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RICE POLICIES IN INDONESIA, FROM RICE SELF-SUFFICIENCY TO RICE SECURITY

by

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Abstract: The relationship between Indonesia and rice self-sufficiency policy has lasted since its independence from colonialism. Unfortunately, the policy does not always work. Even though the Government has done a lot of things to improve rice production, Indonesia has to import rice from overseas to fulfill its demand for rice. This study evaluates what has been done by the Indonesian Government to achieve rice self-sufficiency and why rice self-sufficiency is essential. Moreover, this study evaluates why Indonesia should reconsider its rice self-sufficiency policy and swift to the food security policy for its rice policy.

Keywords: Rice, Food Policy, Self-Sufficiency, Food Security

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Table of Content

List of Figures

List of Tables

List of Abbreviations

1. Introduction	1
1.1. Thesis Aim and Research Question	3
1.2. Thesis Disposition	4
2. Literature Review	5
2.1. Food Policy	5
2.2. Food Trade	6
2.3. The Importance of Rice for Indonesia	7
2.4. The Impact of Rice Price to Poverty Rate	11
3. Theoretical Review	13
3.1. Rice Production	13
3.2. Self-Sufficiency	14
3.3. Food Security	16
4. Data and Methodology	18
4.1. Data	18
4.1.1 Annual Import of Rice	18
4.1.2 Annual Production of Rice	18
4.1.3 Annual Paddy Field Area	18
4.1.4 Annual Price of Rice	18
4.1.5 Annual Ratio of Poverty	19
4.1.6 Annual Population	19
4.2. Methodology	19
4.2.1. Rice Self-Sufficiency Ratio (SSR)	19
4.2.2. Thesis Limitation	19
5. Empirical Analysis	20
5.1. Rice in Indonesia	20
5.1.1. Production	20
5.1.1.1. Rice Farm Production in Indonesia	20
5.1.1.1.1. Wetland Area Rice Field	21
5.1.1.1.2. Dry Area Rice Field	22
5.1.1.1.3. Rice Production Development	22
5.1.1.2. Labor in Agriculture	24
5.1.1.3. Rice Farm Facilities	26
5.1.1.4. Farmers Credit	26

5.1.2. Distribution	28
5.1.3. Consumption	29
5.1.4. Government Institution	31
5.1.4.1. Indonesian Bureau of Logistic (BULOG)	31
5.1.4.2. Food Security Agency (BPK), Ministry of Agriculture	33
5.1.5. Regulation	35
5.2. Behind the Rice Self-Sufficiency Policy	36
5.3. Transformation to Food-Security	37
6. Discussion	41
7. Conclusion	46

List of Abbreviation

AIFS : ASEAN Integrated Food Security

ASEAN : Association of South East Asian Nation

AVA : Agri-Food and Veterinary Authority (Singapore)

BATAN : *Badan Tenaga Nuklir Nasional* / National Nuclear Energy Agency of Indonesia

B POM : *Badan Pengawasan Obat dan Makanan*

BPS : *Badan Pusat Statistik* / Statistics Indonesia

BKP : *Badan Ketahanan Pangan* / Food Security Agency

BNI : *Bank Negara Indonesia*

BRI : *Bank Rakyat Indonesia*

BTN : *Bank Tabungan Negara*

BULOG : *Badan Umum Logistik* / Indonesia Bureau of Logistics

CBP : *Cadangan Beras Pemerintah* / Government's rice reserve

DAK : *Dana Alokasi Khusus* / Special Allocation Fund

FAO : Food and Agriculture Organization

FSVA : Food Security and Vulnerability Atlas

ICFORD : Indonesia's Center for Food Crops Research and Development

KRPL : *Kawasan Rumah Pangan Lestari* / Sustainable Food Home Area

KUD : *Koperasi Unit Desa*

KUR : *Kredit Usaha Rakyat*

LPM : *Lumbung Pangan Masyarakat* / Community Food Barn

P3L : *Pengembangan Pangan Pokok Lokal*

PUPM : *Pengembangan Usaha Pangan Masyarakat* / Community Food Business Development

PKU : *Pengembangan Korporasi Usahatani* / Development of Farming Corporations

RASKIN : *Beras untuk Rumah Tangga Miskin* (Rice for poor household)

SDGs : The Sustainable Development Goals

SPA-FS : Strategic Plan of Action on Food Security

SRI : System of Rice Intensification

SSR : Rice Self-Sufficiency Ratio

UN : United Nation

WTO : World Trade Organization

List of Figures

Figure 1: Rice Self Sufficiency Formula	19
Figure 2: Rice Field Area in Indonesia 2014-2018.....	23
Figure 3: Indonesian Rice Production 2009-2018	24
Figure 4: The Distribution of KUR for Farmers.....	28
Figure 5: Distribution Line of Rice in Indonesia.....	29
Figure 6: Total Rice Imported 2000-2018	30
Figure 7: Total Population of Indonesia 2001-2045.....	31
Figure 8: Three Pillars of BULOG	33
Figure 9: BKP Activities	35
Figure 10: Rice Price in Indonesia, Vietnam, Thailand, and the World Market	38
Figure 11: Poverty Rate 2000-2018	39
Figure 12: Urban Population Ration 2000-2018.....	40
Figure 13: The self-sufficiency ratio of Indonesia 2012-2017.....	42
Figure 14: Rice Production and Growth Rate 2010-2018.....	43

List of Tables

Table 1: Share of Labor in Indonesia	26
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RICE POLICIES IN INDONESIA, FROM RICE SELF-SUFFICIENCY TO RICE SECURITY

1. Introduction

Cambridge Dictionary (2020) stated that food is something that people and animals consume, or plants absorb, to keep them alive. In order to keep them alive, humans need at least carbohydrates, protein, and fat, not only to overcome their hunger but also to produce energy that requires to do their daily activities. The American Diabetes Association (2020) claimed that carbohydrate is the primary source of energy. The term carbohydrates come from its chemical level, which contains carbon, hydrogen, and oxygen. The primary source of carbohydrates comes from the staple food that commonly consumes by people to fulfill their needs.

Fathima, Khanum, and Nallamuthu (2017) stated that staple food is food that is consumed on a daily basis and in a significant portion of calories required by a standard human diet. Staple food comes from many varieties. Most of the staple food consumed in the world comes from a vegetable product such as rice, wheat, maize, millet, potatoes, cassava, sweet potatoes, yams, or taro. Moreover, rice is considered to be the most consumed staple food in many countries around the globe and fulfills the nutritional needs of billions of people each day, which mostly are Asian. Approximately, People in Asia consume 150 kilograms of rice in a year.

In Indonesia, there is a well-known phrase from the Javanese, an ethnic majority in Indonesia. The phrase is, 'We do not consider eating as eating if there is no rice involved in it.' The previous sentence shows that rice, as a food, is crucial for the Indonesian diet and considered to be the most critical staple food for Indonesian people. According to Indonesian Center for Food Crops Research and Development or ICFORD (2012, cited from Kumalasari and Purnomo, 2013), around 95% of Indonesian people choose rice as their staple food over other staple foods (Nuryanti, 2018). The other staple foods that are Indonesian people often eat, such as cassava, corn, sago, and potato.

Indonesia is the seventh biggest country in Asia and the third most populous country in Asia, with more than 267 million people in 2018 (The World Bank Data, 2020). Its archipelago lies 5,110 kilometers from east to west in the equatorial line and 1,880 kilometers from south to north with more than 17,000 islands (Sidik, 2004). Therefore Indonesia is considered a tropical

country. As a tropical country, Indonesia has only two seasons, which are rainy and dry season. With only two seasons, it has a comparative advantage in agriculture. Its soil is possible to be planted throughout the year. Hence, Indonesia is an agrarian country, and many of its people rely on the agriculture sector as their occupation.

As an agrarian country, rice is not only valuable as a consumption commodity but also essential as a production commodity. Indonesia was the third rice-producing country in the world, with more than 80 million tons of rice in 2018 (FAO, 2020). The only countries that produced rice more than Indonesia were China and India, two countries with a larger area and more population than Indonesia. About 70% of agricultural land in Indonesia is a rice field, while the rest of the agriculture area is used for other agriculture commodities (Kumalasari, Hanani, and Purnomo, 2013). In 2007, agriculture had the second-highest contribution to national output growth (Firdaus, Baga, and Pratiwi, 2008). However, rice is not only vital for Indonesia's economy but political as well.

The politician commonly uses rice production as a political issue on elections or political campaigns (Firdaus, Baga, and Pratiwi, 2008), and the rice self-sufficiency has always been a hot topic on every presidential election in Indonesia. Rice self-sufficiency happens when the local rice supply meets domestic rice demand and minimize dependency on international trade (Tortajada and Zhang, 2016). During the new order authority, between 1965 and 1998, rice self-sufficiency had always been their goal every year. When Indonesia managed to succeed in rice self-sufficiency in 1984, it became a national pride. The rice self-sufficiency in 1984 is seen by many as one of the highest achievements of the new order. In his speech during the Food and Agriculture Organization (FAO) conference in 1985, Soeharto, former Indonesian President, claimed that the Indonesian rice self-sufficiency in 1984 was a result of the Indonesian people's hard work (Sari and Sage, 2006). Unfortunately, the rice self-sufficiency has only lasted for a few years. In 1990, Indonesia started to import rice from other countries, which was continued until the fall of the new order regime in 1998 due to the Asian financial crisis in 1997.

During the post new order era, Indonesia has always imported rice from other countries. According to Statistics Indonesia (BPS, 2020), a government institution in Indonesia that conducts statistical surveys, between 2000 and 2018, on average, Indonesia imported 1.01 million tons of rice every year. The data shows that Indonesia still relies on other countries to fulfill the local's demand for rice. However, rice self-sufficiency has always become a goal for the Indonesian Government since it was announced by it's the first Indonesian President, Soekarno. He rhetorically stated that Indonesia had to feed its nation (Neilson and Wright,

2017). Since then, rice self-sufficiency is vital for Indonesian leaders, and they are more likely to get some critics from their political opponents once they fail to achieve rice self-sufficiency and imported rice. Hence rice self-sufficiency in Indonesia is not only about producing a sufficient amount of rice and feed all the Indonesian people but also about politics.

The rice self-sufficiency requires subsidies for the rice farmers' production and protection for domestic rice farmers against import. The rice self-sufficiency policy creates rents and affects the purchasing power of the poorest with the local prices since they have a tendency to be the net consumers of rice (Bourgeois and Kusumaningrum, 2008). The rice self-sufficiency is well-intentioned to stabilize the domestic prices and protect them from the volatility of the global rate. However, when the local price goes higher, it will increase poverty and food insecurity.

The other food policy regarding food availability is food security. The term self-sufficiency is often confused with food security, and people are discussing them as if both phrases are the same thing. The self-sufficiency emphasized in supplying demand with domestic products and minimize international trade, while food security not only relies on local commodities (Tortajada and Zhang, 2016). Food security emphasizes on food availability (domestic production, food reserve levels, and trade), distribution, affordable, and utilization.

1.1 Thesis Aim and Research Question

This thesis aims to provide a discussion about the rice self-sufficiency policy in Indonesia, whether the policy itself succeeded in feeding Indonesian people with sufficient rice, both in amount and price. Moreover, this thesis will discuss the reason why Indonesia has to transform the rice policy from self-sufficiency to food security.

To this end, this thesis has three research questions. The first question is, **what are the efforts of Indonesian Government for having sustainable rice self-sufficiency** by seeing what has been done by the Indonesian Government to achieve its goal in rice self-sufficiency. The second question is **why rice self-sufficiency is essential for Indonesia Government** since the Indonesian Government has mentioned rice self-efficiency since its independence from colonialism. The third question is **why Indonesia has to transform its rice policy from self-sufficiency to food security**. By seeing the result of the self-sufficiency policy on rice commodities, the alternative option on the rice policy will be described and explained whether it has the possibility to provide a better opportunity for rice policy.

1.2 Thesis Disposition

This thesis is structured as follows. The first section is the introduction, which describes the background of the thesis topic and thesis object, thesis aims, and the research question of the thesis.

The second section is the literature review and the theoretical review. The literature review briefly introduces the previous study related to the rice policies that had been happened in Indonesia and other countries. The theoretical review describes theories about the rice industry, started from the production, distribution, and consumption. Moreover, the theoretical review describes the theory of food self-sufficiency and food security policies.

The third section is the data and method. The data section explains what kind of data is used in the thesis, how the data are used, and the source of the data. Furthermore, the method section explains what type of method is used for the thesis, what is the formula used, and the limitation of this thesis.

The fourth section describes the rice industry in Indonesia, the reason behind the rice self-sufficiency policy in Indonesia, what efforts the Indonesian Government has done to achieve its goal, and why food security policy is possibly better for Indonesia's rice policy.

2. Literature Review

2.1. Food Policy

Nowadays, technology, rural-urban migration, and industrialization have transformed how the food is produced, marketed, distributed, and consumed. Since then, global food policy has changed (Maxwell and Slater, 2003). The food system is no longer as simple as distributing food from farms to a kitchen, and food producer is not only a small farm run by a farmer family in rural areas. Maxwell and Slater added that a more overwhelmed food policy needs to be prioritized since production, distribution, and consumption are linked.

The primary goals of food policy are improving agriculture productivity and farmers' wealth. Hardono et al. (2004, cited from Firdaus, Baga, and Pratiwi, 2008) explained that there are two types of government policies in agriculture. First, development policy, which is mostly used by countries with a food deficit. The main objective of development policy is to increase agriculture's output. The other regulation is compensating policy, which is mostly used by countries with food surplus. The main concern of compensating policy is rising farmer's income with a tendency to control food production.

According to Maxwell and Slater (2003), there are four concerns regarding food policy. The first concern is the risk of imperfect competition. The free market without any strict supervision from the ruler will create an oligopoly, a monopsony, and rent-seeking in the food system. Food is a basic human need that many businessmen interested in putting their capital in it. In the free-market economy, the more significant capital, the bigger chance to dominate the market. In the food market, the distributors are dominated by big companies, and globalization allows them to widen their market overseas. Carrefour, one of the biggest multinational food chains, has more than 12,000 stores around the globe and an online shopping website that visited by 1.3 million customers per day (Carrefour, 2020). With intense domination from the big companies, they may influence the food market price.

The second concern is the winners and losers of the food policy (Maxwell and Slater, 2003). Policies tend to create winners and losers, and the winners gain control of losers. Therefore, the income distribution should be monitored. When the food policies imposed, the most crucial groups are the poor. When the agriculture yield increase, they gain benefits from the food price decrease and vice versa. The next concern is policymaking. Imposing policies and regulations are challenging, especially on a new topic or issue that associate with other countries. Moreover, new issues will attract public opinion to may or may not be approved. The last concern is the health and environmental externalities since the cost of an unhealthy diet is

noteworthy (Maxwell and Slater, 2003). Unfortunately, Maxwell and Slater did not include politics on their concerns.

Politics is decisive in food policy since politicians are the ones who regulate policies. Politicians, especially in democratic countries, tend to impose food policies that benefit themselves or their voters since food policies that widely accepted by their people will strengthen their political power. Politicians, whose voters are dominantly by farmers, will support food policy that prevents food imports because it will reduce the food price and increase agriculture commodities competition between import food and local product. On the contrary, the pro-poor politician will support food import, as long as the food price is becoming more affordable.

2.2. Food Trade

Globalization has made a dramatic change in how the food trade. Globalization has turned Asia as the leading player in the food industry. Several Asian countries who have self-sufficiency policy benefited from the establishment of the World Trade Organization (WTO) in 1993. Since then, they become more active in food production investment in their neighboring countries. Moreover, the other Asian countries were considering to implement food self-sufficiency policy to benefit from the food trade (Thompson and Tadlock, 2000). Even though the 1997 financial crisis interrupted their economy, it did not end the globalization activities of the Asian agro-food trade. The financial crisis instead made the government more sensitive to a sudden economic change and instability.

After the New Order regime had been dethroned, the food market policies in Indonesia were deregulated. Indonesia has been liberalized its commodities trade, including rice (Sidik, 2004). By liberalized trade among countries, governments expect that it would improve business, grow the market access, economic efficiency, and increase welfare. Trade liberalization has a tendency to enhance imports. However, the rise in imports will affect domestic producers. Imports with zero or low tariff will depress domestic prices and jeopardize local production (Sidik, 2004). Nainggolan (2000) added that free trade would trigger landless laborers and poor farmers to urbanize to the cities nearby. Trade liberalization was often accused of domestic low productivity and production decrease. To protect local producers from imported products, governments imposing a tariff on import commodities.

