

REVITALIZATION OF FOOD BARNs TO SUPPORT COMMUNITY AND NATIONAL FOOD SECURITY

(*Revitalisasi Lumbung Pangan Masyarakat untuk Mendukung Ketahanan Pangan Masyarakat dan Nasional*)

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Abstrak

Pasca diterapkannya kebijakan revolusi hijau serta keberadaan Badan Urusan Logistik (Bulog) sebagai lembaga yang berperan menjaga kestabilan pangan, lumbung pangan masyarakat telah kehilangan eksistensinya. Dampak dari berkurangnya eksistensi lumbung pangan masyarakat tersebut dalam jangka panjang justru menyebabkan ketidakstabilan pangan di Indonesia. Hal ini disebabkan oleh beberapa faktor, di antaranya alih fungsi lahan pertanian menjadi lahan industri, penggunaan pupuk anorganik yang menyebabkan kesuburan lahan menurun sehingga menyebabkan hasil panen berkurang, terjadinya alih fungsi Bulog dari lembaga pemerintah menjadi BUMN/Perum, dan terjadinya peningkatan permintaan pangan yang disebabkan oleh peningkatan penduduk yang tidak sebanding dengan persediaan pangan yang ada. Tulisan ini bertujuan menggali lebih dalam tentang penguatan ketahanan pangan melalui modernisasi lumbung pangan yang bertolak dari kearifan lokal masyarakat Indonesia dan sejauh mana modernisasi lumbung pangan dapat menjadi solusi dalam mengatasi rawan pangan akibat belum tercapainya ketahanan pangan. Tulisan ini menggunakan metode penelitian kualitatif deskriptif berbasis data literatur, membahas alternatif konsep untuk merevitalisasi lumbung pangan masyarakat dalam upaya menjaga kestabilan ketahanan pangan masyarakat dan nasional. Konsep yang ditawarkan adalah memodernisasi lumbung pangan masyarakat baik dari segi pengelolaan bahan pangan yang disimpan, maupun aspek manajerial pengelolaan lumbung pangan masyarakat. Selain itu, perlu pengembangan kerja sama untuk bersinergi antar beberapa lumbung pangan masyarakat yang berdekatan dengan masyarakat sehingga cakupan wilayah kerjanya menjadi lebih luas.

Kata kunci: modernisasi pengelolaan, lumbung pangan masyarakat, ketahanan pangan

Abstract

After implementing the green revolution policy and the existence of the National Logistics Agency (Bulog) as an institution whose role is to maintain food stability, the people's food barns have lost their existence. The impact of the decline in the existence of community food barns, in the long run, causes food instability in Indonesia. This is due to several factors, including the conversion of agricultural land into industrial land, the use of inorganic fertilizers which causes soil fertility to decline resulting in reduced crop yields, Bulog's transfer of function from a government entity to a state-owned enterprise/Perum, and an increase in demand for food caused by a surge in population that is not comparable to the existing food supply. This paper aims to dig deeper about strengthening food security through the modernization of food barns departing from the Indonesian people's local wisdom and the extent to which the modernization of food barns can be a solution in overcoming food insecurity due to not achieving food security. This paper uses descriptive qualitative research methods based on literature data, discussing alternative concepts to revitalize community food barns to maintain community and national food security stability. The concept being offered is to modernize community food granaries in terms of both management of stored foodstuffs and managerial aspects of community food storage management. Besides, it is necessary to develop cooperation to synergize between several food barns that are close to the community so that the working area coverage becomes wider.

Keywords: management modernization, community food storage, food security

INTRODUCTION

After implementing the green revolution policy and the existence of the National Logistic Agency (Badan Urusan Logistik/Bulog) as an institution that

has a role in maintaining food stability, the people's food barns have lost their existence (Rachmat et al., 2016). The impact of the reduced existence of food barns causes food instability in Indonesia.

This is caused by several factors, including: *first*, the conversion of agricultural land into industrial land. Second, inorganic or chemical fertilizers cause agricultural land to decrease its soil fertility, causing crop yields to decrease. *Third*, Bulog's transfer of function from a government entity to a state-owned enterprise (*Perusahaan Umum/Perum*) has lost its strategic role in maintaining food stability. *Fourth*, there is an increase in demand for food caused by a surge in population that is not comparable to the existing food supply.

The problem of food security stability, if the solution is not immediately formulated, will cause economic instability and disrupt national security (Suryana, 2014). Therefore, food or food security becomes very important in a country because food security also influences the economic wheel and becomes a benchmark for a country's stability. Food security must now be a serious concern of the government. Because basically, food is a basic human need to live and carry out daily activities. This statement is supported by the theory of needs raised by Maslow. In this theory, Maslow explained that each individual has needs arranged hierarchically from the most basic to the highest level, namely physiological needs, needs for security, needs to be owned and loved, needs to be valued, needs to actualize themselves (Andjarwati, 2015).

