

BASELINE STUDY REPORT

“SUSTAINABLE RICE SUPPLY CHAINS, MARKETS AND CONSUMERS IN
CENTRAL JAVA (BOYOLALI, KLATEN AND SRAGEN REGENCIES) AND
EAST JAVA (MADIUN AND NGAWI REGENCIES)”



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BASELINE STUDY REPORT

“Sustainable Rice Supply Chains, Markets and Consumers In Central Java (Boyolali, Klaten, Sragen Regencies) and East Java (Madiun and Ngawi Regencies)”

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INTRODUCTION

Sustainable rice which is cultivated with the SRP (Sustainable Rice Platform) model has been being a focus of the “Low Carbon Rice” program managed by Preferred by Nature. There are three focus areas targeted by the program, namely: government policies, rice mill players, and consumers. Prior implementation of this program, there was a need to conduct a baseline study on the three focus areas of its program's target.

In September 2022, Preferred by Nature conducted a baseline study for the consumer target area. Atmawidya Alterasi Indonesia trusted to conduct this baseline study together with Preferred by Nature. Focus of the study is directed at research on sustainable rice supply chain in five regencies within two provinces, where the location of the “Low Carbon Rice” program: Central Java (Klaten Regency, Boyolali Regency, Sragen Regency) and East Java (Ngawi Regency, and Madiun Regency). The research took place for approximately 2 weeks, which has been completed smoothly, through the following series of activities: in-depth interviews, Focus Group Discussion (FGD), document review, and workshop of research report writing.

This research report was developed by five researchers. Each researcher wrote according to the regency where was the research located. Clarification process, conformation and writing alignment among regencies has been done by the Indonesian Alteration Research Team and the Preferred by Nature Team. The hard work and cooperation of all the Research Teams during the implementation and report deserve the highest appreciation. Criticisms and suggestions on the report are very much welcome appreciated in advance.

Yogyakarta, October 13th 2022

Researcher Team

Atmawidya Alterasi Indonesia dan Gita Pertiwi

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CHAPTER 1

INTRODUCTION

1.1 Background

Globally, rice is one of the most important foods for the world's 3.5 billion people. In Indonesia, rice is also a staple food for nearly 273 million people, with an average consumption of 257.6 grams/cap/day (94.0 kg/cap/year) in 2020 (BPS). Currently, Indonesia is the third rice producer in the world. Rice cultivation is an income source for 50.8% or 13.2 million farming families in Indonesia. Production data in 2020 is 54.64 million tons of Milled Dry Grain (GKG), or equivalent to 31.33 million tons of rice. This production is able to meet the average household consumption with a surplus of 49.83 percent (BPS, 2020). Java Island is one of the capable areas for producing rice in Indonesia. Other islands are Sumatra (Lampung, Riau), Kalimantan (North Kalimantan), Papua, and other islands. Through a capacity of 7 million hectares of rice fields, Java remains the mainstay of production.

The conversion of productive land to other functions is a serious threat to the decline of rice-producing areas. The impact of climate change is also a tremendous challenge for rice farmers by the shift in the rainy season, changes in rainfall, as well as an increase in surface temperature, increasing the threat of crop failure. The rise of surface temperature also increases pest attacks. Unfriendly agricultural practices further degrade soil and water quality, damage ecosystems and threaten human health. Farmers are the most vulnerable group from the impacts of climate change. Unfriendly environmental cultivation patterns, particularly in the use of chemicals from fertilizers and pesticides, exploitation of the land reduce more land productivity, water quality and have an impact on the health of farmers and consumers.

Concern to this issue has prompted stakeholders including ***Preferred by Nature*** to collaborate with KRKP and PERPADI to encourage parties to strengthen government policies and practices of rice chain actors for implementing sustainable principles. The main challenge faced is awareness and technical knowledge about the benefits of sustainable rice cultivation, as well as how farmers adapt toward the impacts of climate change through sustainable rice cultivation in Indonesia. Therefore, the Atmawidya Alterasi Indonesia Association and the Gita Pertiwi Foundation with the support from ***Preferred by Nature*** have completed research on the baseline study "Analysis of Sustainable Rice Supply Chains" to support the *Low Carbon Rice* program in 5 regencies (Sragen, Klaten, Boyolali, Ngawi and Madiun).

1.2 Objectives

Sustainable Rice Supply Chain Research are aimed to:

1. Understand the information system and actors of the rice supply chain in 5 regencies
2. Understand the market response and identify consumer groups for sustainable rice products
3. Conduct gap analysis and formulate strategy for sustainable rice implementation in each supply chain

1.3 Research Question

The research of sustainable rice supply chains is guided by the following main research questions, as followed:

1. How is the supply chain and economic value chain of rice in each of the research regencies?
2. How do the actors in each supply chain portray themselves and influence the sustainable rice supply chain as a whole?

1.4 Perspectives on Rice

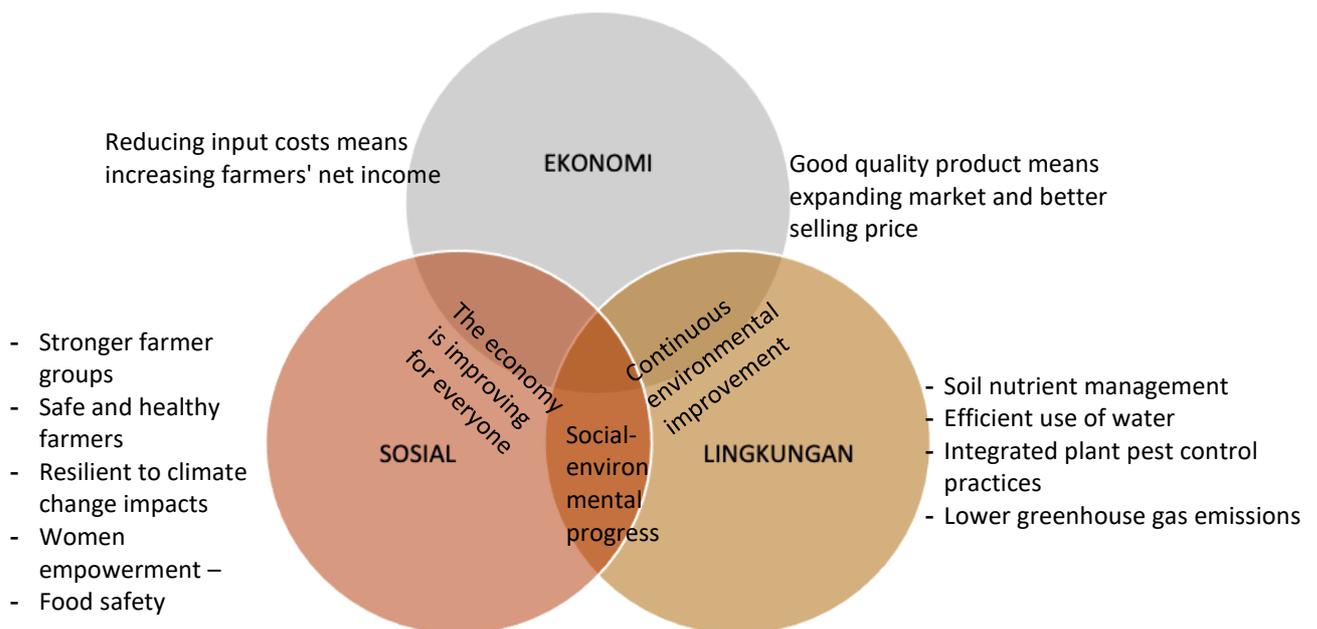
The term of sustainable rice emerged as one of the responses from various parties in responding climate change impacts and the increasing the demand for food. So far, people are familiar with various types of rice which are conventional rice, semi-organic and organic rice. In general, people identify the type of rice in several categories. By the shape of the traded rice is divided into 2 forms, as followed: long rice (ramos) and round rice (usually found in aromatic rice). Meanwhile, when referring to its quality, it is divided into premium (or so-called head rice) and medium rice. Meanwhile, referring to the national standard (SNI) of rice, it is divided into 4 categories, namely; Premium and Medium (I, II and III). The description is described below:

KOMPONEN MUTU	SATUAN	KELAS MUTU			
		PREMIUM	MEDIUM		
			MUTU I	MUTU II	MUTU III
Derajat sosoh	Min. (%)	100	95	90	80
Kadar air	Maks. (%)	14	14	14	15
Beras kepala	Min. (%)	95	78	73	60
Butir patah	Maks. (%)	5	20	25	35
Butir menir	Maks. (%)	0	2	2	5
Butir merah	Maks. (%)	0	2	3	3
Butir kuning/rusak	Maks. (%)	0	2	3	5
Butir kapur	Maks. (%)	0	2	3	5
Benda asing	Maks. (%)	0	0.02	0.05	0.2
Butir gabah	butir/100 gr	0	1	2	3

Organic rice is a special type of rice since production process and its marketing are developed standardization. Society in general distinguishes organic rice and conventional rice on their production process by referring to the use of chemicals and other environmentally friendly principles. The use of the term organic product must also be determined by a valid certification body as a guarantor of the quality of the product.

Meanwhile, the term of Sustainable Rice Platform (SRP) is a rice which applies benchmark from three aspects, namely environmental, social and economics. Some of the indicators obtained by applying the SRP standards include, namely; increased yield, reduced environmental impact, and safe for producers and consumers. The SRP idea initiated by UNEP and IRRI get along with other stakeholders has developed more adaptive sustainable rice standard

(<https://www.sustainable-rice.org/about-rice/>; <https://kedaulatangangan.org/sustainable-rice-platform-3/>). The economics, social, and environmental benefits can be seen from the following chart.



Source: Sustainable Rice Platform

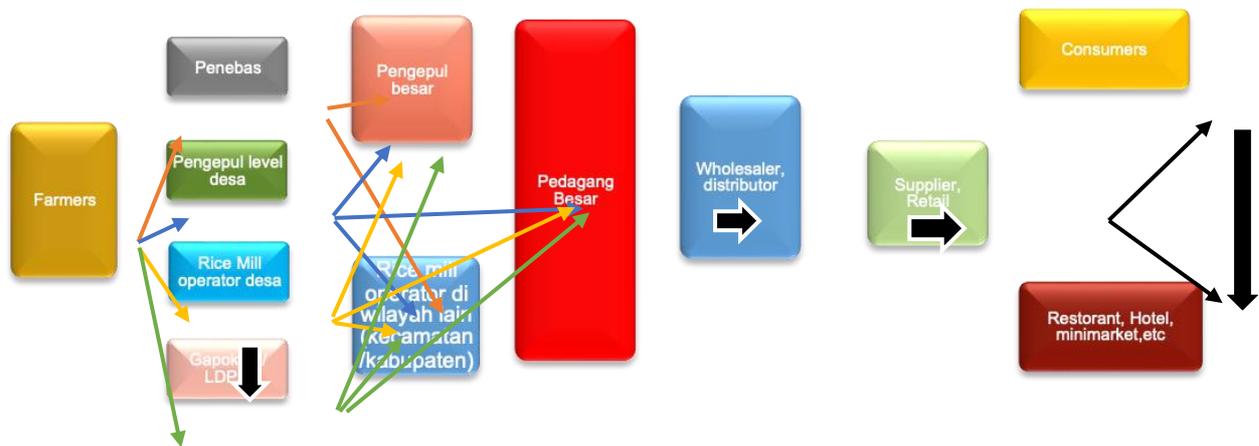
However, in fact sustainable rice remains facing real challenges. For instance, in Indonesia, the term sustainable rice still needs to be more broadly promoted. Although the basic principles in this SRP standard have been widely practiced in various regions, the knowledge and terms of sustainable rice vary from region to region.

Actor Map of the Rice Business

Rice is a commodity that attracts business interests from many parties, not only farmers, since most Asian people consume rice 2-3 times a day so that the demand in the market is very high. The contribution of farmers is not only to become food producers but also to contribute stabilizing the Indonesian economy and food security. The problem nowadays is that the welfare of the farmers in Indonesia remain low. The low welfare of farmers is due to the low value-added products enjoyed by farmers. Farmers sell their agricultural products for granted. Many farmers sell their grain while they are still in the fields because of the urgency of their necessities of life, while farming is their only livelihood. The process of picking agricultural and post-harvest products such as the drying process, milling process, packaging process and selling process to consumers is often carried out by other parties.

The big added-value is in the post-harvest process and the sales process, while the risk of business failure is mostly in the process of planting and cultivating on agricultural land. So, farmers get little added-value because it takes a long time from land preparation to harvest time and also, they bear the risk of crop failure due to various reasons, so it is such a difficult for the farmers to expect adequate welfare. In fact, in some areas, limitations in the field of capital force farmers to depend on other parties in providing agricultural inputs such as seeds and fertilizers with payment through the products they produce.

The actors in the rice business start from slashers (buyers of rice on farmer's land), small and large traders, rice millers (Perpadi members and non-members), distributors or retailers, to rice consumers. Each of these actors has its own potential and capacity. This research on sustainable rice supply chain was built by actors in the rice supply chain in general, (ICCO, 2016). The following chart illustrates the existence of several actors who play in the rice supply chain business with various patterns.



Explanation :

- : Pattern 1
- : Pattern 2
- : Pattern 3
- : Pattern 4

Based on research findings obtained by the Alterasi Indonesia and Gita Pertiwi research team regarding sustainable rice supply chains in 5 regencies, the pattern is no longer like the picture above. There are various supply chain patterns found. In the description of the sustainable rice supply chain in each of the studied regencies, the supply chain pattern has been described.

1.5 Research Method

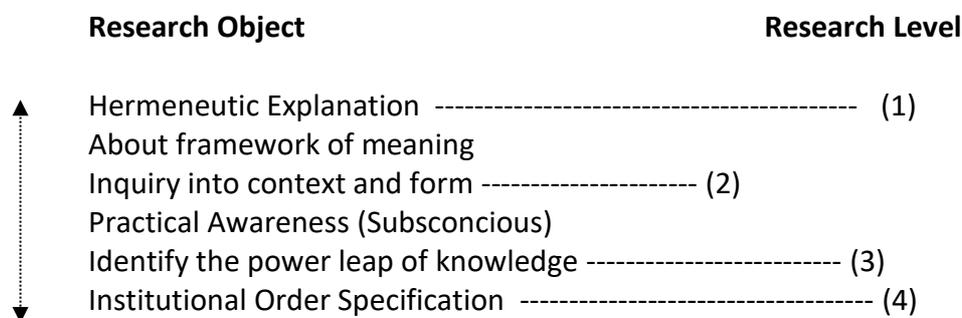
The research on sustainable rice supply chain uses qualitative research methods. Why choose qualitative research method? As this method in its research practice tried to describe a phenomenon under study and interpret it in depth. In other words, it can be said that this qualitative research method was chosen because it can provide a way for researchers to

explore in depth the perspectives, knowledge and social practices of the informants (Flick, 1998:4-6).

From various types of qualitative research, this sustainable rice supply chain research uses a "case study" approach. The objective of "case study" is to describe in depth the experiences of individuals, communities, or organizations. The cases that are the focus of this research are rice farmers and business actors in the rice supply chain, such as; slashers, village-level collectors and large-scale collectors, rice processors (cooperatives, milling operators at the village and sub-regency/regency level, GAPOKTAN), wholesalers, distributors/wholesalers, small/retail traders, rice consumers, and shop/restaurant/hotel/catering.

How is the object of this research? In the structuration thinking developed by Giddens (1984; 406), the level and object of research on social practices such as the rice supply chain (structure and actors), can be identified by applying the levels as illustrated by Scheme 1.1. In the scheme it is shown that the research levels (1) and (2) are the realm of qualitative research methods. While the research levels (3) and (4) are the realm of quantitative research methods. From the division of levels, it is finally known that the object of research that is in accordance with the objectives of this rice supply chain research is an explanation of the context and form of praxis awareness (subconscious). The context that accommodates praxis awareness and is then used as the unit of analysis in this research is the actors in the rice supply chain. The actors in this sense are individuals, groups of individuals, or associations of actors in the order of the rice supply chain.

Scheme 1.1



Sumber : Giddens, (1984:406).

1.5.1. Types and Data Sources

1. Primary data were obtained by in-depth interviews, and focus group discussions/focus groups.
2. Secondary data is obtained through documenting data from reports, as well as accessing information systems or digital applications which provide existing database relevant to sustainable rice supply chain.

