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## Effectiveness of Food Barn in Improving Rice Farmers Income

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### Abstract

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#### **Keywords:**

Barn;  
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Food barn is a program created to realize food security at the micro level through the maintenance of food availability as one implemented in Bantul. This study aims to investigate the implementation of food barn management and the effectiveness of food barn in increasing rice farmers' income. Located at Timbul Asih Food Barn, Bantul Regency, this study collected the respondents involving ten rice farmers who were members of the food barn using a census system, and 35 non-members using random sampling. The implementation of food barn management was analyzed descriptively, while the effectiveness of the food barn program in increasing the farmers' income was analyzed using an independent t-test. The results reveal that Timbul Asih Food barn in Bantul Regency has applied five management functions; however, the addition of members is necessary for the dynamic operation of Timbul Asih Food Barn. The t-test analysis indicates that there is no significant income difference between the member farmers and those who were not members of the food barn. This implies that the presence of food barn is not yet effective in increasing the income of its members.

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## INTRODUCTION

Agricultural sector is the most important sector in Indonesia. Based on the data of the Ministry of Manpower of the Republic of Indonesia (2023), this sector absorbs around 30% of the Indonesian workforce, in other words, it employs more than 40 million Indonesian people in 2022. This showcases that the agricultural sector is a source of earning for the majority of the Indonesian population. Besides, it is the most important sector that yields staple food as Sari et al. (2019) mention that around 50% of Indonesian agriculture is dominated by family farming in rural areas where the majority of the farmers own rice fields as wide as an average 0.25 Ha in Java and 0.5 Ha in other islands. Ricciardi et al. (2018) argue that 30-34% of food supply is produced by small growers owning farmland less than 2 Ha. Edeme et al. (2020), Faqih (2021), Leng et al. (2021), and Melendres et al. (2022) state that looking at the importance of the agricultural sector, the government should keep developing this sector to increase farmers' income, grow employment opportunity in agricultural sector, strengthen household food security, and reduce poverty in rural areas.

Rice derives from paddy which is the main diet of the majority of Indonesian people. The average rice consumption in 2022 was 81,044 kg/capita/year (Adriandri et al., 2023). This high rate of consumption necessitates the sustainable availability of food, especially rice. Consequently, seasonal food produce that is vastly distributed in different areas must be kept in check whether or not the availability is stable enough to feed the community from time to time. Food availability management also has a function to anticipate food scarcity if there is a disruption or cessation of food supply in the community (Djelantik & Sudarma, 2018). Alfia (2016) states that continuous food availability can prevent food price fluctuation. In contrast, the unstable price of food commodities might increase the risk of loss for the producers, namely the small growers, which can affect their welfare.

Farmer welfare is one of the governments of Indonesia and other countries concerns because it is related to the future of agriculture. Several studies of the attempts to improve farmer welfare have been conducted. Some measures can be taken, such as agricultural intensification to increase rice production (Lakitan et al., 2018; Noltze et al., 2013; Shew et al. 2019), corporate farming (Dalimunthe & Kurnia, 2018; Herlina et al. 2021), good agricultural practices (Kharel et al., 2022), and technology use and adoption (Yang et al., 2021). In addition to focusing on input optimization, some studies focus on downstream by optimizing agricultural produce sales (Ji-liang et al., 2022; Sjaf et al., 2022). Such attempts are certainly supported by the government through a variety of programs, such as *pajale* program that aims at increasing the production of food crops

(rice, corn, and soybean), local food diversification in many areas, and making policy on price flexibility for rice price stability.

Currently, a new initiative has been done to improve farmer welfare, namely the development of food barn which is one of the programs to enhance household food security. This is also an example of local wisdom in Indonesia that is conducted by farmers and designed to keep the availability of household food supply until the next harvest period. Mulyani and Agus (2018) mention that food barn have been re-adopted by the government as a strategic plan to make Indonesia a centre of global food barn in 2045. Moreover, Indarti et al. (2022) state that the current food barn is designed based on the modern concept. Traditional granary functioned as a storage and drying place of rice; however, the current one is used as a place to collect the agricultural produce of farmers to be directly distributed to the consumers both in and outside the village. Faqih (2021) also said that food barn could shorten marketing chain to increase the bargaining power of farmers. Faqih and Rohayati (2015) argue that food barn functions to anticipate food scarcity during drought, harvest failures due to natural causes like pests and diseases, as well as climate anomalies and floods.

