Avalaible online at http://journals.ums.ac.id, Permalink/DOI: 10.23917/jep.v22i2.15394

Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 22 (2), 2021, 181-191

Food Insecurity during a Pandemic: *System Thinking-Based Analysis*

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Received: March 2021 | Revised: April 2021 | Accepted: May 2021

Abstract

The Covid-19 pandemic has had a terrible impact on human security. On the one hand, human health is threatened by a mysterious disease that has not known the best way to cure it. On the other hand, efforts to prevent this disease' spread pose another threat to human security, namely food security. Since the 1990's, global food distribution is carried out under the global food regime's governance, which results in many developing and low-income countries depending on imported food. The closure of borders and markets, the imposition of quarantines, and cut off transportation routes have disrupted the global food supply from producers to consumers. As a consequence, food supplies are also under threat, and global food prices are rising. Meanwhile, the economic downturn due to the pandemichas left many people unemployed, fall into poverty, and their ability to access food is reduced. Lack of access to food creates food insecurity conditions. However, it cannot be ignored that low domestic food production and global food insecurity are particular problems that have occurred long before the pandemic. Underlying this condition, this study aims to investigate the primary cause of food insecurity. This study finds the need for a radical paradigm shift of the government in viewing the concept of food security and then convert to food soverignty.

Keywords: Covid-19; food security; food sovereignty; global food regime; systems thinking.
JEL classification: N50; O13; Q17; Q18

How to Cite: Yulianti, D. (2021). Food Insecurity during a Pandemic: *System Thinking-Based Analysis*, 22(2), 181-191. doi:https://doi.org/10.23917/jep.v22i2.15394

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1. Introduction

The global impact of Covid-19 pandemic has appeared in various sectors of human life around the world. In addition to the health impacts where so many people died from Covid-19 and comorbid diseases, this pandemic has had economic, social, political, and cultural impacts. In the economic sector, one worrying impact is the global condition of food insecurity. Before the Covid-19 pandemic, global hunger cases in 2019 had shown an increasing trend. However, although the increase tended to be slow, there are still 820 million people recorded as suffering from hunger with different levels or status of vulnerability (FAO, IFAD, UNICEF, WFP, and WHO, 2019). In 2020, between 720 and 811 million people in the world are in a state of food insecurity. This figure increased from the previous year. Currently, there are 161 million more people than a year before who suffer from food shortages. In detail, when the food insecurity data is compared between 2019 and 2020, there is an increase in the number of hungry people by 46 million in Africa, 57 million in Asia, and 14 million in Latin America and the Caribbean (FAO, IFAD, UNICEF, WFP and WHO, 2021). This data shows that during the pandemic, more people have difficulty accessing food.

Governments worldwide have taken various policies to prevent the spread of Covid-19, ranging from loose social restrictions such as social distancing to strict social restrictions such

as lockdowns, travel ban, and quarantine. This social restriction has a significant impact on the economic growth of countries in the world, bringing up to systemic effects in various other dimensions of life. One of the side effects caused by social distancing is the disruption of the global food supply chain. For example, lockdown policies and restrictions on movement have hampered farmers' activities in providing food raw materials to food industries, affecting the supply or availability of food. The closure of traditional markets also makes it difficult for the weak economy to buy cheaper food than supermarkets. These negative aftermaths were identified by among others, Bene (2020), who concluded that one of the direct impacts of Covid-19 experienced by actors in the food system is a decrease in their income due to various restrictions, and this affected their ability to access traded food.

According to definition given by Food and Agriculture Organization (FAO), food security can be achieved if humans continuously have "physical and economic access" to food that is sufficient in quantity, safe, and contains good nutrition to live healthily. The main problem in this definition is the phrase "economic access." From this definition, which was adopted in the 1996 World Food Summit, we can conclude that the achievement of food security is related to economic sufficiency. In other words, the focus of food security is on availability, and food is positioned as a trading commodity. Food shortages in a country are considered to be met by importing from other countries. Through this concept, agricultural development in developing countries is always directed towards integration with the global trade system, for example, through planting export-oriented crops. Meanwhile, to meet domestic food needs, countries prefer to import. Thus, many countries are very dependent on food imports.