Southeast Asian countries are among the top rice producer and consumer countries in the world. Thailand and Vietnam are two of the top rice producer from ASEAN (Association of Southeast Asian Nation) countries. At the same time, Cambodia, Laos, and Myanmar are

predicted to be a top rice producer in the future (Hermawan, 2016). Graced with water resources and rivers that naturally fit for the rice field, the countries mentioned earlier have higher rice productivity than island countries in ASEAN, such as Indonesia and the Philippines. To fulfill their rice demand, Indonesia and the Philippines rely heavily on their neighboring countries. Due to imbalances between rice supply and demand in ASEAN, the rice price tend to fluctuate, and rice stocks in some ASEAN countries were vulnerable. To overcome those problems and to design long-term food security in the ASEAN region, countries in the ASEAN region initiated ASEAN Integrated Food Security (AIFS) Framework to provide cooperation among ASEAN countries (Asean.org, 2020). The AIFS Framework will be supported by the Strategic Plan of Action on Food Security (SPA-FS).

The AIFS has five components to implement cooperation food-security in the ASEAN region. The first component is the food-security and emergency or shortage of relief. The second component is the sustainable food trade development. The next element is an integrated food security information system. The fourth component is agricultural innovation, and the last part is nutrition for agriculture development (ASEAN.org, 2020; Hermawan, 2016). The SPA-FS goals are to ensure long-term food security and improve the living quality of farmers in the ASEAN region. SPA-FS has six programs to achieve its goals. The first program is strengthening food security arrangements. The second program is by promoting the food market and trade. The third program is strengthening integrated food security information systems. The fourth program is promoting sustainable food production. The next program is encouraging more significant investment in food and agro-based industry, and the last program is identifying and addressing food security's emerging issues (ASEAN.org, 2020).

2.3. The Importance of Rice for Indonesia

Rice comes from the genus *Oryza*, which consists of 24 species. However, among those species, two species are famously known. First is Asian Rice, *Oryza Sativa*, the most popular and productive rice species and originally from the southern and eastern of Asia. Second is the African rice, *Oryza glaberrima*, planted restrictedly in its origin, western Africa. (Fuller and Castillo, 2013). According to archeological evidence, rice has been planted in India, approximately between 1500 and 1000 B.C (Dunna and Roy, 2013).

Rice can be harvested in a various range of ecological habitats, from dryland to wetland area, from mountainous lands to low delta areas, even in terraces cut in the slope of hills. It lies an area between 53° latitude north and 35 ° latitude south and grow until the altitudes of 3,000 meter above the sea level (Fuller and Castillo, 2013; Dunna and Roy, 2013). China and India

are the most productive rice producer and also the most significant consumer in the world at the same time. China and India consume more than 50% of rice in the market, and about 90% of rice is grown and consumed in Asia (Sawe, 2019). Per capita, rice consumption in Asia is ranged between 130 kg until 180 kg per year (Dunna and Roy, 2013). The facts, as mentioned earlier, shows that the biggest market of rice is in Asia.

Indonesia, similar to China and India, is among the biggest rice consumer in the globe. As its primary staple food, rice is consumed by more than 95% of Indonesian every day, three times a day. Indonesian people consume about 37,400 metric tons of rice in 2019, about 10% of the global market (Sawe, 2019). The Indonesian rice industries employ more than 14 million of household labor, 40% of total employment in Indonesia (Hermawan, 2016). Due to the significance of rice, the Indonesian government put the rice industry as a priority than other agriculture commodities.

Since its independence, the Indonesian rice policy has always been self-sufficiency. The main goal is fulfilling the rice demand with domestic rice products. Indonesia has an area of more than 1.9 million km² and 136 million of labor (BPS, 2020). Blessed with a vast territory, an enormous amount of employment and market, aiming in rice self-sufficiency is a realistic idea. However, in achieving rice self-sufficiency, Indonesia has always encountered its challenges.

According to Firdaus, Baga, and Pratiwi (2008), four factors cause low productivity growth in Indonesian rice production. First, the flat rate of rice grain due to the inefficiency in technology and aging rice mill. For the past fifty years, there is a 7.5% decrease in rice grain rate. Second, the low level of farmer's capital while the cost of labor, pesticide, and fertilizer is increasing. The next factor is the productivity of the rice field in vital areas such as Java Island is decreasing. Last, the transformation of rice fields to the non-agriculture area due to industrialization and population growth, which reduce the rice yield.

The initial history of rice self-sufficiency in Indonesia could be tracked back to 1952, seven years after Indonesia had its independence. The Indonesian government, led by its former President Soekarno and known as the old order era, announced a rice policy, which is known as the Kasimo Plan in 1952 (Piggot et al., 1993; Timmer, 1975). The policy was expanding farm production based on the Dutch system of agricultural extension, which resulted in losing the benefits of the original scheme for the second year after it was initiated. Seven years later, Soekarno launched a three-year rice self-sufficiency policy with three main programs. The First program was the intensification of rice cultivation by using *padi* center. The Second program was utilizing mechanical rice cultivation that was used on drylands. The last program was clearing and cultivating of tidal lands (Timmer, 1975).

The program failed because the rice import in the early 1960s showed an increase than before. According to Timmer (1975), there were three factors responsible for the failure. The first factor was rejection from the farmers due to the centralization of the program and the low selling price of rice. The second factor was the abuse of easy credit at the *padi* center, either by the bank officials or the farmers who receive the loan. The last element was the short notice of the program. The *padi* center was given responsibility too soon when they did not have enough staff nor competent technicians.

In his era, Soekarno capitalized rice for his foreign political commodity. Soekarno sent thousands of tons of rice to other countries in need as a sign of solidarity from Indonesia and to gain positive feedback to strengthen the Indonesian position in the international relationship (Sidik, 2004). Unfortunately, most of Soekarno's rice policies were stopped when the new order in the mid-1960s replaced the old order era.

In the early of the New Order era, the main goal of the government was to restore stability, either in social, economic, and political. To support its goal, the government tried to control the inflation on rice and its supply to the poor people. Moreover, to achieve rice self-sufficiency, the government altered its interest from the consumer-oriented to farmers oriented. A more pro-farmers credit scheme was launched to attract their attention and increase their capital even though the program failed (Piggot et al., 1993). The farmer's avoidance of repayment caused failure due to production decline.

As soon as the new order took control of Indonesia, a state-owned company to maintain the rice distribution was built. The company is called BULOG, the Indonesia Bureau of Logistics. The initial plan of BULOG establishment in 1967 was to secure food availability and stabilize the price with the main task was to control the price of rice (BULOG, 2020; Timmer, 1975). With the establishment of BULOG, the authority to import rice was in BULOG's hand.

In the second decade of the new order era, the government changes the farmer's credit scheme. A state-owned bank, BRI (Bank Rakyat Indonesia), was appointed to in charge of the farmer's credit. BRI launched a small branch in the rural area to build a network with medium and small farmers in a rural area so that they can get farmer's credit easier (Piggot et al., 1993). In addition to the farmer's credit service, BRI provides warehouses for fertilizer and rice storage. The rice stored in BRI's warehouse can also be used as a credit warranty from the farmers. To control the market rice price, the government set the floor price of rice.

Apart from the bank loan strategy, three main strategies were developed by the agriculture ministry. These strategies were intensification, extensification, and diversification (Arifin, Dharmawan, and Verdiansyah, 2004). The intensification policy was the usage of biotechnology

and chemical technology such as fertilizer, better rice seeds, and pest control. The extensification policy was expanding the rice farm area by converting unproductive forests to become rice fields, while diversification by introducing farmers with cash crops to increase farmer's income. To support those strategies, the government had improved infrastructures needed by farmers, such as irrigations, roads, and fertilizer factories. However, the government's effort to increase rice production and reach rice self-sufficiency was failed. In the 1970s, BULOG imported a massive amount of rice to fulfill market demand.

Numerous reasons were behind government failure in the 1970s. In 1972, Indonesia and other Asia countries were suffering from the drought caused by a poor dry season. The drought caused a reduction of rice import supply from traditional regional exporters. In less than a year, the rice price was doubled. A pest attack followed the drought in 1972 in the mid-1970s. *Wereng*, a local pest for rice crops, attacked Indonesia's rice farm (Piggot et al., 1993). *Wereng* hit farmers in Bali and Java islands, the primary source of Indonesian rice production.

The rice production in Indonesia surged steadily in the 1980s. In five years, rice production growth was more than 30%. The rice production in 1984 reached more than 26.5 million tons, and BULOG managed to store more than 3 million tons of rice in its warehouse in the following year (Piggot et al., 1993). The 3 million tons of rice reserve is the most significant rice reserve in the history of BULOG (Sidik, 2004). The growth in rice production was followed by growth in other food crops and fisheries commodities. Indonesia's economy in the 1980s was mainly focused on the agriculture sector. However, the economic growth in the 1980s has increased not only income per capita, but also the demand for rice. In accordance with population growth, the need for rice in the 1980s grew 2.5% per year.

The rice self-sufficiency policy during the New Order Era reached its peak in 1984 when Indonesia managed to achieve rice self-sufficiency for the first time (Piggot et al., 1993). Soeharto, the President of Indonesia, was awarded by the Food and Agriculture Organization (FAO) for its achievement in 1986. In his speech in the FAO forum, Soeharto stated that Indonesia's success in self-sufficiency was the result of hard work among his people (Sari and Sage, 2006). Indonesia was considered successful in transforming itself from rice importer to self-sufficiency by the global community.

The success story of Indonesia agriculture in the 1980s was the result of the green revolution that was initiated in 1963. The green revolution aimed to improve agriculture productivity by utilizing technology to modernize agriculture. In Indonesia, the Green Revolution mainly focused on determining the species of rice seed that planted, type of fertilizer to be used, and even the rice planting period (Arifin, Dharmawan, and Verdiansyah, 2004). The green

revolution was fruitful in the 1980s with rice production was increasing steadily. However, the green revolution had its drawbacks.

The green revolution had increased the ration of rice consumption to more than 95%. Before the revolution, the ratio of rice consumption was far below. According to Clifford Geertz in his book *Agama Jawa* (2014), rice was consumed as a staple food by the upper class only. Back then, rice was seen as a luxury commodity. The staple food of the lower level was corn and sweet potato. The green revolution had made Indonesia profoundly dependable on rice as its staple food. Hence, it is becoming more challenging to do food diversification and utilize other commodities as a staple food.

In the last decades of the new order era, rice production did not go any better. Indonesia had to import rice from the neighboring country to fulfill its demand. In 1995 Indonesia imported 3 million tons of rice. When the 1997 Asian Financial crisis had hit Indonesia, it worsened Indonesia's rice production, and in 1999 Indonesia imported more than 5 million tons of rice (Astuti, 2011, cited from Raditya, 2018). The Asian Financial crisis ended the new order authority when Soeharto resigned from his presidency in 1998, and the reform order takes control.

2.4. The Impact of Rice Price to Poverty Rate

As a primary staple food, the government has a political interest in controlling rice prices. Due to the high level of rice consumption rate by the people, rice is considered to be the most significant food commodity and profoundly affect the poverty rate. However, the low rice price is not a perfect solution since the production of rice is quite costly. According to Machmud (2005, cited from Sanny, 2010), controlling the rice price in rice consumer countries requires many considerations. The price of rice cannot be too low since it will affect the farmers' welfare. At the same time, an increase in the price of rice will increase the poverty rate. The World Bank (2004 cited from Sanny, 2010) stated that a 33% increase in the rice price would put 3.1 million people into poverty, while in Indonesia a 10% increase would send two million people into poverty line (Ikhsan, 2001 cited from Malian, Mardianto, and Ariani, 2016). On average, about 27.6% of household expenses in Indonesia are spent on rice consumption (Harianto, 2001, cited from Malian, Mardianto, and Ariani, 2016).

To make sure that the Indonesian citizen is supplied with a sufficient amount of rice, the government imposes some policies. The Indonesian government will intervene in the domestic rice market once there is a market failure so that the market mechanism does not determine the rice market. In speaking of the rice market intervention, governments have two options, direct

and indirect intervention (Hermawan. 2016). The example of straightforward intervention policies such as regulating the ceiling price and the floor price to protect the rice farmers. An example of indirect intervention can be the fertilizer and seeds subsidize and tax on rice.

3. THEORETICAL REVIEW

The United Nations, in 1948, declared the Universal Declaration of Human Rights. The Universal Declaration of Human Rights acts as the global blueprint of freedom and equality. IT announced the fundamental human rights that become the foundation of liberty, justice, and peace (Amnesty.org, 2020). The Universal Declaration of Human Rights, Article number 25, stated that everybody has the right to get an adequate standard of living for the health and well-being of themselves and their family, including food in any circumstances of their livelihood (The United Nations, 2020). Jean Ziegler, a former UN Special Rapporteur on the Right of Food, explained that the rights of food mean that governments are mandatory for providing access to adequate food. Besides, the government also has to ensure that private sector activities do not intrude on other people's rights on food (Ziegler, cited from United Nations Human Rights, 2018).

The Universal Declaration of Human Rights shows that every government must support its pupils in fulfilling their demand for food. Not by providing free food but by providing facilities for them in earning adequate food at a fair price. Therefore, the government should impose a food policy that could offer them food most effectively and efficiently.

3.1 Rice Production

Every country in the world has its way of farming rice. In the big picture, the way they are farming is somehow similar. Rice grows best when it is planted in standing water since it is originally from an area in the world that floods with natural rainfall or waterway flooding. In an irrigated field, rice can yield approximately 5 tons per hectare, while on a dryland rice can only produce about 1.2 tons per hectare (Khush, 1997; cited from Talhelm and Oishi, 2018). 75% of 80 million hectares of rice field are irrigated lowland, mostly in Asian countries. Rice fields are surrounded by small dams that keep the water flooding the rice fields.

However, rice fields that are naturally flooded still require manual irrigation from farmers. Rice plants need about five to ten centimeters of water flooded the rice field (ricepedia.org, 2020). Manual irrigations can control the water level on the rice field precisely while the natural watering cannot. Rice needs an adequate amount of water. Lack of water in the rice field lets weed take over, while too much water will slow the growth of rice (International Rice Research Institute {IRRI}, 2007).

Rice field needs labor more than other crops. Compare to wheat; rice field requires twice of working hours to grow because rice requires that wheat does not. These tasks are transplanting and flatting the area. Farmers have to grow rice seeds in small plots far from the

main fields before it can be transplanted in the main track (Fei, 1983, cited from Talhelm and Oishi, 2018). Flattening the rice field is crucial because it grows in standing water. Once the leveling of the rice field is uneven, the rice growth rate will be uneven as well. However, apart from the higher capital consumed by rice, it is more productive than other staple crops. Buck (1935) claimed that Chinese rice farms might produce 223 kilograms of rice per *mou* (666.5 meters), while wheat farmers produce 71 kilograms.

Between 105 to 150 days of age, rice can be harvested, depend on the variety. Rice harvesting activities are cutting, stacking, handling, threshing, cleaning, and hauling (ricepedia.org, 2020). Once the rice has been harvested, it requires a drying process to reduce the rice grain moisture. Delay in the drying process will reduce the quality of rice grain. After the rice grain is dried, it is stored to minimize grain loss to weather, rodents, insects, and micro-organism. According to International Rice Genebank (ricepedia.org, 2020), rice can be kept for 100 years if it is packed in a vacuum bag and freeze at -18 °C. Before it is sold to consumers as white rice, the rice grain should be milled to remove the husk and polished.

3.2 Self-Sufficiency

In the 1970s period, about 62% of the world population was living in countries with self-sufficiency policy (O'Hagan, 1975; cited from Clapp, 2017). Governments should have prioritized self-sufficiency for their national security. Food self-sufficiency may protect countries from international supply disturbance that may arise due to war or political conflict, sharp price rise, or even global pandemic (Clapp, 2017). From a political perspective, self-sufficiency is a strategy for developing national pride, reduce dependency on other countries, and also as a source of vote-getters for politicians.

The principal element of government roles in self-sufficiency is by maintaining the rice price in the domestic market and minimize food from international trade. A higher production cost of rice will increase the price of rice, reduce the consumer's ability to afford the rice and demand for rice, and make the rice self-sufficiency easier to achieve (Timmer, 2019). Timmer (2019) added that there are three aspects that the government policy may generate rice self-sufficiency. The first aspect is the public investment in rice production. The second aspect is setting up the local price for rice that reflects the long-run opportunity cost in the global markets, and the last element is maintaining the domestic rice prices by intervening in the local rice market by supplying the rice stocks to balance the cost. In order to prevent resource waste, consistency among three aspects is vital.

In spite of the fact that self-sufficiency shows a country's self-reliance on fulfilling their demand for food, there were numerous critics on self-sufficiency policy. Financial Times (2008), learned from the 2007-2008 food crisis, claimed that food self-sufficiency is a wrong lesson of the global food crisis. An executive of a top food company stated that being self-sufficiency in every single food is nonsense (Clapp, 2017). These critiques highlight four risks regarding food self-sufficiency. The first risk is that varieties of production may disturb domestic food supplies. A sharp decrease in food production due to natural disasters, such as drought, pests, or earthquakes, causes a shortage of food supply, which may lead to hunger or poverty since the food price is increasing.