Community food barn is designed with many benefits, however, there are also some obstacles in its implementation. Hulu and Thamrin (2022) described the development of community food reserves through food barn which were not optimally running due to the disruption in saving and loan activities and food reserve distribution from farmers to the management group. Another obstacle in food barn development, according to Hulu and Thamrin (2022) and Lestari and Meilani (2023), including a lack of group infrastructure and human resources that are still unable to optimally manage the food barn.

One of the regencies in Indonesia that develops food barn is Bantul Regency which also records the highest rice plant productivity in the Special Region of Yogyakarta (DIY) Province, producing 5,773 tons/hectare. Bantul Regency itself contributed 23.9% of the total rice production in DIY Province (BPS Provinsi Daerah Istimewa Yogyakarta, 2021). This makes rice the flagship commodity of Bantul resulting in greater opportunity for Bantul Regency to be the central food barn in DIY Province, thus improving the income of the farmers in Bantul Regency. Like other food barn developments in other areas, Bantul also faces some issues, such as inefficient management of food barn and a lack of farmers' interest in becoming members of food barn.

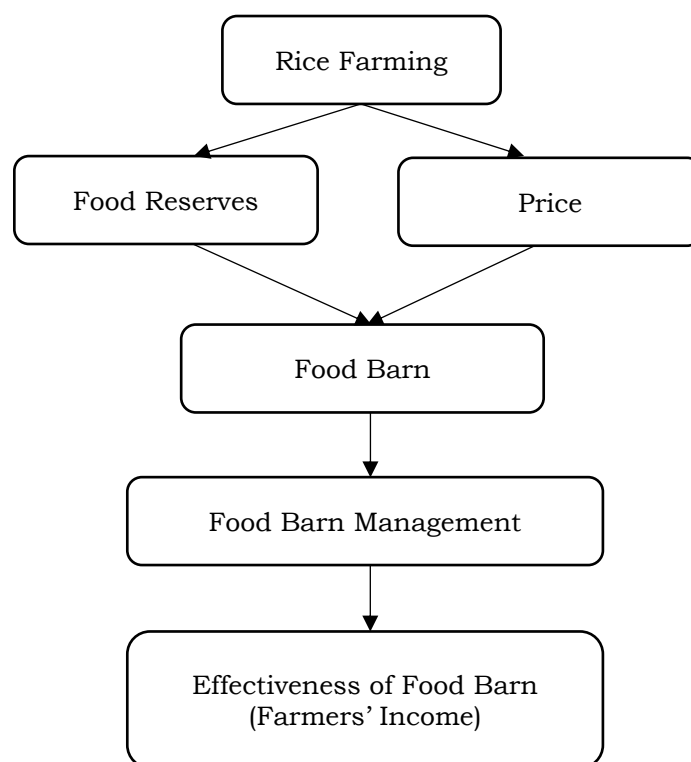
The implementation of management functions plays a crucial role in controlling a group to reach its goal (Silehu & Arvianti, 2012). Therefore, it is important to study the role of management functions in food barn management in Bantul Regency. Previous

studies of food barn that were conducted focused more on the influence of food barn on food security. Meanwhile, this study focuses on the implementation of management functions in food barn management and aims at investigating 1) implementation of food barn management, and 2) effectiveness of food barn in improving farmers' welfare.

## RESEARCH METHODS

The common problem shared among farmers is availability of produce which affects its price fluctuation. Food barn is designed by the government as one of the solutions to solve the problem. This study explores food barn management and its effectiveness from the perspective of farmers' income. The research framework of this study is presented in Figure 1.

**Figure 1. Research Framework**



The research location was purposively selected (Etikan et al., 2016) in Bantul Regency based on the data of Statistics Indonesia that showed that Bantul was an area with the highest rice plant productivity amounting 127 thousand tons or 23.9% of the total rice production in Yogyakarta Special Region Province (Badan Pusat Statistik Provinsi Daerah Istimewa Yogyakarta, 2023). The research data were primary data (Persaud, 2010) with the samples including ten farmers utilizing food barn that were selected by census (Illowsky et al., 2022) and 35 non-user farmers who were randomly selected (Noor et al., 2022). The technique used to collect the data was interview.