Food security is closely related to the global "food regime." According to Friedmann (1993), the food regime is a "rule-governed structure of production and food consumption on a world scale." The current global food regime is under the WTO, which has great power in controlling food production and distribution. Since 1995, the WTO has implemented the Agreement of Agriculture (AoA), which reformed trade in the agricultural sector and made policies in this sector more market-oriented. Through the Structural Adjustment Programs imposed on them by the World Trade Organization (WTO), the International Monetary Fund (IMF), and the World Bank, developing countries are forced to join an international food regime that only benefits developed countries (Gerwin, et al.). In the global food regime under the framework of the Agreement of Agriculture (AoA), countries are required to reduce basic tariffs (import duties) on agricultural imports, limit government subsidies and protections of the domestic agricultural sector, and limit export subsidies (wto.org, n.d.). In other words, under the WTO food regime, a country can no longer freely restrict the entry of imported foodstuffs and regulate domestic food prices.

As a result, the global food regime based on a free-market system is one of the leading causes of food insecurity. Powerful countries can produce food in massive quantities and then sell them all over the world. The global food distribution is currently monopolized by transnational food companies. The strength of transnational corporations (TNCs) is vast that it monopolizes the food market and dominates the formulation of various international food regulations (Holt-Gimenez, 2010). As a consequence, local agriculture has become increasingly marginalized. Agricultural land is decreasing because many farmers sell their fields and turn to work in the industrial and service sectors. In Indonesia, according to the Central Bureau of Statistics, in the period 1990-2018, agricultural contribution to Gross Domestic Product fell dramatically from 22.09% to around 13%. Labor absorption for this sector also fell sharply from 55.3% to 31% in the period of 2014-2019. The agricultural sector has also grown under national economic growth (Citradi, 2019).

In a pandemic era, the global food supply is disrupted, and food-importing countries are threatened with food insecurity. However, low

food production in food-importing countries, such as Indonesia, is a problem that existed long before the pandemic. Low agricultural production is a consequence of handing over food to the free market (Ploeg, 2020). This condition raises the research question, which is the primary cause of this food insecurity, is it the pandemic or related to the paradigm of food distribution?

Several articles have been written about the impact of the pandemic on global food insecurity. Bene (2020), apart from writing down the previously mentioned points regarding the public's reduced purchasing power, also discusses the importance of building resilience capacity, namely by increasing assets or savings and increasing "diversification, connectivity, and substitution." Meanwhile, Ploeg (2020), among other things, discussed that the global food trade regime based on neoliberalism has made world countries prefer to produce food that can be exported and prioritizes importing cheap foodstuffs instead of producing them themselves. The various restrictive policies caused by Covid disrupted this trade chain so that both parties experienced the impact. Food exporting countries are overproduced because they cannot be exported while importing countries have difficulty obtaining the food they need.

In line with Ploeg, Loker & Francis (2020) also assessed that the pandemic has proven the vurnerability of the food system that based on free market. They recommend that the world shift to a sovereign food system, which focuses on providing food to people, rather than producing food for trade. To be able to design such food system, according to Locker & Francis, "holistic thinking" is needed. Although the article doesn't explain in more detail, the holistic thinking refers to "systems thinking." Sterman, leading figure in the field of systems thinking and system dynamics, wrote in 2002, "...systems thinking [is] the ability to see the world as a complex system, to understand how _everything is connected to everything else." Through systems thinking, complex problem is expressed in a causal loop diagram model so that our understanding of a problem becomes more holistic.

In this article, the authors will implement systems thinking perspective by identifying the causal factors that are the leading causes of food insecurity. By making a causal-loop diagram based on system-thinking, we can see that the cause of food insecurity is intertwined between dependence on imported food, the domination of global food regime dan TNCs on food distribution, and an unsustainable food production system. To solve this problem, food policymakers in developing countries such as Indonesia need to make a paradigmatic revision of food policy, shifting to "food sovereignty."

2. Research Method

System thinking is a nonlinear thinking process that seeks to understand how a system works. The aim is to get a complete and broad picture of the system, identify the root cause of a problem, identify all the critical variables involved in it, understand and identify the leverage points in the system and understand the potential impacts along with alternative solutions (Prahasta, 2018).

