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Alternative Models of Food Buffer Systems for Large Cities in Indonesia

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ABSTRACT

Every country has efforts to fulfill food. In order to ensure a fair and equitable food supply at the community, household and individual levels in accordance with the purchasing power to meet food needs. Therefore, an alternative food buffer model is needed in each region, especially in big cities. This paper recommends a big city food buffer model with at least five areas that become the main functions of TTIC/DC. First, the field of supply management. Second, supply reserve management. Third, supply distribution management. Fourth, institutional management of food cooperation. Fifth, e-commerce-based information technology system. Food supply to big cities can be done by optimizing nearby areas to be more effective and efficient, and cutting long supply and distribution chains. This is important so that price fluctuations that often occur in big cities can be properly addressed.

Keywords: *Food, buffer, Indonesia*

INTRODUCTION

The world faces major food security challenges (Reid & Mooney, 2016; Kornher & Kalkuhl, 2019; Röös et al., 2021). Food is still a serious problem in most developing countries (FAO, 2009; Christine, 2016) , therefore every economic policy always puts food and nutrition issues at the top priority (Leenes et al, 2010; Gillespie et al., 2018; Toma et al., 2021).

Food fulfillment efforts are efforts to ensure fair and equitable food provision at the community level (Ahmad et al., 2017; Jacobi et al., 2018) , households and individuals in accordance with the ability of purchasing power to meet food needs (Arendt & Boeckenstedt, 2011; Kornher & Kalkuhl, 2019). Food provision has been carried out through several policies and programs to increase and diversify food supply and consumption (Martinez et al., 2018; Sulaiman A.A, 2017; Levkoe & Sheedy, 2017; Badiane & Odjo, 2015). Increased food production ((CONTAM), 2011; Bancos et al., 2015; Lassaletta et al., 2016) is carried out through the implementation of food intensification, extensification, rehabilitation and diversification programs (Sawit, 2001). The policy of increasing the production and provision of various foods is intended so that every household and individual can access quality food (Dolstad et al., 2016) so as to meet sustainable food needs (Sulaiman A.A, 2017; Teddu, Ali, & Salman, 2018) . Therefore, the ability to meet basic needs, one of which is the fulfillment of food needs (Amoak et al., 2023; Sharareh et al., 2022; Wang et al., 2023; Al-Amin & Ahmed, 2016), if there is a decline in food production, it means that more people will slip into the abyss of poverty and hunger (Asep et al, 2006).

There are many programs to overcome food problems, but there are still many people in developing countries in the world who experience food insecurity (Nguyen & Winters, 2011; Chamberlin and Jayne, 2020; FAO, 2009), The realization of food self-sufficiency is one of the imperative requirements (Rusastra, 2004). However, it is not sufficient to ensure food and nutrition security as reflected by adequate food access at the

household or individual level (Buckley et al., 2013) . Food access is determined by the purchasing power or income (income to price ratio) of households or individuals (Dolstad et al., 2016). Thus, in order to realize food security (Berger & Helvoirt, 2018; Bian & Liu, 2021; Porkka et al., 2013; Rulli et al., 2016) and nutrition, the government needs to keep food prices affordable for domestic consumer households (Levkoe & Sheedy, 2017). In addition to ensuring food access (Ahmad et al., 2020; Sulaiman A.A, 2018), food price stabilization (Brander et al., 2023; Kato et al., 2022; Staritz et al., 2022) is also very important for controlling general inflation and increasing labor wages which are part of the determinants of macroeconomic health (Simatupang, 2004). One of the measures taken by the government in maintaining food availability is by setting up food buffer models in every major city in Indonesia (Sulaiman A.A, 2018; Food Security Agency, 2017; Baye et al., 2021; DeLoid et al., 2017; Li et al., 2016; Lingua et al., 2013; Sheraz et al., 2014).

