



How Diversification Helps Preventing the Food Crisis?

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For months, the global food supply chains are being disrupted due to the Covid-19 pandemic (Stephens et al., 2020). The situation has occurred since the lockdown regulation to contain the SARS-CoV-2 virus has been put in place. It limits people and goods mobility across regions or countries. Disruption on distribution hindered food producers to distribute the harvest to consumers. The immediate impacts are food stock depletion in some areas, while others experiencing undistributed food abundance that inevitably is wasted. In the regions where food stock is declining, food prices continue to rise and vice versa.

The disruption of the food supply chain affected the rice availability as a staple food in Indonesia. Rice consumption per capita per year in Asia is 100 kg, while in Indonesia it ranges between 115 - 150 kg (Ministry of Agriculture, 2018; Reardon & Timmer, 2014). Sudden change in the food supply chain jeopardizes rice stock and price, especially in the regions that are not yet locally self-sufficient. Strategies to prevent food crises such as diet diversification are critical to strengthen supply chains that are ideally resilient to stress and shock such as disasters, local conflicts, and current pandemic.

REDUCING RICE DEPENDENCY?

In 2018, malnutrition got worse in Asmat Regency, Papua Province, and consequently took 71 lives

(Erdianto, 2018). Malnourishment is caused by insufficient or inadequate food intake. One of the causes of hunger in Asmat is the high dependency of rice as a sole staple food without providing other types of carbohydrate resources as substitution. On one hand, Asmat Regency is not a rice producer, it therefore largely depends on supply sourced from outside the region to fulfill rice demands. When the supply chain was disrupted, the rice stock depletion was inevitable. On the other hand, the rice dependency has made people abandon the traditional cultivation of sweet potatoes and sago. The combination of depleting rice stock and low food diversification worsened food accessibility which lacks alternatives and resulted in malnutrition.

The Covid-19 pandemic brings back the issues of food vulnerability in the non-rice producer area (Bhandari et al., 2020). In fact, food scarcity risk could be minimized if effective regulation that imposes behavioral change on rice consumption and local food prioritization are implemented. Food diversification policy has been applied since the 1960s. However, in the 1970s, agricultural development in Indonesia was focused on the rice production to achieve the New Order's food self-sufficiency. The program brought indirect social impact which changed public perception that consider rice as a staple food for all people across the country. Hence, the dietary change occurred; people's previous varied staple food such as sweet potatoes and sago

shifted to rice. Relying on a single commodity would put food security at risk. The Asmat malnutrition case could be a lesson to not solely depend on a single staple food. If massive crop failure happens due to pest or drought, it would further adversely affect the national food security.

Indonesia is not the only country with high dependency on one type of staple food. Similar cases can be found all over the world. Globally, two-thirds of staple foods are dominated by three primary commodities: wheat, rice, and corn (FAO, 2018). The staple food choice is influenced by climate conditions and farming limitations. In Asia, rice has become the primary food because the climate and soil promote rice cultivation. Wheat is the most widely consumed staple food because it is the raw material for making various types of bread, cake, and noodles. Meanwhile, corn is mostly consumed in countries of North America and Europe.

In the 1970s, the food diversification campaign to reduce rice dependency has been aggressively promoted by the Indonesian government since the issue of Presidential Instruction No. 20 year 1979. The aim of food diversification was to improve the nutritional quality of the people. This goal however was not accomplished, again, because it contradicted the government's rice self-sufficiency program at that time. Until 2010, rice continued to dominate while wheat consumption has significantly increased according to Table 1 below.

Tabel 1. Perkembangan Pola Konsumsi Pangan Pokok 1954-2010

Year	Staple Food Pattern
1954	Rice (53,5%), Cassava (22,6%), Corn (18,9%)
1987	Rice is rising up to 81,1%, Cassava (10,0%), Corn (7,8%)
1999	Rice is still dominating, Cassava (8,8%), Corn (3,1%)
2010	Non-rice food (Cassava, Corn, etc) almost extinct, are shifting to wheat flour (up to 500% in 30 years)

Source: BKP in Hardono (2014)