Based on this hierarchy, it can be seen that the physiological needs or the need for food sources that play a role in the process of growth and development are the most basic needs for every individual and these needs under any circumstances and however must be met because it can disrupt a person's survival. Therefore do not be surprised if humans will become selfish and lose their human side when faced with the hunger to justify the various ways then arises competition between individuals and groups that are not good in society.

Therefore, food or food security becomes very important in a country because food security also influences the economic wheel and becomes a benchmark for a country's stability. Departing from this, it is not surprising that in every world level meeting, food security has always been the main agenda discussed. There are at least three factors that cause food security to be a top priority: *first*, the population explosion that continues to increase from year to year while the amount of food availability is not balanced with the rate of population growth (Partiwi & Sukamdi, 2015). *Second*, climate change is drastic, causing a decrease in food production (Hidayati & Suryanto, 2015). *Third*, limited food sources due to the transition of agricultural land into industrial centers.

Considering the importance of food sovereignty, resiliency, and security for the Indonesian population and as stipulated in the Food Law Number 18/2012, the government is responsible for ensuring food availability, accessibility, and utilization. At the same time, the role of communities in achieving food security is implemented through their activities in food production, distribution, trade, and consumption. The communities are also expected to participate in food reserves development.

However, in reality, the enactment of the Law on Food does not have a significant impact on improving national food security. Despite the increase, Indonesia's ranking is still far from what was expected. The Global Food Security Index (GFSI), developed by The Economist Intelligence Unit (EIU), compares countries' food security situation based on aspects of availability, affordability, and food quality and safety. The results of this GFSI analysis show that Indonesia's food security position has improved from 71 in 2016 to 69 from 113 countries in 2017, then moved up to 62 in 2019 (Databoks, 2020). Meanwhile, the Global Hunger Index (GHI) compiled by the International Food Policy Research Institute (IFPRI) uses four aspects to assess a country's food security: the proportion of undernourishment and toddler wasting, toddler stunting, and infant mortality. The GHI index of 22 places Indonesia ranked 72 out of 119 countries. Another food security index is the Rice Bowl Index (RBI) which was developed to assess the extent to which a country's capacity to overcome the challenges of food security and rank Indonesia 10th out of 15 countries in the Asia Pacific (Badan Ketahanan Pangan, 2018; IFPRI, 2014; Syngenta & Frontier Strategy Group (FSG), 2016; The Economist Intelligence Unit (EIU), 2016, 2017).

Seeing these problems and the importance of national food security that can affect the country's stability, we need a strategic step in overcoming these problems. One solution to overcome these problems is the revitalization of food barns as part of the community food reserve. Food barns are part of the Indonesian people's local wisdom whose function is to maintain food availability for a group of people in an insecure food condition such as periods of famine, crop failure, or disaster. Local wisdom has a strong potential in efforts to strengthen national food security. However, it is necessary to revitalize food barns. Revitalization of food barns is due to several considerations, namely: *first*, community barns that developed in Indonesia, both food barns managed by indigenous peoples and village communities have limited coverage, so that they are only able to meet food needs within the food storage area established. *Second*, the managerial

aspect of food barns established based on funding by the government tend to be project-based, so there is no sustainability. *Third*, there is no synergy between food barns in the distribution of foodstuffs. *Fourth*, foodstuffs stored are still in the form of staples such as rice and corn so that they have not covered other foodstuffs such as vegetables, fruits, and meat.

The urgency of this research is to achieve national food security that not only provides benefits in the form of productive human resources but also overcomes a threat to national food security due to increased population growth rates that are not comparable to the amount of food available. Also, the achievement of food security will not cause food insecurity due to competition in getting food because food is the most basic need for every individual. Therefore, this paper aims to dig deeper about strengthening food security through the modernization of food barns departing from the Indonesian people's local wisdom and the extent to which the modernization of food barns can be a solution in overcoming food insecurity due to not achieving food security then. The writer hopes that this research will come up with new ideas in strengthening national food security.

LITERATURE REVIEW

Previous Research

Nowadays, food security is a concern amid the rapid population growth that is not comparable to its food ingredients. Strengthening food security is promoted by the government through community empowerment by increasing their capacity and independence in meeting food production availability, distribution, and consumption that is not limited to seasons. Food security itself has become the study of several researchers and community food observers trying to find and discuss the problems that occur to find representative solutions in the future.