NO	DATA TYPE	INFORMANT /DATA SOURCES	
		Society	Business /Private Sector
1	Qualitative Primary Data	<ol style="list-style-type: none"> 1. Rice Farmer 2. Farmer Group 3. Farmer Group Association 	<ol style="list-style-type: none"> 1. Slayer 2. Small/large scale collectors 3. Milling Operators in Village/Supradesa 4. Wholesale/Retail Traders 5. Rice Consumers 6. Owner of a basic food shop/hotel/catering/minimarket 7. Perpadi
2	Secondary Data	<ol style="list-style-type: none"> 1. Official village and local government reports 2. Statistical reports of the Government agencies 3. Publication of research reports 4. Journal publication 5. Paper publication 6. Website Media 	

1.5.2. Location of Data Collection

The data collection locations cover five (5) regencies of the Low Carbon Rice program in Central Java and East Java, as followed; 1) Klaten Regency, 2) Boyolali Regency, 3) Sragen Regency, 4) Ngawi Regency, 5) Madiun Regency. In each of these regencies, specific locations and actors were selected with potential data and information relevant to the objectives of sustainable rice supply chain research. The selection of locations and actors used as informants is based on the results of identification of agricultural practices using the SRP (Sustainable Rice Platform) cultivation model and/or using a model that is more or less close to the SRP pattern. It was chosen so this research has optimal data and information to describe a sustainable rice supply chain.

1.5.3. Data Collection Method

The data collection method in this rice supply chain research applies a “case study” approach and market development or is called “Quick Market Assessment (PPC)”. Overall, this research uses the framework of a “case study” approach, which is to explore cases that are practiced by actors in each rice supply chain. The selection of cases in actors and supply chains is based on the potential for providing data and information relevant to the main objectives of research on sustainable rice supply chain.

While the PPC approach is “a repeated iterative and interactive research methodology, which is used to better understand complex market systems in a short period of time”. (Adapted from Young 1994). PPC – like PRA (Participatory Rural Appraisal) – includes a set of principles, approaches and tools. PPC is one method that is widely recognized among entrepreneurs as an important tool to get inspiration in developing new products that are tailored to market needs. PPC provides a fast, flexible, and effective way of collecting, processing, and analyzing

information and data about markets and marketing systems. Market chain analysis is useful to help us see whether the market system for farmers' rice production and access to the production inputs they need is efficient and reliable (competitive). In addition, it is also to understand the marketing constraints and opportunities for farming households, both the rice production they produce or the agricultural inputs they need.

PPC is carried out to assist farmers and rice market players in developing high value products that are needed by the market. Development projects carried out by the government, NGOs and others so far have tended to focus only on efforts to improve production aspects and ignore market absorption capacity. This often results in smallholders being left to compete on their own in a market that is saturated with small and limited portions. The presence of PPC is intended to help farmers and other market participants to identify market needs and opportunities. PPC places farmers as a source of information and ideas to utilize and improve new products.

1. Secondary Data Collection

Secondary information and data are needed to study condition and development of sustainable rice markets at local, regency and national levels. The study of secondary data was carried out before the main research activity. Secondary data at least helps to better understand the rice map in the 5 program regencies. Secondary data is cheaper and faster to collect and more accurate than primary data. The team must collect the most up-to-date information due to the dynamic development of market processes, so that old information becomes less useful. Market trend information must be no more than 3 years old.

Before utilizing secondary data, it is necessary to evaluate the data and its sources. Attention should be paid to the definitions used, measurement error, source bias, reliability and timescale of secondary data. Where possible, multiple sources are used so that the consistency of a source can be crosschecked with another.

Secondary data were collected from key sources, namely the Regency and Provincial Agriculture Offices. The research team collected statistical data on rice production (field area, rice variety, productivity, amount of rice produced for family consumption and sale, irrigation, etc.). Searching for secondary data should be started through consulting reference sources such as the web, directories, guidebooks, indexes, and the like. Nowadays electronic information sources will eventually replace printed sources. By the advent of the Internet the search for secondary sources has become more efficient and effective.

Secondary information about the regular and sustainable rice price series either at the wholesale or retail level needs to be sought. The series is used to determine the level of product price stability, important information for farmers may have low risk capacity. Monthly price series can also indicate a time of scarcity, when prices tend to be higher.

2. Primary Data Collection

Even though secondary information gives a major contribution to market surveys, primary information about dynamic markets is also indispensable for understanding current market conditions. Primary data is collected directly from the people involved in this activity. This rice supply research collects primary data from key informants, that is, people who are actively

involved in large market chains mainly supplying the market or business service providers and key observers. Key observers are people who are knowledgeable about the rice market chain by not being actively involved in any business operations. Observers can be from universities, local governments or NGOs who understand it.

1.5.4. Process and Data Analysis

Primary data (qualitative) will be processed by descriptive classification method. After the data is disaggregated according to the predefined classification, an analysis will be carried out using a descriptive-critical method. Meanwhile, secondary data will be studied selectively based on the needs using the MS Excel program, then analyzed with the graphics assistance.

1.6 Systematics of Research Writing

The writing of this research report uses the following systematics. First, the background, urgency and methodology of the research. This section is explained in chapter 1 in detail. Second, the condition of the sustainable rice supply chain and value chain in each regency. The description of the results of this research is explained separately in each regency, namely; Chapter 2 Klaten Regency, Chapter 3 Boyolali Regency, Chapter 4 Sragen Regency, Chapter 5 Ngawi Regency, and Chapter 6 Madiun Regency. Third, the closing part. In chapter 7, the conclusions and recommendations of the study are explained.

CHAPTER 2

SUSTAINABLE RICE SUPPLY CHAIN IN KLATEN REGENCY

This study has tracked, explored, and explored the existence of sustainable rice in Klaten Regency. Sustainable rice product in Klaten is known by several terms, including organic rice, semi-organic rice, natural rice, non-chemical healthy rice, and so on. This study focuses only on sustainable rice that uses the SRP cultivation model or which is more or less close to the SRP cultivation pattern. The following are the results of research on sustainable rice supply chains at the level of producers, processors, traders, and consumers in Klaten Regency.

2.1 Baseline of Rice Agricultural Policy and Trade

Klaten Regency is located between 110°30'-110°45' East Longitude and 7°30'-7°45' South Latitude. Total area of Klaten regency is 655.56 km². On the east, it is bordered by Sukoharjo Regency, bordered by Gunungkidul Regency (Yogyakarta Special Region) on the south, by Sleman Regency (Yogyakarta Special Region) and Magelang Regency on the west, and on the north, it is bordered by Boyolali Regency. Topography of Klaten Regency is located between Mount Merapi and the Thousand Mountains with an altitude between 75-160 meters above sea level which is divided into the slopes of Mount Merapi in the north sloping areas, flat areas and hilly areas in the south. The territory of Klaten Regency is divided into three plains, namely the North Slope Plain of Mount Merapi, the East Longitudinal Lowland, and the South Plain of Mount Limestone.

Delanggu Rice has become an icon of Klaten Regency's "big name" in the national rice scene, even though Klaten itself is not the largest rice producing area in Central Java. Statistical data on harvested area and rice production in Central Java in 2021, it was recorded that Grobogan Regency was ranked first with a production of 460,591 tons, followed by Sragen Regency with a production of 427,311 tons and Cilacap Regency as much as 425,049. In spite of that, Klaten has a rice surplus of up to 157,000 tons in 2021, making this district one of the most productive areas for food production in Central Java, even at the national level. Quoting Widiyanti's statement, the Head of the Klaten DKPP, in a press statement said that rice productivity in Klaten in the January-June 2022 period was recorded at 252,407 tons of GKG originating from a total harvested area of 38,832 ha with an average yield of 6.5 tons. GKG per hectare.

Surplus rice production in Klaten will certainly not be achieved without harvest policies and carrying capacity in agricultural governance, especially in terms of land availability, human resource development, and agricultural infrastructure support. One of particular policy which is addressed to farming sector is the Regional Regulation Number 1 of 2015 concerning the Implementation of Agricultural Protection and Farmer Empowerment. Regulations can be said progressive substantially and technically and because local governments have obligations and obligations in realizing food self-sufficiency and farmers' welfare, including mentoring support for capacity building of farmers. Besides, the local government also guarantees the certainty of agricultural businesses in the form of capital and protects farmers from price fluctuations, high-cost economic practices, and crop failures. Local governments also

explicitly have the obligation to provide agricultural production facilities on time, on target, and on target as well as in sufficient quantities and at affordable prices for farmers.

The Regional Apparatus Organization that has the responsibility for implementing the regulatory policy of Local Regulation (Perda) Number 1 of 2015 is the Food and Agriculture Security Service (DKPP). The Regent of Klaten has issued Regent Regulation Number 68 of 2021 which regulates the Organizational Structure of Tasks and Functions as well as the Work Procedure of the Food and Agriculture Security Service. However, the challenges and obstacles in terms of agricultural production, especially rice, are not small. The most serious challenge is the increasing the conversion of agricultural land (paddy fields and dry fields) to the non-agricultural sector, data from 2016 to 2020 the conversion of agricultural land for food is an average of 65.5 ha/year. In addition, on the cultivation side, there are factors of global climate change that are prone to natural disasters (floods and droughts) and seasonal changes, thereby increasing the development of plant pest and disease (OPT) explosions¹.

Table 2.1

Luas Perubahan Penggunaan Tanah Pertanian ke Non Pertanian Menurut Penggunaannya di Kabupaten Klaten Tahun 2016-2020

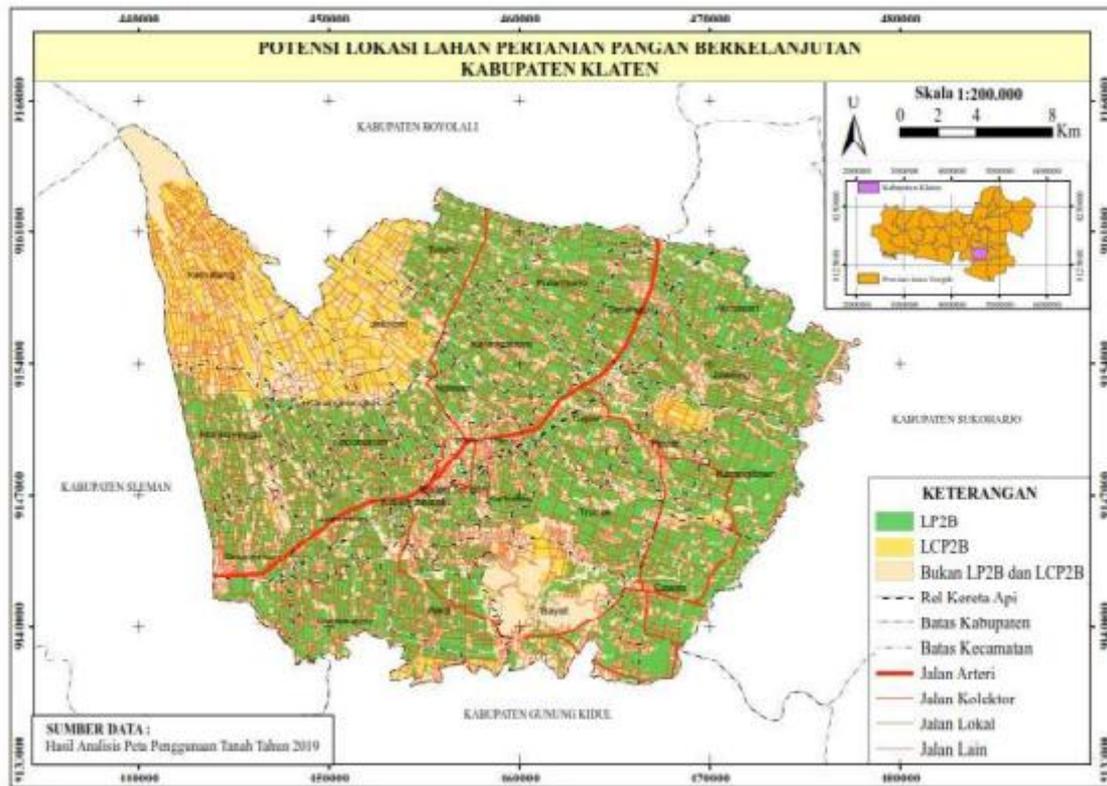
Tahun	Dari Sawah & Tegalan (Ha)	Peruntukan Bangunan Tanah (Ha)				Jumlah (Ha)
		Perumahan	Industri	Perusahaan	Jasa	
2016	45.392	33.058	8.910	0,113	3.311	45.392
2017	45.761	40.298	4.515	0	0,948	45.761
2018	63.381	48.897	13.744	0	0,740	63.381
2019	81.700	55.500	18.200	0,500	7.500	81.700
2020	93.180	56.104	10.332	25.516	1.228	93.180

Sumber : *DPKPP Kab. Klaten, 2021*

The results of a spatial analysis study on land use with the RTRW map of Klaten Regency carried out by the Ministry of ATR/BPN, through the Yogyakarta Land College in 2020, showed that in Klaten Regency there were 30,703 Ha or 46.84% of potential land for Sustainable Food Agricultural Land (LP2B).), and land potential for the location of Sustainable Food Agricultural Reserves (LCP2B) covering an area of 6,877 Ha or 10.49%, so that the area of Potential LP2B and LCP2B is 37,580 Ha or 57.33% of the total area of Klaten Regency. However, the Klaten local government is considered to be not quick enough to immediately enact a regional regulation on the protection of spatial data for sustainable food agriculture and sustainable food agriculture reserve land. The process is still pending because it is still synchronizing data based on the latest Regency RTRW. Data for Protected Rice Fields (LSD) based on Regional Regulation Number 10 of 2021 concerning RTRW states that there are around 25,000 hectares, but according to the Ministry of ATR for LSD in Klaten there should be around 30,000 hectares. The Klaten Regency Spatial Plan for 2021-2041 states that the sustainable food agriculture area is targeted to reach approximately 32,000 (thirty-two thousand) hectares in all sub-districts.

¹ Strategic Planning Document of Food Security and Agriculture Office of Klaten Regency for 2021-2026

Figure 2.1
Potency of LP2B dan LCP2B in Klaten Regency



Source : 2019 Land Usage Map Analysis

The transfer of land use functions from agricultural land to non-agricultural in Klaten Regency is quite massive, especially the strategic location of Klaten Regency with easy accessibility of the road network and the existence of supporting infrastructure facilities (Handayani et al., 2014), abundant natural resources, and a conducive investment climate which make this area a target for investors to invest in the property, services, trade, education, industry, and tourism sectors. As a study conducted by Sulistyowati (2018) shows that of the 35 districts in Central Java, Klaten Regency is number 11 with the highest investment².

The local government of Klaten has also a policy on rice distribution, in addition to the policy on rice production. The Klaten Regent's Instruction Number 1 of 2021 concerning the Rojolele Srinar and Srinuk Rice Socialization Movement for State Civil Servants (ASN) and Regional-Owned Enterprises (BUMD) employees in the Klaten Regency is related to the success of the Klaten Regional Government in developing Rojolele local rice varieties that have been has a Plant Variety Protection (PVT) certification so that it has exclusive rights in the development of the Srinuk and Srinar varieties. The policy published in the Regent's Instruction encourages ASN in Klaten to consume rojolele Srinuk and Srinar rice as an effort by the local government to re-socialize local rice production in Klaten and improve farmers' welfare. DKPP through Agro Techo Park (ATP) Humo provides Srinuk/Srinar seeds which can be accessed by farmers and the harvest is then purchased by constraining (Command for Rice Milling Development

² Muryono S, Utami, W 2020, 'Mapping the Potential of Sustainable Food Agricultural Land to Support Food Security', *Bhumi, Journal of Agrarian and Land Affairs*, vol. 6 no. 2, p. 2001-218, October 2020

Strategy). The distribution or trade regulator is the Klaten BUMD, PT Aneka Usaha, directly to ASN consumers in the Klaten local government.

2.2 Baseline of Sustainable Rice Supply Chain

Sustainable rice supply chain research in Klaten found and explored four value chain flows. The four supply chains, namely the Srinuk rice supply chain from sustainable cultivation SRP Wiji Thukul Farmer Group, Cawas Village, Cawas District, the SRP sustainable farming farmer supply chain from the Bumi Asih Farmers Group, Bogor Village, Cawas District, and the Natural rice supply chain from farmers who are members of the Marsudi Makmur farmer group. Polan Village, Polanharjo District, and the Anarkisari rice supply chain in Kokosan Village, Prambanan District.