Recently, the food diversification campaigns to reduce rice dependency are brought back to life. The food crisis threats due to Covid-19 have raised public awareness on the importance of food diversification and self-sufficiency without being heavily dependent on imports. In Indonesia, rice imports reached 2.25

million in 2018 (Kusuma, 2019). This indicates the incapability of national production to meet the domestic demand. However, the effort to diversify food and venture into wheat also bestow another problem because there is no local area that supports large-scale wheat production. Sustainable food diversification process should rely on local food production. Historically, there was the time where Indonesian people were not dependent on rice as a staple food. As exemplary cases, Japan and South Korea are among the countries that have succeeded in changing their consumption patterns. Current rice consumption in these countries is 60 kg per capita per year, as low as Indonesia's per capita level in the 1960s (Jeong et al., 2020; Yamamoto, 2017). Therefore, supporting agriculture development and promoting alternative staple food consumption should be the government's priority to varying food production.

LOCAL-BASED FOOD DIVERSIFICATION

Food diversification can be categorized into two types: horizontal and vertical. The earlier is diversification of food consumption by multiplying types and increasing production of various commodities. For example, narrow lands for rice cultivation can be utilized to cultivate non-rice foods such as sweet potatoes and cassava. Meanwhile, the vertical diversification of food commodities is centered on its processing, especially for non-rice types, so that it has added value in terms of economic, nutritional, and social aspects (Budiningsih in Umanailo 2018). For example, the processing of sweet potatoes into chips, flour, or compote, to have a higher economic value. Initial efforts to diversify food, at least horizontally, were promoted during the first president of Indonesia, Soekarno, term in 1962 (Hanggoro, 2020). However, the diversification policy was not intended to reduce rice consumption or diversify consumption. At that time, the depleting rice stock had pushed the government to promote corn as an alternative staple food. With the changing governments for almost six decades later, efforts to diversify food through campaigns and regulations have not brought significant results. Indeed, there is a little shift in consumption to non-rice, but it also relies on wheat that needs to be imported.

In general, the objective of food diversification is to increase food security (Choudhury & Headey, 2017). The disruption of the food supply chains during Covid-19 pandemic exposed the Indonesian food

system's vulnerability, which was dependent on export-import distribution. The current diet trend suggests noodles that are made from wheat as the most preferable alternative for carbohydrate. This leads Indonesian wheat imports to reach 11.5 million tons per year. If the wheat supplier countries decided to stop exporting wheat, Indonesia will face a domino effect on the food system. Thus, food diversification not only aims for lowering rice consumption, but also enhances food self-sufficiency and food system (Ariani & Ashari, 2003). To that end, optimizing non-rice local food is needed. The Asmat malnutrition case has shown that the short term goal of food diversification should be about advancing community survivability on any disruption of the food system, especially in obstruction on rice distribution. Alongside with reducing rice consumption, food diversification means to increase substitution to local staple food such as tubers, corn, and sago. Diversifying sources of carbohydrates must begin with exploring the types of local food substitutes for rice that are less consumed. The diet change should be implemented through multi-phases and local-based, otherwise, the ideal state of food security will not be achieved.

Indonesia has many local comestible types that can be introduced to the wider community, especially carbohydrate sources. There are sago, sorghum, also various types of tubers such as cassava, taro, and sweet potatoes. The nation even covers 83 percent of the world's sago land, with an area of 5.4 million hectares and potential to reach one hundred million tons of sago production annually (Nasution, 2020). This indicates a huge opportunity for sago can become an alternative to rice. However, it is not currently on the government's to-do list. The government's low commitment to leverage sago can be seen from the lack absorption of sago production in the Tohor River, Riau, for local food when its supply had piled up because of export constraints due to the Covid-19 pandemic (Suryadi, 2020).

Using a different approach, the high consumption of wheat flour as raw material for noodles, inspired the Indonesian Agency for the Assessment and Application of Technology (BPPT) to develop sago's flour as a substitution. The innovation is expected to meet demand of the Indonesian people as the second highest instant noodle consumers in the world (WINA, 2020). On the other hand, there are already many innovations that mix sago flour and cassava flour as a

substitute for wheat flour in making cakes, noodles, and other flour-based foods.

