Farmer's response to high yielding rice varieties in South Sulawesi (case study of Takalar)

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Abstract. The use of high yielding rice varieties is one of the determinants in the success of rice cultivation. Through the use of high yielding rice varieties and appropriate cultivation techniques, it is expected to increase national rice production. The government has made various efforts to develop new high yielding rice varieties of rice. One thing that has been done is to increase farmers' knowledge and understanding of various new high yielding rice varieties through the Field School. This activity is carried out to support the acceleration of the adoption of new high yielding rice of technological innovations at the farm level. The assessment was carried out in 2018, in Cakura District, Polongbangkeng Selatan District, Takalar Regency using a survey method with direct interviews using a structured questionnaire. Sampling was done intentionally (purposive). The number of respondents 25 people consisting of implementing farmers and officers in the field. The data obtained is the response data of farmers to some high yielding rice varieties, the data were analyzed using the chi-square test using SPSS Non parametric. The study results show that, in general, farmers like high yielding rice varieties of inpari 4, inpari 41 and inpari 42 with an average production of 5-7 t / ha, compared with local rice production using local varieties on average 3-5 t / ha. The highest variety and preferred by farmers are inpari 4. Inpari 4, Inpari 41 and Inpari 42 have an R / C ratio: 1.28; 1.16 and 1.16 so that the use of these three varieties in rice business in Takalar Regency is feasible to be cultivated.

1. Introduction

Increased production and self-sufficiency in rice, corn and soybeans can be carried out through two sources of production growth, namely an increase in planting area and increased productivity, namely:

a) Increase in planting area through: printing new land, optimizing cropping index, utilization of abandoned land, intercropping; b) Increased productivity, through the application of innovation and good cultivation technology (the use of inputs according to recommendations, the use of improved varieties, maintenance of good culture, pest control and DPI), the application of good harvests. One supporter that can provide a rapid influence in increasing rice production is the support of innovation and technology [1].

South Sulawesi is known as the National Granary in Eastern Indonesia. The area of lowland rice in South Sulawesi is 995,335 ha with an average production of 5,292 t / ha [2]. The use of VUB has greatly contributed to the increase in national rice production, as evidenced in 1984 Indonesia achieved self-sufficiency in rice. Rice superior varieties are technological innovations that have a high chance of being adopted by farmers, because they are easy to do, have high yields and are resistant to certain pests and diseases [3].
The problems faced by farmers today are the information system regarding the existence of source seeds at the farm level is still weak and the availability of varieties Paddy excellence is still very limited [4]. [5], said that new high yielding varieties are the technological components that provide the greatest contribution to increasing rice production. Until 2004 Indonesia had released 184 superior rice varieties, including introduced varieties from IRRI [6], also said that to increase the adoption of varieties in the development of rice varieties, farmers' preferences need to be included in the breeding process. Key attributes must be included in certain varieties and many varieties must be developed with a focus on farmers’ demands, on the other hand breeding cannot combine all the desired attributes. [7], that adoption is a change in farmer's attitude which is influenced by experience, communication and social learning. Thus, farmers adopt an innovation after learning from their environment, seeing through demonstrations and communicating directly with actors.

Farmers' perception of a technological innovation is the process of interpreting the stimulus received by the farmer before the farmer makes a decision to accept or reject the innovation. Perception in adoption, is the second stage which was previously the first stage of farmers getting information about new superior varieties through counseling, print media, demonstrations and so forth. Information obtained by farmers is then assessed based on the nature of their innovations such as their superiority, simplicity, suitability, and can be tried and seen [8]. Farmers' perception of the use of superior rice seeds as a whole in the District of Muara Pawan Kêtapang Regency which is classified as not good. Perception is not good, namely on matters related to the supply and application of superior rice seeds. While good perception is on the quality of superior rice seed yields. Thus, in general farmers know and understand the benefits obtained by using superior rice seeds, but because there are still several things that become obstacles, farmers' perceptions of superior rice seeds tend to be less good [9].

Various government efforts have been made in developing new superior varieties of rice. One thing that has been done is to increase the knowledge and understanding of farmers in introducing various new superior varieties through the Field School. This activity is carried out to support the acceleration of adoption of technological innovations in the use of new high yielding varieties at the farm level.