2.2.1. Baseline of Sustainable Rice Producer

This research interviewed four farmers as producers who have implemented sustainable rice cultivation, Kastowo and Irnawari who are administrators and members of the Bumi Asih farmer group from the CISU program, Rutamadji, Head of the Wiji Thukul Farmer Group, who received assistance from Rikolto. Both farmer groups have implemented the SRP cultivation model. Harun is a member of the Marsudi Makmur farmer group who received assistance from the KOMPAK program in non-SRP sustainable rice cultivation. The four informants, two of them are relatively new in implementing sustainable cultivation. Harun from the Marsudi Makmur Farmer's Group has been cultivating naturally for about 5 years, while Rutamadji was originally an organic farmer since 2012, due to environmental factors that do not allow for organic cultivation, then he adapts using the semi-organic model, and is currently implementing SRP cultivation. They began to leave the conventional farming model because they gained knowledge and experience from demplot during the introduction and mentoring of programs on sustainable rice cultivation.

In the past year, the varieties planted by the four informants were Inpari 32 and rojolele Srinuk, but often in the previous planting period, farmers in Bogor Village (Bumi Asih farmer group) were alternated by IR64 varieties for Planting Season I. There is a tendency that they will plant more than one rice varieties when having more than one land to anticipate crop failure caused by pests and diseases. Seeds or seedling are usually obtained by buying at a farm shop or ATP Humo specifically for rojolele srinuk. The option to buy rather than produce seeds/seedlings by themselves because it is more flexible in terms of planting preparation time and there is a guarantee of seed quality.

They stated that during farming with a sustainable rice farming pattern, there were several perceived impacts and benefits, as follows;

1. Rice plants are more resistant to pests and diseases than plants cultivated using chemical fertilizers (conventional). The use of organic fertilizers (liquid organic fertilizer/POC and manure) has an efficient cost of fertilization by 40-50% compared to using chemical fertilizers. Likewise, the use of pest and disease drugs using vegetable pesticides (pesnab). The use of chemical pesticides is carried out when pests or diseases occur massively.
2. The soil becomes more crumbly, easier to cultivate and the soil pH is more stable. Significant changes were felt in the land of Irnawati & Kastowo from the Bumi Asih

Farmer Group, before applying SRP cultivation the soil pH had a level of 3.5 after using organic fertilizer the pH rose to 4.5 at the beginning of the trial, and now the pH has reached a level of 6. It has also an impact on the efficiency of land management at the beginning of the growing season.

3. The paddy soil pattern system on the land already uses the jajar legowo model so that maintenance is easier in fertilizing, making trenches (for water management so that it easily recedes and does not continue to inundate the land), and it is easy to control planthopper pests.
4. There is an increasing of the crop yields, especially in terms of the quality of the rice grains, which are getting full so the quantity at harvest also increases.

The managed land and the potential for sustainable rice production from the four supply chains that have been interviewed can be seen in table 2.2. The farmer who applies the largest sustainable rice cultivation, out of the four villages where the farmer groups in this research, is in Cawas Village where the Wiji Thukul farmer group is located. Approximately 900 plots of the area in Cawas Village, around 50-60% of the rice fields have implemented sustainable cultivation, while in the other three villages have not massively implemented sustainable rice planting patterns.

Table 2.2

Information on Land Area & Production Potential Informants

Information	Tani Bumi Asih Group		Tani Wiji Tukul Group	Tani Marsudi Makmur Group	Assited Farmers of UD Anarkisari
	Irnowati	Kastowo	Rustamadji	Harun	-
Land Area	0,51 Ha	0,35 Ha	0,79 Ha.	1 Ha	0,40 Ha
Land Area of Farmer Group	1,7 Ha		6 Ha	1,8 Ha	1,9 Ha
Production Potential	<ul style="list-style-type: none"> • MT I: 5 ton/Ha GKP • MT II & III: 6 ton/Ha GKP 	<ul style="list-style-type: none"> • MT I : 4 ton/Ha GKP • MT II & III: 7,4 ton GKP 	MT I & MT II: 6,6 ton/Ha GKP	<ul style="list-style-type: none"> • MT I = 4 ton/Ha GKP • MT II & III: 5 ton/Ha GKP 	MT I & MT 2: 5 ton/Ha GKP
Cropping Pattern	Paddy - Paddy - Paddy		Paddy - Paddy - Nutmeg	Paddy - Paddy - Paddy	Paddy - Paddy - Nutmeg

If the harvested dry grain (GKP) is sold “wholesale” for one stake (approximately 1500m²) to the slasher on the land, the selling price around 3-4 million Rupiah. If it is sold through harvesting by using a combi machine and weighing per kg of GKP, the slasher bought it at around. 4,000 up to 5,000, Rupiah, depending on the type of rice and estimates from the slasher.

The informant mentioned that the selling price would be higher when it was sold in the form of stored dry grain (GKS) or cracked skin (PK). The selling price of GKG can reach 5.600 Rupiah up to 5,800 Rupiah for each kilogram, while the selling price in the form of PK is around 6,700 Rupiah up to 7,000 Rupiah. However, if it is sold in the form of GKS/GKG/PK, the farmer must have an effort in terms of time, effort, and transportation costs to bring it home and the drying process.

Table 2.3

Producer Supply Chain to Collector-Processor

Sustainable Rice Knot	Producer	Collector	Processor
Srinuk Rice	Stored Dry Grain (GKS) <ul style="list-style-type: none"> • The harvest is brought home. • Farmers carry out drying process of the harvested grain 	Koperasi Tani Pangan Lestari <ul style="list-style-type: none"> • Buying Price of Milled Dry Grain (GKG) at 5.800 Rupiah for each kilogram • Taken at the farmer's house • Cash • Has 300 members from Cawas & Bayat District • Play a role in marketing GKG from member farmers • Storage length in Koperasi is approximately 2-5 days. 	Small Rice Mill (PPK) Abi Tani <ul style="list-style-type: none"> • The purchase of GKG 6,800 – 7,000 Rupiah/ kg • Cash payment • Srinuk's Konstraling
Natural Rice	Harvested Dry Grain <ul style="list-style-type: none"> • Transportation from the farmers 		PPK Muh. Rochim <ul style="list-style-type: none"> • Purchasing price 5,000 Rupiah/ kg of GKP • Cash Payment
Tani Bumi Asih Group	Harvested Dry Rice <p>The harvest brought to home</p> <ul style="list-style-type: none"> • Farmers carry out the grain drying process 		PPK Kedung Mulyo <ul style="list-style-type: none"> • Purchasing price 7,000 Rupiah/ kg of PK • Cash payment

Anarkisari Rice	Harvested Dry Grain <ul style="list-style-type: none"> • Harvesting is mandatory using a rice harvesting machine 	UD Anarkisari <ul style="list-style-type: none"> • Purchasing price 5,200 to 5,400 Rupiah/ kg of GKP (higher than GKP's price in the market) • Cash payment
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There are several conclusions on the analysis result of sustainable rice cultivation at producer lever, as follows:

1. Assistance and training in sustainable cultivation are important instruments, not only in terms of introducing cultivation methods but also convincing farmers about the impacts and benefits obtained on the producer side. The role of Field Extension Officers (PPL) in terms of local government attention also plays an important role in expanding the potential for sustainable rice cultivation development apart from external parties (KOMPAK, CISU, Rikolto, Nestle, UD Anarkisari). Therefore, it can be said that there is an effective collaboration in increasing and strengthening the knowledge of farmers in cultivating land, handling pests and diseases, as well as crop yields.
2. The implementation of sustainable cultivation models remain faces challenges related to the factor of adapting farmers' habits in cultivation. These challenges, for example, safety protection has not been implemented, the pattern of irrigating the land (when it recedes and when it is inundated) has not been fully implemented due to the condition of the irrigation system at the land level, difficulties in finding materials for making medicines or organic fertilizers themselves, the number of weeds that grow due to the addition of organic fertilizers from animal waste, as well as pests and diseases that cannot be directly controlled with natural saprotans.
3. Farmer groups which received assistance from the SRP cultivation model have been able to provide solutions to other farmers through internal assistance. This is done to maintain the trust of members who are already enthusiastic about the SRP cultivation model.
4. UD Anarkisari and Koperasi Tani Pangan Lestari have an important role as offtakers in sustainable rice production. Furthermore, about the roles and positions of these two organizations will be discussed in more detail in the next sub-chapter.
5. The results of farmers' GKP production cannot be identified/traceable as sustainable cultivation products when sold to slashers/collectors/processors who do not have an understanding of sustainable rice. This was confirmed by the data found by informants Irnawati, Kastowo, Harun, and Rutamadji when their harvests were sold to slashers in the field and/or to mills. It is because the collector-processor chain will mix producer's grain production with conventional cultivation products.

2.2.2. Baseline of Sustainable Rice Collector – Processor

Collectors - processors have an important role in the rice supply chain, because their position is very vital since the party who will collect and process the harvest from farmers so that later it becomes rice that is ready to be distributed to traders/distributors and or direct consumers. Klaten Regency has around 631 PPK and 32 PPM according to BPS data on the number of rice milling industries based on business scale in 2020. That number does not include mobile mills that have sprung up in the last 5-7 years. Meanwhile, the number of collectors (and slashers) is difficult to be identified because their work patterns are very personal as freelancers.

However, in the rice supply chain in general, these slashers and collectors have a central role to supply crops to rice processors.

Table 2.4

Collector – Processor Supply Chain to Distributors/Traders

Sustainable Rice Knot	Collector – Processor	Distributor/Trader
Srinuk Rice	PPK Abi Tani <ul style="list-style-type: none"> • Grain & Rice Stock stock • 5kg dan 10kg Packaging • Deliver to consumer 	Regional-Owned Enterprise (BUMD) Aneka Usaha <ul style="list-style-type: none"> • Purchase of Rice 11,000 – 12,000 Rupiah / kg • Stock quota data from mills • Payment due 1 month
Natural Rice	PPK Muh. Rochim <ul style="list-style-type: none"> • GKG is dipped in stages according to market needs • 5kg packaged rice • Transportation & distribution • Delivery each 2-3 weeks 	Asmunah Grocery Store <ul style="list-style-type: none"> • The Kulak Price 10,500 Rupiah/ kg. • Consignment system/point of sale
Tani Bumi Asih Group	PPK Kedung Mulyo <ul style="list-style-type: none"> • Modern Electric Power Machines • Processing grain & PK into packaged bulk rice 25 kg • Conventional mixed grading rice with sustainability 	Distributor <ul style="list-style-type: none"> • Comes from DIY • <i>Sustainable Rice unidentified</i>
Anarkisari Rice	UD Anarkisari <ul style="list-style-type: none"> • GKP is self-processed into GKG and stored in warehouse • Grain is processed into rice based on consumer demand • GKG processing into rice in cooperation with PPK (milling and polishing services only) 	

The results of the interview with the slashing informant, Gito from Polan village, who often buys GKP on the producer informant's land, Harun stated explicitly that in the transaction what he considered was the harvest yields' estimation in terms of quantity, type of variety, and grain of rice. Gito did not pay attention to how the farmers in their cultivation model,

conventional or sustainable, even the separation of rice varieties at the time of purchase was only done once the collectors gave specific instructions for the grain they needed. Gito himself has several collector channels that are ready to accommodate GKP purchases, but there is a collector who has been his main partner so far, namely a collector from Sukoharjo Regency. According to the informant, this collector from Sukoharjo Regency is an agent who supplies GKP to a rice factory in Ngawi. In this phase, the sustainable crop yields from Harun's farmers are not identified/traceable.

This is more or less the same with sustainable grain conditions with the SRP cultivation model when it is absorbed by Gito collectors, by the time the researchers conducted interview with the Kedung Mulyo rice mill located in Posis Village, Bogor Village, this mill accommodates various types of varieties from individual collectors and farmers. Grain absorption of the GKP form only during the harvest season, while during the planting season it usually receives GKS and PK grain.

Bu Ning, owner of the Rice Milling Strategy Command (kostraling) or milling, would not confirm the cultivation pattern. Purchases are made by looking at the condition of the grain that is deposited and sold to him. The results of grain processing, when it becomes rice, will be packaged in bulk packages per 25 kg with grading the quality of the rice.

Back to the traceability on the harvest of Harun's farmer which were sold to KDP, it was possible to identify their products that were processed into sustainable rice products by labelling natural rice. PPK Muh Rochim sold processed sustainable cultivated rice into natural rice products since he was aware and had knowledge that sustainable cultivated products have a better value than conventional rice as they have the characteristics of shape, color, and fragrant aroma. So that PPK Muh Rochim was able to convince and sell natural rice to retailers and consumers directly.

On the Srinuk rice supply chain, the role of the Koperasi Tani Pangan Lestari Collector is particularly to accommodate (collectors) rice farmers who carry out sustainable cultivation, including from the Wiji Thukul Farmer Group which applies the SRP cultivation model. Koperasi Tani Pangan Lestari which accommodated Srinuk's grain already has a relationship with the Abi Tani mill as a kostraling/processor who holds a cooperation contract with BUMD Aneka Usaha whose partners with the local government in distributing Srinuk rojolele rice.

The Abi Tani mill accommodates and stores grain from farmers cultivating the rojolele variety to be stored and processed into rice with the Srinuk label. Abi Tani's mill must secure stock for at least the next 2-3 months because BUMD will always ask for a quota of Srinuk rice stock. So PPK Abi Tani also acts as an offtaker, because it also provides seeds and seedling for farmers and will buy grain from them later. Abi Tani's mill sells packaged Srinuk rice to BUMD at a price of 11,000 – 12,000 Rupiah per kg with a capacity of 5-6 tons per month.

The treatment for grain from sustainable cultivation which be still identified at the processing level is grain from KOMPAK farmers, SRP Rikolto farmers from the Wiji Tukul group, and farmer partners UD Anarkisari. KOMPAK farmers already have a sales chain for their harvest

to the Muh Mill. Rochim, so that by the owner of the grain mill will be stored separately and later when it is processed into rice it will be packaged in different packages.

Sustainable rice branding which is then produced from milling is referred to as healthy rice. Likewise, in Fendi's Abi Tani mill, as a partner of the BUMD Aneka Usaha in processing srinuk rice, the grain is stored and processed separately. He got the rice from Koperasi Tani Pangan Lestari which its role as a collector of GKS from koperasi's members, which numbered approximately 300 members in Cawas and Bayat sub-districts. The presence of the GKG processing results of the Srinuk variety by PPK Abi Tani is processed into 5kg and 10kg packaged rice to be supplied to BUMD Various Usaha in the form of the local rojolele rice brand Srinuk.

UD Anarkisari also adopts a similar pattern, even it is more intensive practically. UD Anarkisari itself was formed by the aim of helping farmers to be more prosperous so that the relationship pattern with farmers is more interventional, more or less similar to the plasma pattern. UD Anarkisari itself is only willing to buy semi-organic farmers' crops, as Yusuf (a manager) called it, in the form of GKP which is harvested using a combi machine. The purpose of this method is the occurrence of fair trade (fair trade) between farmers and collectors because the transaction is based on the net yield per kilogram of grain taken in the field. In addition, having purchase mechanism per kg using a machine, the harvest will be cleaner from dirt and straw.

Based on the factual conditions obtained from the field, it shows that the knowledge and awareness of the processors on the existence of sustainable rice is an important point for the existence of SRP grain from farmers' land, which can be identified and maintained to the collectors and processors. Even in terms of the purchase price of grain from farmers by collectors and processors, it is relatively stable and tends to be higher. Otherwise, the grain from the sustainable cultivation pattern will be considered ordinary rice just like other conventional rice.

2.2.3. Baseline of Sustainable Rice Trader

The biggest sustainable rice trade in Klaten at the moment is Srinuk rice, which is carried out by BUMD Aneka Usaha, its sales capacity as of August 2022 is recorded at almost 80 tons per month. The amount of rice distributed to civil servant (ASN) in the Klaten area comes from 5 rice mills which beacome partners with Srinuk's rice suppliers. Based on an interview with Sabdono, as the person in charge of distribution to ASN consumers, he stated that the demand is getting higher, but because the supply from farmers to mills is still limited, it has not been able to serve all ASN, moreover the general public. According to the BUMD Aneka Usaha, the selling price of the Srinuk rice brand 13,000 Rupiah per kg is not expensive compared to organic products, because this Srinuk rice aside from the taste which is known to be delicious, it is also healthier because the cultivation process has severely limited the use of chemicals.