Rahmatullaila et al. (2014), in their research, discussed one of the food security empowerment programs, the Community Food Distribution Institute or LDPM, in Lampe Village. There are at least two main objectives of LDPM, namely regional food price stability and food security at the farm household level. The innovation made by LDPM is a step towards revitalizing food and farming management through customs in Lampe Village, so that food stability is not only a seasonal program, namely the rules related to the sale of farmed unhulled rice in Gapoktan's food distribution unit. The need for unhulled rice consumption is directed to be purchased at the distribution unit and food reserves and carry out grain milling activities in the mill owned by Gapoktan. Ironically, the innovation offered is considered to be

at odds with the Lampe community's local wisdom, so that in the process, LDPM found many obstacles due to norms (regulations) that were not in line with the culture of the people of Lampe Village.

In another study, Faqih & Rohayati (2016) examined something similar, namely the rice barn program, with a quantitative approach. They are starting from his concern about farmers' dependence on production companies that can manipulate prices and distribution. Village food granaries that are intended for farming communities are not only a support for food security but also a form of economic prosperity. In this case, Faqih & Rohayati (2016) strive to find a real and robust relationship between the rice barn program on food security so that the higher the participation of members in the food barn program, the stronger the food security.

The strengthening of village food barns for food security was also studied by Bahua (2011a). His research found that food storage institutions as socio-economic institutions have significant potential for rural communities' economic base. The strategies offered to strengthen food storage institutions include (1) increasing the role of the central and regional governments, (2) increasing the potential of farmers' resources through training and counseling, (3) strengthening agricultural business capital, (4) minimizing the conversion of agricultural land functions through the implementation of real corporate farming, (5) building partnerships between village food barns and the Logistics Agency (Bulog), (6) developing a Warehouse Receipt System, and (7) building cooperative relationships with universities and research institutions.

In line with the above strategy, Kholiq et al. (2008) attempted to examine perceptions and participation, which were then outlined in strategies for participatory rice granary development, including (1) building public perceptions not to always rely on the market for access to foodstuffs, (2) building perceptions and empowering community participation in realizing and developing food barns following regional conditions to anticipate food insecurity, and (3) maintaining and fostering the traditions of group communities in realizing food reserves through food barns.

Purwaningsih (2008) stated that implementing food security policies was carried out through rural agriculture-based economic development and food fulfillment for the low and food insecure groups. Food storage to strengthen food security focuses on community empowerment to be independent in meeting the community's food availability, distribution, and consumption.

Meanwhile, in another study conducted by Sawitri Dj & Sudarma (2018), it was emphasized that food storage in Tabanan Regency has an essential role in maintaining food security. As a district that has received a Special Allocation Fund in the agricultural sector, Tabanan Regency has successfully implemented the food barn program, which can save food, overcome food shortages, and increase group income. The desire of members to continue to improve the program continues until a cooperative is formed to support the village food barn program.

Rachmat et al. (2016) agreed that food barns become institutions that respond to the Indonesian people's food insecurity. However, this food storage area does not merely focus on food production and yields because if it is limited to that, no progress will be made in dealing with food insecurity. From the results of his literature review, it is stated that there are at least four things that have caused the decline in food storage, namely (1) the implementation of the green revolution, which introduced superior rice technology and agricultural modernization, which was deemed incompatible with the traditional barns of the community, (2) the existence of Bulog which plays a role in stabilizing the supply and price of food (unhulled) in each region at any time results in no incentive to store unhulled rice, (3) changes in consumption patterns due to globalization, and (4) coaching activities that are inconsistent and tend to be more project-oriented which lead to ineffective coaching. In conclusion, it states that strengthening food storage is not only in the production and distribution of foodstuffs but also in improving infrastructure and developing human resources.

Food Barns

According to Rachmat et al. (2010), food barns are food reserves that serve to maintain food stock or stability either because of a lean season or because there are emergency conditions such as natural disasters. Individual food barns function to store household food stock for a certain period. The food barns or granaries serve to overcome food insecurity during the famine and help members provide capital (Prasmatiwi et al., 2013). Village granaries can also play a role in building independent farmers and sustainable agriculture. Foodstuff stored in the barns guarantees that food will be available in sufficient quantities until the following season. The food barns can help farmers overcome the possibility of food insecurity if they fail to harvest (Faqih & Rohayati, 2016). Food barns are also an institution formed by rural, regency/city communities aimed at developing food supply provision to delay the sale, storage, distribution, processing, and trading of foodstuffs managed in groups (Yuroh, 2015).