OPPORTUNITY AND CHALLENGES OF FOOD DIVERSIFICATION IN INDONESIA

In mid-2020, Indonesia's economy class has risen from a lower-middle to upper-income country. According to Bennett's law, when income increases, people will consume more diverse food. Higher income also raises people's purchasing power to buy low-carb foods, meat, fruits, and vegetables. In the long term, this dietary change could support food diversification that aims to balance consumption patterns to fulfill nutritional needs. In addition, food diversification can be used to reduce malnourishment in Indonesia which hits 22 million people.

The opportunity for food diversification in Indonesia is quite enormous and promising (Table 2). Nationally, the demand for fish, meat, fruit, and vegetables increases every year; this is a positive indicator that people's diet is getting more nutritious. In terms of consumption, diversifying food needs to involve carbohydrate sources variation, so it does not solely depend on rice. The fulfillment of commodities for this carbohydrate source diversification can rely on local and regional resources. In Papua, more people began to consume sago again and in the East Nusa Tenggara region, people also started eating sorghum (Winarti et al., 2019). Indonesia has sufficient land potential to grow many types of substitute food crops. Suboptimal land that is not used can be developed as a main producer of alternative food besides rice (Dariah & Heryani, 2014). Thus the availability of diverse food can be optimized through land that is considered less productive for rice. Hence, it is possible to implement food diversification in Indonesia through a gradual process.

The challenge in food diversification in Indonesia is to actualize food self-sufficiency. The Covid-19 pandemic gives a lesson to learn that dependency on food import must be reduced as soon as possible. In reality, although the consumption pattern shows diverse food commodities, Indonesia still largely relies on imports for corn, soybeans, and wheat. To lower the import dependency, the domestic production for these commodities should be increased, especially for corn and soybeans. Another challenge is that Indonesia is a tropical country that is vulnerable to changing patterns

Tabel 2. Opportunity of Alternative Staple Food for Rice and Wheat

No	Type of Staple Food	Processed/Derived Products	Potential Region
1	Sago	Sago flour: <i>Pempek</i> , Meatballs, <i>Cilok</i> , Pastry, Noodle dll	Papua, Maluku, and Riau
2	Cassava	Tapioca flour: Cake, <i>Cimol</i> , <i>Biji Salak</i> , Brownies, <i>Combro</i> , <i>Misro</i>	Almost all regions, particularly Lampung and Java
3	Sweet Potati	Flour: Chiffon, Sponge, <i>Kolak</i> , Chips	Almost all regions, particularly Papua and Java
4	Corn	Maizena, Corn rice, Popcorn	All regions in Indonesia
5	Sorghum	Porridge and Soup	Nusa Tenggara and Java
6	Potato	Donut, croquette, <i>Perkedel</i> etc	Java

Source: Modified from Ministry of Agriculture (2018).

of weather (Caruso et al., 2016). There is a threat of crop failure for staple food commodities, especially rice. The process of diversification, which is relatively slow, can reduce food security's resilience when production disruptions or crop failure occur. In addition, in terms of food prices, flour from local ingredients such as tapioca and sago are more expensive than rice and wheat. The price gap can reach twofold. Yet, this could be addressed by increasing production and consumption on a massive scale so the prices can be lowered. If it can be achieved, with the increasingly positive response of the Indonesian people to food diversification, Indonesia can reduce the dependence on rice and wheat (Susilowati et al., 2017).

CONCLUSION

Indonesian food consumption patterns are inseparable from the government's role, which tends to homogenize national staple foods only for rice. This affects the priority scale of rice development, which takes precedence over other local foods. However, at the same time, the initiative to diversify food is also widely encouraged, especially at the community and regional levels. Still, the diversification efforts need to be advanced. Ideally, food diversification is one of the most effective methods to mitigate unexpected food crises. Variation in types of food, both production and consumption, will eliminate dependence on one commodity type and decrease the imports. Moreover, relying on local resources will drive the economy and equip the local regions to be independent in realizing food security through food diversification.

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ABOUT TJF

Tay Juhana Foundation (TJF) is a nonprofit organization dedicated to promote the advocacy of the conversion and cultivation of suboptimal lands into productive lands, through the most environmentally, economically, and socially sustainable manner.

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