"A system is an interconnected set of elements that is coherently organized in a way that achieves something," that is the definition of a system proposed by Meadows (2008), a prominent figure in system thinking discipline. With systems thinking, we will look for cause-and-effect relationships that give rise to a problem. Systems thinking is different from linear thinking. In linear thinking, one will see that 'cause' gives rise to 'effect' linearly, as illustrated in the following diagram.

Figure 1. Diagram of linear thinking

Conversely, by thinking in systems, we must find causal relationships in the form of loops, where a 'cause' can lead to an 'effect', but an 'effect' can also turn into a 'cause'. A can cause B, but B can reverse to cause A. For example, the birth of a baby can increase the population; on the other hand, an increase in population also causes more births of babies.

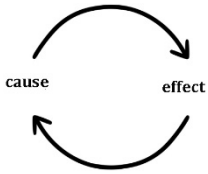

Figure 2. Causal Loop Diagram

Causal loop diagram uses arrows to show how systems affect each other. The causal loop diagram describes our mental model in observing a phenomenon and clears our minds to carry out a more comprehensive analysis. Basically, a causal loop diagram consists of three important elements: (1) variables, (2) links or arrows that connect related variables (direct and / or indirect effect), and (3) labels (+ / -) which shows the direction of change (bigger / + or smaller / -). This diagram shows that even a fairly complex food security problem can be described well to be communicated and then understood by many people.

With a linear mindset, some people may think limited; for example, food insecurity results from sheer crop failure; or obstruction of transportation routes due to Covid-19. However, with a nonlinear mindset and making a causal loop diagram, we can get a relatively complete picture of this problem and find an alternative solution. By using system-thinking assessment, the authors identify most of variables connected to food insecurity, then draw a causal loop diagram.

In the study of political economy, the causal relationship between various variables in an economic system was proposed by economist Gunnar Myrdal in the 1940s and later developed, among others, by K. William Kapp. They put forward Circular Cumulative Causation theory which argues that economic processes are part of a more extensive process and consist of interrelationships among various relevant factors. According to Kapp, "...the outcome (the event, the process) must be viewed as the result of the entire initial situation and the interaction process as well the basic properties of the total social structure" (Kapp, 1961, in Berger, 2009).

Using Myrdal's CCC theory, we can say that poverty, including food shortages in some countries in the world, is caused by interrelated factors. Some of the elements are internal, namely economic (e.g., including unequal land distribution), social (e.g., income inequality), and politics (e.g., elite domination in a country). The other element is the unequal trade relations between developing countries and rich countries (Berger, 2009).

3. Results and Discussion

3.1 Results

During the pandemic, the food-exporting countries take several protectionist policies, such as increasing tariffs and banning exports from domestic market needs. These policies have increased world food prices. Therefore, countries that rely heavily on food imports to cover their consumption needs experience increased food prices, and prices will increase if their currency is depreciated further against the US dollar. The condition is exacerbated by the actions of large importers who carry out panic buying, which makes the price of food commodities traded globally increase sharply (Food Security Information Network, 2020). High Level Panel of Experts on Food Security and Nutrition (2020), states some variables that affecting food security globally such as, "disruptions to food supply chains; loss of income and livelihoods; a widening of inequality; disruptions to social protection programmes; altered food environments; and uneven food prices in localized contexts."

In making causal loop diagrams for this article, the authors use data from Indonesia. But in general, what happened in Indonesia also happened in various countries that depend on imported food and join the food system that is integrated with the free market. In Indonesia, food security is a serious problem long before the Covid-19 pandemic began. Based on the Global Food Security Index (GFHI), in 2020 Indonesia is ranked 65 out of 113 countries in the global food security index with a total score of 59.5, for the affordability score aspect of 73.5, the availability score of 64.7, the aspects of quality and safety score of 49.6 (GFHI, 2020). Indonesia's rank is below some other ASEAN countries such as Singapore (rank 19), Malaysia (rank 43), Thailand (rank 51), or Vietnam (62th) (GFHI, 2020). Covid-19 has caused disruption of the food system, hampered logistics distribution, and disrupted supply chains. The Center for Indonesian Policy Studies has predicted that employment in the agricultural sector

will decrease by 4.87%, and domestic agricultural supply will cutback by 6.20%. Agricultural imports will be likely to decline by 17.11%, while the prices will increase by 1.20% in 2020 and by 2.42% in 2022. With reduced domestic supply and imports, food-deficit and food prices inflation are inevitable (Amanta and Aprilianti, 2020).