According to Rosyadi & Sasongko (2010), food barns or village granaries play a significant role in supporting food availability in the village. The strategic function of village granaries in the past and present is (1) as a food supply reserve, (2) in cases where crop failure is due to pests or natural disasters, the food needs are met with food reserves in the barns, (3) as a means to improve the bargaining position of farmers, (4) when there is an overproduction (big harvest) the farmer can arrange his supply by storing his crops in the barns and will be thrown to the market at a higher price, (5) as a store of seeds. At the time of harvest, the results are sorted, then the excellent quality is stored in the barns as seeds, and (6) has a social role, which helps meet food needs during the famine.

According to Kusumawardini as quoted Tias S, (2012), the term food barns has been known by people in various regions. Existing food barns are often connoted as famine granaries. Famine granaries are formed as a reserve for farmers in the famine season to borrow grain to meet household needs. The existence of food barns is an alternative institution that is sought to replace local institutions that are now experiencing much destruction. The existence of food barns is needed during the famine and an alternative provision of capital for farmers (Faqih & Rohayati, 2016; Rachmat et al., 2016).

Empowerment of food barns will be successful if (1) from the management side, capital strengthening funds are channeled directly to farmer groups according to criteria so that there is an accumulation of business capital for groups (group savings), (2) from a technical perspective, there has been an increase in production and productivity of farm businesses and income of members of farmer groups receiving aid, and (3) in terms of behavioral change, that is, from the habit of working individually to working in groups or together to grow independent and independent farmer groups (Rachmat et al., 2010). According to the Food Security Agency, essential aspects focus on empowering food barns, among others, organization, administration, business development, capital fertilization, and network development. All aspects mentioned above must directly get further attention and guidance from the central, provincial, and regency/city.

Constraints were faced in the empowerment of farmer communities through the institutional strengthening of village food barns: internal constraints, namely: limited human resources, especially farmers, and limited budgets at the farm level in developing village food barns. The external obstacle is that there has not been a good partnership between farmers and agricultural cooperatives to ensure rice price (Bahua, 2011b; Mishbah, 2013).

Food Security

From a historical perspective, food security arises and is resurrected because of the food crisis and hunger. The term food security in the world food policy was first used in 1971 by the United Nations to liberate the world, especially developing countries, from the crisis of production and supply of staple food. Food security focused on meeting basic needs and freeing the region from the food crisis that appeared in the United Nations' definition of food security (Bahua, 2011a).

In 2018 more than 26 percent of the world's population experienced food insecurity (Backer & Billing, 2021). On the other hand, the debate about farmers selling their own crops, then buying food is still going on (Mehraban & Ickowitz, 2021). Actually, food security in various countries in the world, long before the Covid-19 pandemic came, was already under threat (Fan et al., 2021), added to when a pandemic with various kinds of regulations set such as restrictions on social interactions (Panzone et al., 2021), of course it can make it difficult for people to get food. This is a problem in itself for developing countries to survive in a sustainable manner in the midst of food scarcity (Meyer, 2020).

In the last few decades, the food system has undergone a transformation (Arnalte-Mur et al., 2020). Regardless of this transformation, food security must be a priority for every country. Food security is the most crucial part of fulfilling the right to food and being one of the main pillars of human rights. Food security is also an essential part of national security. Unequal food distribution is an obstacle to realizing food security at the national level. This phenomenon explains the hunger paradox, a concept used to explain a phenomenon where the national food security has matured (reflected by the availability of calories and protein above the nutritional requirements). However, hunger or malnutrition still occurs everywhere (Fauzi et al., 2019).

According to Andini (2017) that at the national level, food security includes the supply of food in quantity and quality at affordable prices by the community, especially rural communities. This is because of the basic concept of food security in households, especially in rural areas. In general, food security is defined as a condition where everyone has physical and economic access to food that is sufficient to meet food needs to live productively and healthily. However, based on Government Regulation Number 17 of 2015 concerning Food and Nutrition Security, food security is a condition in which the fulfilment of food for the country up to individuals, which can be reflected in the availability of sufficient food, both

in quantity and quality, safe, diverse, nutritious, equitable, and affordable and does not conflict with the religion, beliefs, and culture of the community (Andini, 2017).

Achmad Suryana as quoted Bahua (2011a), explained that reliable food security was built at the household level, based on local resources' diversity. The dynamics of strengthening food security are carried out by developing food sources, food institutions, and food culture owned by the people in each region. This approach's advantages include that the food produced locally follows local agricultural and climate resources so that its availability can be pursued on an ongoing basis. With these local capabilities, people's food security is not easily affected by food supply problems or fluctuations outside the region or abroad.