The other risk is that market intervention to protect local products tend to be inefficient and lead to a reduction in productivity, supply, and increase food prices (Clapp, 2017). The third arguments are that self-sufficiency policy may prevent farmers from exporting their commodities and having a bigger market for their product. The last risk is constrained on the environment when the government push for food self-sufficiency since not all countries have the ability and resources to achieve food self-sufficiency.

Vietnam, the third biggest rice exporter after India and Thailand (Statista, 2020), had a sharp increase in rice production between 1981 and 1987. The upward trend continued until 1999, even though the growth rate was not as high as before (Young et al., 2002). The high growth rate of rice production was the result of applicable government policies in the agriculture sector, more specifically on rice production. After the Vietnam War had ended in the 1970s, the government invested in irrigation facilities and a more modern rice production system. Following the 'Doi Mui' economic renewal program, some critical reforms on agriculture were imposed to improve agriculture productivity. These programs were decollectivization of agriculture, new land tenure law, agriculture price reforms such as elimination of administration cost, liberalization of interest rate, foreign trade and investment, the establishment of a legal framework, and initial openness to domestic and international private banks.

Thailand, on the other hand, started to improve its rice productivity since the rice policy shifting from low rice prices to support consumer and workers' cost of living to producer supported policy (Poapongsakorn, 2019) in the 1970s. To support the pro-farmers policy, the government impose several agriculture policies. In the 1980s, the farmers were introduced to a subsidized farm loan followed by the elimination of rice export tax and the Green Esan project to solve the drought problems in seventeen provinces. Moreover, in the early millennium, the Thai government introduced farmer income guaranteed policy and willing to pay farmers the price gap between the guaranteed price and market price.

3.3 Food Security

The World Food Summit (1996; cited from Warr, 2011; FAO, 1996) stated that food security exists when every people, at any time, have both physical and economic access to adequate healthy food. A healthy diet will help them to meet their dietary demands and food preferences for an active and healthy lifestyle. The food security policy was initially focused on food stocks to survive from famine (Baer-Nawrocka and Sadowski, 2019). When local production decreases due to famine, the government import food from overseas to meet the domestic food demand.

Food security consists of three interconnected levels: the farm level, the national level, and the international level (Baer-Nawrocka and Sadowski, 2019). On the farm level, food security is affected by the farm's population, access to education, healthcare. On the national food security level, it is affected by production resources, institutions, political, economy, and social life. The international level relies on the food supply and demand, food aid, food reserve, information systems that are utilized for the world's population food demand.

The Food Security and Vulnerability Atlas (FSVA, 2015) claimed that there are three pillars of food security. The first pillar is food availability (FSVA, 2015; Teng and Escaler, 2010). It is the physical food existence, either from local production, government's food reserve, commercial imports, and even food aid. The availability of food is affected by climate, soil, rainfall, technologies, farming practices, government trade policy, supply, and demand, etc.

The second pillar is food access (FSVA, 2015; Teng and Escaler, 2010). Access to food means the ability of the people to get a sufficient amount of food either from their production and food reserve, purchase, gifts, borrow, and aid. Food access consists of physical access, such as market infrastructure and functionality; economic access, such as the financial capacity to buy or produce food; and social access, the social capital to get the food. The last pillar is the food utilization (FSVA, 2015; Teng and Escaler, 2010). It refers to the ability of the people to benefit the food they can access and use the food's nutrients efficiency. The food utilization highly depends on the food storage and processing facilities, the knowledge to prepare and process the food, the household's food-sharing methods, and the people's health status.

One of the best examples of food security country is Singapore. Singapore imports about 90% of its food demand. Its food security strategies rely on varieties of food sources. Their food comes from a combination of local production, reserve on essential food, and imports from approximately 170 countries (Tortajada and Zhang, 2017). To ensure their food supply to be sustained, the Singapore government established the Agri-Food and Veterinary Authority (AVA). At present, AVA responsible for maintaining food supply continuity, safety, and price stability.

Moreover, AVA also accountable for supporting domestic food producers in utilizing technology and agriculture trade facilities.

The initial food security policy was announced in 1984 when the Singapore government transformed its food policy from self-sufficiency. The reason behind the transformation was the government's decision for not focusing on agriculture production but on goods production and services, which they had advantages to compete with other countries (Goh,1984; cited from Tortajada and Zhang, 2017). To persuade farmers to retire from the agriculture business, the government offered a one-time compensation grant. Reduction in agriculture land and labor, naturally decreased overall agriculture production (Tortajada and Zhang, 2017).

In maintaining its food security sustainability, Singapore has promoted a Food Security Roadmap with three strategies that divided into core, supporting, and enabling strategy (Tortajada and Zhang, 2017; AVA, 2013)). The core strategies are diversifying the import food sources by investing in foreign countries, and expanding its industry, developing strategies to cope with limitations in diversification, utilize the domestic product and stockpiling. The supporting strategies are research and development, reducing food waste, strengthen infrastructure, developing financial instruments, and focus on welfare or affordability. The enabling strategy is coordination among governments, emergency planning, communication, market monitoring, strengthening fiscal, legal, and regulatory frameworks.

Apart from increasing local food production and food import, food security can be achieved by developing innovations and technologies on food. Innovations such as encouraging people to consume local products, reduce food waste are essential in food security because it does not only reduce the cost but reduce the food demand as well (Ludher, 2016). Technologies can support food security by developing urban farming techniques, inventing safe and long-lasting food, or utilizing food waste into fertilizer or high-value food ingredients (Tortajada and Zhang, 2017).

4. Data and Methodology

4.1 Data

This section describes each data related to this thesis topic. All of the data are explained regarding their meaning, where it was taken, calculated, and the utility for this research. The majority of data were taken from the Indonesian Central Bureau of Statistics and the Ministry of Agriculture of Indonesia between February 2020 and April 020. The writer gathered the information for the period between 2010 and recent times. The reason why this period was chosen, is to see the current situation of Indonesian rice supply and demand from the implementation of rice self-sufficiency policy and the possibility of implementing another rice policy, the food security.

The majority of the data come from Statistic Indonesia (Biro Pusat Statistik or BPS). Statistic Indonesia is a Non-Ministry Government Agency that is established based on Constitution Number 6 the Year 1960 regarding Census and Constitution Number 7 the Year 1960 regarding Statistics (BPS, 2020). The main tasks of Statistics Indonesia are providing data for government and public; assisting statistics activities in Indonesian ministries, government, institutions, and public institutions; developing statistical techniques and methods in Indonesia and providing education and training services of statistics in Indonesia; and cooperating with international institutions and other countries for the benefit of Indonesia's statistical development.

4.1.1. Annual Import of Rice

The annual import of rice is data that explained the origin of rice that was imported by Indonesia. This data is collected from Statistics Indonesia.

4.1.2. Annual Production of Rice

The annual production of rice is data regarding the amount of rice that is produced by domestic farmers in each province in Indonesia. This data is collected from Statistics Indonesia.

4.1.3. Annual Paddy Field Area

The annual paddy field area is data of both wet and dry rice field areas in Indonesia. This data is collected from Statistics Indonesia.

4.1.4. Annual Price of Rice

The annual price of rice is the average rice price in several countries and the global market. The rice price in countries is collected from the FAO of the UN while the rice price in the

worldwide market is rice price released by the World Bank data and International Monetary Fund data.

4.1.5. Annual Ratio of Poverty

The annual ratio of poverty is the percentage of poor Indonesian people compare to the total population. The World Bank data defined poverty as people who live on less than \$1.90 a day, while Statistics Indonesia uses the basic needs approach. According to Statistics Indonesia (2020), poverty is an economic disability in fulfilling the food and non-food demand that is measured from expense. The basic needs data that is used by Statistics Indonesia comes from the National Social and Economy Survey that is held by Statistic Indonesia every year. This data is collected both from the World Bank data and Statistics Indonesia.

4.1.6. Annual Population

The annual population is the number of people in Indonesia. This data is collected from the World Bank data.

4.2 Methodology

This thesis uses a qualitative method to get an insight into the rice policy in Indonesia, which is rice self-sufficiency, and why Indonesia has to transform its rice policy.

4.2.1. Rice Self-Sufficiency Ratio (SSR)

The self-sufficient ratio is the percentage of food consumed local producer produces that. The SSR indicates how a country relies on its domestic production (FAO, 2012). The higher the ratio, the greater the self-sufficiency. The SSR is defined as:

$$SSR = \frac{\text{production} \times 100}{\text{production} + \text{imports} - \text{exports}}$$

Figure 1: Rice Self Sufficiency Formula (FAO, 2012)

4.2.2. Thesis Limitation

This thesis has some limitations that imply further study regarding food policy in Indonesia. This thesis is about the ability of Indonesia to fulfill the food demand of its people. The staple food in Indonesia consists of several commodities. However, since 90% of Indonesian people rely on rice as their staple food, this thesis will only analyze rice as an Indonesian staple food.

5. Empirical Analysis

5.1. Rice in Indonesia

5.1.1. Production

The history of rice production in Indonesia can be traced back to the time when the word 'Indonesia' was not even mentioned yet. The oldest relief that is known that tells about the rice production in Indonesia is the Karmawibhangga relief in the Borobudur temple. The Borobudur temple is built around 780 a.d by the Sanjaya Dynasty (Perpustakaan Nasional Republik Indonesia, 2014). An illustration of the Borobudur temple shows two people who guard the rice field by sitting in the hut in the middle of the rice field while the other relief depicts a farmer plow his rife field using his two cows (Putri, 2019). Djaliati (2019, cited by Putri, 2019), a university archeologist, stated that ancient Javanese had developed a rice field in dry and wetland areas by utilizing rainwater. These illustrations tell that the history of rice production had started more than one millennium ago.

Crucial factors on rice self-sufficiency are rice production, distribution, consumption, and the Government. Rice production determines how much rice can be supplied to the people, and effectivity on the rice plantation has a significant impact on rice production since it may reduce the production cost. The distribution influence the consumer rice price. Since Indonesia has a very vast area, and not all area has its own rice field, effectivity on distribution may reduce rice price in the non-rice-producer area. Consumption determines the amount of rice is needed to fulfill the rice demand. The last factor and might be the most crucial is the Government. The Government imposes policies to achieve rice self-sufficiency, and its institutions have the responsibility to support and supervise farmers on producing their rice and supervise the rice distribution to be efficient so that both farmers and consumers may have a fair price on rice.

5.1.1.1. Rice Farm Production in Indonesia

There are two ways to improve domestic rice supply in Indonesia, intensification, and extensification. The extensification is expanding the rice field area, while intensification is improving rice field productivity (Rozen and Kasim, 2018). Widening the rice field is considered to be more challenging since Indonesia is transforming to become an industrial country. Unemployed land are preferred to be utilized for the industrial sector. In some areas, agricultural land is even altered to become factories. Therefore, improving land productivity is a possible way to enhance rice supply in Indonesia.

In order to improve productivity, the Indonesian Government launched a program called Five Farming Effort (*Panca Usaha Tani*) (Rozen and Kasim, 2018). The first effort is the

use of high-quality rice seeds which will give higher rice yield. The next one is irrigation by controlling the water flow for the rice field since rice requires sufficient water supply for its growth. Too much or less water supplied to the rice field will impact the rice yield. The third one is the use of fertilizer accordingly because the fertility of the soil in Indonesia is various. An appropriate dosage of fertilizer will improve the growth of the rice plant, followed by controlling the pests, which is prioritized on natural resources to reduce the cost. The last one is improving agriculture infrastructures, such as building roads and rice mills in rural areas.

As stated earlier, the rice field in Indonesia consists of two types, the dry and wetland area. One of the most adopted planting systems on both kinds of soils are SRI (the System of Rice Intensification) and gogo rice. The SRI system is applicable in the wetland area, while the gogo rice system is in the dry area. The benefit of SRI is the high rate of yield compared to the traditional method and requires less seed and water. On the other hand, the benefit of gogo rice is it more environmentally friendly since it requires less water (Rozen and Kasim, 2018; Ministry of Agriculture of Indonesia, 2014; Perdana, 2010; BPTP Jawa Barat, 2009).

5.1.1.1.1. Wetland Area Rice Field

The implementation of the SRI system in the wetland rice field is started in preparing the soil. Firstly, the soil is filled in with water until it flooded and plowed it two times in two weeks until it gets muddy. Once it gets muddy, the soil needs to be flattened and fertilized with natural fertilizer such as compost or dried leaves. The second steps are seedling. Before being used, the seed is soaked for two days, dried, and put it in a plastic bag or banana leaf for a week to make the seed more robust and the stem grows. The third step is planting the seed after being kept for a week. The seed is planting on the soil with an approximately 25 centimeters gap among seeds. When the plant is, more or less, 45 days old, the rice field needs to be dried for ten days to hinder the seedlings grow (Rozen and Kasim, 2018; Ministry of Agriculture of Indonesia, 2014; PPK Sampoerna, 2009).

After ten days, the rice field is filled with water until approximately 100 days old. Once it reaches about 100 days old, the rice field has to be dried until the harvest time. Between the seed's planting until the harvest time, the farmers have to weed the unwanted plants that grow between the rice crops. The last part of the SRI method is the harvesting time. The rice crops can be harvested when the leaf is about 90% yellowing, and the rice grain is solid already. After being harvested, the rice grain is dried, put it in a rug and keep in a rice barn (Rozen and Kasim, 2018; Ministry of Agriculture of Indonesia, 2014).

The implementation of the SRI system in Indonesia is a success story, especially in West Sumatra Province. The average of traditional rice plantation system yield is about 4.5 tons per acre, while the return of SRI is far above the norm. In 2006, the SRI implementation in Kabupaten Padang Pariaman and Solok, a small city in West Sumatra yielded 7.5 and 8.0 tons per acre, while in Kabupaten Tanah Datar the rice field harvested 8.5 tons per acre (Rozen and Kasim, 2018). However, the implementation of SRI has its barriers. The SRI system requires more labor than conventional, and controlling the supply of water is quite challenging for farmers.

5.1.1.1.2. Dry Area Rice Field

The suitable system to be planted in a dry rice field is the gogo rice. Even though it is planted in a dry area, it still requires water. The demand for water for the gogo rice can be fulfilled from the rainfall. Hence it requires no additional irrigation system during the rainy season. However, the gogo rice can be planted both in the dry season and the rainy season, but it requires further irrigation during the dry season and has a different amount of yield (Perdana, 2010). The suitable rainfall ratio for the gogo rice system is between 1500 until 2000 mm/year and can be implanted in any kind of soil.

Just like any other plantation system, the gogo rice is started with preparing the soil. The best time to start the gogo rice system is just before the rainy season started to maximize the growth of the rice plant. Firstly, the rice field is cleaned from any unwanted plants, plowed two times on 25 until 30 centimeters depth, fertilized, and flattened. Once the flattened process is done, the soil is left as it is until the rain is fallen. After the soil is wet from the rainfall, the seed can be planted with a gap of about 25 centimeters among rice seeds. Once the seed is planted, the farmers should apply fertilizer. The recommended fertilizer is mixed between organic and chemical fertilizer (Perdana, 2010; BPTP Jawa Barat, 2009).

The date requires until the crops are ready to be harvested in the gogo rice system is various depend on the variety and the environment. However, the characteristic of the plants when it is ready to be collected is similar to SRI. It is ready to be harvested when the leaf is about 90% yellowing. Once it has been harvested, the rice grain needs to be cleaned with a blower, dried for three until four days, put in a rug, and kept in a rice barn (Perdana, 2010; BPTP Jawa Barat, 2009).

5.1.1.1.3. Rice Production Development

The Indonesian Government's plan to improve rice production can be divided into extensification and intensification. The extensification program is improving rice production by increasing the rice farm area. Contrarily, the intensification program, improving rice production by increasing current rice field productivity. Indonesian Government launched a program called *Serasi (Selamatkan Rawa dan Sejahterakan Petani)*, which was announced in 2018 to improve its rice field area. The main idea of *Serasi* was to transform swamp into the rice field. The initial plan of *Serasi* was to create 500.000 hectares rice field in total. Approximately 250.000 hectares rice field would be built in the South Sumatra region, and the other 250.000 hectares rice field would be made in the South Kalimantan region (Ministry of Agriculture, 2019b). Moreover, the Government provides farmers with seeds, fertilizers, and agriculture machines. The yields of the *Serasi* program are expected to supply rice demand in Sumatra and Borneo islands.

As shown in figure 2, from 2014 until 2018, the rice field area in Indonesia is growing every year. In four years, there were more than two million hectares of new rice field area was established to boost rice production (Ministry of Agriculture, 2020). However, the growth ratio of rice field area between 2016 and 2018 shows the opposite. The rice field growth rate in 2016 was 7.34%, yet, in 2017 and 2018, the growth rate decrease to 4.08% and 1.13%.