Table 2.5
Supply Chain Distributors/ Traders to Consume

Sustainable Rice Knot	Distributor/Trader	Consumer
Srinuk Rice	Regional-Owned Enterprise (BUMD) Aneka Usaha <ul style="list-style-type: none"> • Srinuk Rice packaging 5kg & 10kg • Purchasing system by Sistem group purchasing order (department/OPD) • Selling capacity Kapasitas penjualan 75-79 ton/month (as of Agustus 2022) 	Civil Servant (ASN) Kab. Klaten <ul style="list-style-type: none"> • Purchasing price Harga beli 13.000 Rupiah / kg • Collective salary payment system • Consumption 10 kg /month
Natural Rice	Asmunah Grocery Store <ul style="list-style-type: none"> • Display with other rice products • There is no promotion/branding 	Food Stall Consumer <ul style="list-style-type: none"> • Purchasing price 11.000 – 12.000 Rupiah / kg • Cash payment • Consumption 150 – 170 kg/month
Natural Rice ???	PPK Muh. Rochim <ul style="list-style-type: none"> • Direct Selling to consumer 	Household Consumer <ul style="list-style-type: none"> • Purchasing price 11.000 Rupiah/ kg • Consumption 10 kg/month
Tani Bumi Asih Group	N / A	N / A
Anarkisari Rice	Marketing of UD Anarkisari <ul style="list-style-type: none"> • Online and COD Selling • Rice Selling Capacity 400-500 kg / month 	Household Consumer <ul style="list-style-type: none"> • Consumer: DIY, Solo, Jakarta • White rice purchasing price Harga beli beras putih 12.500 Rupiah/ kg • Red rice purchasing price 20.000 Rupiah/ kg

Healthy rice products from Toko Asmunah are sold at a price range of 55,000-57,000 Rupiah for each 5 kgs. The supply of Natural rice is obtained from the Muh Rochim mill which routinely sends 10-15 packs per fortnight. However, Asmunah herself did not understand

what the difference between the Sehat rice and the other rice, as the informant sold natural rice and put it together with the other rices. So that consumers themselves will choose which rice product suits their tastes and purchasing power.

UD Anarkisari sell sustainable rice outside Klaten, because its market share is in Yogyakarta, Jakarta and Solo. The product promotion system at the beginning of sales is based on a relationship with semi-organic rice branding to help farmers' welfare. UD Anarkisari itself started selling rice since 2018 with a monthly sales capacity of up to 1.5 tons, but since the pandemic it has decreased to a maximum sales capacity of 500kg per month. This was triggered because the main consumers, which were restaurants and hospitals, no longer took their products due to the pandemic.

2.2.4. Baseline of Sustainable Rice Consumer

Hartiyem is a rice consumer of Srinuk on ASN program of Klaten District. The informants did not know whether the Srinuk ASN rice she consumed was the result of sustainable cultivation or conventional rice. The intention to consume ASN rice because of the desire to help increase farmers' income, even though they have harvested rice from their own land. Hartiyem is a staff of Juwiring sub-district, every month on the 15th she gets 10 kg of Srinuk rice by dropping it from BUMD to the sub-district. Srinuk rice is not free, but ASN is required to buy it with a pay cut system every month.

Marsiyatun is a consumer of natural rice purchased from the Muh Rochim mill at a price of 55.000 Rupiah for each 5kgs. According to the informant, the natural rice he knew was the result of rice cultivation that was not sprayed with chemical drugs, rice that was not sprayed with chemicals tasted good, had good quality and was better for maintaining health. In terms of price, it is quite affordable, not expensive and reasonable because it is bought directly from selepan (rice mill). Informants stated that the need for consumption is 10 kg/month.

Another natural rice consumer, Mrs. Gito, got the rice from the Asmunah grocery store, after trying to find it suitable because the quality of the rice is quite good and the price is cheaper than premium rice. Previously she consumed regular C4 rice. The price of natural rice is 11,000 –12,000 Rupiah per kg, she buys a minimum of 5 kg and a maximum of 10 kg every day for the purpose of selling food stalls. For the price of 11,000-12,000 Rupiah, according to her, it is quite right because the price is in the middle between ordinary rice and premium rice. Informants do not really know about sustainable rice, they understand that this rice is good and healthier than most rice. And according to the informant in terms of price and quality, it is as good as to premium rice. And what is certain is that the customer matches the rice from this natural rice. On average, those who consume the stalls are drivers and workers from around Tulung and Boyolali.

2.3 Closing

2.3.1. Conclusion

Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the following conclusions are drawn from the research results in Klaten Regency, as followed:

- 1. Information systems and actors in the sustainable rice supply chain in Klaten Regency are dominantly played by collectors - processors and distributors.** The research results show that the processors of Natural rice (Muh. Rochim mill) and Anarkisari rice (UD Anarkisari) play an important role in introducing sustainable rice to the next supply chain, namely traders to consumers. Meanwhile for Srinuk rice, the role of BUMD Aneka Usaha is to become the main actor in the supply chain of srinuk rice through collaborative collaboration with a number of mills and kostraling in Klaten Regency.
- 2. Market response and identification of consumers of sustainable rice in Klaten district shows that ASN is the largest consumer of sustainable rice** in Klaten. Referring to the BUMD statement that as of August 2022 the distribution capacity of Srinuk rice to ASN has almost reached 80 tons compared to the initial months of Srinuk rice being introduced which was only around 30-40 tons. However, the support is consumer mobilization (ASN) through the Regent's policy of instructions regarding the "obligation" of ASN to consume Srinuk rice. However, in general, consumers of sustainable rice in Klaten do not know much about the rice they consume. This was confirmed by consumer informants in describing the rice they had bought. For household consumers, the price of rice is an important factor in addition to product quality. The price of Natural rice, Srinuk rice, and Anarkisari rice is in the middle between ordinary rice and Organic rice, it can even be said that the price is in the premium rice range produced by the factory. The power of consumers of sustainable rice is actually almost the same as the consumer segment of organic rice, namely consumers with a typical middle class, educated, and living in urban areas. On average they have awareness of sustainable rice. But on the other hand, there are also many lower middle-class consumers who are interested in sustainable rice. Sustainable rice processed and produced by PPK Muh. Rochim is able to reach the lower middle class by branding it as delicious and healthy rice because it is produced naturally.
- 3. Gaps exist between supply chain actors in terms of sustainable rice traceability.** Four sustainable rice supply chains in Klaten have researched the flow and distribution, only two supply chains that can be traced products ranging from rice produced by farmers to rice in the hands of consumers. The two supply chains are Rojolele Srinuk rice and Natural rice. Meanwhile, one supply chain, namely sustainable rice produced by members of the Bumi Asih farmer group, cannot be traced to consumers. Harvested dry grain (GKP) from farmers when it enters the mill is then mixed with grain from conventional cultivation. Likewise, the sustainable cultivation of rice from Harun's land (Marsudi Makmur farmer group) when it is sold, the slasher who buys it knows how the cultivation model is. However, when it is in the hands of collectors, the grain from Harun's sustainable cultivation cannot be traced. There is a missing link for sustainable aquaculture products at the collector-processor actor level. Meanwhile, in Anarkisari rice, the processing actor cannot be traced, because the involvement of rice millers in the supply chain is only for processing services.

The difference about the Srinuk rice is the traceability of the distribution chain starting from the harvest of sustainable cultivation can be clearly illustrated to consumers. This is supported by the existence of policies from the local government that "regulate" the supply chain from seeds/seeds to consumers. There is a product certificate of the

seeds/seedlings purchased by farmers which are then used to confirm Srinuk's rojolele grain when it enters the processors. The relationship between processors and distributors is also systematic. Even so, there is a gap in terms of profit margins between processors and distributors, where the burden and responsibility of processors (kostraling) is very large, especially in financing and guaranteeing the supply of Srinuk rice for BUMD. Therefore, not all mills are able to enter the Srinuk rice supply chain because they are carried out by mills that have large capital capabilities. Milling/kostraling in the Srinuk rice supply chain must be able to absorb grain from farmers, accumulate grain and rice stocks, as well as packaging and distribution. Even the mills have to build relationships with the farmers through distribution of seeds/seeds in order to build a commitment of grain selling from farmers.

4. Development of a sustainable rice business model that is relevant and feasible to be developed in Klaten Regency is a PPK business model owned and operated by individuals who collaborate with distributors. This business model is found in the supply chain of Srinuk rice and Anarkisari rice, but it is at the Srinuk rice node that the actors of sustainable rice gain a margin of value for their respective roles. At the Srinuk rice node, the role of collectors and processors plays a dual role in the production process (seed supply, storage, and packaging). UD Anarkisari also plays a dual role, as the guarantor of continued rice, not only in terms of cultivation techniques but also drying, storage, packaging and sales.

2.3.2. Recommendation

The recommended sustainable rice business model for Klaten Regency is **the PPK business model which is owned and operated by individuals in collaboration with BUMD (Perusda)**. This sustainable rice business model must be built in a pattern of intense, mutually beneficial relationships and the presence of parties who play the role of qualified offtakers to ensure traceability and build a sustainable rice market. The supply chain of Srinuk rice and Natural rice can be a reference in developing a sustainable rice business model. The business model canvas which can be built based on these recommendations are;

1. PPK-PPM as processors have a central role in the sustainable rice supply chain in Klaten in terms of traceability of grain from farmers to rice in the hands of consumers so that its existence can be traced. The collectors and processors of Srinuk rice products have a central role as offtakers, ensuring that cultivation of the farmers/producers are absorbed as well as ensuring the quality and quantity of rice produced to distributors - consumers.
2. The policy of the local government in providing production support to sustainable rice marketing can be a model business guarantee which is implemented. This support is in the terms of capital, infrastructure, and other resources in a sustainable rice supply chain.

3. Sustainable rice needs to be introduced broadly at the level of all actors in the rice supply chain, particularly to collectors, processors and consumers. PPK-PPM as one of the post-production guarantors must have knowledge, awareness, and consumer desires in consuming sustainable rice. This is an effort to expand and strengthen market share (demand) on the consumer side. Without increasing demand, of course, the market share of sustainable rice will not be able to expand widely. Consumers must also be strengthened in their knowledge of sustainable rice so that they have good awareness and choose to consume sustainable rice.

CHAPTER 3

SUSTAINABLE RICE SUPPLY CHAIN IN BOYOLALI REGENCY

Sustainable rice in Boyolali Regency is known by various names. Some farmers are familiar with the term “SRP rice”, some know “rice with reduced chemical inputs”, and some others know it as “healthy rice”. Farmer communities who are familiar with the term “SRP rice” are farmers who are members of APOB (Boyolali Organic Farmers Association) and APPOLI (Boyolali Organic Rice Farmers Alliance). Meanwhile, the farming community who are familiar with the term “rice with reduced chemical inputs” are members of the PPO ML (Organic Farmers Association of Mersudi Lestari). Meanwhile, the term “healthy rice” is also known and used by farmers who are members of APOB and PPO ML. Specifically, the term “SRP rice” was introduced by the CISU program and Rikolto. In writing the research findings in Boyolali Regency, from the various terms, one term is used, namely "sustainable rice". In general, the actors involved in the sustainable rice supply chain in Boyolali Regency, farmers, processors, traders and consumers have a variety of knowledge and experience. The following is a narrative description of research findings on aspects of local government policy and sustainable rice supply chains in Boyolali Regency.

3.1 Baseline of Rice Agricultural Policy and Trade

Boyolali Regency is an area in Central Java Province which is bordered by many other regencies. The total area of Boyolali Regency is 1,015.10 Km². Administratively, it is divided into 22 sub-districts, 261 villages and 6 sub-districts. The boundaries of Boyolali Regency in each non-single cardinal direction are as followed:

- Northern Boundary : Grobogan Regency dan Semarang Regency
- Southern Boundary : Karanganyar Regency, Sukoharjo Regency, and Klaten Regency
- Western Boundary : Semarang Regency and Magelang Regency
- Eastern Boundary : Sragen Regency and Karanganyar Regency

The area of Boyolali Regency is astronomical, located between 110o22' - 110o50' East Longitude and between 7o7' - 7o36' South Latitude, the coverage altitude is between 75-1,500 meters above sea level. The topography of Boyolali Regency is divided into the highlands in the west, consisting of; Selo, Cepogo and Ampel sub-districts. The lowlands are in the southern, central and northern parts, including; Teras District, Banyudono, Sawit, Mojosongo, Ngemplak, Simo, Nogosari, Kemusu, Karanggede, Wonosamodro, Juwangi, Wonosegoro, Sambu, and as Boyolali District. The hydrological character of Boyolali Regency is diverse, its potential sources; springs, rivers and reservoirs. This hydrological diversity affects the agricultural sector. Meanwhile, climatologically, Boyolali Regency has a tropical climate with an average rainfall of approximately 2,212 mm³/year.

Land use in Boyolali Regency is described in land use into several classifications of use, namely; settlements, industry, transportation, rivers, reservoirs, forests, rice fields, ponds,

concerning the Regional RPJM of Boyolali Regency for 2021-2026, the 3rd mission that is set out is very clear in its alignment with the agriculture and food sector (Boyolali Regency Government, 2021).

Strictly speaking, the mission of these 3 regions is “Boyolali, the city of milk, the national food barn”. This means that Boyolali Regency is determined to become a food barn through food security programs, both at the local and national levels. The agricultural directions and strategies developed are agricultural principles that are advanced, sustainable, internationally competitive, and contribute significantly to the nation's economy. By its agricultural development strategy, it is expected to improve the welfare of farmers. The tactical steps are carried out through the application of good farming practices (GAP: good agriculture practices), facilitation of capital requirements, healthy partnership development, group/individual development credit, assistance to responsible and sustainable consumption and production, as well as providing added value to post-production.

The following briefly shown **Table 3.1** which is sum up from the local RPJM 2021-2026 of Boyolali Regency document, (Boyolali Regency Government, 2021).

Table 3.1

Agricultural Sector Problems, Objectives, Targets, Strategies and Policy Directions of Boyolali Regency in 2021 - 2026

Mapping Results of Agricultural Problems in Boyolali Regency	Agricultural Sector Development Goals	Agricultural Sector Development Targets	Agricultural Sector Development Strategy	Policy Directions for the Agricultural Sector
The quality and quantity of agricultural products is not optimal yet	Improve farmers' welfare	Increasing GRDP growth in the agricultural sector	Increased production of food crops	Construction and repair of agricultural infrastructure
				Increased production and development of agricultural facilities
				Increased assistance and innovation in agriculture and livestock
				Improved handling of agricultural disasters, especially food crops
		Increased food security	Increasing food availability	Increased stock of food reserves
				Provision of food granary infrastructure

			Increased access to food distribution	Improving the quality of food distribution information
				Handling food insecure villages
			Improvement of food safety and supervision	Guidance and supervision of circulating food
			Increased use of varied food	Increasing diversification of non-rice-non-wheat food

From the information in the matrix above, it can be seen that the Local Government of Boyolali Regency in the RPJMD document has not specifically formulated a policy direction on sustainable rice development.

What about the annual policy directions and priorities for the development of the agricultural sector in Boyolali Regency in the 2023 fiscal year? The annual policy direction for the agricultural sector is to spur agricultural productivity by empowering the community to optimize the leading sector, as well as to accelerate and distribute investment evenly. The annual priority for the development of the agricultural sector is optimizing the superior identity of Boyolali Regency, namely; milk and barn. There are 2 priorities' types for the development of the agricultural sector, as followed; 1) increased production of food crops, agricultural innovation, and animal husbandry. 2) sustainable MSME/IKM assistance.