2. Methods
The assessment was carried out in 2018, in Cakura Village, South Polongbangkeng Subdistrict, Takalar Regency using a survey method involving farmers implementing the activities by direct interviews using a structured questionnaire. Sampling was done intentionally (purposive), ie farmers involved in the implementation of the demonstration plot were 25 people. Data obtained from the results of farmer interviews. The data obtained were analyzed using the chi-square test using SPSS Non parametric. The use of non-parametric statistics Chi-Square is used for the case of single groups or related variables using the formula [10, 11]:

\[ x^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \]

Note:  
O = Observation  
E = Expected

The available data consisted of modern rice varieties having 3 categories namely inpari 4, inpari 41 and inpari 42. The assessment of the varietas was based on 3 categories namely appearance, resistance to disease and production. Assessment of respondent farmers for modern rice varieties is grouped in the category of really like, like, less likely, dislike with their respective values 3, 2, 1, 0. Furthermore, from the frequency of observation and the expectation frequency the Chi-Square value is obtained.
3. Results and Discussion
The use of high yielding rice varieties is one component of a reliable innovative technology to increase rice productivity, both through increasing the potential or yield of plants as well as tolerance and or resistance to biotic and abiotic stresses [12]. Certified seeds from new high yielding rice varieties (VUB) of rice are needed by farmers because of the potential to increase farm productivity. Assuming the use of other optimal production facilities, such as fertilizers, pesticides, irrigation and labor, the use of superior seeds will greatly support rice farming [13].

The Farmers Response to some new high yielding rice varieties of rice conducted in this study can be seen in Table 1.

**Table 1.** Farmer responses to several new high yielding rice varieties in Polongbangkeng Selatan, Takalar Regency.

| Farmer responses | Inpari 4 | Inpari 41 | Inpari 42 |
|------------------|---------|-----------|-----------|
| Dislike          | -       | 1         | 1         |
| Less likely      | -       | 6         | 4         |
| Like             | 19      | 15        | 20        |
| Really Like      | 6       | 3         | -         |
| Amount           | 25      | 25        | 25        |

Table 1 shown that in general, farmers like all varieties (inpari 4, 41 and 42), although inpari 41 and inpari 42 there are still farmers who respond to dislike and dislike. The difference in farmers' responses to the high yielding rice varieties studied in Takalar District showed differences in each region, depending on their suitability with local conditions, appearance, resistance to disease and production (Table 2). With these differences, farmers can choose varieties that are in accordance with the suitability of varieties in their respective regions.

**Table 2.** Response of some varieties to appearance, disease resistance and rice production in Takalar Regency

| Rice Varieties | Appearance (%) | Disease Resistance (%) | High Production (%) |
|----------------|----------------|------------------------|---------------------|
| **Inpari 4**   |                |                        |                     |
| Really like    | 26.3           | -                      | 21.1                |
| Like           | 73.7           | 78.9                   | 78.9                |
| Less likely    | -              | 5.3                    |                     |
| Dislike        | -              | 15.8                   |                     |
| **Inpari 41**  |                |                        |                     |
| Really like    | 10.5           | 5.3                    |                     |
| Like           | 57.9           | 68.4                   | 63.2                |
| Less like      | 26.3           | -                      | 31.6                |
| Dislike        | 5.3            | 26.3                   |                     |
| **Inpari 42**  |                |                        |                     |
| Really like    |                | 5.3                    |                     |
| Like           | 78.9           | 7.9                    | 78.9                |
| Less like      | 15.8           | 15.8                   | 21.1                |
| Dislike        | 5.3            |                        |                     |

Dislike response 5.3 In line with [14], farmers' responses to several high yielding rice varieties of rice that were demonstrated, generally favored varieties that had high production, high exposure to disease and had a good appearance. Although in general the appearance of all varieties is liked by
farmers but in the end the farmer chooses varieties that have high productivity, it is related to the benefits to be gained from his farm, because the main factor that farmers consider in applying the technological innovation component is the application of technological innovation that can increase productivity. Likewise, [15] also said, based on the results of the survey that the farmers' response to the vegetative and generative appearance of each variety showed that in general farmers in the two sub-districts liked all varieties with a Likert scale percentage index > 60%. The reason is because of high yields, long panicles with grain filled and good plant height or not worry about falling down, while the Inpari 25 variety in Parungkuda District was responded to by ordinary farmers (57.1% index) on the grounds that the number of grains per panicle (index 57.1%) and grain color (index 51.4%) the results are normal or normal. The results of research [16], that the response of farmers obtained by the majority of respondents agreed to plant varieties of Inpari 30, with the reason; Inpari 30 variety gives higher production than Inpari 26 and Ciherang varieties, shorter harvest age, lower level of risk in the field, shorter harvest age. Then the results of [17], study in Bantul Regency showed that the level of farmers' response to high yielding rice varieties and 3 varieties were known to have good responses and respectively Ciherang, Pepe and IR64 comparison varieties. Then the response of farmers to the use of Sidenuk rice seeds is included in both categories [18].