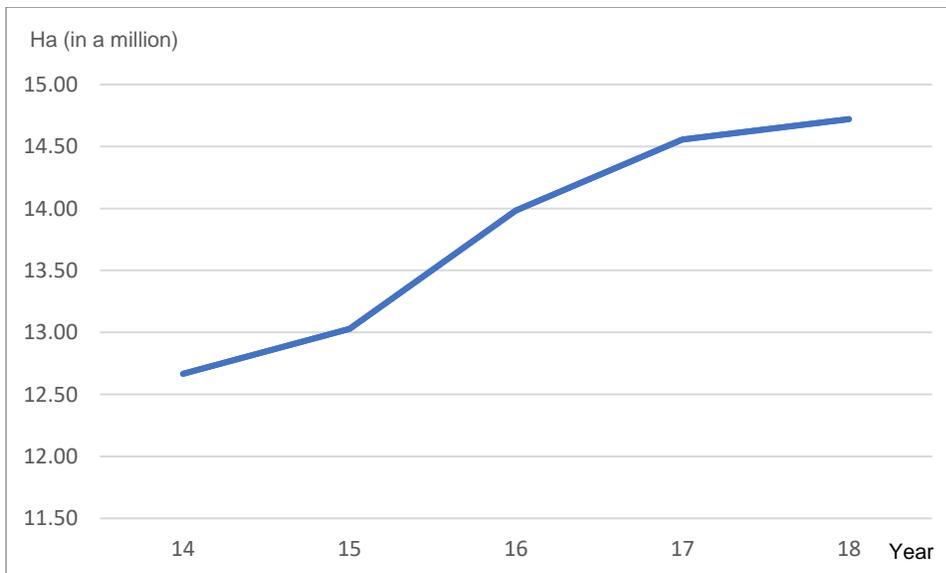


Figure 2: Rice Field Area in Indonesia (Ministry of Agriculture, 2020)

Despite the Government's program to build new rice fields, the rice field area in Java islands, a major rice producer in Indonesia, is declining every year (Santosa et al., 2014). According to BPN (2007), the rice field transformation to the non-agriculture area was 3,600 hectares per year. The reason behind the rice field area declining is the shifting into business

and residential areas. Since the majority of companies, factories, and government institution headquarters are located in Java islands, Java is considered to be the main island in Indonesia. Therefore, migration from other islands to Java is happened every year and increase the demand for business and residential areas.

On the other hand, the intensification program mostly relies on the superior seeds and subsidy on fertilizer. The high-quality seed that is provided by the Government is Mira-1. This seed is the product of Batan's (*Badan Tenaga Nuklir Nasional*) research since 2000 and harvested for the first time in the Banten region in 2017. Batan is a government institution that specialized in nuclear and science research and development (Batan, 2020). The Mira-1 seed can produce 7 tons of rice per hectare, a 52% growth from the previously used seed. All the Governments attempt to support rice production has increased rice production over the past ten years, as shown in figure 3, even though the growth rate has never surpassed 7% per year. Since 2009, Indonesian rice production is in upward trends, except in 2011 and 2014, when rice production declined (Ministry of Agriculture, 2020).

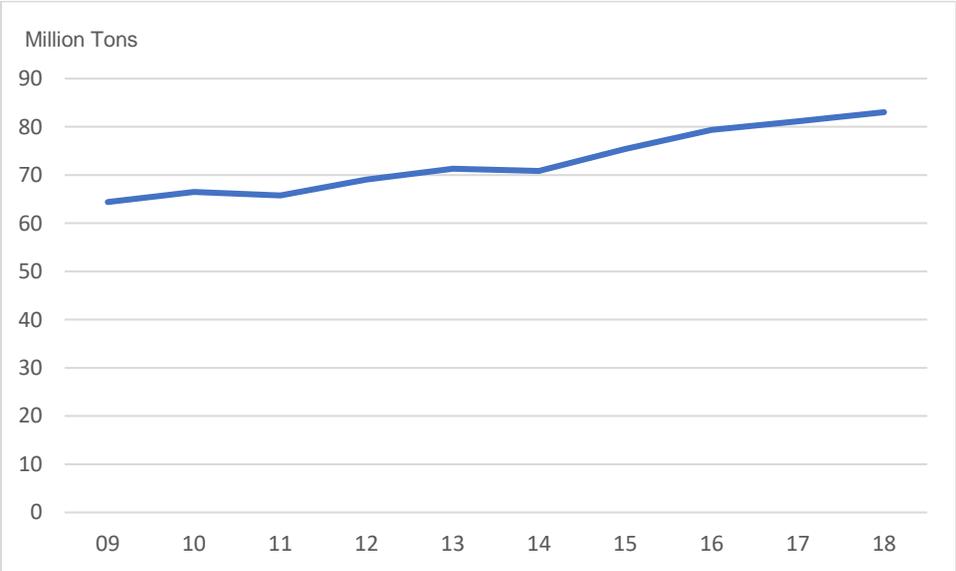


Figure 3: Indonesian Rice Production 2009-2018 (Ministry of Agriculture, 2020)

5.1.1.2. Labor in Agriculture

According to Indonesian Law number 41 the Year 2009 (2009; cited from Syahyuti, 2013), farmers are defined as Indonesian people, including other nuclear family members, who utilize areas for food commodities continuously. Most farmers in Indonesia rely on their agriculture activities as their main job to make a living. BPS (BPS, 2018) divides farmers into four categories. First, farmers whose farmland is less than 0.5 hectares. Second, farmers with farm area between 0.5 and 0.99 hectares. Next is farmers with farmland between 1 hectare and 1,99

hectare and the last is farmers with more than two-hectare area. In 2018, farmers in Indonesia were dominated by farmers with less than 0.5 hectares of farmland. About 61.8% of farmers in Indonesia have farm less than a half hectare, followed by farmers with the area between 0.5 and 0.99 hectares with 17%, and the least were farmers with farmland more than 2 hectares in 6.2%. However, PATANAS in 2010 (Susilowati and Maulana, 2016) stated that farmers without farmland exist in Indonesia. Farmers without farmland are farmers who rent the farm or using a profit-sharing system with the landowner, and there were about less than 20% of farmers in Indonesia were farmers without land in 2010. However, BPS, in its Inter-Census Agricultural Survey in 2018, did not mention about them.

The average farm size in the USA today is approximately 444 acres (US Farm Data, 2020), equivalent to 180 hectares, while more than 60% of farmers in Indonesia has less than 0.5 hectares. There is a big gap between them, which raised a question of whether the majority of farmers in Indonesia can fulfill their needs by utilizing their 'small' farmland. According to Susilowati et al. (2010), the minimum area that is required by Indonesian farmers to move from the poverty line is 0.65 hectares. That meant most of the Indonesian farmers would not be even able to get away from poverty if they only rely on their farm to make money. Therefore, many farmers in Indonesia are living in poverty due to lack of area. In 2016 there were about 6.05 million poor farmers (BPS, 2016).

Running a farm for an Indonesian farmer is a job for the whole family, not only for the breadwinner. When the member of the family is not sufficient enough to run the farm, they will look for additional labor from their nearest circle, such as friends and neighbor, to work as wage labor (Edwar, 2017). The amount of salary depends on their agreement. Some worker is paid daily, while the other is profit sharing once the farm is harvesting. Employing labor will improve the farm's productivity even though the cost of production is increasing as well.

The issue of agriculture labor in Indonesia is not only about the lack of farm area. According to BPS data (BPS, 2020; Arifin et al.,2019), the share of agriculture employment since 1975 is on a downward trend. In 1975 when Indonesia relied heavily on its agriculture sector, the ratio of labor who worked in agriculture was 62%. In ten years, the rate declined by 6%. Since 2005, the majority of Indonesia's labor has shifted from agriculture to the service and industrial sector. The ratio of labor shifting is shown in table 1. Since 1975, the share of employees who work in the service sector and the industrial sector has shown an upward trend. In 2017, the number of labor who worked in the service sector was almost doubled than labor in agriculture. The labor migration from agriculture to industry and service is mainly a push-factor.

The low income from the rural-agriculture area pushes them to move to the urban area to seek a better living, which is dominated by jobs from the industry and service sector.

	1975	1985	1995	2005	2010	2015	2017
Agriculture	62.0%	56.0%	46.0%	42.5%	39.0%	32.9%	29.7%
Service	6.0%	9.0%	12.8%	13.0%	14.5%	13.3%	14.5%
Industry	32.0%	35.0%	43.2%	44.5%	47.5%	53.8%	55.8%

Table 1: Share of Labor in Indonesia (BPS, 2020; Arifin et al.,2019)

5.1.1.3. Rice Farm Facilities

Farm facilities, such as irrigation, rural transportation, rice mills, and dams, are crucial for rice production. The Government needs to provide farm facilities, both for pre-harvest and post-harvest time, so that the rice-self-sufficiency is achievable. An inadequate irrigation system will hinder the rice production since the rice farm depends heavily on water. At the same time, the lack of transportation will prevent farmers from sending their products to the market. Indonesia has an inadequate irrigation system that impacts its attempt to achieve rice self-sufficiency. According to the Ministry of Agriculture (2014, cited from Nurbaiti, 2015), More than 52% of the rice irrigation system was damaged in 2013. About 3.7 million hectares of rice field's productivity was affected by the damage. Moreover, the number of dams available was insufficient.

In order to support the rice self-sufficiency goal, the Indonesian Government under President Joko Widodo pay full attention to the agriculture's infrastructure problems. The Government allocated *Dana Alokasi Khusus* (DAK), a fund from the State Budget that is earmarked to fund special projects of the region area as long as the project is a national priority project (Directorate General of Fiscal Balance, 2020), to support various infrastructure projects. With the DAK, the Government repaired the damaged irrigation area, built more than 800 hectares of new irrigation area, constructed more than 20 water reservoirs, and built 55 dams (41 dams on progress) all over Indonesia. Moreover, to improve agriculture distribution, more than four thousand kilometers of road and hundreds of bridges were built.

5.1.1.4. Farmers Credit

Farmer uses their farm's output not only to feed themselves but also as capital to run their farm. Since most of Indonesia's farmers have a small area and they have no other job apart from being a farmer because the only skill they have is farming, they find difficulties in funding their farm. Darmawanto (2008) and Edwar (2017) stated that one of the biggest problems faced by Indonesian farmers is the lack of capital. The lack of money is worsened by the limited

access of farmers, either traditional farmers or agriculture trader, to the bank loan. The obstacles for farmers to get bank loans from commercial banks are mainly caused by their inability to provide land certificates for bank guarantee and their inability to pay monthly installments since their income relies on the harvest season. Approximately, only 15% of farmers who gain access to the bank loan.

Government involvement on agriculture bank loans is mandatory since agriculture bank loans mostly a political incentive (Darmawanto, 2008). The agriculture bank loan is a subsidies loan that has a lower interest rate than the market interest rate. Therefore it will not attract commercial banks. Moreover, the agriculture bank loan is a mass bank loan, and it will be a burden for commercial banks to analyze their debtor one by one, which most of them have no financial records.

The Indonesian Government launched a government's loan for micro, small, and medium enterprises in 2007 to provide capital and investment. The loan is essential because micro, small and medium enterprises have limitations to access conventional bank loans due to their inability to provide a bank guarantee. The government loan for micro, small, and medium enterprise is called *Kredit Usaha Rakyat* (KUR). One of KUR's objective is to provide loans for farmers to improve their productivity (Kemenko Ekoin, 2018). Farmers can easily apply for KUR directly in any bank that is owned by the Government or indirectly via Micro Finance Institutions or the nearest Cooperative Association. Government banks that provide KUR are Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), Bank Mandiri, Bank Tabungan Negara (BTN), and Regional Government's Bank.

KUR for agriculture is slightly different from general KUR. Farmers who would like to apply for KUR has to join a farmer group before they can get KUR from the provider. Farmer group is a group of farmers that is legally listed on local government institutions. These groups cooperate in providing quality seeds, standardized rice field, and quality yields. In most cases, these groups of farmers are supported by the cooperative association to improve their commodities' quality (Kemenko Ekoin, 2018). Once the farmer groups receive their KUR, the KUR provider coordinates with the cooperative association to make sure that the establishment of the rice field, the output sale, and the payment for KUR work accordingly. Figure 4 shows the connection among KUR providers, farmer groups, and cooperative associations. The farmer's credit facilities from the Government are expected to help farmers to fund their capital that can be used to obtain superior seeds, farm machines and technologies, and fertilizer. The credit facilities can be utilized not only to produce rice but also to improve their productivity. Furthermore, the farmer's credit shown that the Indonesian Government supports its farmers.

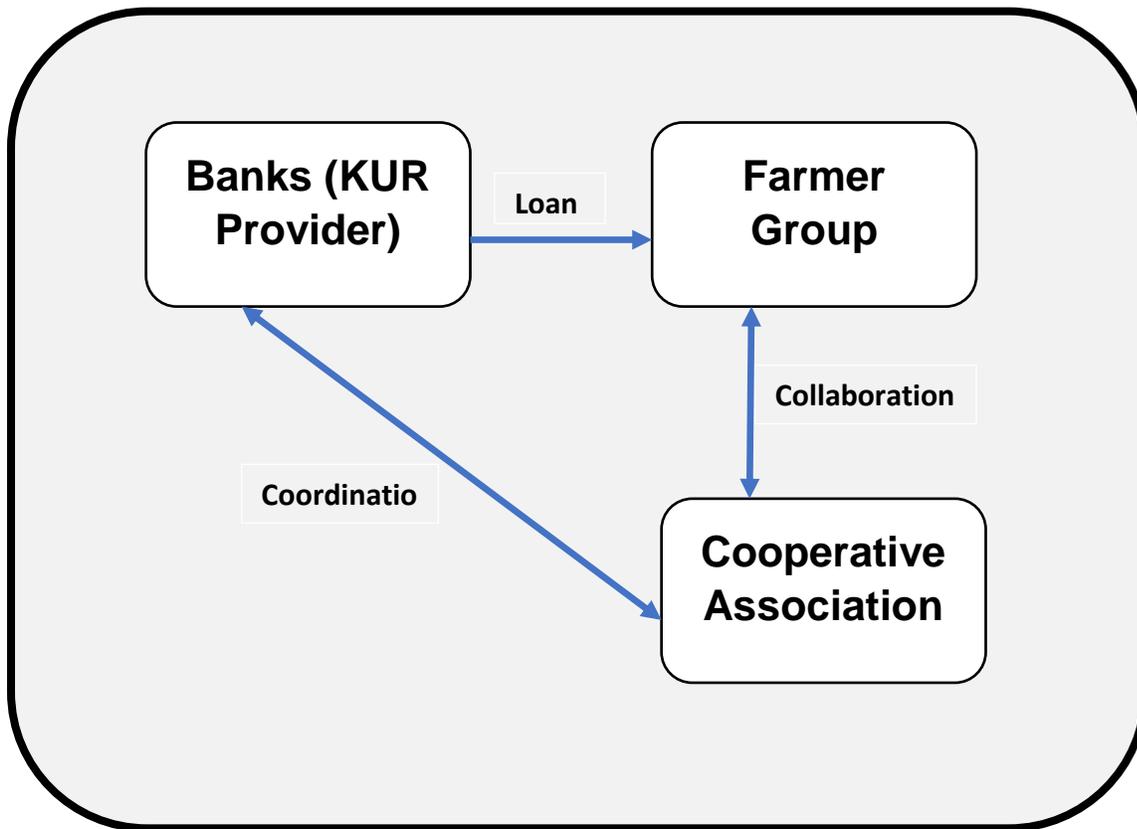


Figure 4: The Distribution of KUR for Farmers (Kemenko Ekoin, 2018)

5.1.2. Distribution

The distribution line of rice in Indonesia is driven by a market mechanism and involves many parties. Started from the farmers, the rice journey before it ended in the customer's kitchen include several traders such as merchant traders, distributors, sub-distributors, rice agents, supermarkets, and retailers. Even though in some cases, customers buy rice directly from farmers without any trader's involvement. This case can be easily found in rural areas where customers can access the rice farm easily. According to BPS (2018), most rice farmers sell their commodities to distributors, and the distributor sells it to retailers before it reaches the customer. Figure 5 shows the most common distribution line of rice in Indonesia. However, the distribution line of rice in Indonesia is varied, depending on the area.

Some areas are even involving more parties in the rice distribution line. In South Sumatra, the distribution line of rice does not include rice distributor. Farmers sell their rice to rice agents who will distribute it to the wholesaler. Then, the wholesaler will send it to the retailer who sells

rice to customers. Apart from the parties mentioned above, the rice distribution in Indonesia also involves a government institution called Bulog, which will be explained later.