This condition did not occur suddenly, but rather the accumulation of various declines in agriculture that occurred previously. As mentioned before, according to the Central Statistics Agency (BPS) in the last 30 years, support from the agricultural sector to gross domestic product (GDP) has continued to decline. The heavy pressure in agriculture has made many people stop being farmers, so that the number of people working in the agricultural sector is now only 29% (Citradi, 2019). One of the leading causes of the deficit in domestic food production is the significant narrowing or shrinking of agricultural land. In Indonesia, the agricultural land was 8,111,593 hectares in 2014, then shrank to 7,105,145 hectares in 2018 (Kementerian Pertanian, 2019).

Many factors contributed to the depreciation of agricultural land, including land conversion or conversion of agricultural land to industrial and residential land, which occurred massively. Also, the reduced land cultivated by farmers is caused by the declining number of farmers. The reduced figure of farmers occurs due to the global food regime, which has not created a genuinely pro-farmers market. The price of local food commodities often falls as a result of the large quantity of imported food products. That is why the level of farmers' welfare is still deficient, and their bargaining position is fragile. For example, in 2019, many salt farmers suffered losses due to the drop in salt prices because the salt import quota increased from 2.37 million tons to 3.7 million tons (republika.co.id, 2019). The same thing happened in June 2020; local sugar prices fell due to a massive arrival of imported sugar (Timorria, 2020). Report document of FAO, IFAD, UNICEF, WFP and WHO (2021) mentions that 31% of households in Indonesia experience food shortages; and 38% eat less than usual.

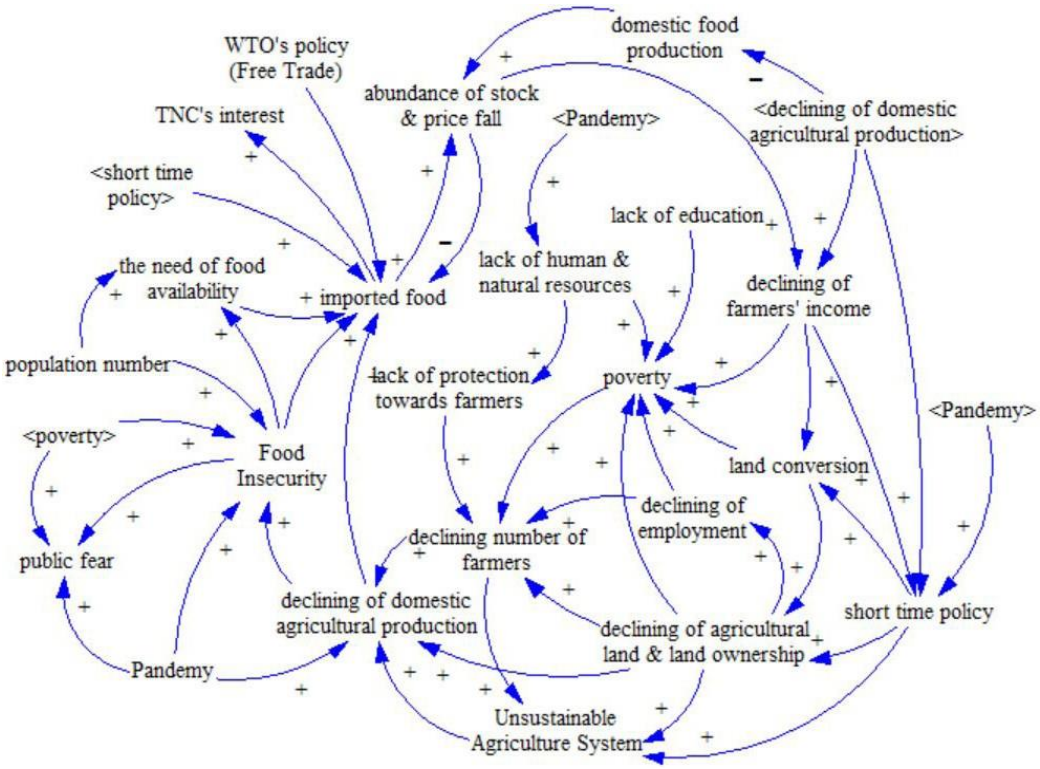

Figure 3 Causal Loop Diagram of Food Insecurity

After we identify most of the variable related to food insecurity, we draw the relationship between various factors or variables that intersect with each other in a causal loop diagram, as shown below.