Descriptive analysis was used to answer the first inquiry of this research on food barn management implementation. Meanwhile, to analyze the effectiveness of food barn, which is the second issue to address in this research, farmers' income was used as the proxy then analyzed by independent t-test. The formula of independent t-test is as follows (Illowsky et al., 2022):

$$t_{hitung} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where:

$s_1$  = standard deviation of the income of farmers utilizing food barn

$s_2$  = standard deviation of the income of farmers not utilizing food barn

$\bar{X}_1$  = average income of food barn user farmers

$\bar{X}_2$  = average income of food barn non-user farmers

$n_1$  = sample size of farmers utilizing food barn

$n_2$  = sample size of farmers not utilizing food barn

## RESULTS AND DISCUSSION

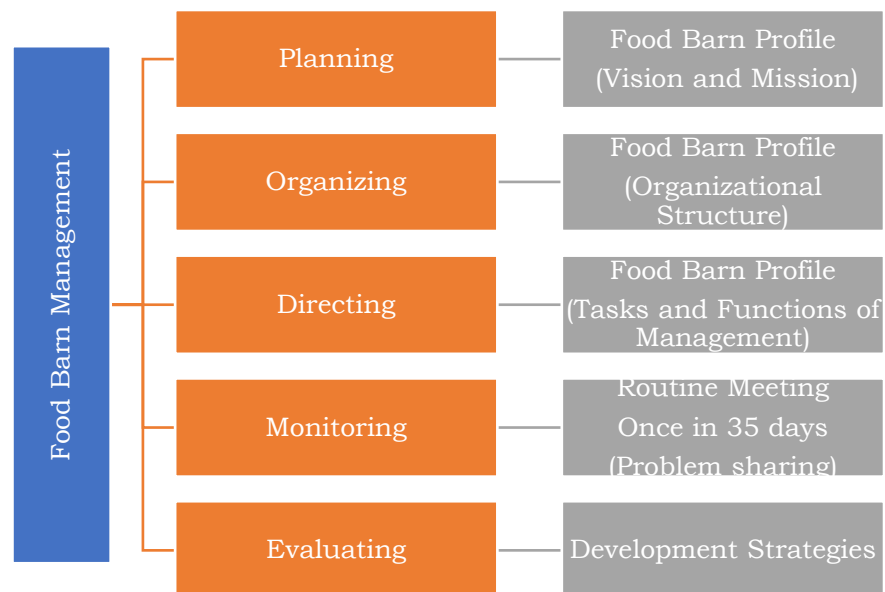
### Implementation of Food Barn Management

Community food barn is a program of the local government of Yogyakarta Special Region Province that is developed based on the concept of integration between food sufficiency fulfilment and local wisdom-based agricultural practices. One of the local wisdom-based practices existing in Yogyakarta is the encouragement for the community to cultivate the edible commodity (Dinas Pertanian dan Ketahanan Pangan Daerah Istimewa Yogyakarta, 2023). In addition, this program is based on the Provincial Regulation No. 4 of 2018 on Food Reserve Organization that is performed by means of provision, management, distribution, and release by the provincial government, regency government, village government, and the community (Pemerintah Provinsi Daerah Istimewa Yogyakarta, 2018).

One of the food barns located in Bantul Regency is Timbul Asih Food Barn. The purpose of its establishment is to realize the food security in Ngireng-ireng Hamlet, Bambanglipuro of Bantul through Timbul Asih Food Barn that favours the welfare of its members and the community under the mission of food reserve administration. The organizational structure of food barn consists of advisor, chairperson, secretary, treasurer, public relations, business unit, distribution, and marketing (Kelompok Lumbung Timbul Asih, 2021). The chairperson of Timbul Asih Food Barn mentions that to be eligible as a member of the organization, a farmer

must have a compulsory reserve of as many as 50 kg of rice. The member would get a membership card that should be submitted whenever he wants to borrow un-hulled rice from the organization. There was an addition of 10% of the total borrowing upon the return (Muslih, 2021). The real benefits of this community food barn program are that the members can utilize the barn as a place to save their harvest, and the barn guarantees the availability of food reserves for all of its members and their family since they are allowed to borrow rice from the barn (Sari et al., 2022).