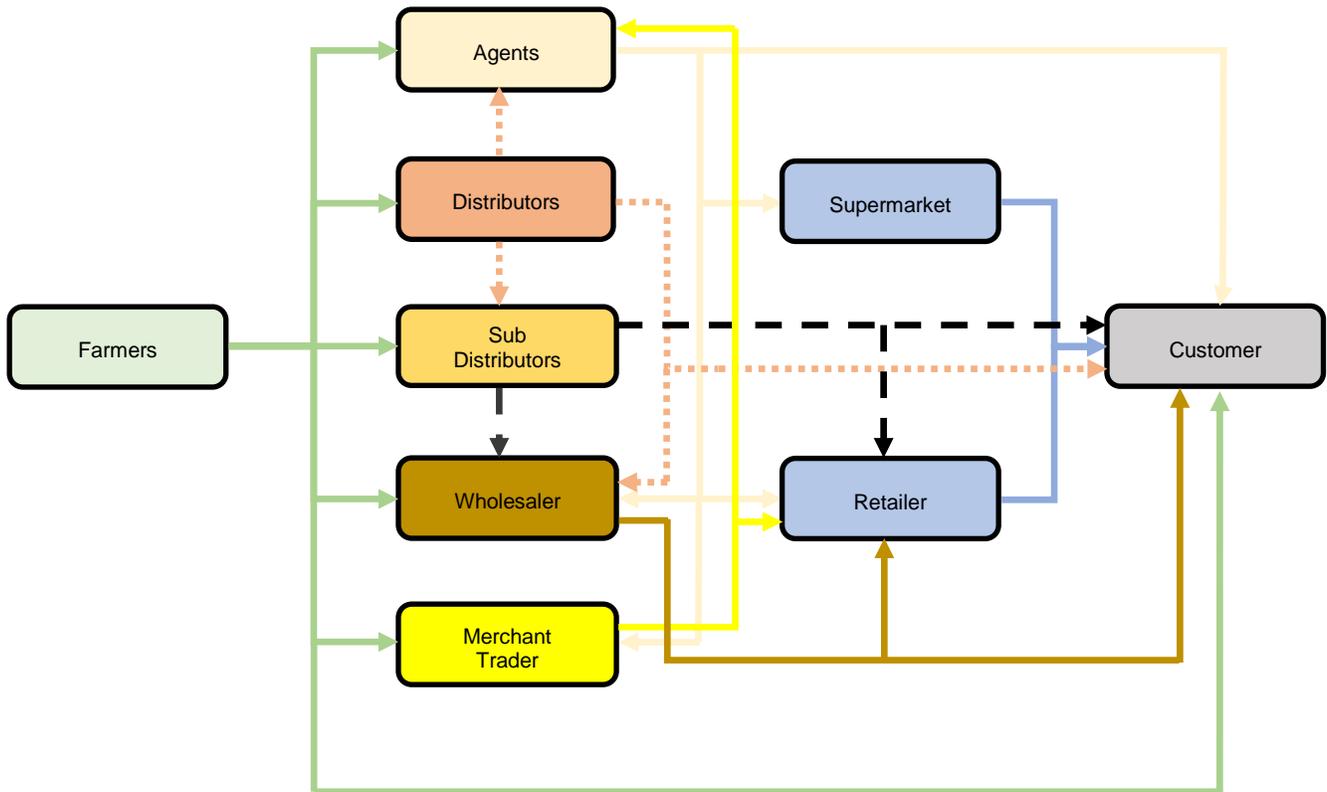


Figure 5: Distribution Line of Rice in Indonesia (BPS, 2018)

5.1.3. Consumption

The main challenge in Indonesian rice consumption is the upward trend of rice demand due to the increasing number of the population every year. The gap between rice production and rice consumption is getting widened (Siswanto, Sinaga, and Harianto, 2018), and to fill in the gap, importing rice is the instant solution. Every year Indonesia orders hundreds of thousands to million tons of rice from other countries such as Vietnam, Thailand, China, and India. The amount of imported rice is varied every year, depend on the amount of domestic rice production. Figure 6 shows the amount of rice imported. The continuity of rice import policy every year indicates that the Indonesia rice supply still depends on other countries.

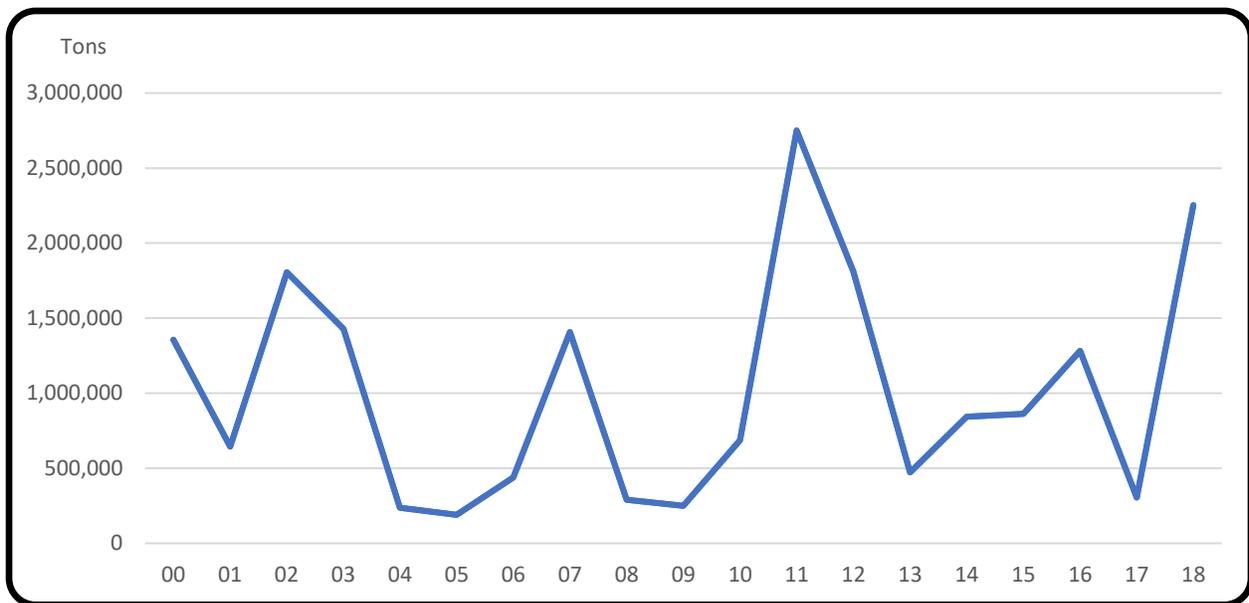


Figure 6: Total Rice Imported 2000-2018 (BPS, 2020)

Since rice is the leading staple food in Indonesia, and most of them consume rice in every meal, the rice per capita consumption in Indonesia is considered to be higher than in other countries. In 2011, per capita, rice consumption was 113.72 kg and decreased to 111.58 kg per capita in 2017 (BPS, 2018b). On average, between 2011 and 2017, rice consumption in Indonesia was around 113.8 kg per capita, with the highest consumer was the household. However, Kusmana, Budiman, and Hidayat (2017) predicted that Indonesian per capita rice consumption was not accurate.

Kusmana, Budiman, and Hidayat (2017) argued that the BPS data on per capita rice consumption that was based on National Socio-Economy Survey (SUSENAS) was underestimated. They stated that per capita rice consumption in Indonesia was 139 kg, and they were supported by Firdaus, Baga, and Pratiwi (2008), while Kumalasari, Hanani, and Purnomo (2013) argued that the consumption was 140 kg. The skepticism on BPS data was also the reason why BULOG imported rice from overseas. BULOG asserted that it could not rely on BPS and Ministry of Agriculture data on rice production because of the method they used to calculate the vast area of rice field. In calculating the rice field area, the Ministry of Agriculture used the eye-sight method. The mismatch data on per capita rice consumption among the Government institution make the rice self-sufficiency is even harder to achieve since there is no exact data on rice consumption.

The total amount of rice consumption in Indonesia is projected to be in an upward trend. The reason behind the pattern is the increasing number of the total population in Indonesia every year. Over the past ten years, the average population in Indonesia is increasing by

1.29%, as shown in figure 7. In 2010 the total population in Indonesia was 241,834,215, and in five years, it expanded to 258,383,256 citizens (World Bank Data, 2020). The BPS (2018) projected that Indonesian citizens would be 294 million in 2030 and more than 318 million in 2045. Therefore, the Indonesian Government should improve its rice productivity if they are still planning to impose rice self-sufficiency policy.

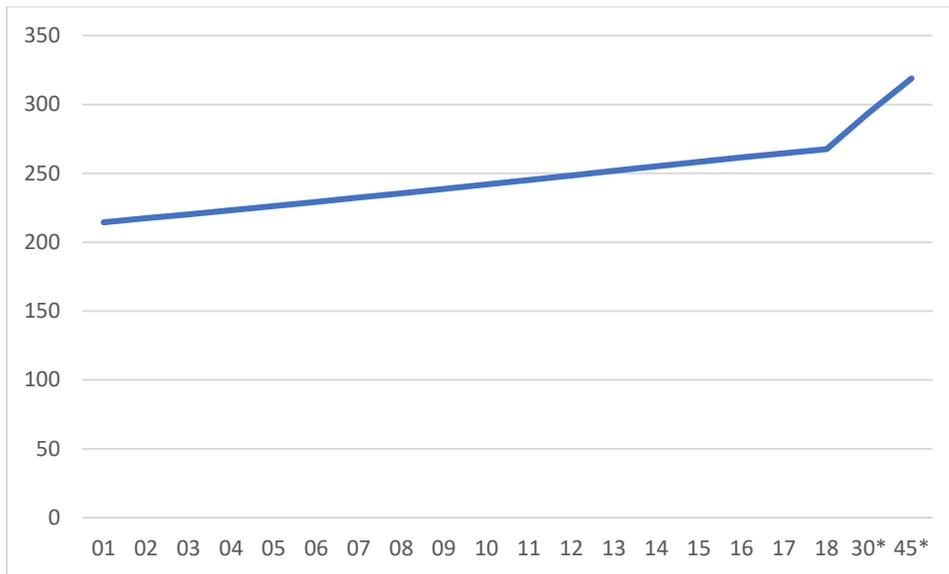


Figure 7: Total Population of Indonesia 2001-2045 (BPS, 2020; World Bank Data, 2020)
*projection

5.1.4. Government Institution

Several Indonesian institutions involved in the rice availability program to make sure that domestic products can fulfill the rice demand. Two of the essential institution are BULOG and the Food Security Agency (*Badan Ketahanan Pangan/BKP*). BULOG is a state-owned enterprise, while BKP is an institution under the Ministry of Agriculture of Indonesia.

5.1.4.1. Indonesian Bureau of Logistic (*Badan Umum Logistik / BULOG*)

BULOG was established in 1967, once President Soeharto gained his power from the previous President, Soekarno. Its initial task was to stabilize the rice and other staple food's price and supply (Yonekura, 2005; BULOG, 2020; Timmer, 1975). To fulfill its duty, BULOG maintained the food supply by utilizing market operations, stabilizing the food price to protect the consumers, and controlling the food-price gap among regions in Indonesia. Moreover, BULOG also provided food for the Government's official, military, and state-owned enterprise's employees. During the New Order Era, BULOG had its most influential position because

BULOG worked directly under the President. With full support from President Soeharto, it monopolized the import and domestic distribution of rice, wheat, sugar, and other crucial food commodities in Indonesia (Yonekura, 2005; Timmer, 1975). It also has the right to receive a bank loan from the Indonesian central bank. However, BULOG's benefits were ended when the New Order era was overthrown due to the financial crisis that hit Indonesia in 1997, followed by the resignation of President Soeharto.

After the resignation of Soeharto, BULOG's had its reform started with the abolishing of monopolistic rights and regulation on distributing rice and other food commodities in Indonesia was a. The reform itself was pushed by the International Monetary Fund (IMF) as one of the requirements for the Financial Aid to tackle the Asian Financial Crisis in 1997. The reformation has turned BULOG into a public corporation. All the benefits that BULOG had during the New Order era were stripped away, and the Indonesian rice industry becomes more liberalized than before (Yonekura, 2005). Since then, BULOG has lost its monopolies rights on rice and other food commodities imports, have no rights on bank loan from the central bank and does not exist directly under the President anymore. Just like any other state-owned enterprises, BULOG is under the Ministry of State-Owned Enterprises.

Indonesian Government released Government Regulations Number 13 in 2016 regarding the duty of BULOG, which still applied until now. The regulations assigned six tasks for BULOG which are controlling rice price on producer and customer's level, maintaining the Government's rice reserve (*Cadangan Beras Pemerintah* or CBP), providing rice for certain groups of the citizen, importing rice when it is necessary, developing rice industry, and developing rice warehouse. The tasks are known as the three pillars, availability, affordability, and stability (BULOG, 2019), as shown in figure 8. These pillars are expected to actualize food-sovereignty in Indonesia.

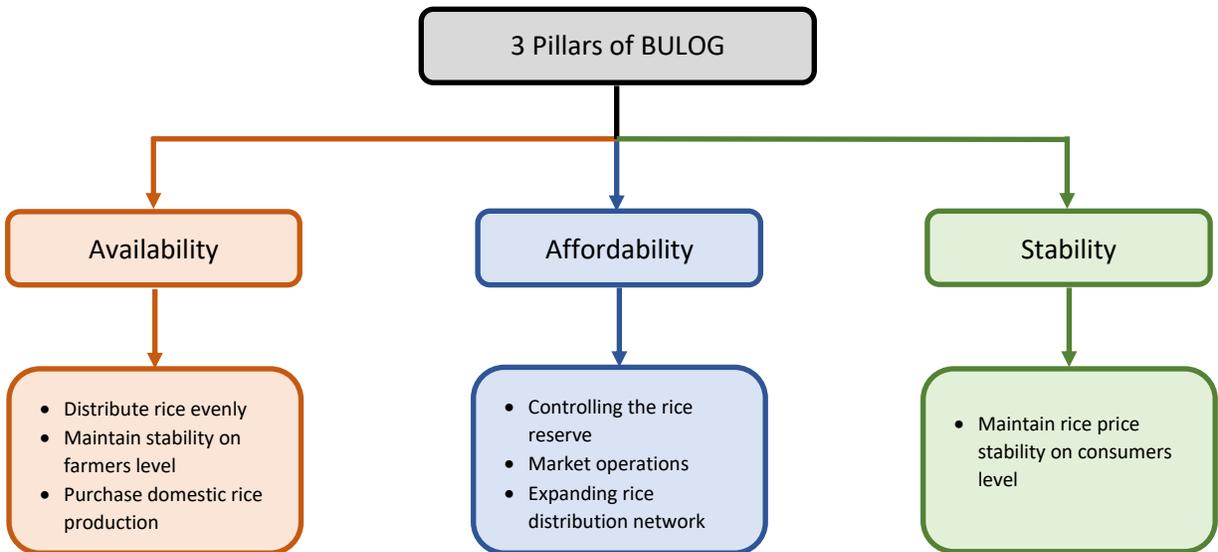


Figure 8: Three Pillars of BULOG (BULOG, 2019)

To provide cheap rice for impoverished citizens, the Indonesian Government assigns a particular program to BULOG. The program is called RASKIN (*Beras Untuk Rumah Tangga Miskin*). RASKIN is a rice subsidy program to provide rice for impoverished households, and the Government fully funds the program. The goal is to reduce the household expenditure on food by providing rice that is cheaper than the market value (BULOG, 2020). Every year, BULOG distribute millions of ton of cheap rice for impoverished households in Indonesia.

5.1.4.1. Food Security Agency (BKP), Ministry of Agriculture

BKP is an institution that is established to support the Government's goal to achieve food sovereignty. Food sovereignty can be described as fulfilling food demand by domestic product, regulate independent food policy, and protecting farmer's welfare (Ministry of Agriculture, 2019). According to the Ministry of Agriculture Law Number 43 the Year 2015 (2015), BKP has to provide a review, development, and coordination on strengthening food sovereignty in Indonesia (BKP, 2020). BKP activity is focused on five activities to achieve its goal.

The first focus is the equity on welfare and managing poverty and food insecurity (BKP, 2020). BKP's program called *Lumbung Pangan Masyarakat* (LPM), a program to provide food reserve by supplying the food barn, food reserve, and improve cooperation among farmers. The other programs are *Pengembangan Korporasi Usahatani* (PKU) and *Kawasan Rumah Pangan Lestari* (KRPL). PKU is a cooperative program from BKP to support farmers in selling their food commodities and establishing legal agriculture enterprises. KRPL is an activity to engage civil

society to have its food source by planting food crops in their yard. The second focus is stability on price and food supply. BKP develops an activity called *Pengembangan Usaha Pangan Masyarakat* (PUPM), an action when the Government buys farmer's commodities at a fair price during harvest season to protect farmer's income and keep it as a food reserve. Moreover, to maintain the food price, BKP develop a monitoring system that provides data regarding domestic food supply, food price, and food reserve.