Based on this diagram, it is known that the causes of food insecurity are numerous, interrelated, and complex. The positive sign (+) in the diagram arrow indicates an increase. Thus, for example, the variable "decline in domestic agricultural production" would increase the variable "food insecurity." Conversely, the negative sign (-) in the diagram arrow indicates a decrease or decrease. Therefore, for instance, the variable "decline in domestic agricultural production" will reduce the variable "domestic food production."

Unquestionably, not all variables mentioned in this diagram can be elaborated in this short paper. Nevertheless, the most critical points that have been discussed are several factors that cause food insecurity, namely:

(1) the dependence on food imports; the supply chains of food import are breaking down during the pandemic;
(2) the dependence on food imports is caused by: (a) a country's integration into the global food regime under the WTO, (b) insufficient domestic production.

Point (1) and (2) tends to give rise to short-term policies, including importing more food or other policies deemed necessary in dealing with a pandemic, which in the long term will increasingly hamper domestic agricultural production.

4. Discussion

Indonesia, since the Suharto era, has been integrated with the global agricultural system. The integration started with the government's willingness at that time to implement the Green Revolution program initiated by the FAO and the Rockefeller Foundation, with debt funds from the World Bank. The Rockefeller Foundation is the second-largest private philanthropic organization in the US that since the 1940s has financed food plant breeding research in Mexico. In the 1960s, a similar study was conducted in the Philippines. This research aims to create new varieties of rice, wheat, and corn to produce more quickly. Then, various Asian and African countries implemented a new agricultural system called the Green Revolution. This system uses high-yielding seeds that can produce more but must be given chemicals inputs (fertilizers, pesticides) and water in substantial quantities compared to natural varieties. As a result, farmers in many countries rely on factory-made seeds, fertilizers, and pesticides. Developing countries also have to take debt to international donor agencies to finance the construction of modern irrigation. The Green Revolution method was later proven to cause loss of genetic diversity and degradation of soil quality. High-yielding seeds are also very susceptible to pests, so harvest failures often occur. At the same time, transnational corporations benefit significantly from the massive sales of seeds, fertilizers, and pesticides around the world (Bainus & Yulianti, 2016).

Starting in 1974, the government forced a change in agriculture method, from the traditional agricultural system to a technology-based system. This program achieved its results in 1984, 1985, and 1986, when Indonesia achieved food self-sufficiency. However, in the following years, Indonesia returned to importing rice. As admitted in one of the Ministry of Agriculture reports, the Green Revolution's agricultural system degrades the soil quality. In a 2010 Ministry of Agriculture report entitled "The Decade of Institutions for Food Security in Indonesia," it is stated that the Green Revolution method, such as the use of transgenic seeds and the application of chemical fertilizers and pesticides, has negative effects. In the 1990s, farmers began to face pest attacks. Besides, soil fertility is decreasing, the use of fertilizers and pesticides is increasingly ineffective, and synthetic chemicals used in agriculture have damaged the soil's structure, chemistry, and biology (Badan Ketahanan Pangan, 2010).

Then, the monetary crisis that hit Indonesia in 1997 made President Soeharto decide to debt to the International Monetary Fund (IMF). The IMF and Indonesia then agreed on a Letter of Intent (LoI) on September 11, 1997. In general, the contents of the LoI were Indonesia's willingness to

implement the economic liberalization Structural Adjustment Programs (SAPs) set by the IMF. The economic liberalization obliges Indonesian government is to allow the private sector to import rice (imf.org, 1998). Following up on this LoI, the government released Decree of the Minister of Industry and Trade No. 439 of 1998, which contained a stipulation that rice imports were no longer a monopoly of "Badan Usaha Logistik" (BULOG). Any party that complies with the provisions is allowed to import rice with zero percent import duty.