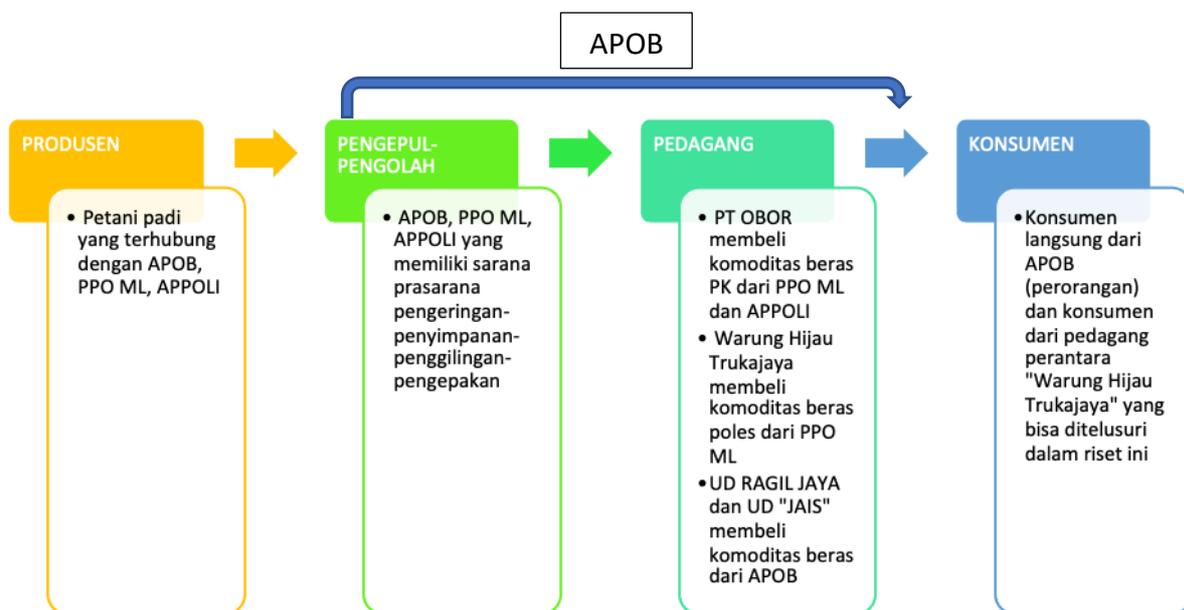
The priority plans for the agricultural sector program in Boyolali Regency are as followed; 1) Program for providing and developing agricultural facilities. 2) Program for providing and developing agricultural infrastructure. 3) Agricultural disaster control and management program. 4) Agricultural business licensing program. 5) Agricultural extension program. Meanwhile, the priority plans for the trade sector program to be implemented are as followed, namely; 1) Company Licensing and Registration Program. 2) Program for Improvement of Trade Distribution Facilities. 3) Price Stabilization Program for Basic Needs and Important Goods. 4) Export Development Program. 5) Consumer Protection Standardization Program. 6) Program for the use and marketing of domestic products. In the priority plan of the program described above, it is clear that the trade sector does not yet have the will to organize a sustainable rice supply chain and economic chain.

3.2 Baseline of Sustainable Rice Supply Chain

The research found a sustainable rice supply chain in Boyolali Regency through three (3) nodes with different chain lengths. The three sustainable rice nodes found are the APOB node, the PPO ML node, and the APPOLI node. In general, data and information are found that describe the role of actors in the sustainable rice supply chain. Farmers as actors of sustainable rice producers have knowledge and experience of SRP model cultivation

practices. These farmers are connected to each sustainable rice node, because they are a source of knowledge, provide technical assistance in cultivation, and act as parties who harvest rice, as well as post-harvest rice processing (transportation, drying, storage, milling, and selling to traders, and consumers). The sustainable rice knot party is an organization incorporated as a cooperative or other legal entity (association, foundation). They have a dual role, assisting farmers, steaming and processing rice products, and trading sustainable rice commodities. The process of continuous rice distribution from these nodes to the next chain is averaged to the traders, both intermediaries, retailers, and wholesalers. In addition, specifically the APOB sustainable rice node was found to be practicing selling rice directly to consumers. The following is **Figure 3.2** which generally describes the sustainable rice supply chain in Boyolali Regency.

Figure 3.2
Sustainable Rice Supply Chain in Boyolali Regency



Based on **Figure 3.2** regarding the sustainable rice supply chain above, the following will describe in detail the existing conditions of actors in each sustainable rice chain in Boyolali Regency.

3.2.1. Baseline of Sustainable Rice Producer

The nodes of knowledge on sustainable rice in Boyolali Regency are in the collectors and processors of rice. It is from them that the actors of sustainable rice producers can be found. This research found 3 sustainable rice knots in Boyolali Regency, namely; APOB, PPO Mersudi Lestari, and APPOLI. In detail, these 3 nodes are described in **Table 3.2**.

Table 3.2

Supply Chain Producer to Collectors – Processors Sustainable Rice

SUSTAINABLE RICE KNOT	PRODUCER	COLLECTOR – PROCESSOR
APOB Organic Farmers' Association of Boyolali	<ul style="list-style-type: none"> - There are 600 farmers of SRP - SRP Cultivation in 2 Districts: Sawit, Banyudono 	APOB as the collector and processor of SRP paddy in the form of GKP
PPO ML Organic Farmers' Group of Mersudi Lestari	<ul style="list-style-type: none"> - There are 45 famers of "healthy paddy" - "Healthy paddy"cultivation (sustainable rice) is implemented in Tawang Sari Village, Teras District (20 ha) 	PPO ML is a collector and processor, but also facilitates farmers; knowledge, costs, seeds, organic fertilizers. Become CORE for PLASMA (healthy rice farmers)
APPOLI Organic Paddy Alliance of Boyolali	<ul style="list-style-type: none"> - There are 834 SRP farmers (18 POKTAN) - Cultivation of SRP in Simo district, 	APPOLI becomes collectors and processors of SRP rice from farmers in the form of GKP. However, not all farmers' products are accommodated and processed

From the 3 knowledge nodes of sustainable rice as described in the matrix above, this research explores 3 sustainable rice producers as informants, namely; Budi (farmer at APOB), Muallif (farmer at PPO ML), Wondo (farmer at APPOLI). The information explored to producers starts from rice land tenure, sustainable cultivation, planting, fertilization-treatment-pest control, and harvesting.

First, land tenure for sustainable cultivation of rice. Informant Budi became the head of a farmer group in Hamlet 3, Gombang Village, Sawit District, Boyolali Regency. He has a network with APOB, so that since 2019 he has been planting rice with a sustainable cultivation model. Budi learned about SRP cultivation from this APOB. He actually controls 9 stakes of agricultural land (1 stake is equivalent to 2,000 m², equivalent to 1.8 Ha). However, the agricultural area used with the sustainable cultivation model is only about 4 stakes (0.8 Ha). Informant Muallif is a smallholder farmer in Tawang Sari Village, Teras Subdistrict (profit sharing: cultivator, owner). The area of agricultural land with a sustainable cultivation model controlled is 5 stakes (1 land stake in this stretch is equivalent to 2,200 m², meaning more than 1 Ha). Muallif became a member of PPO ML, started healthy rice farming in 2016. Meanwhile, Wondo's informant is a tenant farmer in Gondang Rawe Village, Simo District.

Wondo owns 0.5 ha of land for rice with a sustainable cultivation model (rent Rp 6 million/year per 0.5 ha, meaning the rental price is 12 million/ha/year). Wondo has been networking with APPOLI all this time. These three nodes of sustainable cultivation of rice farming are known to have received support from Rikolto and CISU (APOB), ICCO (PPO ML), and Rikolto (APPOLI).

Second, sustainable cultivation/planting techniques for rice cultivation. Budi has been cultivating sustainable rice for 9 growing seasons (MT). His planting technique is JARWO (Jejer Legowo), the distance between plants is widened (15x20 cm). According to Budi, the benefits obtained from the JARWO technique are reducing fertilizer costs, plants are free to grow and develop. Although the cost of planting labor using the JARWO technique is more expensive (300,000 Rupiah for each stake), the total operational costs are more economical. Informants Muallif and Wondo use a technique similar to the JARWO technique, where the minimum spacing is 15x15 cm, or 15x20 cm. This technique is oriented towards giving the plant the freedom to grow and develop, so that the quantity and quality of the rice product increases.

Third, fertilization-treatment and control of plant pests. According to Budi's informant, sustainable rice cultivation techniques can reduce chemical fertilizers up to 50% (for instance: urea and phonska per stake (1 stake: 2,000 m²) only 1 sack/50 kg (equivalent to 5 sacks/250 kg/Ha). when cultivating conventional rice, usually the need for urea and phonska per stake is 2 sacks/100 kg (equivalent to 10 sacks/500 kg/ha). Meanwhile, according to Muallif, his choice to have sustainable cultivation because it is still possible to use chemical fertilizers. That is same as what Wondo's informant mentioned. They both chose sustainable rice cultivation because it is not complicated in full organic farming where fertilizer, treatment and pest control must meet certain standards. Muallif's experience in cultivating sustainable rice with PPO ML is very easy and profitable. Organic fertilizer is provided by PPO ML based on Muallif's request. So Muallif only needs to communicate with the land owner to meet the needs of chemical fertilizers. The amount of organic fertilizer that can be provided by PPO ML for sustainable rice cultivation, can be from 0% to 90% of fertilizer needs for sustainable cultivation of rice plants.

Found innovations to control plant pests. Informant Budi developed a "ball technique" for controlling plant pest. The ball technique is to make a hollow space in the middle of the rice field (the cement ball is pulled from end to end), to concentrate water and nuisance grass in the middle of the hollow space. Out of the 3 farmers who became informants, it is only Budi who developed this technique. Muallif (PPO ML) and Wondo (APPOLI) farmers in plant pest control remain conventional. The use of water for sustainable rice cultivation, Budi farmers rely on technical irrigation (water source from dams), Muallif farmers use irrigation water from umbul (spring) Tlatar, Mojosongo District, Boyolali Regency. Meanwhile, Wondo farmers said that the source of irrigation for sustainable rice farming comes from rain-fed water and deep well water (drilled).

Fourth, sustainable cultivation of rice harvest. The existence of a sustainable rice offtaker is urgent and needed. According to Budi's informant, the productivity of sustainable cultivated rice is 1-2 ounces of GKP more than conventional rice. The average productivity of sustainable cultivated rice produced by Budi, Muallif and Wondo is around 2-3 tons per land stake (local

size for a plot of agricultural land in Boyolali; 1 stake: 2000 – 2200 meters). Except in APPOLI, the harvest method for sustainable cultivated rice in APOB network farmers and PPO ML member farmers is carried out by the collectors-processors (APOB, PPO ML). According to Budi, after the sustainable cultivation of rice was ready for harvest, he contacted APOB. Then it is checked and harvested by APOB, with the "long-grown" or "traser" technique. The yield in the form of GKP is valued at around 5,100 up to 5,200 Rupiah per kg. This means that APOB provides a higher difference than the market price of GKP, approximately 100 –200 Rupiah.

Indeed, it is not every offtaker having the same in treating sustainable rice producers. Muallif's experience said that when the sustainable cultivated rice was ready to harvest, he contacted PPO ML. PPO ML then takes care of harvesting, picking, collecting, transporting, drying and milling. So that the final calculation is carried out when the yield of SRP cultivated rice is already in the form of PK (Pecah Skin) rice. Muallif said that PK rice was valued by PPO ML with a difference of 200 –300 Rupiah per kg, from the market price of PK rice. The purchase price of GKP in the area received by Wondo farmers from APPOLI is in the range of 4,100 –4,700 Rupiah per kg. This price When added to the operational costs of transportation, according to Sidik (APPOLI Manager), (Interview, 2022) it has provided an average price difference of IDR 100 per kg which is higher than the market price. Based on 3 informants in explaining the difference in the price of sustainable cultivated rice harvests received from collectors and processors, it can be concluded that the added value obtained by SRP cultivation farmers is 100 - 300 Rupiah per kg.

3.2.2. Baseline of Sustainable Rice Collector – Processor

A dual role is carried out by sustainable rice offtakers in Boyolali Regency. Boyolali Regency has at least 3 offtakers who are also sustainable rice knots. Its role in sustainable rice starts from literacy in sustainable rice farming, providing support to farmers in sustainable rice cultivation, harvesting, post-harvest processing, and trading processed rice to the next chain (traders, consumers). The following is **Table 3.3** which describes the findings on the role of the 3 nodes of sustainable cultivation in Boyolali Regency, from the supply chain of collectors-processors to traders-consumers.

Table 3.3

Sustainable Rice Collector-Processor to Trader-Consumer Supply Chain

SUSTAINABLE RICE KNOT	COLLECTOR – PROCESSOR	TRADER – CONSUMER
APOB Organic Farmers’Association of Boyolali	APOB becomes collectors and processors of SRP rice, according to farmers' requests, in the form of PK rice and polished rice.	 APOB sells PK rice (healthy rice) to UD Ragil Jaya and UD “Jaiz”  APOB also sells “healthy rice” in bulk to individual consumers
PPO ML Organic Farmers’Group of Mersudi Lestari	PPO ML is a collector and processor of all sustainable rice farmer harvest products in Tawang Sari Village. The rice	 PPO ML sells PK rice to order to PT OBOR in the Palur area of Surakarta.

	produced is in the form of PK rice and polished rice.	In addition, PPO ML also sells polished rice to the intermediary trader "Warung Hijau Trukajaya" in Salatiga Regency.
APPOLI Organic Paddy Alliance of Boyolali	APPOLI becomes collectors and processors of SRP rice from farmers, but not all of SRP's rice yields are accommodated and processed by APPOLI.	 APPOLI sells PK rice to PT OBOR in the Palur area of Surakarta City  APPOLI also sells polished rice to individual resellers in Tegal Regency and Yogyakarta City.

The situation is not the same to the supply chain that is served by the 3 nodes of sustainable rice in Boyolali Regency. From the matrix above, it is illustrated that only PPO ML serves sustainable rice harvesting, steaming and processing from all sustainable rice farmers. Meanwhile, APOB and APPOLI selected them according to their economic considerations. The following is the situation of each sustainable node in playing itself as a sustainable rice collector and processor, as described in the matrix above.

First, the situation of APOB collectors and processors. APOB facilitated around 600 farmers who practice SRP model rice farming in 2 sub-districts. Its role is to carry out SRP literacy to them, to be the buyer of the harvest (GKP's weight). According to APOB Bowo, "We are the intermediary from Rikolto and CISU for the SRP program in areas which become the APOB's work areas, called; Palm and Banyudono." This means that APOB plays a role in literacy of farmers about SRP, as well as guaranteeing their harvest products. Indeed, not all SRP farmers are facilitated, their rice products are harvested and processed by APOB. In further explanation by APOB Mulyono, "we realize that the SRP rice market is not good, therefore APOB still frees SRP farmers to sell their harvest".

APOB runs a service model for purchasing GKP, SRP rice slashing services, and buying PK rice. This service model works because of the "moral burden" as an intermediary for Rikolto Indonesia. In carrying out GKP purchasing services, APOB provides harvesting services (Combi machines: 500,000 –600,000 Rupiah per stake, human labor: Rp. 750,000 per stake). The harvested SRP rice (GKP) is then transported using a pick-up car (rented) from the fields to the APOB Warehouse at a cost of 75,000 Rupiah per rit/one transport. APOB processes SRP rice drying in the sun (drying) in the APOB complex. After becoming GKG and then grinding it yourself with the milling machine it owns, the milling capacity belongs to the small milling category (PPK), namely small-powered grinders (20-40 HP) and the production capacity is 300-700 kg/hour, (Rosiana Ulfa, et al., 2014). The SRP rice produced by APOB was then branded as "Healthy Merpati Rice" and sold to traders, APOB bulk rice to individual consumers, and APOB PK rice to UD Ragil Jaya (about 5 tons per month) and UD "Jaiz". Individual consumers buy APOB rice in bulk at a price of 11,000 Rupiah for each kg.

Second, the situation of PPO ML collectors and processors. Sustainable rice is better known as “healthy rice” among PPO ML. According to Dwi Sumino PPO ML, “Healthy rice is the term we use for sustainable rice. This healthy rice when cultivated using chemical fertilizers and pesticides inputs between 10-50%.” PPO ML plays itself as a “core” for farmers who are willing to use cultivation techniques to reduce chemical and pesticide inputs between 10-50 percent. The service model served is literacy in sustainable agricultural cultivation, financial support, guaranteeing sustainable rice products, processing and selling sustainable rice. There are 45 rice farmers with sustainable cultivation facilitated by PPO ML in Tawang Sari Village. These farmers are supported by financing for cultivation operations, procurement of seeds, organic fertilizers and organic pesticides. According to Dwi Sumino, “We are morally called to help and guarantee the product yields of the farmers in this village with financial support and control it by providing organic inputs.” The thought conveyed by the head of PPO ML was special, and made the nucleus-plasma relationship built between PPO ML and the farmers.