The next focus is supervision on raw food safety and quality (BKP, 2020). According to Law Number 18, the Year 2012, the Government must guarantee food safety. To fulfill the task, the Government regulates norms, procedures, and standards on food safety and also supervises the food safety application by the market. In overseeing food safety, the task is delegated to the BKP. The BKP is only monitoring raw foods since the supervision of processed food safety is under the *Badan Pengawasan Obat dan Makanan* (BPOM). This government institution control and supervise the safety and distribution of drugs and processed food. The last focus is on analyzing and assessment on food sovereignty policies. BKP create food security and vulnerability map, rice mill and traders monitoring and *Sistem Kewaspadaan Pangan dan Gizi* (SKPG), an early warning system for food and nutrition situation.

Apart from food sovereignty, BKP is entrusted by the Government to support the agriculture diversification growth. BKP has a program called *Pengembangan Pangan Pokok Lokal* (P3L). P3L is a program to reduce the dependency on rice as a staple food (Ministry of Agriculture, 2019). Many regions who consumed corn, sago, and tubers in the past had turned into rice consumers. The transformation of diet has increased the rice consumer ratio in Indonesia to 97%. Therefore, the P3L program tries to provide and introduce tubers, sago, and corn as a substitution to rice as a staple food by developing domestic food and changing consumers' habits.

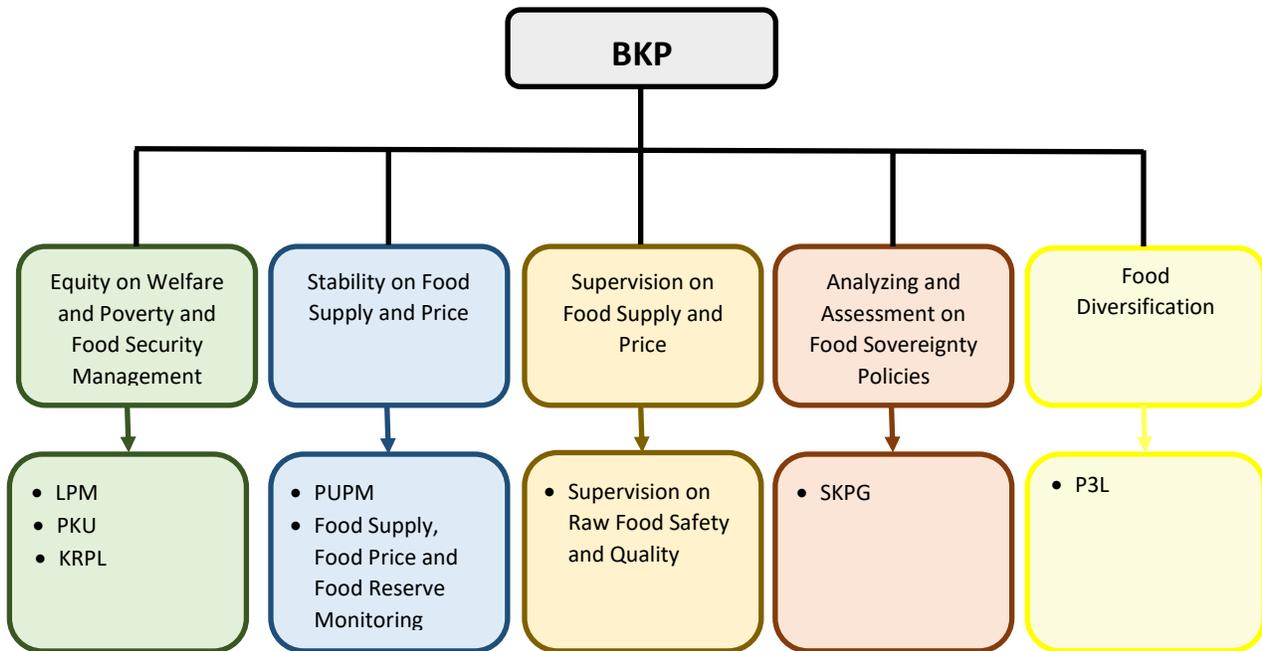


Figure 9: BKP Activities (BKP, 2020; Ministry of Agriculture, 2019)

5.1.5. Regulation

The highest regulation that rules about food in Indonesia at present is the Constitution of the Republic of Indonesia Number 18 the Year 2012 regarding food. The constitution (2012) described the food as the most important basic human need, and its availability is guaranteed by the 1945 Constitution to generate a qualified human resource. The law regulates that the Indonesian Government is mandatory to provide a sufficient amount of food for its people, food production, food distribution, food export-import, and food reserve.

According to Constitution Number 18, the Year 2012 (2012), Indonesia, as a country with numerous citizens, natural resources, and various food sources, is capable of providing its food demand independently. Counting on its vast agriculture area and labor, nature, and local wisdom, the Indonesian Government seeks for food autonomy by producing domestic food crops to fulfilling its food demand. Moreover, the constitution stated that the local food demand should be adequately supplied with local food commodities, and food management and plans should prioritize in improving domestic food commodities. However, the constitution gave room for imported food as long as several conditions are applied.

The Constitution Number 18, the Year 2012 (2012), regulated that importing food is possible only for food that cannot be produced locally, either caused by nature or climate, or the local production is not sufficient enough to fulfill domestic demand. Insufficient production might

be caused by the inability of farmers to produce an adequate amount or disaster. In 1998, Indonesia had to import more than seven million tons of rice when *el Nino* hit Indonesia because the accident affected the rice harvested in the following year. As stated in the Regulation of the Ministry of Trade Number 01 the Year 2018 (2018), BULOG is the only institution that allowed to import rice to Indonesia, and the amount of rice imported is decided by the Coordinating Ministry for Economic Affairs' decision.

Indonesian Government imposes regulation regarding rice reserve that is regulated in the Regulation of the Ministry of Trade Number 04/M-DAG/PER/1/2012. The constitution (2012) defines rice reserve as rice stock in Indonesia that is used to deal with rice deficit, disturbance on the rice supply, emergency, and maintain the increase of rice price in the market. Furthermore, the availability of rice reserve is stated in the ASEAN Plus Three Emergency Rice Reserve (APTERR) agreement. According to the regulation, BULOG may supply the rice market with the rice reserve when the rice price is increasing 10% than the regular market price, and it happens for at least one week, or it causes chaos among citizens.

5.2. Behind the Rice Self-Sufficient Policy

Rice is consumed by the majority of Indonesian people, with approximately 95% of them eat rice on a regular basis. A sufficient amount of rice supply is essential so that the rice price is affordable for them. However, Indonesia is a rice producer country. In 2008, Indonesia was the third-largest rice producer in the world, with more than 14 million hectares of rice field in 2017, and millions of people rely their income on rice producers (BPS, 2020). Therefore, rice policy is crucial for Indonesia, and maintaining rice prices is challenging for the Indonesian Government since Indonesia is a rice consumer and producer at the same time.

Rice self-sufficiency has been introduced in Indonesia for a long time. Historically, Indonesia has a rice-planting culture for more than a millennium. Blessed by the volcanic mountain that produces ashes that enrich the soil, many areas in Indonesia are naturally suitable for growing rice, even without artificial fertilizer and modern technology (Timmer, 1975). During the colonial era, the Dutch needed cheap labor so that they tried to press the rice price by increasing rice production. With the low cost of rice, the labor had sufficient income to feed their household. Since then, many people assume that domestic rice production equivalent to cheap rice.

When Indonesia had its independence, the first Government of Indonesia, led by the charismatic President Soekarno, used the same policy, provide an adequate domestic supply of rice at low prices to gain political support and loyalty from the people and political allies (Lassa,

2005). He always said that Indonesia has to stand on its own foot (*berdikari*), a statement that is still famously known by the people. Since then, all of the Indonesian leaders put rice self-sufficiency as one of their main goals along their reign to gain support from the people. Many Indonesian leaders claimed their success in achieving rice self-sufficiency despite that Indonesia had been a rice importers country for decades.

Inspired by former presidents, the current Indonesian Government chose rice self-sufficiency policy for its rice policy. During the Presidential campaign, the current Indonesian President Joko Widodo made a promise to his voters' several programs in agriculture to achieve food self-sufficiency in three years. These promises were the development of irrigation and dams, the establishment of one million agriculture areas, bank loan for farmers, farmers' welfare, and providing affordable fertilizer. With his promises in the agriculture sector, he successfully won the presidential election in 2014, with 53.25% voters. Once he was inaugurated as the 7th President of Indonesia, he launched a development program called the *Nawa Cita* (nine programs or plan). In accordance with the Constitution of the Republic of Indonesia Number 18 the Year 2012, the *Nawa Cita* was aiming for food sovereignty. In addition to food-sovereignty, the Government planned to improve infrastructure facilities to improve productivity.

Rice self-sufficiency can be interpreted as the Government support for local farmers because rice self-sufficiency depends on domestic rice supply. Self-sufficiency will benefit the farmer's income because it creates demand for their products. Moreover, self-sufficiency also benefits the Government from a political view. With more than 27 million agriculture households in 2018 (BPS, 2018a), the options to choose self-sufficiency policy will help the Government because the policy selected by the Government gives farmers an advantage in supplying their product. Since the election in Indonesia is one man one vote, self-sufficiency policy would be a popular program during the election to gain voters, especially among farmers.

5.3. Transformation to Food-Security

The United Nations (UN) launched 17 Global Goals in 2015 called the Sustainable Development Goals (SDGs) as a unity among UN members to end poverty and take care of the planet earth (UNDP, 2020). The first and second goals of SGD are ending poverty and all forms of hunger by 2030. The UN Global Goals aimed for more affordable staple food. When the staple food is becoming cheaper, the part of household income for food is less, and the family has more money to spend. The SDG's aim on ending poverty and hunger is in line with the food

security policy. The FAO of the UN described food security as sufficient access to food, in quantity and quality. Adequate access to food means that food should be affordable for all.

Rice is a non-elastic commodity (Abidin, 2015; cited from Siswanto, Sinaga, and Harianto, 2018). Changes in prices will not make any impact on its demand, and its cost is easily affected by the supply. When the rice supply increase, the rice price will rise and take a more significant proportion of household expenses and vice versa. Therefore, rice prices have an impact on poverty volatility. Due to the effect of rice prices on the poverty rate, the Indonesian Government considers rice as an essential political and economic commodity and tries to make its price affordable for the people. However, the rice price in Indonesia is considered to be more expensive than its neighboring countries and the world market price (FAO.org, 2020; World Bank, 2020; IMF, 2020).

In 2009, the rice price in Indonesia was relatively lower than its neighboring area and the world market price. Indonesian rice price started to catch up in 2010 and skyrocketed in 2011, as shown in figure 10 (FAO.org, 2020). The decline of rice production in 2011 increased the rice price. Since then, the gap price in rice between Indonesia and its neighboring countries is quite broad.

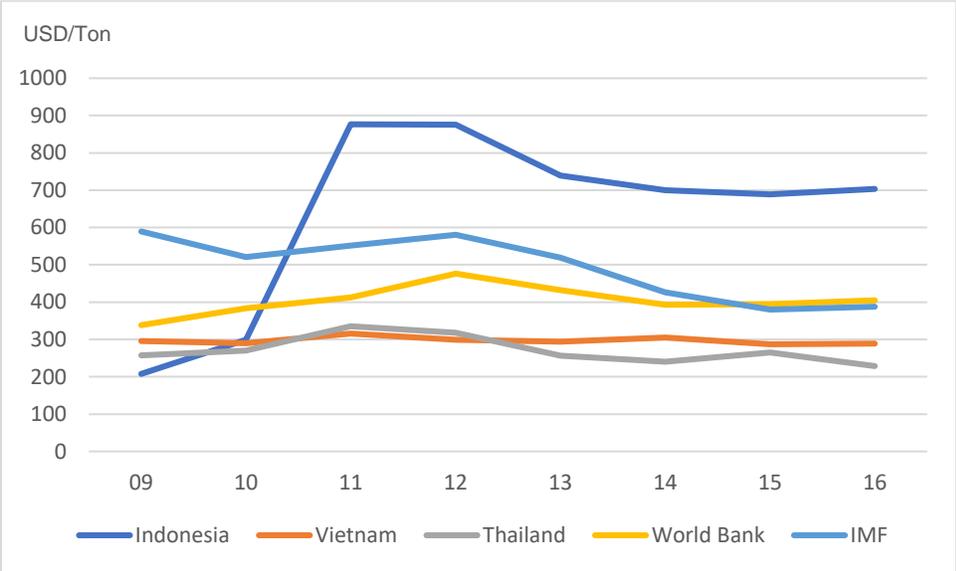


Figure 10: Rice Price in Indonesia, Vietnam, Thailand, and the World Market (FAO.org, 2020; World Bank, 2020; IMF, 2020)

Since rice is a non-elastic commodity, a reduction in its price will impact on poverty reduction. As shown in figure 11, the poverty rate in Indonesia in 2018 was 9.8%, and the reduction ratio is less than 1% per year. In order to achieve SDGs' goal in ending poverty in 2030, more affordable rice will accelerate the poverty reduction process. The food-security policy is expected to supply more rice to the Indonesian market. With, on average, 1.3% of the

population growth rate since 2010, Indonesia will increase its demand for rice. Without a sufficient supply of rice, the price of rice in Indonesia will become more unaffordable and will affect poverty reduction. Even though the Indonesian Government has supported farmers in increasing their productivity and opening new rice fields in Kalimantan and Sumatra Island, the other problems exist in increasing rice productivity in the future. The share of labor who work in the agriculture sector is decreasing significantly, and the majority of farmers are more than 45 years old. According to BPS (2018a), more than 64% of the head-farmers in agriculture households is more than 45 years old. Only 0.99% of them are younger than 25 years old. The dominance of older head-farmers in Indonesian agriculture households is worsened by the increasing ratio of the urban population, as shown in figure 12.

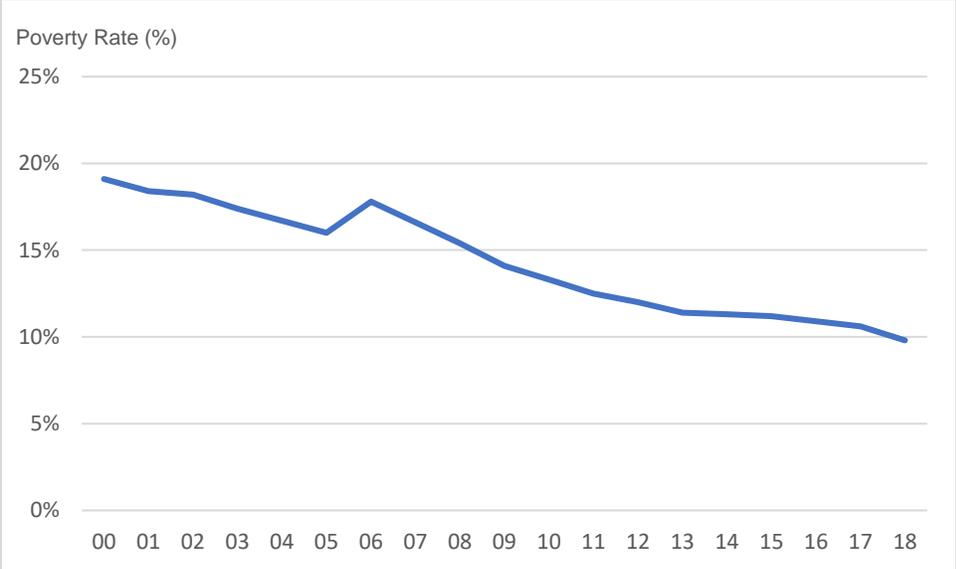


Figure 11: Poverty Rate 2000-2018 (World Bank Data, 2020)

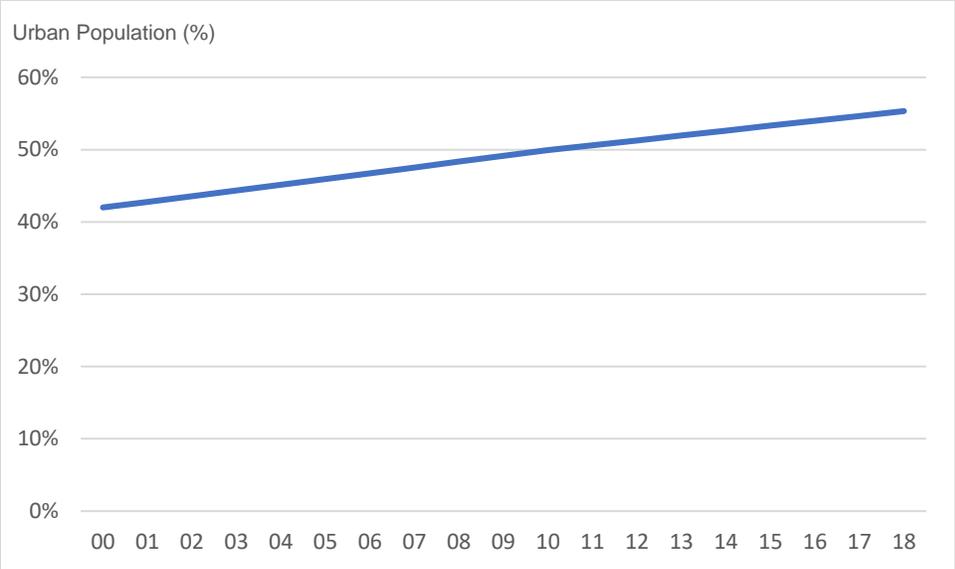


Figure 12: Urban Population Ration 2000-2018 (World Bank Data, 2020)

6. Discussion and Research Finding

In order to achieve rice self-sufficiency, the Indonesian Government has done a lot of things to support rice production and distribution. The support varies from providing high-quality seed, fertilizer subsidy, rice field irrigations, dams, rural road, farm credit, institutions to help rice distribution, and even building new rice fields in several islands in Indonesia. Government support is fruitful, and rice production in Indonesia is in an upward trend.