Aside from being a place to store harvests, food barns also play a role in overcoming food shortages when farmers experience crop failure or during a famine. At the time of harvest, farmers do not always get a good harvest as expected. There are times when damaging weather factors cause harvests that are less than they should. At times like that, farmers can overcome these by borrowing from the barn. This is very helpful for farmers, so they do not need to worry too much about their food availability. Most of the farmers or members of both food barns have felt assistance with the food barn program (Sawitri Dj & Sudarma, 2018).

Food barns also play a role in increasing the income of the group members. Food supplies in the barn will increase from time to time as more members or farmers of the barn group store their harvests and ask for food assistance during the barn's offseason. It also had a positive impact on the income of the food barns group. When food prices are high, some food stocks in the barn may be sold. Proceeds from the sale can be used to manage the food barn itself (Sawitri Dj & Sudarma, 2018).

Village Institution

Changing the status of Bulog or the National Logistics Agency to a state-owned enterprise, following an economic institution's mission, make Bulog's dual role, namely, creating profits for companies while continuing to carry out social functions mandated by the government. Combining the two functions or objectives, which fosters profit and function as food buffer stocks, will undoubtedly cause a conflict of interest because the two goals can be conflicting with each other in a specific situation. In many cases, Bulog did not play an optimum role in purchasing farmers' grain, and on the other hand, the national food reserves are getting smaller. The

grain/rice market is becoming more free-market, wherein the large traders the middlemen become more dominant. In such conditions, the rice market becomes more sensitive to the grain world market dynamics. The low ability of farmers to wait for a good sale and reduced Bulog's ability to absorb part of the marketable surplus has resulted in a decline in grain prices below the harvest season's base price. This condition is very unfavorable for farmers, tiny farmers (Rachmat, Budhi, Supriyati, & Sejati, 2016).

Institutions of food barns today are generally still at a relaxed and socially oriented level. Therefore the village barns need to be reconstructed their role and function and strengthened their capabilities. The barn is expected not only to help the community's food security on a limited scale but also in the long run. It can be increased again to become a reliable economic institution for rural farmers. Empowerment is carried out systematically, intact, integrated, and continuously by involving all related elements. This effort is expected to make a significant contribution to the realization of food security, and the socio-economic institution of the community can become a rural economic driving agency.

To increase the existing Lumbung Pangan Masyarakat Desa (LPMD) or Rural Community Food Barn towards a village economic institution, it needs to be implemented in stages, starting with developing an existing but social institution, which can be upgraded to a stable, simple LPMD, then facilitated to become an advanced food barn, and ultimately it is expected to become a modern food barn. In the short term, the strengthening of LPMD institutions will continue to be directed at increasing the capacity of food barns security to strengthen farm capital so that farmers are better able to improve the application of technology to improve rice productivity quality. "The institution can also form originated *Kelompok Wanita Tani (KWT)*" or farming women group (Witro, 2019). For this reason, conventional management patterns in the form of natural are gradually fostered, leading to the use of currency exchange tools and subsequently directed to the development of broader economic activities (Faqih & Rohayati, 2016).

Food Barns Development Strategy

The strategy is a way to anticipate future challenges and opportunities in the company's rapidly changing environmental conditions. The strategy can provide the company's goals and direction in the future clearly for all employees (Yunus, 2016). According to Ajibroto, Keizer, and Pringgabayu (2018), a company can develop strategies to overcome external threats and seize

opportunities. The process of analysis, formulation, and evaluation of these strategies is called strategic planning. The primary purpose of strategic planning is to see objectively internal and external conditions to anticipate changes in the external environment. So strategic planning is essential to obtain a competitive advantage and have a product following consumers' wishes with optimal support from existing resources.

The first weakness in developing food barns reserves is that the development of food reserves by individual farmer households requires a superior room with a specific size that can be used to store grain until the next harvest difficult for every farmer household to fulfil (Sawitri Dj & Sudarma, 2018). The second weakness is that the farming community's tradition to carry out collective food reserves in the form of food barns tends to weaken (Rosyadi & Sasongko, 2010).

One of the factors that can be seen as an opportunity in developing food barns reserves is that empirically food problems can occur either caused by natural disasters or human-made disasters (social conflicts). Another factor that can be considered an opportunity is that the government is obliged to encourage community participation in the implementation of food security, as stipulated in the Dictum of Government Regulation No. 68 of 2002 concerning Food Security.

One of the challenges or threats in the development of food barns reserves is in the form of economic conditions in which staple food is available in the right quantity and quality and affordable purchasing power, as happened in the second half of the Orde Baru era. Other challenges or threats include the increasingly widespread adoption of slash-harvest harvesting institutions with the consequence that smallholder farmers no longer bring home grain but cash (Rosyadi & Sasongko, 2010).