The production capacity of the PPO ML milling machine is classified as medium rice mill (PPM). The information conveyed by Dwi Sumino stated that the milling production capacity could be up to 10 tons per day, equivalent to 1000 kg/hour, (Rosiana Ulfa, et al., 2014). Even Dwi said that, in certain cases, the machine can grind grain up to 18 tons/day. This ML PPO has not yet connected with Rikolto, but has experience with ICCO and LPTP. So far, there has been no financial support from the government, both in terms of goods and materials.

Even without government support, PPO ML's rice processing infrastructure is truly impressive. There are 4 GKP ovens with a capacity of 4-5 tons per 14 hours. PPO ML in facilitating farmers can cover up to 65 Ha of paddy fields. Each sustainable farmer can get cash financing support of up to IDR 2-3 million/ha and the provision of seeds and fertilizers worth 2 million Rupiah/ha. In running a sustainable rice processing business, PPO ML still needs supplies from sustainable rice slashers (30-40% of its RMU production capacity).

The sustainable rice production capacity of RMU owned by PPO ML is already strong. Dwi said that healthy (sustainable) rice production could reach 25 tons per month. The main major market for PK from PPO ML is PT OBOR with a product uptake capacity of 50 tons/day. But so far, PPO ML still supplies around 18.75 tons of broken husked rice (PK)/month (75% of its product) to PT OBOR. The remaining 25% is marketed to several resellers, such as Warung Hijau Trukajaya which absorbs about 250 kg of rice head/month. The selling price of healthy rice (sustainable rice) produced by PPO ML provides a profit value of approximately 200-300 Rupiah per kg. The amount of this profit is unstable in the PT OBOR market, so PPO ML must be careful in releasing sustainable rice products to PT OBOR.

Third, the situation of APPOLI collectors and processors. The greatest potential for sustainable rice in Boyolali Regency can be obtained from the APPOLI network. Why? Because the number of farmers who declare farming adheres to the SRP cultivation principle is 834 farmers (18 Poktan). This number of farmers is the highest compared to sustainable farmers in the APOB and PPO ML networks. However, Lord APPOLI has not yet found a large market potential for SRP that can be used as a “hole” and provide good profits for APPOLI. APPOLI's RMU production is not only SRP rice, but also organic rice. According to Sidik (APPOLI Manager), “we prioritize the organic rice business, because the profit value is large. Meanwhile, the

profit value of SRP rice is very thin, approximately 100 Rupiah per kg". The organic rice produced and purchased by APPOLI is currently certified to SNI 6729-2016, (www.koperasiappoli.com). But previously, around 2012-2013 APPOLI organic rice was certified by Swiss IMO and exported to several European countries, (https://indonesia.rikolto.org/id/news/ekspor-perdana-rice-organik-appoli).

The huge potential of SRP rice in the APPOLI network has resulted in very dynamic GKP market competition between slashers and APPOLI. Sidik said that to obtain 120 tons of GKP SRP, it needs a capital of 70 million Rupiah. After obtaining GKP, APPOLI must dry the GKP using the sun drying technique. This process requires loading and unloading workers and L300 and Grand Max transport car drivers. The product of RMU APPOLI is PK rice which is marketed at PT OBOR's main market in the Palur area of Surakarta City (16 tons/month), to resellers in Tegal and Yogyakarta City. Information provided by Sidik, Muhdi, Danang (APPOLI) stated that the fate of SRP rice from APPOLI was no longer known to the "jungle" after it was released from the APPOLI warehouse (missing link).

3.2.3. Baseline of Sustainable Rice Trader

The sustainable rice commodity faces serious problems in its trade aspect. Research findings in Boyolali District inform that the trade in sustainable rice (SRP, healthy rice, Pamor-PGS organic rice) is distributed in several lines (line of trade). The trade route from mills (RMU) directly to consumers, is played by APOB. There is an intermediary role for sustainable rice traders, which is connected by the PPO ML trading channel. While the rice trade route from mills (RMU) to retailers is played by APOB and APPOLI. Meanwhile, the trade route to grocery (wholesalers) is carried out by PPO ML and APPOLI. How will this sustainable rice supply flow in the hands of intermediary traders, small traders (retailers) and wholesalers (grocery)? This research in Boyolali Regency did not conduct in-depth information on wholesalers (grocery), especially PT OBOR which is located in Palur, Surakarta City. Distance and time constraints are the reasons for not studying at PT OBOR. Finally, the deepening of information can only be done at an intermediary trader in Salatiga City, namely Warung Hijau Trukajaya. The following is Table 3.4 supply chain of traders to consumers of sustainable rice at the 3 existing sustainable rice nodes.

Table 3.4

Sustainable Rice Trader to Consumer Supply Chain

KNOT SRP	TRADER	CONSUMER
APOB Organic Farmers' Association of Boyolali	 UD Ragil Jaya Klaten and UD "Jaiz" Boyolali	 Individual consumers around APOB
PPO ML Organic Farmers' Group of Mersudi Lestari	 PT OBOR in Palur Surakarta area.	-

	 <p>Intermediary Trader "Warung Hijau Trukajaya" in Salatiga Regency.</p>	 <p>community "Warung Hijau Trukajaya"</p> <p>Healthy food "Warung Hijau"</p>
<p>APPOLI Organic Paddy Alliance of Boyolali</p>	 <p>PT OBOR in Palur City of Surakarta area</p>  <p>Individual retailer in Tegal Regency and Yogyakarta City.</p>	<p>-</p> <p>-</p>

From this described matrix, it can be seen that intermediary traders appear to be real only in the sustainable rice trade route at the PPO ML node. Sustainable rice intermediary traders can be pinned on the practice followed by Warung Hijau Trukajaya in Salatiga City. According to Evilla, the source of information on sustainable rice comes from the Indonesian Organic Association (AOI) network. Finally, Warung Hijau Trukajaya contacted PPO ML. In 2018 it began to take sustainable rice products as much as 800 kg - 1000 kg per month. However, because consumers questioned the organic certificate of sustainable rice produced by PPO ML, so that the sales declined. Therefore, starting in 2019, Warung Hijau Trukajaya only ordered 250 kg of sustainable rice from PPO ML per month. Moreover, it must be followed by forming the Koperasi Mersudi Mulyo Sejati (MMS) with 22 members of sustainable farmers in 2020. On the basis of the existence of Koperasi MMS, PAMOR dares to issue an organic certificate - PGS on sustainable rice produced by RMU PPO ML in Tawang Sari Village, Teras Subdistrict. Boyolali Regency.

The Warung Hijau Trukajaya marketed Boyolali's sustainable rice in the form of packaged rice with the label "PAMOR Organic Rice". The variety of rice sold is Inpari 64, with a selling price of 11,500 Rupiah per kg. According to Evilla, "We bought it from Pak Dwi Sumino for 9,500 Rupiah per kg. After paying for packaging and other things, that's why we sell rice at a price of 11,500 Rupiah per kg." The difference in the price of 2,000 Rupiah per kg obtained by Warung Hijau Trukajaya, after deducting operational costs, the net profit was approximately 1,000 Rupiah per kg. However, Warung Hijau is still having difficulty in adding and expanding the consumers of this Pamor organic rice. The healthy community that has been fostered by Warung Hijau Trukajaya so far, is basically organic food consumers. So, they are critical of the traceability of sustainable rice produced by RMU PPO ML, when they are offered rice labeled "Organic PAMOR".

3.2.4. Baseline of Sustainable Rice Consumer

Rice consumers in Boyolali Regency do not know and understand about rice with sustainable cultivation. This research explores information to 2 consumers of sustainable rice produced by RMU APOB and RMU PPO ML. Mutiah is a regular consumer of rice produced by the APOB

mill. Why she bought APOB-produced rice? Mutiah gave the reason, "I subscribed to APOB healthy rice every month 25 kg. The rice produced by APOB is cleaner and more secured. After all, I live next door to APOB, it's easy to just order and deliver it to your house." The variety of rice purchased by Mutiah is usually a mixture of Inpari 64 and Mentik Wangi, at a price of 11,000 Rupiah per kg. Does this consumer know that the rice she bought is sustainable rice cultivated with SRP? Regarding sustainable rice is not known and not known at all. These consumers only know about healthy rice produced by APOB, which is characterized by cleanness and quality assurance.

Consumers of sustainable rice produced by RMU PPO ML understand it as organic rice. Kristine is a consumer whose information is studied regarding sustainable rice consumption through the PPO ML trade route to Warung Hijau Trukajaya. Kristine and her family are part of a healthy community facilitated and fostered by Warung Hijau Trukajaya. In her mind and belief, the rice she consumed from Warung Hijau Trukajaya is organic rice. It because her family has been starting to consume organic food. In her speech, "My family and I have been living a healthy lifestyle by consuming organic food. So my family and I know that the rice we get from Warung Hijau Trukajaya is a monthly allowance because I'm an employee of Trukajaya. Because the label is organic rice, I understand that this is healthy rice." This situation is indeed a dilemma for both consumers and Warung Hijau Trukajaya. The organic rice label is attached because it has met PAMOR certification standards using the PGS (Participatory Guarantee System) approach. "We bear the moral burden to the actual sustainable rice farmers. They have to sell their rice products, even though our consumers actually object to the rice products that we label as "organic PAMOR," said a staff at Warung Hijau Trukajaya.

3.3 Closing

3.3.1. Conclusion

Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the following are the conclusions of the research results in Boyolali Regency, as followed:

1. **Information systems and actors in the sustainable rice supply chain in Boyolali Regency rely on collector-processor actors.** In the findings of research in Boyolali Regency, these actors are referred to as sustainable rice knots. The actors found are organizations, namely; APOB, PPO ML, APPOLI
2. **Market response and identification of sustainable rice consumer groups in Boyolali Regency are only a few who are local consumers.** The rest of the consumers of sustainable rice are in the consumer network of the Warung Hijau Trukajaya Cooperative in Salatiga City, the consumer network of traders in Klaten, Tegal, Yogyakarta, as well as through the PT OBOR network in Surakarta City and most likely evenly distributed throughout Indonesia.
3. **Gaps still exist among supply chain actors to implement sustainable rice traceability in Boyolali Regency.** Sustainable rice traceability, such as; rice seed varieties, cultivation techniques, types of fertilizers, pesticides, integrated pest control (IPM),

can be done well on farmer actors and PPK-PPM owned by farmer organizations. In the case of paddy slashers who are networked with PPM owned by PPO ML, the only traceability that can be done is "knowledge of low chemical rice" which is often accurately estimated for its production capacity (eg 1 Ha of rice land produces 7 tons of GKP). Meanwhile, the traceability of sustainable rice to traders and consumers is still very minimal.

4. **The development of a relevant and feasible sustainable rice business model to be developed in Boyolali Regency is the PPK-PPM business model which is owned and operated by farmer organizations with legal entities of Koperasi or foundation/association legal entities.** This business model is found in 3 current sustainable rice nodes in Boyolali Regency, namely; APOB node, PPO ML, APPOLI. The existence of nodes that play multiple roles (sustainable cultivation training services, rice harvesting services, transportation, drying, storage, milling, packing, to sales) provides guarantees for sustainable rice producers and traders.

3.3.2. Recommendation

The recommendation for the sustainable rice business model suggested for Boyolali Regency is **the PPK-PPM business model** which is owned and operated by **farmer organizations with legal entities of Koperasi or foundations/associations**. The business model canvas that can be compiled from these business model choices is as followed:

1. **The main partners of PPK-PPM are farmers, farmer groups, loggers, Saprodi providers, financial institutions, environmentally friendly technology providers, NGOs, local governments, BUMD, Pemdes, BUM Desa, and BUMDesa Bersama.** They need to strengthen literacy on sustainable models of cultivation and their benefits.
2. **The main activity required for the value proposition for PPK - PPM is the provision of sustainable post-harvest services.** Some service activities that can be developed, such as; harvesting services, transportation of GKP, drying of grain, storage of GKG, milling into PK and polishing/glosor rice, and rice packaging.
3. **The main resources needed for the value proposition for PPK - PPM are the availability of infrastructure, knowledge resources, human resources and finance.** Infrastructure facilities in the form of buildings for storage, drying, milling warehouses, including the presence of an adequate milling machine unit (RMU). Knowledge or intellectually related to sustainable model cultivation and sustainable rice that already has a brand, PSAT, and process and product certification. PPK-PPM has an experienced work team in processing and producing sustainable rice. The financial capacity of the PPK-PPM must also be strong and adequate to transact with rice producers, slashers, and traders.
4. **The value proposition of sustainable rice commodities for PPK-PPM customer satisfaction. Strengthening literacy related to sustainable rice for consumers is the**

main thing and must be done continuously. The establishment of a sustainable rice consumer community is urgent, followed by organizing and a series of literacy activities for healthy food consumption.

5. **Establish good and intensive relationships with consumers of sustainable rice.** PPK-PPM as the main provider of sustainable rice commodity products must maintain the knowledge, awareness, and willingness of its consumers to continuously consume sustainable rice. Various activities with the nuances of Health, environment and charity can be held to maintain good relations between PPK-PPM with consumers.
6. **Outreach to consumers can be done by PPK-PPM with various approaches.** This sustainable rice product offering can be done openly through social media, sports activities, cultural arts, health services. PPK-PPM can even offer cooperation to local governments, BUMDs, PEMDES, BUM Desa, and BUM Desa Bersama.

CHAPTER 4

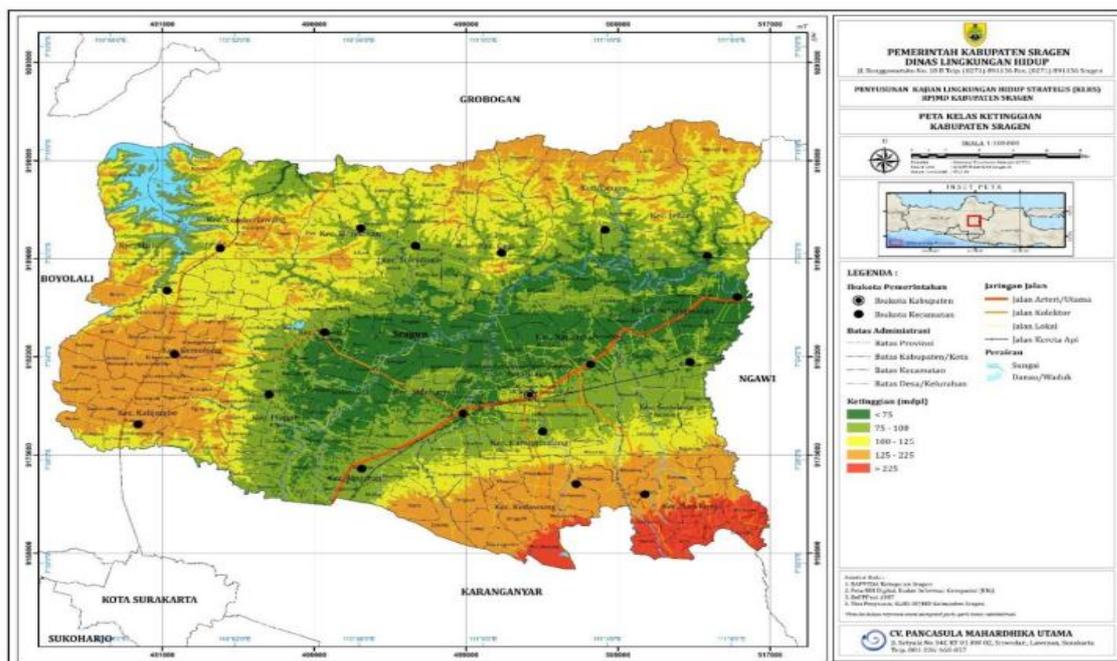
SUSTAINABLE RICE SUPPLY CHAIN IN SRAGEN REGENCY

The notion of sustainable rice in Sragen Regency has not been popular in many circles. Farmers are more familiar with the term rice as the type of variety planted, for example; Inpari, IR 64, Cisadane, and others. There are also farmers who call it ordinary rice or organic rice. Some farmers who practice environmentally friendly cultivation call rice environmentally friendly. While in the rice trade there are also those who add quality criteria, namely; premium rice (head rice) and medium rice. Consumers call the term rice even more diverse, namely; C4 rice, maros (long), aromatic, and healthy rice (organic). The following are the findings of research on aspects of local government policies, and sustainable rice supply chains in Sragen Regency, Central Java Province.