Setting up a big city food buffer model by optimizing the function of buffer areas as the main providers of food is a big job and not easy to implement (Levkoe & Sheedy, 2017; Arendt & Boeckenstedt, 2011) . Therefore, the government (central and local) needs to continue this idea in order to stabilize supply and prices in big cities. In order to implement this agenda, there is a need for in-depth studies to find alternative models of food buffer systems for big cities in Indonesia.

RESEARCH METHODS

Based on a literature study of various national and international journals, the question was raised as to what are the alternative models of food security in big cities in Indonesia. The type of data used is secondary data. The data collection method is literature study. The method that will be used for this assessment is literature study (Creswell, 2015). In addition, this research is accompanied by FGD (Focus Group Discussion) and field observations to better understand the real conditions that occur. The data obtained is compiled, analyzed, and concluded so as to get a conclusion regarding the literature study (Baker, 2018).

RESULTS AND DISCUSSION

Alternative Model of Large City Food Buffer System

The Food Buffer Model (Baye et al., 2021) focuses more on reformulating the function of Toko Tani Indonesia Center (TTIC) as an embryo / forerunner of distribution centers (DC) for major cities in Indonesia (Sulaiman A. A., 2018) . TTIC/DC plays a role in supplying, stocking, and distributing food commodities through the use of information technology (e-commerce) to markets, TTI, Rumah Pangan Kita (RPK), grocery stores, E-Warung, and others, thereby simplifying distribution flows and shortening distribution channels.

There are two aspects to the distribution process, namely the support and financial systems and the service aspects (warehousing, packaging, and shipping) (Saragih J.P., 2017) . They play an important role in the distribution process of goods from DCs to final distributors and consumers (Figure 1). In the model presented, the distribution flow of foodstuffs originating from farmers/groups can go directly to TTICs/DCs and then DCs distribute to retailers and directly to consumers. With such a system, the supply chain will be more efficient and distribution costs can be reduced, resulting in food price stabilization.

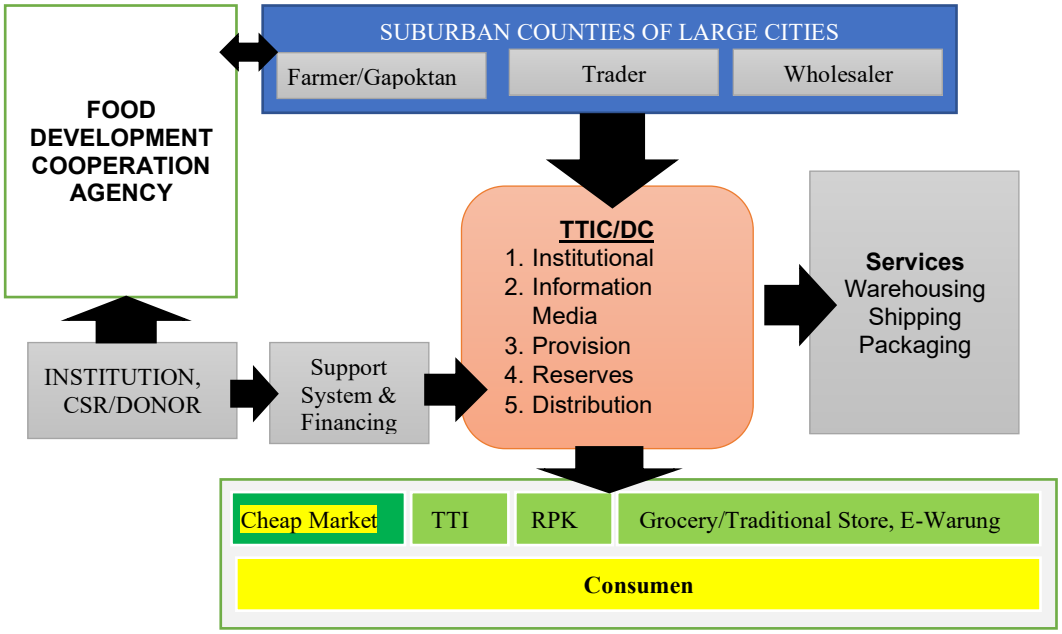

Figure 1. Alternative models of big city food buffer system

There are at least four advantages and challenges in reformulating the food buffer system. First, strengthening the function of TTIC as an embryonic DC for big cities. Second, the expansion of cooperation between buffer districts and big cities by expanding or establishing a new institution, BKSPKP. Third, strengthening the support system for DCs from donor agencies.