The food storage model that is expected to develop is a modern food barn as a social institution that can serve access to food supply and services in terms of the community's social and economic activities. According to Kholiq et al. (2008), achieving food barns in the modern category required several priority strategies according to the results of the Strength, Weakness, Opportunity, and Threat (SWOT) analysis related to participatory food barns development.

DISCUSSION

Food barn or village granary is one of the Indonesian people's local wisdom (Bahua, 2011a; Rahmatullaila et al., 2014). The primary purpose of establishing this granary is as a storage place for harvests or seeds stored in a natural building in

the form of a stage, which is then called a granary (Purnomo et al., 2018). Generally, the granary is used as a storage area for rice, corn, or tubers, which incidentally is the staple food of the Indonesian people. However, the food barn or village granary is one of the local wisdom that can help national food security, but until now, it has not achieved maximum results in its utilization by the community.

Therefore, efforts are needed to modernize village granaries or food barns in realizing national food security following the successful implementation of national food security. There are three indicators of national food security success: availability, affordability, and food quality.

Revitalizing the Food Barns Management System

In the period 2009-2016, there were 3,826 food barns or reserves built and developed by the Ministry of Agriculture. Of these 3,826 food barns, 3,296 were at the development stage, and 1,662 were at an independent stage. The success of the development and management of food barns is based on the achievement of indicators in several aspects, namely: *first*, the output aspect if the government has channeled funds and utilized the provision of food reserves and food economic business activities and productive economic sera business activities in the agricultural sector. *Second*, in terms of outcomes, namely the continued development of the group's food landscape and increasing group capital through productive economic business activities in agriculture. *Third*, in terms of the benefits of establishing a food institution, it is an independent and sustainable food barns institution as well as a group productive economic effort in the field of sustainable food so that it has an impact on meeting the food needs of group members at all times and increasing the income of group members.

So the strategies that can be carried out in revitalizing food barns to the stage of independence and sustainability are as follows: (1) providing program/activity facilitation support to groups to strengthen their ability to provide and manage food reserves so that they are easily accessible and available at all times for its members on an ongoing basis, and (2) providing facilitation to groups in developing productive economic businesses including through buying-sales, delay selling systems, for grain and/ or rice and/ or other staple food commodities and other productive economic business activities in the field of food at the group level to increase the welfare of members of the Community Food Granary (LPM) group and supporting rural economic growth.

The strategy for developing food barns can be described with the following steps of implementation

activities: enhancing the ability of human resources through training and coaching; development of sustainable food reserves; development of productive economic groups; and strengthening group institutions. The regional government continues to foster food barns in order to achieve self-reliance through maintaining the sustainability of food reserves in the food barns; providing other supporting fund allocations from the provincial and district (Anggaran Pendapatan dan Belanja Daerah/ Regional Income and Expenditure Budget (APBD)) to strengthen training and training in order to increase group capacity; and, increasing the ability of management in sustainably managing food reserves and partnerships. Besides, the involvement of agricultural students in real work lectures and field practice can play an active role in accelerating a stage of independence for food barns.

The Use of Food Preservation Technology in Meeting Food Availability and Quality

One of the indicators of the success of the implementation of food is the availability of food and good food quality to be consumed. Meanwhile, the granary or village granary, which is one of the village food barns reserves, only focuses on storing staples such as rice, maize, and tubers. In contrast, food needs are not only rice but also food that is essential for humans, and it means to have a balance of calories, protein, carbohydrates, fats, vitamins, and other essential substances.

Besides, food is also food consumed for social and cultural interests, and this is part of Human Rights (HAM), as stated in the Universal Declaration of Human Rights in 1948. Then this is reinforced by the explanation of the National Agency of Drug and Food Control that explains that food is food for consumption which is not only rice but also vegetables, fruits, and meat in the form of livestock as well as fish, eggs, and water (Pasaribu & Rowland, 2013). Thus, food is not only rice but also includes vegetables, meat, fish, eggs, and milk. Also, good food can meet the needs of the body's essential substances, including protein, fat, carbohydrate, and vitamin needs. Therefore, in meeting the availability and quality of food, it is necessary to modernize the food barns by utilizing various kinds of food preservation technology, including:

1. Food preservation using irradiation techniques

The development of nuclear techniques in the food sector has been proven to create new things as alternative technologies to help solve various sanitation problems. Some examples of nuclear engineering applications for this purpose have been developed to increase

durability, food safety, and sterilization of certain foodstuffs. One of them is irradiation. Irradiation is a physical process that can be used to preserve and improve food security. The type of radiation used is high-energy radiation, called ionizing radiation, because it causes ionization of the material in its path (Asiah et al., 2019; Badan Tenaga Nuklir Nasional, 2016).