4.1 Baseline of Rice Agricultural Policy and Trade

Sragen Regency is one of the rice granaries in Central Java. Its area is mostly lowland (109 asl) so that it is very suitable for agriculture, moreover it is supported by the Bengawan Solo river which divides the Sragen regency. The potential of most Sragen regency is suitable for food farming, especially rice, as illustrated in Figure 4.1 below:

Figure 4.1
Map of Altitude Class of Sragen Regency



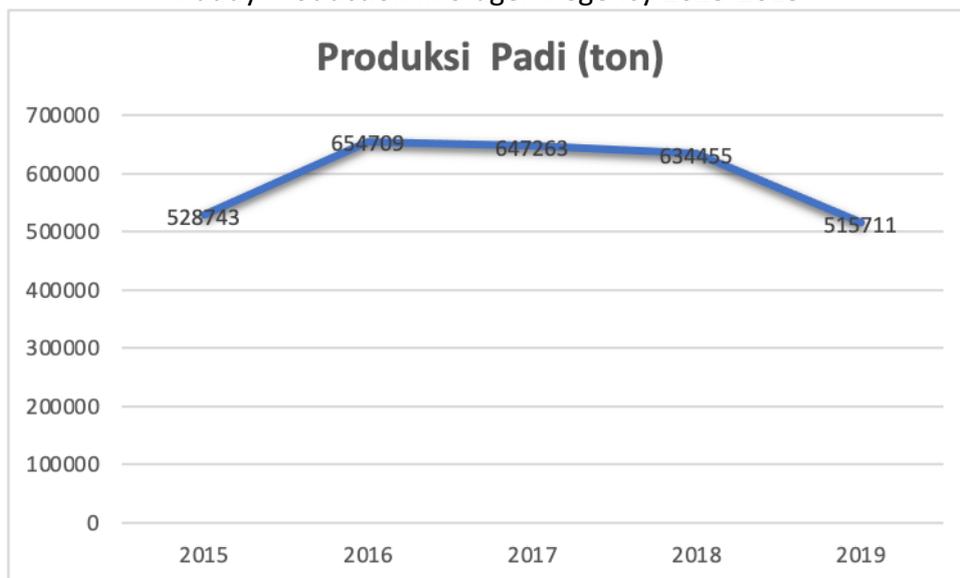
Source : KLHS RPJMD of Sragen Regency

With an average rainfall of between 138.4 mm-256.8 mm per year, Sragen Regency is an ideal location to develop rice during 3 seasons a year. Paddy production in 2020 was recorded at 668,553 tonnes, with productivity reaching 6.45 tonnes/ha. This potential is also the policy vision of the Regional Government which is contained in the third mission of the 2021-2026 Regional Medium Term Development Plan (RPJMD), namely increasing economic growth, investment and food security. The Sragen Regency Government is committed to optimizing increased economic growth including accelerating economic recovery during the Covid-19

pandemic through increasing the role of regional leading sectors, quality investment services, and increasing community food security, as well as increasing village community empowerment. Food security is intended so that Sragen Regency is able to increase its contribution as a national food barn for both PAJALE (rice corn soybean), fishery and husbandary.

Graphic 4.1

Paddy Production in Sragen Regency 2015-2019



Source : Regional Statistic of Sragen Regency The Year 2020

Sragen Regency has long had policies related to sustainable rice. In fact, since 2001, Sragen has pioneered a large-scale organic rice program. The nickname of the organic district has become an icon of this district. This program did not continue with the change of regional leadership (Bupati). However, at the farmer level, the development of organic rice continues to this day. In 2014, organic farming clusters can be seen in Sukorejo and Jetis Villages, Sambirejo District, Sragen Regency. Released by the Sragen Regency Government in May 2014, the total area of organic rice farming in Sragen Regency is 3,256.77 ha with a total production capacity of 19,439.78 tons.

Currently, the agricultural policy of Sragen Regency is to become a rice producer that is taken into account on a national scale. Some of these policies in rice production can be seen in the implementation of programs run by various agencies within them. From the Department of Agriculture there is a free rice seed program, a combi harvester grants to run a demonstration plot of 10 ha for the IP Padi 400 program model. Rice Planting Index (IP) 400, a program to increase rice production without requiring additional irrigation facilities and opening new land. The concept is that in one year in a stretch of rice fields that have year-round irrigation, rice can be planted four times. The Environment Agency also supports a business permit for rice milling. Meanwhile, the Trade Office focuses on supervising rice distribution. Because Sragen is known as a rice surplus area, a lot of rice and unhulled rice leaves the Sragen area. It is recorded that there are more than 34 rice mills (medium and large) selling local rice from Sragen outside the region.

The support for rice policy in Sragen Regency is also addressed by the support by the Regional Legislative Councils (DPRD) in the form of road construction for farmer production using aspiration funds. In particular, the DPRD has not yet issued a regional regulation that specifically concerns rice farming in Sragen Regency. The policy of becoming a food storage area is in line with the potential of its natural resources. However, this district does not have a specific policy regarding sustainable rice. In fact, there are several obstacles in realizing the ambition as a food barn area, including the limitation of subsidized chemical fertilizers. So far, farmers have received subsidized fertilizers, but now the price of non-subsidized pulp can increase three times, so that farmers reduce their use. On the one hand, this policy provides opportunities for farmers to try environmentally friendly methods.

Another challenge is the impact of climate change. Rice cultivation in addition to providing potential welfare for farmers, but on the other hand contributes to greenhouse gas emissions. Specifically, Sragen Regency does not yet have climate change action in rice cultivation. The use of high nitrogen fertilizers, intensive cultivation of paddy fields and prolonged immersion of paddy fields are the triggers for increasing greenhouse gas emissions from rice farming.

As one of the Regencies that has experienced developing sustainable/organic agriculture since 2001, Sragen Regency has partnered farmers who produce organic rice until now. Even the organic farming program has reached an area of up to 1450 ha. Moreover, agricultural facilities and infrastructure to support organic rice farming have also been initiated since then. Even in 2021, the Regent of Sragen will also continue efforts to develop organic rice in this Regency in collaboration with stakeholders including investors.

The organic farming policy has produced farmers who produce organic rice with internationally certified quality standards. Even has a special market. Efforts to develop organic rice have become one of the mainstays of agricultural programs, but have not been supported by regency policies in the long term. Sustainable rice development also does not yet have a place and specific policy support. Moreover, the term sustainable rice is still unfamiliar to hear. However, technically rice cultivation techniques that refer to sustainable rice cultivation standards have been widely practiced. Such as integrated pest control techniques which are quite popular with the IPM (Integrated Pest Control) field school program, the application of the SRI (rice intensification system) model, planting the *jajar legowo* model, to the development of organic fertilizers and pesticides from animal manure or other agricultural waste. Various sustainable rice farming techniques are already popular and are widely applied by farmers in their fields. Including when experiencing restrictions on subsidized chemical fertilizers currently encouraging many farmers to implement sustainable rice farming with organic fertilizers.

As the second largest rice storage area in Central Java after Cilacap, Sragen Regency does not yet have efforts to regulate prices in the market. Even though the highest retail price (HET) is controlled by the central government, when there is a big harvest, the selling price at the farm level always falls. Even when there is quite a lot of unhusked rice in Sragen, not all mills can operate smoothly. This is because a lot of grain in Sragen is directly purchased by traders from outside the region.

After the pandemic, Sragen Regency has also made efforts to boost its rice production and marketing. In addition to supporting organic rice efforts, Sragen Regency Government also supports the production and marketing of premium quality rice. Aside from the potential for the rice quota per season, Sragen also has the potential to produce certified rice like premium rice. Even in 2021 they will export rice to Arab and other countries.

4.2 Baseline of Sustainable Rice Supply Chain

The baseline study of the sustainable rice supply chain in Sragen Regency begins by gathering information from farmers who are currently running the SRP (sustainable rice platform) model cultivation program facilitated by Rikolto in collaboration with Preferred by Nature. Starting from the indept interview with Daryadi as the head of the Gemah Ripah Loh Jinawi farmer group from Pilang Village, Sragen sub-district. These initial findings have difficulty continuing at the market level, because the rice production process will only start in 2021 due to pandemic constraints. Some of the sustainable rice that is produced is self-consumed and only a small portion is sold as harvested dry grain. For this reason, the study was continued by the informants from farmers who had been facilitated by the Sragen Regency Government in developing sustainable rice to become organic producers namely Sriyanto, one of the administrators of the Sri Rejeki Group from Sukorejo Village, Sambirejo District.

4.2.1. Baseline of Sustainable Rice Producer

In Sragen Regency in 2021 the number of officially registered farmer groups will be 1,350 farmer groups with various organizational conditions. There is no official data on the number of rice farmers in Sragen Regency.

In this research, informants from the sustainable agriculture program developed by Rikolto Indonesia and Preferred by Nature through the CISU program, namely Daryadi of the Pilang I group in Masaran Sragen, have collaborated for 3 growing seasons since 2021. Daryadi is the head of the Gemah Ripah farmer group, loh Jinawi which consisting of 25 rice farmers. This farmer group has tried to develop a model of sustainable rice cultivation, combining several known methods/techniques and trying new things. From the rice varieties used, the average chooses the types available in the vicinity that can be purchased easily and are trusted according to the growing season. Before sustainable farming, the use of chemical fertilizers with a land area of 1,500 m² amounted to 150 kg (urea, KCL, ZA) now the dose is 58 kg, reducing up to 61.3%. In fact, since collaborating with Bank Indonesia's CSR from 2010-2015, the Gemah Ripah Loh Jinawi Group has begun to learn to develop various sustainable agricultural techniques and the use of agricultural technology from tillage machines, planting machines to combine harvester type machines.

Some of the lessons learned during sustainable agriculture assistance from Rikolto as followed:

1. Testing the soil pH before cultivating the land for planting is given 20 kg of dolomite so that it is not acidic from the frequent use of chemical fertilizers.
2. How to apply chemical fertilizers as needed, which was previously 150 kg now only 58 kg. Moreover, during the trial there was a reduction in subsidized chemical fertilizers.
3. Trial of legowo spacing 2:1, Planting Season (MT) September 2022 is a trial comparing the planting of jajar legowo with tiles, using the same dose of fertilizer, yesterday's

MT could not be carried out because of abundant water and farmers have not been able to control the high-water discharge enter the land.

4. Trial water management, namely digung (flooded) disat (dried) that is, aged 0 – 20 ST is flooded with water, 21 ST is dried until the ground is cracked and then flooded again. Stressing is really important if the panicles have come out but the aim is not evenly distributed so that the panicles grow simultaneously (75 - 80 ST), after that the water (young pregnant) really needs water to be stressed for 1 week.
5. Carry out the principle of controlling pests and diseases based on agro-ecosystem conditions, namely conducting weekly observations & controlling attacks of stink bugs in demplot land with their own ingredients

The economic potency in sustainable rice cultivation in a land area of 1,500 m² gets a harvest of 2 – 2.5 tons of GKP. In terms of the number of harvests, they are almost the same, only currently reducing production costs from the reduced use of chemical fertilizers. In MT 1 & MT 2, the average yield of GKP is 2 tons, if sold by cutting it will get an income of 4 – 5 million Rupiah/ 1,500 m². Meanwhile, on the 3rd MT, if the GKP harvest is good, the average yield of GKP is 2.5 tons, worth 6-7 million Rupiah/ 1,500 m² cut. The potency of sustainable rice production also encourages cooperation patterns with slashers or harvest service providers. So far, slasher does not treat sustainable rice products specifically because their productivity is still low and the volume is too small to receive special treatment.

While the potential for environmental aspects in sustainable rice cultivation includes reducing the use of chemical fertilizers by around 61.3% and applying the use of organic fertilizers from the manure of the cows they keep. Management of water use for irrigation in accordance with the needs of plant growth and save labor costs. By utilizing local potential plants for natural pesticides to control pests and diseases.

During post-harvest, land processing uses a tractor machine, as well as harvesting using a tracer or combine and the crops are dried in the sun. Agricultural waste is used for animal feed, husks are used for organic fertilizer, rice bran is used for cattle feed, and groats for chicken feed.

Socially, developing sustainable rice also restores the function of gotong royong related to meeting basic food needs communally. Because saving rice at home will become social capital and family food savings. Because the rice farming business is very culturally strong, often management aspects such as recording costs, business plans are not documented. They rely on memory alone.

The Pilang I group is well known and has been accompanied by a CSR project from BI (Bank Indonesia) for 5 years ending in 2015. In addition to receiving assistance, the Pilang I group also received equipment assistance, namely tractors for tillage, planting machines, harvesting machines (combine), until now BI is still monitoring the condition of the equipment and machine inventory assistance.

In producing sustainable rice, the Pilang I group also received support for the operational costs of the demplot at program costs, namely plowing, tillage, planting fees, buying fertilizer, weekly maintenance, weekly meetings, harvesting costs.

The current challenge is that the Pilang area is designated in the IP Padi 400 program where in a year you have to plant rice for 4 seasons. This is felt to be contrary to the principle of environmental sustainability because it does not give the soil a chance to rest and it is feared that the soil will be damaged.

This sustainable rice cultivation practice has made the Pilang group increasingly known and requested as a resource person at the Sragen Regency level by the Department of Agriculture & Soloraya level in Sukoharjo including farmers from Kalijambe District, Plupuh District, Ngrampal District, Sepat Village-Masaran District starting to implement sustainable rice cultivation practices.

In addition to the Pilang I region, it has the potential to develop sustainable rice. In addition to the potential of the rice fields owned by this village, the average rice farmer also plants 3 planting seasons a year. From the Pilang I group, which has 25 members, on average they cultivate their own land or lease up to 2-4 stakes (1 stake is equivalent to an area of 2,300 m²). The challenge is who is willing to accommodate the harvest of farmer groups/farmers with insufficient capital and don't know the sales network, including not knowing the market share of sustainable rice.

The development of sustainable rice cultivation can also refer to organic rice producers, namely the Sri Rejeki group from Sukorejo village, Sambirejo District. Information from Sriyanto, the management of this farmer group initially developed a sustainable rice model which later became an organic rice producer. The farmer group, which was established on August 14, 1990, has been developing environmentally friendly agriculture since 2010, the second generation which was previously pioneered by their parents. In 2010 through studying in the SLPHT program, in 2013 the SRI program, in 2016 received SNI organic rice Certification from the Indonesian Organic Farming Certification Institute (LSO) Organic Farming Certification (Inofice). Sri Rejeki's experience in implementing environmentally friendly rice farming is done by treating the soil to make it fertile because the soil is hard due to the use of too many chemical fertilizers in a long time. Previously the use of chemical fertilizers in an area of 7000 m² was sprinkled with chemical fertilizers up to 3-4 quintals of urea and Phonska. The use of pesticides minimum of 2-3 bottles per season. Now it has been replaced by using natural pesticides (fungicides, bacteria) materials available in the village and the availability of organic fertilizers is quite a lot. Economically, organic rice cultivation is more economical because the materials are available in the environment and do not require money to buy them.

In terms of production, after practicing sustainable rice, from an area of 7000 m² from the usual yield of 6-6.5 tons, GKP decreased to 4.5-5 tons. Only after planting 4-5 seasons (or about 2-2.5 years), production returns to normal. For organic rice currently grown by Sri Rejeki farmers, the grain harvest is accommodated in groups. Besides accommodating, this group owns a small-scale mill as well as has cooperation in marketing in Sragen locally, to Palur, Purwodadi and PT Beril, Jakarta.

Sri Rejeki experienced the challenge of developing organic rice if the land adjacent to it was planted with chillies, melons and brambang plants which had not been able to leave the pesticides, a border filter had to be made with the kolojono plant or plots close to it, the crop yields were not included in organic rice. For the water channels that enter the land, a filter is prepared at each water entrance with a width of 2x2x1 m, water hyacinth is added to absorb residue.