Fourth, expansion of distribution channels through cooperation with retailers (TTI, RPK, and E-Warung). Meanwhile, there are challenges that need to be considered. First, relatively large funds are required for the initial establishment of TTIC/DC. Second, changes in food distribution channels take a relatively long time.

In the alternative model of big city food buffer system, there are at least five areas that become the main functions of TTIC/DC. First, supply management (Sadler et al., 2011) . Second, supply reserve management (Liu et al., 2022) . Third, the field of supply distribution management. Fourth, the field of institutional management food cooperation (Brander et al., 2023) . Fifth, e-commerce-based information technology system (G. Wang, Hou, et al., 2023; G. Wang, Zhang, et al., 2023) .

Supply Management Division

Supply management is one of the areas in the Distribution Center model that plays a role in managing and guaranteeing the availability of food supply from supplier sources (Elangovan et al., 2021 ; Hicks et al., 2016; Pérez-Escamilla, 2012 ; Longo, 2016) . Starting from farmers or farmer groups, wholesalers, collectors, and others to food supply (Bodirsky et al., 2015; Charlton et al., 2016; Ercsey-Ravasz et al., 2012; Thornton et al., 2012; Valin et al., 2013) to DCs (Jurgilevich et al., 2016; Tokkozhina et al., 2023) . DCs play a role in determining the type of food, quantity, volume, price, and quality of basic and strategic food commodities in accordance with DC targets (Busch & Spiller, 2016; Cristina Rulli & D'Odorico, 2014; Jurgilevich et al., 2016; Tokkozhina et al., 2023)

.To deliver supplies from the source to the DC warehouse, the role of relevant actors or stakeholders such as ministries/institutions, BKSPKP, BUMD, or other delivery services is required (Food Security Agency, 2017) . This becomes one of the alternatives when there is a surge in demand that causes an increase in the capacity and carrying capacity of the fleet. Supply from Gapoktan, collectors, wholesalers, and others can go through TTIC/DC. In terms of availability and supply conditions (Ali & Abdullah, 2012; Su et al., 2016) , DCs play an important role in conducting supply management. The role of information is influential in maintaining supply stability (Anastasiadis et al., 2021; Drejerska & Sobczak-Malitka, 2023; X. Wang et al., 2023) both from the level of supplying goods (Gapoktan, collectors, wholesalers).

Supply Reserve Management Division

Supply reserve management is one of the fields in DC that plays a role in managing basic and strategic food reserves that will be stored in warehouses. Then distributed at certain times according to the demand and needs of each commodity. Through this submodel, it will be determined the optimal amount of reserves that must be available in the warehouse in order to meet the needs that fluctuate every time. This field also plays a role in regulating the techniques and procedures for management and storage in warehouses that are adjusted between the characteristics of foodstuffs and the capacity and conditions of warehouses (Anastasiadis et al., 2021; Drejerska & Sobczak-Malitka, 2023; G. Wang, Hou, et al., 2023).