This is based on the ratification of the use of irradiation technology in food by the Food and Drug Administration (FDA), which sets regulations on labeling on irradiated food products. The FDA stipulates that food packaging by including the radios logo (radiation durable), in contrast, food irradiation in Indonesia is carried out based on the Regulation of the Minister of Health of the Republic of Indonesia Number 826/MENKES/PER/XII/1987, Number 152/MENKES/SK/II/1995, and Number 701/MENKES/PER/2009, and RI Food Law Number 7/1996, Government Regulation on Food Label and Advertisement Number 69/1999 paragraph 34, and International Trade Regulations for Commercialization of Irradiated Food Commodities and International Standard Codex Alimentarius Commission Regulations for Irradiated Food (Utami, 2016). However, irradiation has several disadvantages, namely: *first*, if decomposing microorganisms are destroyed, but pathogenic bacteria are not, consumers cannot see the indications from the form of food. *Second*, the possibility of developing microorganism's resistance to radiation. *Third*, the loss of the nutritional value of food. Until now, analytical procedures in detecting whether food has been irradiated have not been sufficient.

2. Cooling down

Storing below 15°C and above the freezing point of the material is known as chilling storage. The storage of fruits and vegetables requires the optimum temperature to maintain quality and freshness. Optimum temperature can cause damage due to cooling (chilling injury). Cooling damage from bananas at critical temperatures (13°C) is a dull colour, taste changes, and can not cook. The optimum conditions for the bananas are 11-20°C and RH 85-95 percent. In this condition, oxidative metabolism, such as respiration, runs more perfectly. Cooling does not affect the quality of taste, except when the fruit is over-cooled so that the ripening process stops (Santoso, 2006).

3. Controlled atmosphere (CA) storage

Storage technique CA Storage is a significant discovery in the post-harvest system of fruit and vegetable horticulture. When combined

with cooling techniques, this technique will be able to prevent respiratory activity and may be able to inhibit the process of yellowing and deterioration of quality. The air temperature in CA Storage can be regulated and maintained in various ways and ways. A straightforward way is to place the commodity in an airtight chamber. Because respiration occurs and the concentration of O₂ decreases, CO₂ levels can also be adjusted according to the desired dose employing the use of CO₂-absorbing compounds usually used NaOH. CA Storage, especially if the CO₂ concentration is very high (Santoso, 2006).

4. Hipobar storage or low-pressure storage

Hipobar storage conditions or low-pressure storage (LPS) have been studied and reported by several researchers. Dilley reports good results for some products at absolute pressure, namely for 10 Kilopascal (kPa) apples, 7 kPa sweet corner, 10 kPa ripe green tomatoes, 3-5 kPa asparagus, and 2 kPa food mushrooms (1 atm = 101 kPa). Spalding reported that LPS at 20 kPa was superior to CA for limes and mangoes but inferior to CA advocates. LPS is very good at creating an oxygen atmosphere that is almost free of ethylene. Therefore it is great for apples, leafy vegetables, and ornamental plants. For products sensitive to spoilage, some effort is needed to prevent it, usually in a transportation system that uses hypobaric combined with MA Storage (Santoso, 2006).

5. Freeze drying

Freeze drying is a drying method that can maintain the quality of drying results, especially for products that are sensitive to heat. Compared to other methods, the advantages of freeze-drying are: *first*, it can maintain product stability (avoid changes in aroma, colour, and other organic elements). *Second*, it can maintain the material structure's stability (shrinking and deformation after drying are minimal). *Third*, it can increase rehydration power. Furthermore, the freeze-drying technique methods are: *first*, by using cold air that is blown or other gases with low-temperature direct contact with food, for example, through a blast freezer, tunnel, fluidized bench, spiral, rope (belt), and others. *Second*, by direct contact, such as a plate freezer where the food or liquid has been packaged in contact with the surface of a cylindrical metal plate cooled by circulating cooling liquid (multi-plate freezer). *Third*, by immersing food directly into the cooling liquid, or spraying the cooling liquid on it, for example, with liquid nitrogen and freon, sugar, or salt solution (Pujihastuti, 2009).

The five preservation methods can answer food barn problems' challenges in storing foodstuffs such as meat, vegetables, and fruit. Efforts to modernize community food barns by supplementing with high technology in food preservation require large funding schemes as well as "the need for trained human resources in operating and maintaining the technology used" (Witro et al., 2019). This problem can be overcome by having technical guidelines that the community can use to obtain funding sources from the government. Besides, community food barns managers can work together with the private sector to cover the financing scheme. However, due to the large financing schemes required, it is suggested that community food barns that have been equipped with food preservation technology be established in areas with certain commodities such as areas with fish or fruit commodities, so that the price can be maintained because of its availability in food barns Public.