Adoption of the use of a technology component, depends on the response of farmers to a technology. Likewise in the use of new improved varieties by farmers, farmers see directly from the appearance of a variety that can be directly observed, easily applied, and profitable because it can increase production or productivity [19]. The level of innovation adoption is started by the initial users who are involved or close to the socialization activities initiated by the instructor / researcher / government. BBI, SOE, and large private institutions that have broad business and networking capabilities are expected to play a role in producing, promoting, providing superior seeds [20]. The results of [21], show that the adoption of high yielding rice varieties as a substitute for IR64 varieties can be accelerated by 1) providing location-specific high yielding rice varieties that has a character superior to existing varieties, especially agronomic characteristics such as higher productivity, resistance to attack OPT, and drought stress and fluffier rice taste. 2) Provide rice VUB seeds as needed, including technical aspects, time and amount.

Technology is one of the determining factors in the production process [22]. Technology is a key factor in increasing agricultural production capacity because technology is created through research activities and plays a role in increasing agricultural production and farmers' welfare. In the production process the application of new technology will increase the use of inputs, so farming efficiency is possible. Research with productivity is very related that can be seen in one form of agricultural research output, namely if the technology for increasing productivity is disseminated to farmers then applied so that there is an increase in productivity [23].

Compared to before the technology assistance, the application of each component of rice cultivation technology prior to assistance is still low, this shows that farmers in the application of technological innovation need to be confident of the innovation by looking and implementing directly in the field, both growth and productivity. The technology of Existing Rice Farmers and introduction technology in the village of Cakura Kec. Polorangbangkeng Selatan, Takalar Regency can be seen in table 3.
From the table above it can be seen that farmers who use local methods, the seeds obtained from previous planting. The number of seeds used is still a large amount of 30-35 kg / ha, by planting a tiled system. Farmers use local methods to plant rice at the age of 20 days and weeding is done as needed.

Production yields obtained by each high yielding rice varieties are different, depending on their durability and adaptation to their environment. From the results of the demonstration plot, it was found that the use of high yielding varieties gave the highest yields in inpari 4 varieties of 6.7 tons / ha, Inpari 41 of 5.72 and inpari 43 of 5.46, this increased production using the average high yielding rice varieties the average previously obtained 3-4 tons / ha using local varieties, as in Table 4.

### Table 3. The technology of existing rice farmers and introduction technology in the village of Polongbangkeng Selatan, Takalar Regency.

| Number | Technology | Farmer's way | Introduced Technology |
|--------|------------|--------------|-----------------------|
| 1.     | Seed       | Unlabeled    | Labeled / certified seed |
|        | • Amount (kg / ha) | 30-40 kg / ha | 25 kg / ha |
|        | • Varieties   | Ciperang, Cigeulis, Ciliwung | Inpari 4, Inpari 41, Inpari 42 |
| 2.     | Seed Treatment | There is no | Agrimeth |
| 3.     | Fertilization: | Not according to recommendation | As suggested |
|        | • Type of Fertilizer | Urea | Urea, KCl, SP36 |
| 4.     | Pre-tillage treatment | Land sanitation and herbicide spraying | Land sanitation and spraying of herbicides |
| 5.     | Tillage     | Maximum Tillage | Maximum Tillage |
| 6.     | planting system | Transplanting | Legowo 2: 1 |
| 7.     | Spacing     | 25 X 25 cm | (25x12.5x50) cm |
| 8.     | Age of seedlings | 21 days more | 15-20 days |
| 9.     | Maintenance | - grass and other plants are left | There is |
|        | • Stitching | About Nothing | There is |
|        | • Fertilization Time | 1 - 2 times | 3 times |
|        | • Weeding   | About Nothing | There is |
|        | • Pest control | Chemically | Prevention and chemistry |
| 10.    | Harvest     | Physiological maturity (90%) yellowing, Moisture content 25 -30 | Physiological maturity (90%) yellowing, Moisture content 25 -30 |
|        | - Harvest time | Combine Machine | Combine Machine |
| 11.    | Post Harvest | Sun drying, packaging, labeling | |
| 12.    | Average 3-4 tons / ha | 5.46-6.7 tons / ha | |
Table 4. Rice Production to several new high yielding rice varieties in Cakura Village, Polongbangkeng Selatan, Takalar Regency.