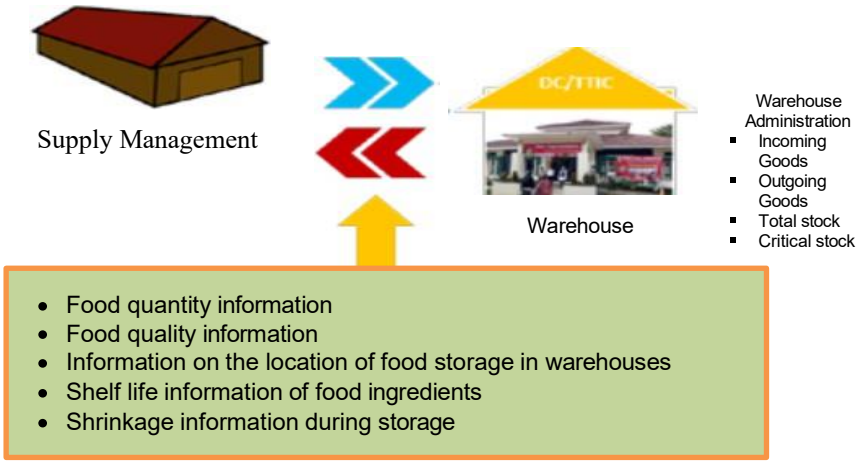

Figure 2. Field diagram of supply reserve management

In improving the effectiveness of reserve inventory control in the warehouse, it needs to be supported by an inventory control information system that describes the process of changing inventory items. The existence of an inventory information system will greatly help the DC to determine how many orders each time with the right order lead time planning before the food supply in the warehouse runs out.

The existence of an inventory information system will greatly assist the DC in determining what is the most optimal reserve stock (Aryal et al., 2019; Economics, 2015; Eker et al., 2020; Eltholth et al., 2015; Ohlsson, 2014) . Thus, there is no shortage or oversupply that can cause inefficiency in the use of warehouses with limited capacity. The information contained is in the form of information on the amount of food, the quality of food, the place where food is stored in the warehouse, the shelf life of food, and information on shrinkage during storage.

Supply distribution management field

The field of distribution management (Fertö & Hubbard, 2003; Hoddinott, 1999; Maxwell & Frankenberger, 1992) describes the process of distributing basic and strategic food commodities so that they can be delivered by business actors at the intermediate level of distributors or to end consumers effectively and efficiently. This submodel describes the DC function of how the system and procedures for distributing food products, starting from the ordering and delivery process to be on time, in the right amount, and in the right quality. Several stages that occur in this submodel include information on food needs, namely the number and type of food commodities, as well as the quality expected by the final distributors (TTI, RPK, E-Warung, retail/cooperatives). In addition, the role of related agencies, BUMDs or BKSPKP in providing the necessary transportation to distribute to consumers.

Institutional Management Division

It is a field that describes the governance relationship between actors, especially in DC management with related government institutions (Abid et al., 2016; Cook et al., 2011; Fertö & Hubbard, 2003; Mounirou et al., 2018) . In this field, it is also necessary to determine the institutions and institutional forms that drive all DC management functions. In addition, this field also describes the structural relationships in the institutions to be established, coordination, and human resource management. The development of DCs for staple and strategic food needs the joint involvement of the Provincial Trade and Food Security Office, District Agriculture and Food Security Office, Bulog, cooperatives, and others. The relevant agencies have their respective roles in supporting and coordinating the implementation of each DC management function. Operationally, it is carried out by regional companies that have been appointed as the DC operational implementation.

In accordance with their main tasks and functions (tupoksi), each agency becomes the leading sector in carrying out each DC management function. First, the District Agriculture and Food Security Office plays an

important role in supporting and fostering farmers (Poktan/Gapoktan), collectors, and wholesalers in efforts to increase productivity, improve their ability to provide food supplies. Secondly, the Provincial Trade Office together with the Provincial Food Security Office play an important role in fostering and empowering business actors, especially regional companies implementing DC functions. The guidance is in supply management, capacity building, and business development, as well as carrying out control functions in controlling food prices in the market. Third, the Food Security Agency, Bulog, and cooperatives play an important role in fostering cooperatives that become DC cooperation partners as final distributors (TTI, RPK, retail/cooperatives) to reach consumers. The three elements as a whole play a role in supply provision, supply management, and supply distribution.