The Synergy between the Food Barn and The Food Development Center

One problem with the food barn that does not play a significant role in food security is the limited coverage area so that the food barns can only meet the needs of the group. A concept is suggested to answer these challenges by synergizing between food barns to be distributed to food-insecure areas or aiming to maintain food availability to minimize inflation. The steps that can be taken are as follows: *first*, the synergy between the food barns is prioritized in the food barns that have been modernized and have been equipped with food preservation technology. *Second*, sources of food reserves are obtained from farmers' production, where the food barns are established. Besides, farmers are offered several alternative options, namely storing food reserves such as saving money in a bank or selling it to the manager of food barns at a modest price as in the Village Unit Cooperative management model. *Third*, to avoid monopoly by food barns, farmers are allowed to sell their crops to intermediaries or markets if the price is higher than offered by the barns, so that food barns are not the only ones that collect or buy farmers' crops.

Fourth, food barns categorize food reserves in the food barns they manage into two categories of durable food and rot quickly to apply food preservation techniques to these durable foodstuffs. *Fifth*, managers of food barns calculate the availability of food in the food barns they manage to cover their members' needs certainly. So that if there is excess, it can be distributed to food barns located in food-insecure areas. *Sixth*, food barns can become

a business entity that adopts modern markets to buy food at affordable prices and quality from the food barn, and the profits can be used to improve the health of their members.

Procurement of Modern Food Barns in Each Region

Food affordability is an indicator of food security's success and essential because food affordability or access is a link between food availability and consumers (the public). If abundant availability and food quality are met, but the community cannot access food, food security will not be achieved. Therefore, it is necessary to procure food barns in every district or city, although in its implementation, it is not as easy as turning the palm because it requires so much funds and requires contributions from various parties, both government and practitioners who are competent in their fields.

So the procurement and development of modern food barns in each district and city areas can answer these challenges, especially in food-insecure areas. Because with the modernization of these food products, the barns can solve the problem of uneven distribution of food and ensure the availability of food not only in the form of rice but also includes: vegetables, fruits, meat, fish, and milk, which are essential elements needed by the body. With the procurement of modern food, barns can maintain price stability in the market because of the guaranteed availability of food and suppress the market monopoly that intermediaries often carry out so that people's access to food becomes easy and affordable's purchasing power.

Besides, to create easy access to food for the community, food storage can be a solution in overcoming the community to survive in the community. Food insecurity that occurs will cause difficult access to food because food is a basic human need. Humans will try in various ways to meet their basic needs, which triggers competition in the community, significantly when strengthened by the provocation issues that accompany it. The modern food barns can be the right solution in overcoming the problem because the food barns are one of the local pearls of wisdom of the Indonesian people who used the principle of cooperation in collecting food in the granary as a deposit when the famine arrived. From this local wisdom, a value of friendship is created that begins to fade in life in the community. Especially when the Indonesian people face a demographic bonus in 2050, this solution is very appropriate to offset the population explosion with food availability and food quality that meets and is supported by people's easy access to food sources.

CONCLUSION

Food is everything that comes from nature which is used as a source of food either has not been processed or in the form of raw materials, or has been through the process of deception so that it is ready for consumption. Besides, food is one of the basic human needs, besides clothing and shelter. Therefore, humans will do various ways in meeting these needs so that the availability, affordability, and quality of the food, which is an indicator of the success of food security or in other words, food security, becomes very important.

The urgency of the efforts to revitalize the food barns is due to the implementation of the green revolution policy and the existence of Bulog as an institution that has a role in maintaining food stability, causing the food barns to lose their existence. The impact of the reduced existence of food barns causes food instability in Indonesia. This is caused by several factors, including: *first*, the conversion of agricultural land into industrial land. *Second*, inorganic fertilizers cause agricultural land to lose its nutrients, causing crop yields to decrease. *Third*, Bulog's transfer of function as state-owned enterprises (Perum) has lost its strategic role in maintaining food stability. *Fourth*, there is an increase in demand for food caused by a surge in population that is not comparable to the existing food supply.

In line with the above argument, it is suggested an alternative concept in revitalizing food barns to maintain national food security stability. The concept offered is: *first*, to modernize the food barns storage in terms of the management of stored food and managerial aspects of food barns management. *Second*, to make food barns not only meets the needs in a limited scope where the food barns are located, but also synergizes with food barns in other regions.

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