| Number | Rice Varieties | Production ton/ha |
|--------|----------------|------------------|
| 1      | Inpari 4       | 6.7              |
| 2      | Inpari 41      | 5.72             |
| 3      | Inpari 42      | 5.46             |

To find out the benefits obtained by using high yielding rice varieties, it is necessary to do farming analysis. This analysis is also conducted to determine the farming activities carried out effectively and efficiently in obtaining benefits at a certain time. It is said to be effective if farmers (producers) can allocate the resources they have as well as possible, and are said to be efficient if the utilization produces output that exceeds inputs [24].

The business feasibility test using the R / C ratio of several rice varieties in the Cakura District of Takalar District shows that all rice varieties demonstrated have an R / C ratio > 1, so that the inpari 4, inpari 41 and 42 varieties are feasible to be cultivated or cultivated in Takalar Regency. The difference in the value of business feasibility is due to differences in the level of rice production of the three rice varieties cultivated at the same time and with the same treatment. Analysis of Cost of Using high yielding rice of several types of rice varieties can be seen in Table 5.

Table 5. Cost analysis of inpari 4, 41 and 42 high yielding rice varieties

| Number | Description                  | Inpari 4 | Inpari 41 | Inpari 42 |
|--------|------------------------------|----------|-----------|-----------|
| 1      | Land area (ha)               | 1 ha     | 1 ha      | 1 ha      |
| 2      | Production (kg / ha)         | 6,700    | 5,720     | 5,460     |
| 3      | Unit price of production (Rp / kg) | 4,200 | 4,200 | 4,200 |
| 4      | Production Value (Rp)        | 28,140,000 | 24,024,000 | 22,932,000 |
| 5      | Production cost              |          |           |           |
| a.     | Variable Cost (Rp)           |          |           |           |
| - seeds (Rp)                  | 250,000  | 250,000  | 250,000  |
| - fertilizer (Rp)             | 1,285,000 | 1,285,000 | 1,285,000 |
| - pesticides (Rp)             | 995,000  | 995,000  | 995,000  |
| - labor (Rp)                  | 3,640,000 | 3,640,000 | 3,640,000 |
| - Total variable costs (Rp)   | 6,170,000 | 6,170,000 | 6,170,000 |
| b.     | Fixed Cost (Rp)              |          |           |           |
| - Tool depreciation fee (Rp)  | 9,000    | 9,000    | 9,000    |
| - land rent (Rp)              |          |           |           |
| - rental machine (Rp)         |          |           |           |
| - Total fixed fee (Rp)        | 9,000    | 9,000    | 9,000    |
| 6      | Total production cost        | 6,179,000 | 6,179,000 | 6,179,000 |
| 7      | Net income (Rp)              | 21,961,000 | 17,845,000 | 16,753,000 |
|        | R/C Ratio                    | 1.28     | 1.16      | 1.16      |

Same with the results of research by [25], that rice farming in Subak Baturiti Balinggi Village, Balinggi Subdistrict, Parigi Moutong Regency is worth the effort with an R / C value of 1.42 showing that R / C > 1, farming is profitable. Likewise, the results of research by [26], Paddy farming run by farmers in the study area is feasible to be cultivated, this can be seen from the results of BCR analysis.
in which on average a value of 1.24 is obtained, classified as eligible criteria (42 people). [27]. The analysis showed that the Revenue of Cost Ratio of lowland rice farming was 1.56. Thus, rice farming in Randomayang Village is feasible to be cultivated, because the value of the ratio a > 1. The results of research in Sebangki District Landak Regency, that the calculation of the feasibility of rice farming, obtained an R / C Ratio of 1.82 and a B / C value Ratio of 1.58. shows that rice farming is feasible to be cultivated or provides financial benefits [28].

4. Conclusion

1. In general, farmers prefers high yielding rice varieties of inpari 4, inpari 41 and inpari 42 with an average production of 5-7 t/ha, compared to local rice production using local varieties an average of 3-5 t/ha.
2. Variety with the highest production and preferred by farmers is inpari 4.
3. Inpari 4, Inpari 41 and Inpari 42 have an R / C ratio: 1, 28; 1.16 and 1.16 so that the use of these three varieties in rice farming in Takalar Regency is feasible to be cultivated.

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