Rice supply is essential for the Indonesian Government for its economy and political interest. With more than 250 million population, and 95% of them consume rice more than 100 kg per capita per year, the demand for rice in Indonesia is extremely high. With many people on the age of labor and high demand for rice, producing rice locally to fulfill the domestic request will benefit the economy. Moreover, self-sufficiency policy has a political implication for the Government as well. Self-sufficiency policy is seen by many as the support of the Government to local farmers, one of the largest occupations in Indonesia. Therefore, all Indonesian presidents impose rice self-sufficiency for their policy in order to gain political support from the farmers and their families. However, there are some obstacles in Indonesian rice self-sufficiency policy, even though the rice production in Indonesia grows every year.

Indonesian Government should reconsider their rice self-sufficiency policy for several reasons. First, the SSR of Indonesia from 2012 until 2017 was below 100%. In 2012, the FAO (2012) introduced a formula to calculate the ability of a country to have a food self-sufficiency policy called the Self-Sufficiency Ratio (SSR). SSR is the ratio of food consumed that produced by local producers (FAO, 2012). The SSR calculation involves the production, export, and import of food products. The FAO divided the SSR result into three layers. The first SSR's layer is below 80%. These countries, such as Japan and the United Kingdom, are net food importer. The second layer of SSR is between 80% and 120% for a country that roughly supply domestic food the same amount with the local food demand. The example of the second layer is Brazil and Germany. The last layer is above 120% for countries that meet their food demand and export their surplus food, for example, Canada and Sweden (FAO, 2016). As shown in figure 13, the SSR of Indonesia from 2012 to 2017 was in the second layer of SSR.

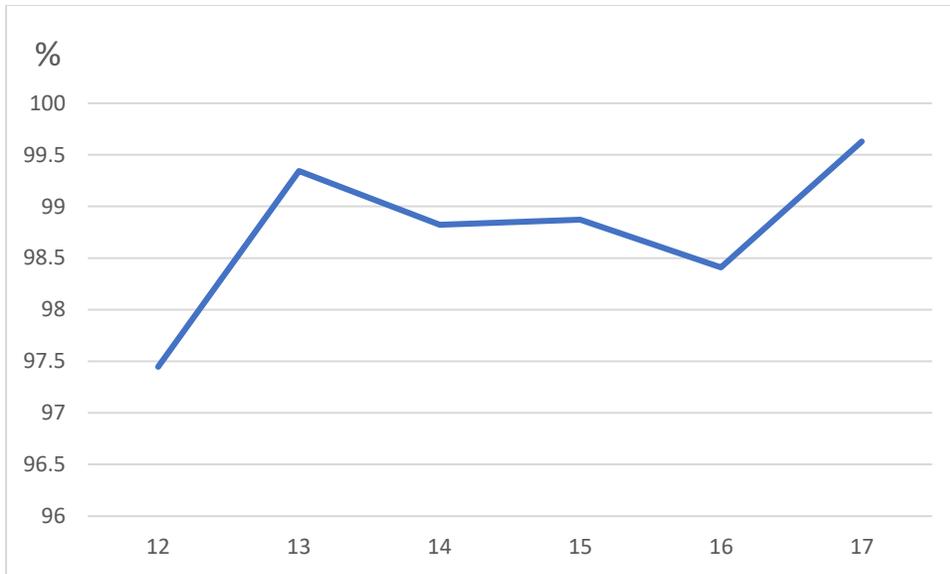


Figure 13: The self-sufficiency ratio of Indonesia 2012-2017 (FAO, 2012)

Having SSR below 100% for six consecutive years, Indonesia was on the verge of self-sufficiency country, and the food consumption was roughly the same amount of food produced. Having SSR below 100% and being a rice importer for the past 20 years, it is quite difficult to conclude that the rice self-sufficiency in Indonesia is considered successful. However, each country has its uniqueness with its capacity in food production, importing food, and distribute the food equally (FAO, 2016).

Second, Indonesia always imported rice from 2000 to 2018, even though Indonesia also exported rice overseas. However, the gap between rice imported and rice exported from 2012 to 2017 was vast. The minimum rice imported to Indonesia was in 2005 with 189 thousand tons of rice imported from Thailand, Vietnam, and other countries while the highest and the second-highest were in 2011 and 2018, with more than 2.2 million tons of rice imported.

Third, Indonesian rice production is vulnerable to climate change. As shown in figure 14, the growth rate of rice production between 2010 and 2018 fluctuated. There were two periods when the growth rate was negative. In 2011 and 2014, the growth rate was -1% and -0.61%. The reason behind the negative growth in both years was the decline of the harvest area due to drought and flood in rice producer areas in Indonesia (bps.go.id, 2015; Cahyani, 2015), and each time the growth ratio below zero, the amount of rice imported from other countries rise significantly. In 2011, the imported rice grew 300% than the previous year, while in 2014, it grew 78.6%.

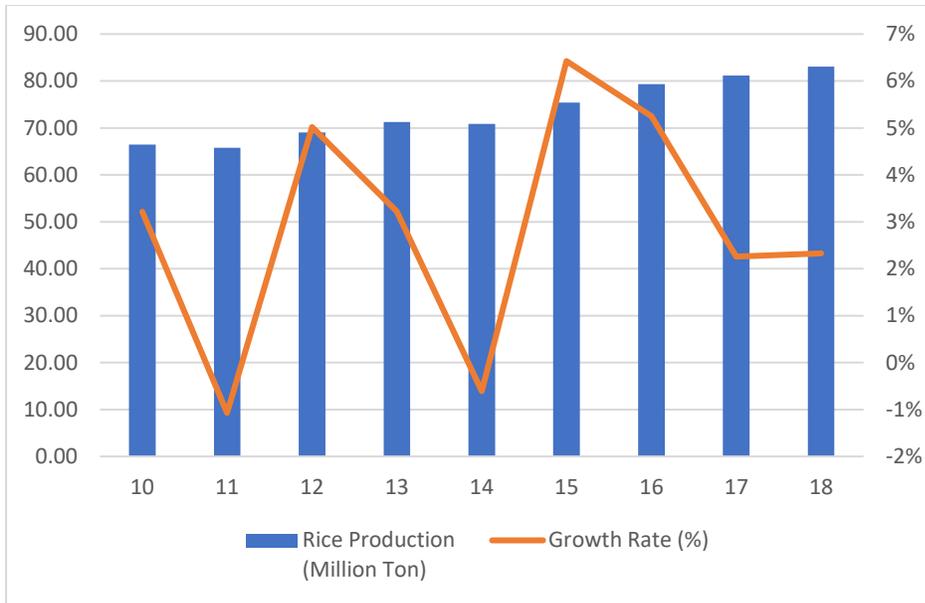


Figure 14: Rice Production and Growth Rate 2010-2018 (Ministry of Agriculture, 2020)

The facts, as mentioned earlier, show that rice production in Indonesia is vulnerable to climate change since many rice farmers in Indonesia are traditional farmers who rely on rainfall. Once there is a disaster due to climate, it affects rice production in Indonesia and pushes the Indonesian Government to import rice from other countries to fulfill domestic rice demand.

Fourth, poverty among farmers. Even though Indonesia applied the rice self-sufficiency policy, which prioritizes local commodities, most farmers in Indonesia are poor due to their insufficiency of land area. More than 60% of Indonesian farmers have less than the minimum land requirement for farmers to escape from poverty (BPS, 2018; Susilowati et al., 2010). Therefore, to eliminate poverty, it is recommended for them to change their crops from rice to a more productive commodity, such as tropical fruit.

Fifth, the share of labor in the agriculture sector is decreasing every year, and the ratio of urban population has exceeded 50% with no sign to decline due to urbanization (BPS, 2020; Arifin et al., 2019; World Bank Data, 2020). Sixth, the majority of the leading farmer in agriculture household is more than 45 years. A lot of young labor has no interest in having a job on the farm, which shown with only 0.99% of them are less than 25 years old (BPS, 2018a).

The last part is the price of rice in Indonesia is more expensive than its neighboring countries and even the world market price. Rice, as the leading staple food consumed by more than 95%, is an excellent tool to reduce poverty. As a non-elastic commodity, more affordable rice prices will reduce poverty. An increase in imported rice supply will reduce the cost of rice.

Apart from the reasons mentioned earlier, a reformation on Indonesian rice policy is urgently needed to provide Indonesia citizens a need for rice in the future. Every year, the number of Indonesian population increase, with the growth rate of at least 1.14%. However, even though rice production is increasing every year, the growth rate is in a downward trend. The trend is worsened by the massive change in agriculture are which turned into an industrial or residential area. Indonesian population is projected to be increased in the future. Therefore the need for industrial and residential areas is likely to be increased as well.

One of the biggest problems in the current rice policy is the rice price. The Indonesian rice price is higher than its neighboring countries and the world's market price, which is considered as an obstacle in reducing poverty. The gap between the rice production growth rate and the population growth rate in the future is predicted to increase the rice price to a higher level. To tackle the problem, the Government launched the RASKIN program that provides subsidized rice for poverty. However, there are some obstacles to the RASKIN program.

The first problem is distribution. RASKIN is distributed by BULOG. Unfortunately, the RASKIN distribution does not work as planned and sometimes does not right in the target. The root of the distribution problem lies in the lack of socialization, local institution involvement. Lack of socialization caused many poor people do not know the rights of RASKIN. The lack of local institution involvement causes inaccuracy in poverty data collection since. It is frequently seen that some poor people do not have access to RASKIN at all (UGM, 2007). Moreover, a lot of poor people do not know about the rights of buying rice

The second problem is the financial problem. The fund provided to run the RASKIN program is usually allocated at the beginning of the year. Unfortunately, the budget allocated for RASKIN is frequently revised in the mid-year. The mid-year budget revision will interfere with the rice stock allocated for RASKIN, initial budget planning, and expenses (Suriani, Sapha, and Rizki, 2016).

Distributing subsidized rice is challenging. It is typically seen that the distribution is seen as unfair. Therefore, reducing the rice price is more suitable than providing subsidized rice. In order to reduce the price of rice, the Government should increase the supply of rice. The rice self-sufficiency policy that applied at the moment is not yet succeeded in providing affordable rice prices for every Indonesian people.

The other problem that the Indonesian Government should solve is the low interest among young people to work as farmers. The majority of the main farmers in Indonesia is more than 45 years old. When globalization started, many new types of work is invented in the service and industrial sector, which give a lot of options for labor to choose. Most of these jobs are located in

urban areas. Most young Indonesian workers are interested in working in the industrial and services sector than agriculture. Due to the high interest among young people on jobs in the urban area, the migration rate in Indonesia is so high that more than 50% of the population lives in the metropolitan area, and the ratio is increasing each year.

Moreover, the share of labor on Indonesian agriculture is decreasing rapidly. In 2005, 42.5% of Indonesian labor worked in the agriculture sector. In twelve years, the ratio declined to 29.7%. On average, the declining rate was 1.06% per year. The decline of agriculture share of labor is a warning for the Indonesian Government since they are building new rice fields in Kalimantan and Sumatra, which require a lot of laborers. If the Government failed to attract young labor to work on agriculture, the rice production is in danger.

The transition from rice self-sufficiency to food security is crucial because it determines the readiness of the Government to impose the new rice policy. The most affected group from the rice policy transition is the rice farmers, and the Government should inform them to prevent rejection. One option for them is to change their crops from rice to tropical fruit, which will benefit them more than rice. According to Kompas (2013), oranges yields are sevenfold than rice, even though it took five years before they can be harvested. Therefore, the Government should arrange this issue a few years before.

Before the transition, the Indonesian Government should carefully calculate their real per capita demand for rice and the range of rice market prices they aim once the food security policy is implemented. Once both challenges are settled, the Government makes the strategies on how to supply a sufficient amount of rice. The plans are mostly on how much rice should be produced locally and which part of Indonesia should produce it, how much rice should be imported, and from which country it will be, and most importantly, how much rice stock should be available for backups.

7. CONCLUSION

The food self-sufficiency concept means that a country can fulfill its food demand by its local production (FAO, 2008; cited from FAO, 1999). Indonesia has been applying rice self-sufficiency policy since its independence from colonialism. The main reason behind the rice-self-sufficiency policy is that Indonesia, with a wide area, fertile soil, and sufficient water resource, has been an agricultural country for centuries ago, and rice has always been the most crucial agriculture commodity. Apart from agriculture history, rice self-sufficiency has been used by the politician to gain support from voters. President Soeharto's achievement in rice self-sufficiency in 1984 was recognized by the FAO and considered as one of his best achievements as an Indonesian President for 32 years.

Indonesian people consider rice is their crucial food, and rice availability and affordability is a must. To achieve rice self-sufficiency, the Indonesian Government has been making many efforts, from increasing farmers' productivity, expanding the rice field until distributing rice from rice producer areas to non-rice producer areas in Indonesia. However, all efforts that have been done by the Indonesia Government are not always entirely successful in reaching rice self-sufficiency. Indonesia has been a rice importer for more than two decades, and the amount of rice imported is fluctuating depend on rice demand.

From the result of the Indonesian rice self-sufficiency policy, it is recommended for the Indonesian Government to switch from rice self-sufficiency policy to food-security system. In the food security system, Indonesia not only relies on its rice demand for local production only but also on imported rice from other countries such as Vietnam and Thailand. The advantage of the food security system is the sustainability of supply, and affordable rice prices in Indonesia since the market price of rice in Vietnam and Thailand are way lower than Indonesia. The food-security policy is expected to fasten the poverty reduction in Indonesia to meet the SDG's goals. Moreover, the shift from rice to the more productive plant will reduce poverty among farmers.

In transforming its rice policy from self-sufficiency to food security, Indonesia may take an example of Singapore. Singaporean food security depends on its food supply on imported food, yet they still produce local commodities. To support their domestic production, the Singapore Government support the research and development and improve its infrastructures. Moreover, the Government should plan the transition of rice policy from rice self-sufficiency to food security carefully, to prevent rejection from the rice farmers and rice price increase during the shifting period.