Field of Food Technology and Information System

Food price and supply are strategic indicators to determine the status of food distribution (Adeboye et al., 2014; Benavidez et al., 2018; Blauhut et al., 2016; Šlaus & Jacobs, 2011) . Frequent price fluctuations in a region indicate that there has been a disruption in food distribution. It can be caused by insufficient supply or increased demand for food. Insufficient food supply in a region can be an indicator of unequal food distribution between regions. It may be due to low production and disruptions in the distribution process due to the impact of climate change such as floods, droughts, pest attacks, high sea waves, and poor transportation facilities.

Food price is one of the indicators of food sufficiency in society (Fahmid et al., 2018; Nona et al., 2019) . Price is also one of the important elements in food economy and contributes to inflation (Fahmid et al., 2018; Munirathinam et al., 1998; Nona et al., 2019; Ogbeide & Ogbeide, 2015; Safaruddin et al., 2023.) . Food prices at the consumer level affect food access, the occurrence of food insecurity and the volume of demand. Any disruption in supply that may affect food prices requires an immediate policy response from the government. This is because it can cause social turmoil in the community and lead to disruption of national socio-political conditions. Therefore, an up-to-date and accurate early warning system on the condition of food supply and prices is needed, in order to immediately anticipate and respond to possible fluctuations.

The lack of integrated and reliable information has led to greater price disparities (Kleijn et al., 2015; Thøgersen, 2017) . The lack of information on food prices in the regions will affect the efficiency of decisions taken by economic stakeholders, both at the central and regional levels. The negative expectations that occur in the community due to asymmetric information have the potential to cause market price volatility and affect overall economic stability. Thus, each major city is expected to have Food Price Information, so that the existence of a comprehensive and easily accessible information medium in major cities can support the implementation of the tasks of local governments/relevant agencies. Especially in providing more accurate information to the public, thus creating positive expectations and stabilizing regional food prices.

Food Buffer System Model Replication

The Food Buffer System model is a generic model that can be replicated in other major cities across Indonesia. Providing food to big cities can be done by optimizing nearby areas to be more effective and efficient, as well as cutting long supply and distribution chains. This is important to do so that price fluctuations that often occur in big cities can be properly addressed. Therefore, in order to optimize the replication of the concept of food buffer system strategic steps are needed:

The distribution flow of staple and strategic food supplies from buffer zones is not only to the big cities that are already served, but also to other regions that have been cooperating for a long time. It is not an easy matter to change the existing distribution flow. For this reason, it is necessary to guarantee the price and continuity of supply from buffer zones to big cities.

The provision and distribution of supplies to big cities has so far only been done business to business and has not involved the involvement of inter-regional governments. Therefore, a clear legal umbrella is needed on inter-regional cooperation (big cities and food buffer districts) in the field of food security implementation.

The implementation of inter-regional cooperation in food supply cannot be carried out by the relevant regional offices alone, but needs to involve all policy-making components. For this reason, the involvement of relevant ministries/institutions is needed to smooth the supply distribution channel.

Food supply from buffer zones to big cities has implications for the profit margins received by farmers as a consequence of supplying food outside the region. Therefore, in order to improve farmers' welfare and create justice, input subsidies for farmer groups in buffer zones need to be prioritized.

CONCLUSION

Preparing a big city food buffer model by optimizing the function of the buffer area as the main provider of food is a big job and not easy to implement. An alternative buffer model is needed with at least five areas which are the main functions of TTIC/DC. First, supply management. Second, supply reserve management. Third, supply distribution management. Fourth, food cooperation institutional management. Fifth, e-commerce-based information technology system. Food supply to big cities can be done by optimizing nearby areas to be more effective and efficient, and cutting long supply and distribution chains. This is important to do so that price fluctuations that often occur in big cities can be properly addressed. Therefore, in order to optimize the replication of the concept of food buffer systems.

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