustainable or low categories. The source of assets to obtain financial capital is limited. Low financial capital will also affect farmers' sustainable livelihood strategies because financial capital will provide many alternatives for future strategies. The low financial capital will also contribute to the amount of income obtained by farmers. The characteristics of livelihood capital impact the income that the average livelihood strategy is as a farmer. The research results by [32] show that the lack of money, primarily financial and social, impacts the low income of farmers.

The biophysical component owned by "Inpago Unsoed 1" rice farmer in Banyumas District generally still shows a low or unsustainable category. Mastery of biophysical components illustrates the ease of access to facilities and infrastructure supporting households, i.e., farmers, in surviving [33]. The biophysical component refers to the ownership of one's biophysical assets in the family.

"Inpago Unsoed 1" rice farmers in Banyumas District who generally have low physical capital have not been able to achieve the expected sustainable livelihoods. Biophysical components or money have a good or high sustainability value if farmers intensify and diversify their livelihood strategies. This condition is indicated by many or increasing business strategies in biophysical components to maintain their sustainable livelihoods [34].

The cultural component owned by the "Inpago Unsoed 1" rice farmer in Banyumas District is in the medium category, the highest among the five other components. "Inpago Unsoed 1" rice farmers who have cultural components can be used to gain access to a better livelihood. The cultural component comes from nature and is used to meet its needs [35]. The cultural component is also considered very important because

humans cannot live on environmental services and food from nature [36].

The cultural component owned by "Inpago Unsoed 1" rice farmers in Banyumas District has survived because it is generally in the medium category. [37] results that the cultural component owned by farmers is directly proportional to their livelihood strategies. The higher the level of sustainability with a cultural component, the farmers' livelihood strategies will be higher than just for survival. However, this has not been achieved because other assets or capital are low or unsustainable.

Ownership of assets or social component of "Inpago Unsoed 1" rice farmer in Banyumas District is still low or unsustainable. The social component describes the ease in social networks used by households, both formal and informal, which are the foundation for survival [38]. The social component shows how families interact with other communities in their social environment. The social component is considered capable of increasing mutual trust and reducing the cost of working together [39].

The social component of "Inpago Unsoed 1" rice farmers in Banyumas District is low because their participation in farmer organizations/groups is still meager, and many are not even involved. So that the faulty social component also affects the strategies they take and low incomes. [40] shows that a lack of capital, primarily financial and social, impacts the low income of farmers. Increasing indicators of social component owned by "Inpago Unsoed 1" rice farmers in realizing sustainable livelihoods can be done in several ways. [41] Increasing community access to economic institutions, optimizing existing community institutions, especially in every government program, integrating informal institutions with formal institutions, and re-activating existing cooperatives or establishing farmer's cooperatives would increase sustainable livelihoods.

4. CONCLUSION

Based on the results described in the previous discussion, the following conclusions can be drawn as follows.

1. Livelihood strategies applied by farmers are, of course, followed by income earned. Most of more than half of the farmers (55%) are low-income. Others have moderate income (35%). Only a small percentage (10%) earn a high income. This condition shows that although farmers have varied their livelihood strategies, most income levels are still low.
2. The economic and social components need to be increased since these components play an essential role in successfully accepting new varieties "Inpago Unsoed 1" at the farmer level. In contrast, the other components, i.e., biophysical, cultural, and psychological, have less concern. Nevertheless, the effort of farmers to strive from poverty and hunger is not only done by providing their needs but also the surrounding environment that supports livelihood.

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