**Figure 2. Implementation of Management Functions at Timbul Asih Food Barn**



Management functions include planning, organizing, directing, and controlling (Suryani et al., 2021). Timbul Asih Food Barn has implemented all the five functions of management as can be seen in Figure 2. It can be seen from the presence of a clear vision and mission as the representation of planning. Planning management is very important in a group. Every activity must be planned to be in sync with the work performance standards, for example, how the group can manage its members in allocating their time for routine meetings, setting deadlines, returning the borrowed un-hulled rice, and many others. A study conducted by Nalle et al. (2023) shows that the role of the group in management planning has nothing to do with the income of rice farmers. In addition, the farmers have not planned the concept of good membership in the community. In this research, Timbul Asih Food Barn has set the goals, target of its strategic missions, and vision requirements at the tactical level as well as its operations, so the planning is already directed to reach the target of the organization.

The involvement of other organizations in planning and sustaining Timbul Asih Food Barn is also important. For instance, Timbul Asih Food Barn can analyze the integration of organizational actors that play a role in the development of the barn, like farmers group, joint groups of farmers, and cooperatives (Harjanto et al. 2022). There are strong and reciprocal economic, institutional, and social relations among the various actors in the food system (Béné, 2020).

Timbul Asih Food Barn has an organizational structure with clear job descriptions for every group profile as the reflection of the organizing function. Timbul Asih Food Barn is closely linked to its farmer members as those who save their rice. Consequently, rice production optimization is important to increase the food reserves since food security can be realized by narrowing the production gap, increasing food plant productivity (Akash et al., 2022) and agricultural intensification (Rozaki, 2021). Zain et al. (2016) suggest that farmers' level and capacity as well as group capacity must be improved related to land management, institutionalization, rice farming management, and market system analysis. Hence, a model of rice farming management, institutionalization, marketing, and competitiveness strengthening must be designed by engaging advocacy and simple technology which are accessible and easily adopted by farmers. The active role of stakeholders is crucial to support farmer institutionalization (food barn). In their research, Hasmarini and Purnomo (2016) state that economic and social aspects have proved to have an important role in farmer community empowerment to realize local food security. The presence of food barn is expected to help farmers in controlling rice prices in the market. If the harvest is abundant, they can save the rice surplus in the food barn, and during the lean time the barn can release the rice, so the price is likely to be stable. Therefore, Timbul Asih Food Barn needs to have a strong and solid organization to be able to represent the interests of farmers and the community. Suminah (2018) says that the perception, institutional regulation, and economic institutionalization of food barn have positive and significant effects on the institutional development and capacity of food barn to realize food security for the disadvantaged households in Wonogiri Regency. Similarly, Timbul Asih Food Barn can improve the food security for the people of Bantul Regency, thus, they will feel safe and not experience food shortage proneness.

Food shortage is one of the conditions causing food insecurity (Sari et al., 2018; Mohammadi et al., 2024). As a result, an organization must be able to manage its power, motivation, and independence to represent its members' interest (Rwelamira, 2015).

Concerning control, Timbul Asih Food Barn has performed an evaluation function by administering special meetings and social gatherings every 35 days on Sunday *Wage* (one day of the Javanese five-day cycle) to discuss the obstacles, solutions, and development strategies for the food barn. According to Kassaw and Worku (2024), low level of public participation in decision-making, payment delay, low level of gender awareness, and bad planning process are the main challenges that need management and strategy improvement. Gunawan and Pujiastuti (2022) describe that human resources are the important pillar in food barn management. Research conducted by Sihag and Rijdsdijk (2019) urges that control over output, behavior, and group in general can increase the group performance and effectiveness.

### **Effectiveness of Food Barn**

Food availability for the community is the key point to creating household food security. The government must support the realization of food reserves that is based on local wisdom to achieve sustainable food security (Hulu & Thamrin, 2022). Local wisdom as the cultural sub-system has become a model for the previous farmer communities in Indonesia to create food security during harvest abundance (Mulyani & Kusumaningrum, 2023). The purpose of food barn program is to support food security through food availability by facilitating physical food reserves, food stock filling, and strengthening institutional group (Rihanae et al., 2020). Additionally, food barn is also promoted to be an initiative to increase farmers' income. The findings show a probability score of 0.0515 for the effectiveness of food barn membership in increasing the income of rice farmers in Bantul Regency.

The analysis results reveal that the probability value is more than 0.05 indicating that there is no significant income difference between members and non-members of food barn program. This is because there was no difference in the farming practices between members and non-members. The study conducted by Riadinata et al. (2020) shows the discrepancy in income between the farmer members of Community Food Barn (LPM) in Pringsewu Regency and the non-members. This is affected by the difference in farmland width average and the sales price of the farming produce where LPM reserves quite a strong bargaining position to set the time for the sales of its members' farming produce.