The IMF agreement occurs in line with Indonesia's participation in the global food regime (AoA), which requires member countries to open up domestic markets for imported goods and lower basic tariffs on agricultural imports. AoA also requires the government to limit subsidies and protection for the domestic agricultural sector. Furthermore, AoA obliges the government to limit, even eliminate, subsidies for the export of agricultural products. In this system, the government only acts as a regulator of food management. However, it does not have the authority to intervene in the principal foodstuffs' price because the free market has taken over the mechanism.

The Circular Cumulative Causation theory can explain this condition. Interrelated factors cause food shortages in developing countries and least developing countries. The international donor agencies' pressure toward governments to implement the Green Revolution method cannot solve the problem of food insecurity. Income inequality, unfair land distribution, trade liberalization in agriculture, and unsustainable practices of agriculture are among the various causal factors that cause food insecurity while at the same time providing enormous wealth to industrialized countries.

There is practically no paradigm shift in agriculture and food policy in Indonesia in subsequent presidents' administrations. Indonesia continues to use the Green Revolution-style agricultural system, continues to join the global food regime (AoA), and the number of food imports continues to increase. Many factors have contributed to Indonesia's food insecurity problem, such as reduced allocation of the National Budget (APBN) funds for the agricultural sector, the dependence on imports for several strategic commodities, and the narrowing of agricultural land inversely proportional to population growth.

In period of 2015-2019, the allocation of APBN funds for the agricultural sector was less than 5% of the total APBN, even the 2020 revised budget for the agricultural sector experienced a very significant decline wherein the previous year (2019), the allocation of APBN funds for agriculture was Rp. 21.6 trillion and reduced to Rp. 17.44 trillion in 2020. Even the indicative ceiling for 2021 shows that the APBN allocation for agriculture is only Rp. 18.4 trillion (dpr. go.id., 2020). This budget is inadequate to hasten the acceleration and economic recovery process, notably after the Covid-19 pandemic.

According to the 2019 Global Food Security Index published by The Economist Intelligence Unit and Corteva AgriScience, Indonesia is ranked 62 out of 113 countries and is in the "good" category (Heriyanto, 2020). Based on the 2020 Global Hunger Index (GHI), Indonesia ranks 70th out of 107 countries and the country's point is 19.1 which means this country has a "moderate" level of hunger (globalhungerindex.org). The report of IFAD, UNICEF, WFP and WHO 2019 states that Indonesia is included in the 53 countries with the largest number of undernourished people. From this condition, it can be concluded that the condition of food security in Indonesia is vulnerable. Indonesia has been heavily dependent on food imports to cover domestic production deficits. In 2018 alone, Indonesia imported 2.25 million tons of rice, 737.22 thousand tons of corn, 5.02 million tons of sugar, 2.83 million tons of salt, 160.64 thousand tons of buffalo and beef. The volume of imports for these commodities has increased when compared to 2017 (cnnindonesia. com, 2019). In 2018, Indonesia was included in the list of net importer countries for food products. The Covid-19 outbreak has led to disruptions in foodstuff distribution and led to an increase in Indonesia's food prices (Amanta and Aprilianti, 2020). This condition is in line with the report from the Food Security Information Network, which states that the movement restriction policy

carried out to prevent the spread of the virus will disrupt the transportation and processing of food and other essential goods, increase delivery times and even reduce staple foods (Food Security Information Network, 2020).

To overcome this problem, we need to revisit the concept of "food security" which is used as a reference by the Indonesian Ministry of Agriculture. Food security is a trade-based concept. It views that the most important thing the state does is to provide food in the market and increase the community's economic capacity to access food. Accordingly, since the 1990s, global food distribution has been carried out in a free market system. The free market makes many developing and low countries increasingly dependent on imported food, and transnational companies dominate the world food distribution.