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Appendix A: Annual Paddy Field Area per Province (Ha)

No.	Provinsi	Tahun					Pertumbuhan 2018 thdp 2017 (%)
		2014	2015	2016	2017	2018 ¹⁾	
1	Aceh	366,590	450,087	420,771	464,544	458,977	-1.20
2	Sumatera Utara	676,724	731,811	826,696	864,283	907,265	4.97
3	Sumatera Barat	491,504	499,157	486,569	533,399	525,249	-1.53
4	Riau	85,062	86,218	79,475	80,680	80,879	0.25
6	Jambi	121,722	102,207	132,998	140,129	144,587	3.18
7	Sumatera Selatan	745,593	821,666	951,682	953,554	970,204	1.75
9	Bengkulu	132,155	120,404	143,326	158,766	148,844	-6.25
10	Lampung	600,750	660,560	736,853	789,322	806,353	2.16
8	Kepulauan Bangka Belitung	4,422	5,760	8,587	9,308	7,959	-14.49
5	Kepulauan Riau	385	263	186	197	199	0.92
11	DKI Jakarta	1,400	1,137	1,002	787	787	-0.03
12	Jawa Barat	1,854,865	1,748,620	1,962,315	1,987,751	2,023,421	1.79
14	Jawa Tengah	1,717,270	1,804,556	1,882,979	1,933,627	1,878,293	-2.86
15	DI Yogyakarta	115,667	113,027	116,180	114,385	108,719	-4.95
16	Jawa Timur	1,934,293	2,021,766	2,112,563	2,136,412	2,110,625	-1.21
13	Banten	361,634	368,152	399,334	415,687	428,590	3.10
17	Bali	142,476	137,254	139,462	141,425	139,782	-1.16
18	Nusa Tenggara Barat	371,604	412,897	397,836	427,783	434,492	1.57
19	Nusa Tenggara Timur	172,136	188,092	185,288	220,623	241,204	9.33
20	Kalimantan Barat	356,843	350,520	384,067	386,802	476,922	23.30
21	Kalimantan Tengah	186,509	183,416	188,740	193,489	205,381	6.15
22	Kalimantan Selatan	447,297	455,149	482,240	506,823	525,209	3.63
23	Kalimantan Timur	71,332	69,072	54,365	71,403	71,292	-0.16
24	Kalimantan Utara ²⁾	19,882	15,073	16,903	14,031	13,543	-3.47
25	Sulawesi Utara	110,925	122,139	120,707	146,480	149,205	1.86
26	Sulawesi Tengah	213,654	203,918	221,272	237,002	245,985	3.79
27	Sulawesi Selatan	1,001,761	995,335	1,110,620	1,168,479	1,142,608	-2.21
28	Sulawesi Tenggara	133,550	135,003	165,911	164,757	165,229	0.29
29	Gorontalo	57,991	57,223	63,198	74,954	63,037	-15.90
30	Sulawesi Barat	87,430	87,874	101,549	121,518	136,525	12.35
31	Maluku	20,441	20,368	20,616	23,914	26,130	9.27
32	Maluku Utara	14,311	14,736	15,661	15,560	17,290	11.12
33	Papua Barat	6,288	6,800	5,985	6,102	6,081	-0.35
34	Papua	41,881	38,977	49,207	52,020	60,077	15.49
Indonesia		12,666,347	13,029,237	13,985,140	14,555,996	14,720,942	1.13

Source: Ministry of Agriculture, 2020

Appendix B: Annual Rice Production (Ton)

Year	Rice Production (Ton)
1993	48,129,321
1994	46,598,380
1995	49,697,444
1996	51,048,899
1997	49,339,086
1998	49,236,692
1999	50,866,387
2000	51,898,852
2001	50,460,782
2002	51,489,694
2003	52,137,604
2004	54,088,468
2005	54,151,097
2006	54,454,937
2007	57,157,435
2008	60,325,925
2009	64,398,890
2010	66,469,394
2011	65,756,904
2012	69,056,126
2013	71,279,709
2014	70,846,465
2015	75,397,841
2016	79,354,767
2017	81,148,594
2018	83,037,150

Source: BPS, 2020

Appendix C: Annual Rice Production per Region (Ton)

No.	Provinsi	Tahun					Pertumbuhan 2018 thdp 2017 (%)
		2014	2015	2016	2017	2018 ²⁾	
1	Aceh	1,820,062	2,331,046	2,205,056	2,494,613	2,516,221	0.87
2	Sumatera Utara	3,631,039	4,044,829	4,609,791	5,136,186	5,423,154	5.59
3	Sumatera Barat	2,519,020	2,550,609	2,503,452	2,824,509	2,754,079	-2.49
4	Riau	385,475	393,917	373,536	365,744	391,132	6.94
5	Jambi	664,720	541,486	752,811	782,049	855,944	9.45
6	Sumatera Selatan	3,670,435	4,247,922	5,074,613	4,943,071	5,076,831	2.71
7	Bengkulu	593,194	578,654	641,881	731,169	699,531	-4.33
8	Lampung	3,320,064	3,641,895	4,020,420	4,248,977	4,556,378	7.23
9	Kepulauan Bangka Belitung	23,481	27,068	35,388	37,123	28,310	-23.74
10	Kepulauan Riau	1,403	959	627	639	651	1.88
11	DKI Jakarta	7,541	6,361	5,342	4,238	4,183	-1.30
12	Jawa Barat	11,644,899	11,373,144	12,540,550	12,299,701	12,494,919	1.59
13	Jawa Tengah	9,648,104	11,301,422	11,473,161	11,396,263	11,401,821	0.05
14	DI Yogyakarta	919,573	945,136	882,702	881,106	878,136	-0.34
15	Jawa Timur	12,397,049	13,154,967	13,633,701	13,060,464	13,000,475	-0.46
16	Banten	2,045,883	2,188,996	2,358,202	2,413,477	2,470,538	2.36
17	Bali	857,944	853,710	845,559	836,097	848,698	1.51
18	Nusa Tenggara Barat	2,116,637	2,417,392	2,095,117	2,323,701	2,423,285	4.29
19	Nusa Tenggara Timur	825,728	948,088	924,403	1,090,821	1,213,760	11.27
20	Kalimantan Barat	1,372,695	1,275,707	1,364,524	1,397,953	1,625,355	16.27
21	Kalimantan Tengah	838,207	893,202	774,466	771,893	783,497	1.50
22	Kalimantan Selatan	2,094,590	2,140,276	2,313,574	2,452,366	2,528,593	3.11
23	Kalimantan Timur	426,567	408,782	305,337	400,102	385,544	-3.64
24	Kalimantan Utara	115,620	112,102	81,854	75,831	68,793	-9.28
25	Sulawesi Utara	637,927	674,169	678,151	775,847	887,758	14.42
26	Sulawesi Tengah	1,022,054	1,015,368	1,101,994	1,144,399	1,154,907	0.92
27	Sulawesi Selatan	5,426,097	5,471,806	5,727,081	6,055,404	6,196,737	2.33
28	Sulawesi Tenggara	657,617	660,720	695,329	711,401	716,156	0.67
29	Gorontalo	314,704	331,220	344,869	350,193	350,256	0.02
30	Sulawesi Barat	449,621	461,844	548,536	667,100	751,531	12.66
31	Maluku	102,761	117,791	99,088	104,716	132,852	26.87
32	Maluku Utara	72,074	75,265	82,213	84,037	101,054	20.25
33	Papua Barat	27,665	30,219	27,840	29,516	27,736	-6.03
34	Papua	196,015	181,769	233,599	257,888	288,335	11.81
Indonesia		70,846,465	75,397,841	79,354,767	81,148,594	83,037,150	2.33

Source: Ministry of Agriculture, 2020

Appendix D: Annual Rice Imported (Ton)

Countries of Origin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Vietnam	369,546.80	142,511.80	561,728.90	506,012.80	58,810.10	44,772.50	272,832.70	1,022,834.60	125,070.50
Thailand	361,734.80	189,655.90	418,697.60	492,114.20	129,421.50	126,408.90	157,983.30	363,640.10	157,007.30
China	476,776.70	24,728.50	126,768.40	54,440.40	110.5	1.3	100	901.4	3,341.70
India	0.1	2,047.10	405,032.20	108,797.40	923.3	327	720.6	3,571.80	289.5
Pakistan	20,139.10	26,110.00	32,281.40	49,071.00	0	0	904.3	4,603.60	751.3
United States	49,405.20	177,889.10	13,392.90	107,607.60	16,766.70	2,184.20	801	821.7	1,411.20
Taiwan	0	0	3,541.50	9,600.50	10,600.00	0	2,500.00	625	0
Other Countries	75,367.90	49,080.60	110,439.90	55,148.20	11,119.80	9,290.60	698.3	9,849.40	1,817.90
Jumlah	1,355,665.90	644,732.80	1,805,379.90	1,428,505.70	236,866.70	189,616.60	438,108.50	1,406,847.60	289,689.40

Countries of Origin	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Vietnam	20,970.50	467,369.60	1,778,480.60	1,084,782.80	171,286.60	306,418.10	509,374.20	557,890.00	16,599.90	767,180.90
Thailand	221,372.60	209,127.80	938,695.70	315,352.70	94,633.90	366,203.50	126,745.70	535,577.00	108,944.80	795,600.10
China	5,167.60	3,637.40	4,674.80	3,099.30	639.8	1,416.70	479.9	134,832.50	2,419.00	227.7
India	473.1	601.3	4,064.60	259,022.60	107,538.00	90,653.80	34,167.50	36,142.00	32,209.70	337,999.00
Pakistan	501.5	4,992.10	14,342.30	133,078.00	75,813.00	61,715.00	180,099.50	1,271.90	87,500.00	310,990.10
United States	1,323.40	1,644.10	2,074.10	2,445.50	2,790.40	1,078.60	0	0.1	-	-
Taiwan	0	0	5,000.00	0	1,240.00	840	0	0	-	-
Other Countries	664.4	209.2	3,144.10	12,591.40	18,723.00	15,838.00	10,734.20	17,465.10	57,601.30	41,826.70
Jumlah	250,473.10	687,581.50	2,750,476.20	1,810,372.30	472,664.70	844,163.70	861,601.00	1,283,178.50	305,274.60	2,253,824.50

Source: BPS, 2020

Appendix E: Indonesian Annual Population (Source: World Bank Data, 2020; BPS, 2020)

Year	Population	Year	Population
1960	87,751,068	1999	208,615,169
1961	90,098,394	2000	211,513,823
1962	92,518,377	2001	214,427,417
1963	95,015,297	2002	217,357,793
1964	97,596,733	2003	220,309,469
1965	100,267,062	2004	223,285,676
1966	103,025,426	2005	226,289,470
1967	105,865,571	2006	229,318,262
1968	108,779,924	2007	232,374,245
1969	111,758,563	2008	235,469,762
1970	114,793,178	2009	238,620,563
1971	117,880,144	2010	241,834,215
1972	121,017,314	2011	245,116,206
1973	124,199,687	2012	248,452,413
1974	127,422,211	2013	251,806,402
1975	130,680,727	2014	255,129,004
1976	133,966,941	2015	258,383,256
1977	137,278,058	2016	261,554,226
1978	140,621,730	2017	264,645,886
1979	144,009,845	2018	267,663,435
1980	147,447,836	2030*	294,100,000
1981	150,938,232	2045*	318,900,000
1982	154,468,229		
1983	158,009,246		
S1984	161,523,347		
1985	164,982,451		
1986	168,374,287		
1987	171,702,763		
1988	174,975,954		
1989	178,209,150		
1990	181,413,402		
1991	184,591,903		
1992	187,739,786		
1993	190,851,175		
1994	193,917,462		
1995	196,934,260		
1996	199,901,228		
1997	202,826,446		
1998	205,724,592		

*Projection

Appendix F: Annual Price of Rice (USD/Ton)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Indonesia	127.1	112.3	133.9	140.5	175.9	210.1	231.7	277.4	280	207.7	299.3
Vietnam	123.3	111.3	116.5	125.2	144.4	166.7	155.3	198.2	286.5	295.6	289.5
Thailand	108.5	108.6	117.6	134.2	165.4	172.1	180.3	326.5	290.8	257.8	270.1
China	205.4	151.7	140.9	207.8	314.1	321	331.1	227	277.9	284	-
India	132.6	124.6	124.1	134.2	207.7	203.6	258.9	-	385.7	-	-
World Bank	180.33	175.13	198.44	190.24	241.27	248.35	244.10	285.36	468.99	338.33	383.66
IMF	203.69	172.71	191.83	199.46	245.78	287.81	303.52	332.39	700.2	589.38	520.49

	2011	2012	2013	2014	2015	2016	2017	2018
Indonesia	876.6	875.8	739.2	699.8	688.7	703.2	-	-
Vietnam	315.8	299.3	294.1	304.8	287.1	289.1	284.6	282.7
Thailand	335.4	318.1	256.9	240.6	264.8	228.7	259.8	300.6
China	403.9	456.4	492.3	457.9	-	559.9	-	-
India	-	-	-	-	-	-	-	-
World Bank	412.97	476.35	431.89	392.76	394.44	404.47	390.50	393.75
IMF	551.71	580.24	519.31	426.48	380.05	388.26		

Source: FAO, 2020; World Bank, 2020; IMF, 2020

Appendix G: Indonesia Poverty Rate

Year	Ratio
2000	19.10%
2001	18.40%
2002	18.20%
2003	17.40%
2004	16.70%
2005	16.00%
2006	17.80%
2007	16.60%
2008	15.40%
2009	14.10%
2010	13.30%
2011	12.50%
2012	12.00%
2013	11.40%
2014	11.30%
2015	11.20%
2016	10.90%
2017	10.60%
2018	9.80%

Source: World Bank Data, 2020

Appendix H: Age Group of Main Farmers (Years old)

Provinsi Province	Kelompok Umur Petani Utama (Tahun) Age Group of Main Farmers (Age)			
	< 25	25 - 34	35 - 44	45 - 54
(1)	(2)	(4)	(5)	
1 Aceh	7 494	92 396	200 079	203 860
2 Sumatera Utara	16 259	185 232	383 849	390 756
3 Sumatera Barat	5 592	72 561	171 716	184 809
4 R i a u	8 338	92 815	195 878	183 221
5 J a m b i	6 540	72 476	149 655	134 068
6 Sumatera Selatan	13 830	169 956	312 366	280 305
7 Bengkulu	4 138	48 058	91 878	81 264
8 Lampung	17 907	193 592	375 275	346 617
9 Kepulauan Bangka Belitung	2 522	30 846	52 784	42 206
10 Kepulauan Riau	833	10 006	24 060	22 596
11 DKI Jakarta	186	1 148	3 250	4 551
12 Jawa Barat	23 060	269 886	675 688	934 356
13 Jawa Tengah	22 422	313 556	881 942	1 264 633
14 DI Yogyakarta	1 714	21 303	79 678	133 352
15 Jawa Timur	32 358	379 656	1 062 398	1 532 865
16 Banten	3 453	55 143	134 796	193 021
17 B a l i	2 564	28 527	84 904	113 441
18 Nusa Tenggara Barat	15 094	107 817	175 153	177 387
19 Nusa Tenggara Timur	10 527	110 958	210 361	219 532
20 Kalimantan Barat	10 172	108 251	210 724	186 865
21 Kalimantan Tengah	4 488	40 495	83 905	81 458
22 Kalimantan Selatan	6 253	62 804	132 664	138 436
23 Kalimantan Timur	2 031	24 708	61 654	65 774
24 Kalimantan Utara	818	6 879	15 475	15 208
25 Sulawesi Utara	2 309	23 598	62 495	80 284
26 Sulawesi Tengah	6 638	60 585	128 314	121 690
27 Sulawesi Selatan	16 195	121 346	271 525	295 190
28 Sulawesi Tenggara	4 821	49 107	93 114	91 981
29 Gorontalo	2 320	18 599	38 988	39 016
30 Sulawesi Barat	4 513	31 483	56 966	53 420
31 Maluku	2 798	24 616	49 605	47 918
32 Maluku Utara	2 079	21 033	42 529	38 248
33 Papua Barat	2 598	16 775	26 174	21 930
34 Papua	10 975	81 043	149 793	93 149
INDONESIA	273 839	2 947 254	6 689 635	7 813 407

Provinsi Province	Kelompok Umur Petani Utama (Tahun) Age Group of Main Farmers (Age)		Jumlah Total
	55 - 64	≥ 65	
(1)	(7)	(8)	(9)
1 Aceh	131 487	75 794	711 110
2 Sumatera Utara	307 546	168 995	1 452 637
3 Sumatera Barat	158 090	100 255	693 023
4 R i a u	117 900	56 831	654 983
5 J a m b i	89 305	44 315	496 359
6 Sumatera Selatan	179 181	83 460	1 039 098
7 Bengkulu	52 705	26 529	304 572
8 Lampung	249 993	156 901	1 340 285
9 Kepulauan Bangka Belitung	27 654	13 138	169 150
10 Kepulauan Riau	15 555	8 760	81 810
11 DKI Jakarta	3 762	2 185	15 082
12 Jawa Barat	787 374	560 461	3 250 825
13 Jawa Tengah	1 166 983	820 192	4 469 728
14 DI Yogyakarta	130 879	126 838	493 764
15 Jawa Timur	1 340 021	816 681	5 163 979
16 Banten	144 158	65 733	596 304
17 B a l i	92 913	66 107	388 456
18 Nusa Tenggara Barat	124 399	66 525	666 375
19 Nusa Tenggara Timur	159 819	107 656	818 853
20 Kalimantan Barat	115 735	52 329	684 076
21 Kalimantan Tengah	51 865	25 657	287 868
22 Kalimantan Selatan	91 957	39 953	472 067
23 Kalimantan Timur	42 678	20 793	217 638
24 Kalimantan Utara	8 535	4 484	51 399
25 Sulawesi Utara	59 007	35 678	263 371
26 Sulawesi Tengah	73 474	41 070	431 771
27 Sulawesi Selatan	191 447	119 529	1 015 232
28 Sulawesi Tenggara	55 747	37 216	331 986
29 Gorontalo	25 056	12 068	136 047
30 Sulawesi Barat	31 885	19 154	197 421
31 Maluku	34 827	19 303	179 067
32 Maluku Utara	23 625	11 774	139 288
33 Papua Barat	12 803	5 770	86 050
34 Papua	36 622	10 861	382 443
INDONESIA	6 134 987	3 822 995	27 682 117

Source: BPS, 2018a