The income that is not too much different between the members and the non-members of Timbul Asih Food Barn is because the farmland width is not much different between those two groups. The research findings indicate that the average



farmland width of the rice farmers in Bantul Regency ranges from 1,000 to 5,000 hectares. The average farmland width of the members of Timbul Asih Food Barn is 2,710 m<sup>2</sup>, while that of the non-members is 2,602 m<sup>2</sup>. The farmland width affects positively and significantly farmers' income (Khairati et al., 2023; Pariasa & Hardana, 2024), and farmer welfare (Widarma & Setiawan 2019). Additionally, farmland width also positively affects agricultural productivity (Anupama & Falk, 2018).

Another contributing factor is a similar level of experience between the farmer member group and the non-farmer member group. Equally 80% of the members of each group have an average year of experience as long as 10 years of farming. The length of farming experience is an influential factor of the success in farming practices. Experience can reflect the knowledge and finesse of the farmers in handling the problems and obstacles on the field (Arvianti et al., 2022; Setiyowati et al., 2022). Farming experience significantly affects the farming management of the farmers will influence the decision making and results in farming (Munawaroh et al., 2019).

One of the indicators describing the socio-economic condition of the community is the formal education level. A higher level of education helps farmers increase farming productivity (Guo et al., 2015). Education level also affects performance (Kurniasih et al., 2017). This study observes that the education level of the members of Timbul Asih Food Barn is significantly higher than that of the non-members. The majority of the members of the food barn graduated from senior high school or equivalent, while most of the non-members graduated from elementary school or equivalent. Jamil et al. (2023) argue that farmer's education level and experience is closely related to human resource improvement that will influence the effectiveness of agricultural development.

The findings of this study show that the average income of the farmer members is relatively higher than that of the non-members. Looking at the farmer profile, the farmer participants of the food barn program have higher level of education and more experience compared to those who do not participate in the program. Moreover, the average width of the farmland owned by the farmer members is slightly larger than that of the non-members.

**Table 1. Statistical Test Results of Income Difference between Farmer Members and Non-Farmer Members of Food Barn Program in Bantul Regency in 2022**

<b>Program</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error Mean</b>
Non	35	33,120,378.54	34,950,061.27	5,907,638.60
Lumbung	10	38,568,394.10	24,262,115.72	7,672,354.65

Source: Primary Data Analysis (2022)

The results of t-test presented in Table 1 signify that there is no significant difference in income between the two groups. However, the effectiveness of food barn program can also be observed from other perspectives, one of which is food security. Food barn program is purposed to anticipate food shortage. The study performed by Faqih and Rohayati (2015) reveals that active participation of group members will increase household food security. Faqih (2021) and Rahayu et al. (2016) prove that the implementation of food barn program in Cirebon Regency and Batam City records a great success. On the other hand, food barn program of *Masyarakat Barat* in Lombok Regency is not effective and successful yet to increase the income of the farmer members of the food barn (Sari et al. 2022). Food shortage is one of the conditions causing food insecurity. The community can benefit economically and socially from the presence of food barn (Rahayu et al., 2016) since food barn functions as an important food reserve for all the village inhabitants to mitigate food shortage during harvest failure or famine, and it also contributes to the collective income of the community (Permatasari et al., 2023).

## **CONCLUSION**

Timbul Asih Food Barn has implemented the management functions, including planning, organizing, directing, and controlling. Besides, the farmers who are the members of the food barn have the benefits to borrow un-hulled rice from the food barn if there is a harvesting failure or a long drought. Nonetheless, independent t-test results show that there is no significant income difference between the farmer members and non-farmer members that is probably because of the less optimal utilization of the food barn.

## **RECOMMENDATIONS**

Currently, the number of member farmers of Timbul Asih Food Barn is still low. Thus, adding more members is suggested to create more dynamic management. One of the measures that can be taken is dissemination of information on the existence

of the food barn, its registration procedure, and benefits of being a member of the food barn. Moreover, Timbul Asih Food barn should optimize the management to increase the farmers' income, and this should be supported by the government represented by Office of Food Security of Special Region of Yogyakarta through giving counselling. Also, an analysis on the effectiveness from social aspect should also be performed in addition to economic aspect as to encourage farmers to join as the members of Timbul Asih Food Barn.

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