Many thinkers and practitioners have criticizedmarket-basedfoodsecuritybyintroducing a new concept that emphasizes protection of domestic agriculture and farmers, namely food sovereignty. The concept of food sovereignty has been in use since the mid-1990s. This concept is an overarching concept for several approaches to dealing with hunger and malnutrition, rural development, and environmental sustainability. food sovereignty has become a policy framework to challenge policy trends in rural development and agricultural policies (Windfuhr and Jonsén, 2005). As the antithesis of this paradigm, food sovereignty is not based on trade, but on the strength of the agricultural sector. According to Ploeg, agriculture needs to be understood as a natural process, not just a technical one. Increasing agricultural production is not only concerned with soil productivity but also on the empowering the farmers to become productive forces (Ploeg, 2013). When a farmer is positioned as a productive force, he must be given the freedom to grow crops on his land to meet food needs for himself and his family. This view contrasts with the market-based approach, where farmers are encouraged to grow crops demanded by the markets. As stated by Pimbert (2011), there must be a policy that protects and encourages more than 2.5 billion small farmers, small fishers, and small breeders on earth to build an autonomous food system, where they plant, process, and utilize food products for own interests and partly sold to nearby communities.

Four conditions must be met if a country wants to achieve food sovereignty—first, land ownership. Currently, the average land ownership for Indonesian farmers is only 0.8 hectares and continues to decrease. This shortage of land makes it difficult for farmers to achieve sufficient production. Also, talented human resources are needed. Farmers in Indonesia must have good agricultural skills, especially the ability to farm in sustainable ways. Second, management is needed. High production must be followed by post-harvest management and sales. Ideally, farmers can generate surplus food so that the remainder can be sold for economic benefits and meet their own food needs. Third, democracy, which means justice and equity to protect farmers and agricultural systems, must be upheld. For example, when farmers are harvesting, the government should close the import tap so that the domestic harvest price does not fall. Fourth, the sustainability of farming. Sustainable farming is an agricultural system that protects the agricultural community, including land and human. This farming system, called agroecology, avoid industrial seeds, fertilizers, and artificial nutrients. Instead, it uses local self-breeding seed, natural fertilizers, and essential nutrients (Bainus and Yulianti, 2019).

The description above, which has been summarized in the causal loop diagram (Figure 3), shows that the root of food insecurity is the government's paradigm towards agriculture. As previously mentioned, the food security paradigm focuses on providing food in the market and making people buy. This focal point is in contrast to the food sovereignty paradigm, which focuses on food production. Making a paradigm shift starts with the formulation of an appropriate Agricultural Law regarding "food sovereignty" accompanied by an explanation of the detailed steps in implementing the food sovereignty policy.If the government implements the food sovereignty concept, definitely, the variables that have appeared in the diagram above will be eliminated. For instance, lack of agricultural land,

land conversion, or lack of protection for farmers will not occur if the government implements food sovereignty instead of food security. Moreover, when a country reaches food sovereignty, it will not be disturbed by disruptions in the global food supply chain, even in the global pandemic.

5. Conclusion

This study explains the various factors that cause global food insecurity, especially food insecurity in Indonesia during the Covid-19 pandemic. The authors conducted a system-thinking assessment of Indonesia's food system by identifying most of the complexly interrelated variables. The authors then summarize the variables in a causal loop diagram, and based on it, it is recognized that various, interrelated, and complex causes of food insecurity are involved.

To deal with systemic problems, as illustrated by the causal loop diagram, the government must take integrative steps and involve all the actors of food supply and production. Suppose the solution taken is only partial; for example, the threat of food insecurity during a pandemic is overcome by increasing imports. It can be seen in the diagram that this solution in the long term will cause other problems, which intertwine and then return to food insecurity conditions.

The authors argue that the main factor causing food insecurity is the market-based paradigm of food security. When food is handed over to a free market-based global food regime, food availability is highly dependent on the supply chain. COVID-19 disruptions have caused significant trouble to the food supply chain due to road and port closures. This phenomenon shows how fragile the global food system is.

The authors contend that a fundamental way to overcome food insecurity is to change the paradigm of Indonesian agriculture, namely implementing food sovereignty. Food sovereignty is based on domestic food production to meet domestic needs independently and sustainably. When a country reaches food sovereignty, various disruptions at the global level, including pandemic disruptions, will not cause a "foodemic" or food insecurity after the pandemic.

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