Haven't thought about whether there is a crop failure, whether it is insured or something else. Organic certification is valid for 3 years and every year under surveillance from LSO Inofice, the soil is tested and the rice is tested for chemical residues. Until 2003 it was financed by APO (Organic Farmers Alliance) Sragen Regency. The challenge is that there are still requests that the marketing group has not been able to fulfill.

The Sri Rejeki farmer group is one of the groups that is still consistent in carrying out the organic rice production process. When the support of the government has diminished, many farmer groups return to conventional farming models but still apply environmentally friendly practices (sustainable agriculture).

4.2.2. Baseline of Sustainable Rice Processor

The actors who play a role in bridging rice from farmers to the market are carried out by traders (cutters or collectors). Traders (penesas) play a role in buying rice from farmers, both before the rice is harvested and when it has been harvested by the farmers. Farmers in Sragen are very rely on the role of collectors because on average they no longer have a place to process their grain, both for drying/drying, storing and often also because of an urgent need. There are traders (cutters) who act as an extension of the mill owner, purely independent grain buyers or just sellers of grain trading services.

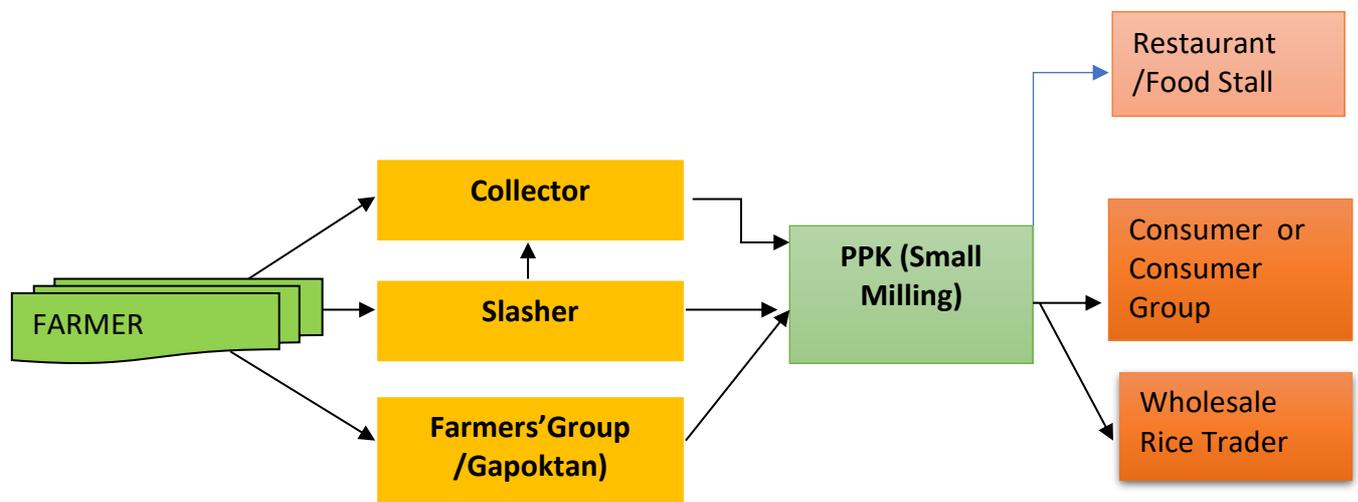
Since there is no specific designation yet for sustainable rice in Sragen, the rice managed or purchased by traders (penebas) is only called rice. Within rice collectors, they were only differentiated based on quality, namely good (weight, pithy, undamaged) and ordinary. Collectors do not distinguish rice varieties planted by farmers. But collectors understand the types of rice varieties.

One of the slashers who bought sustainable rice from the Gemah Ripah Loh Jinawi farmer group is Suyanto from Kliwonan Village, Masaran sub-district. Suyanto has more than 30 years of experience as a slasher in Sragen, Sukoharjo, Karanganyar, even as far as Pematang and Tegal. The slasher never differentiates whether rice plants are cultivated in an environmentally friendly way or not. The average seen is the quality of the grain. The determination of the purchase price from farmers based on land area (for forecasting yields), grain conditions and current prices. High competition among grain traders often makes traders (slashers) use strategies to convince farmers. Starting from giving higher prices, lending tools to giving down payment before the rice is ready to be harvested. This includes rice produced by the Gemah Ripah Loh Jinawi group which is usually sold to Suyanto, because the current production is good, the rice is not sold in bulk (slashed) but is sold per kilogram.

Suyanto remained mention that rice grown with sustainable farming techniques usually different in terms of its the quality of the grain, which is pithier and the plants are usually more disease resistant, not easy to collapse. This is because the use of organic fertilizers makes the soil better, more fertile and the rice stalks stronger. In an environmentally friendly cultivation system, it will produce better rice plants because there are efforts to control pests and diseases, provide organic fertilizers, and provide appropriate water. Currently, many farmers also choose to sell at a price per kg, not a wholesale estimate, especially if the cultivation process is good in a sustainable way like the farmer groups in Pilang I or Sri Rejeki. Figure 4.2 depicts the sustainable rice supply chain from the middlemen to the KDP in Sragen Regency.

Figure 4.2

The Role of Actors in the Sustainable Rice Supply Chain in Sragen Regency



In detail the roles of each actor and their product outputs are described in Table 4.1 below.

Table 4.1

The Role of Rice Supply Chain Actors in Sragen Regency

ACTOR	ACTIVITIES	PRODUCTS
Farmer : Daryadi & the gemah ripah loh Jinawi Group, Sriyanto	Sustainable rice cultivation Developing environmentally friendly cultivation techniques Organizing other farmers in the field in producing sustainable rice	Harvested Dry Grain
Slasher Suyanto	Purchasing in bulk or per kg of harvested dry grain from farmers Selling dry grain rice, storing it to collectors or directly to PPK to be processed into rice Prepare harvesting and transportation equipment Accommodating farmers' products from slashers Provide capital to the slasher for the purchase of farmers' grain	Milled dry grain / keep
Collector Suyanto	Selling dry grain rice, storing it to collectors or directly to PPK to be processed into rice	Milled dry grain / keep
Farmers'Group /Gapoktan KT. Gemah Ripah Loh Jinawi KT. Sri Rejeki	Literacy / education of member farmers Financing support and provision of organic seeds and fertilizers Accommodating the products of its member farmers Cooperating with PPK in processing grain into rice.	Harvested Dry Grain
PPK (Small Milling) Joko Susilo	Processing harvest dry grain into rice Accommodate products from farmer groups or collectors Selling polished rice to the market (consumers, retailers, traders, etc.) Producing PK rice and selling to middle mills	Brown Rice, Polished rice, bran and rice groats

Currently, many collectors have to compete with other collectors. In fact, they use many ways to attract farmers to sell their grain to them. In addition to the down payment factor to other facilities, for example, the price is slightly different from other collectors. It is also the choice of farmers to choose collectors who are well known and live in areas close to farmers. Because a lot of experience grain is bought by collectors from outside the city, then the payment for the grain is not resolved.

One of the informants who acts as a collector as well as a processor working with small-scale milling machines is Joko Susilo who owns that machine (capacity below 700-1,000 GPK kg/day) in Pilang Village, Masaran District. Collectors can get harvested dry grain from farmers who sell directly or have to hunt in the field while competing with other collectors. The yield of grain will affect the quality of the rice produced. Good yields can only be produced by good cultivation methods and reducing chemical fertilizers. Collectors understand that sustainable rice cultivation methods will produce quality rice. Even if processed organically will produce good rice. According to Joko Suyatno, the challenge as a sustainable rice collector is still in

small volumes, so separating it from other rice is considered economically unprofitable. This is related to the milling machine it runs because it requires the same operational costs (labor and fuel).

Collectors and processors generally understand which varieties are selected and which season produces a good harvest of dry grain. In the second or third growing season, when the rain has lessened and even starts to dry, it will produce harvested dry grain that has a higher yield, compared to grain produced in the rainy season. The yield (percentage of the weight of rice produced from milling grain or milled paddy) in the dry season (gadu) can reach 54%, while in the rainy season it is around 48%. This means that by grinding one quintal of grain, you will get 48-54 kg of rice.

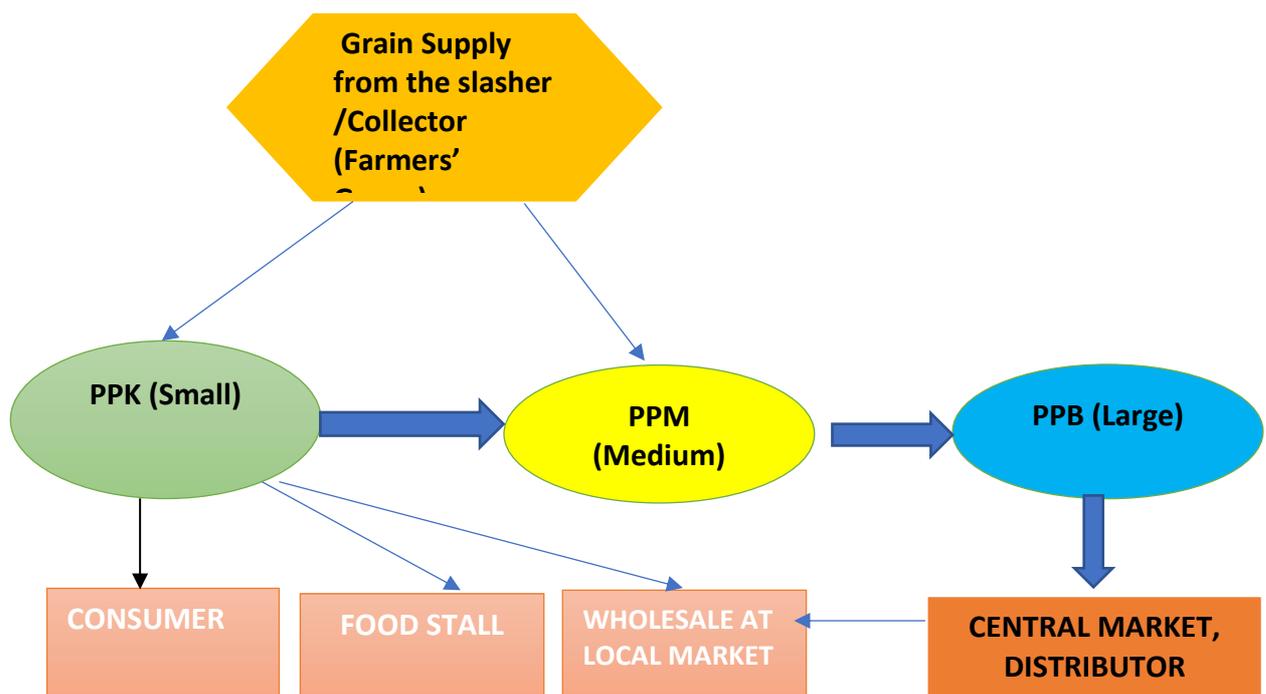
In medium and large mills, grain is obtained from both collectors and small mills. Currently, the demand for brown rice is increasing, so that small-scale rice mills process the grain into brown rice, and then sell it to medium or large mills. Meanwhile, large-scale milling because it has a more sophisticated machine and a large capacity will receive harvested dry grain and brown rice. Opportunities for sustainable rice in the future are highly dependent on the volume it produces. Learning from the experience of organic rice, the opportunity for sustainable rice in the market will be managed by small-scale mills.

4.2.3. Baseline of Sustainable Rice Trader

There is no particular trade for sustainable rice in Sragen Regency. Because of this, the pattern of sustainable rice trading follows the general scheme, namely the trading of ordinary rice and organic rice. Generally, the rice supply chain in Sragen Regency can be described through Figure 4.3 below.

Figure 4.3

The Scheme of Rice Processing in the Mill of Sragen Regency



In the chain of processing grain into brown rice (PK) or polished rice, in Sragen there is a pattern that is now developing, namely where PPK serves the process in small batches, which is processed directly from the farmer until it is ready to be sold to consumers, food stalls or retailers in the local market. Meanwhile, medium and large-scale rice mills (PPM and PPB) share roles in processing grain into rice. Many PPMs now only carry out the function of processing grain into brown rice (PK). In addition to the reasons for the limitations of polishing and grading technology, they also polish better and the market they have. Whereas PPB (Large Rice Mills) generally have more sophisticated mills, adequate finances and market networks, so they can carry out all processes. However, to accelerate the fulfillment of market quotas and make it easier to get a continuous supply of grain in the required quantity.

Table 4.2
Different Roles of Rice Mill in Sragen

ACTOR	ACTIVITIES	PRODUCT
PPK (Small Scale Milling) Joko Susilo KT Sri Rejeki	Processing harvest dry grain into rice Accommodate products from farmer groups or collectors Selling polished rice to the market (consumers, retailers, traders, etc.) Producing unhulled rice or PK rice and selling to medium mills	PK rice, polished rice, bran and groats rice
PPM (Medium Scale Milling) Amin Hadi Sumarto	Processing harvested dry grain into PK (brown rice) rice Accommodating products from collectors Producing PK rice and selling to big mills	PK rice, bran and groats rice
PPB (Large Scale Milling) Mulyono Mulyosari), Jalal, Zaini	Purchasing and processing grain into rice and PK rice into polished rice Selling polished rice to the market (main market or rice traders) Provide financing for the purchase of grain or PK rice.	PK rice, polished rice, bran and groats rice

The chain of rice distribution and trading channels in Sragen generally has several types of channels according to the types and market segments. Rice trade routes as followed:

1. Harvested Dry Grain Trade (GKP)

This trade is the simplest way because the sale of harvested dry grain (GKP) is generally carried out by traders (slashers or accomplices of rice mill owners) to farmers who need money urgently. Farmers who manage their paddy fields, especially in technically irrigated areas, do a lot of trading their GKP to pursue the next planting season. This distribution pattern reduces costs incurred by farmers because they do not need to pay for harvesting, but the profit is very small. The cost of harvesting (treser and labor) for distribution is borne by the slasher or capital owner. The distribution channel is very short because it only goes directly from farmers to slashers. The cutters are paid to the owner of the mill, or the cutters

are brought home to be managed by themselves. This method is widely practiced by Suyanto in obtaining grain from farmers.

2. Milled Dry Grain (GKG)

Trade of dry milled grain has 2 kinds of channels, namely:

- a. Farmers to farmer groups or rice mill owners
- b. Farmers to collectors then to the owner of the rice mill

Farmers sell milled dry grain (GKG) through this channel after the grain has been treated for drying and storage. Farmers have the opportunity to increase profits by considering the right time to sell according to market prices and their needs. Farmers can also cooperate with other farmers in selling large batches to traders who are willing to pay a higher price. This model is mostly carried out by farmers in rain-fed irrigation and technical irrigation areas who have intercropping patterns and capital reserves for planting in the next MT, and farmers which its gapoktan own whose capital savings and loan businesses or agricultural saprodi.

3. Brown Rice and Poles Trade

This rice trade model is mostly carried out by owners of small-scale rice mills, either in the form of brown or polished rice, because they have the equipment (machines and warehouses) as well as the capital to buy from farmers. Rice traders in the Mojosoongo market, such as Sumi Marimin, who collect polished rice from Joko Susilo's PPK, which sells retail to consumers or food stalls around the Mojosoongo market, Surakarta. According to Sumi, the character of the rice buyers prioritizes the price and physical appearance of the rice. Only a few consumers want premium and aromatic rice. The desired price is in the range of 9,000 – 11,000 Rupiah. This price range has provided a profit of around 500 – 1,500 Rupiah/kg of rice sold. Before the pandemic, household consumers purchased around 2-5 kg of rice/day/person. Meanwhile, food stalls range from 5-10 kg/day or at least 25 kg/week. In a day trading rice between 25-50 kg / day.

The situation is slightly different with the organic rice trade. Due to the limited volume and the need for a traceability process on the product, organic rice since harvesting is directly accommodated by farmer groups or Gapoktans such as the Sri Rejeki group in Sambirejo, processed by a special mill and sold in a market chain that is developed separately. This is to ensure organic rice can reach consumers in need.

4.2.4. Baseline of Sustainable Rice Consumer

As a consumer of the main food source for Indonesian people, rice has various segments. This is not only based on economic ability but also because of the influence of knowledge and social culture. General understanding of consumers about rice is only based on its physical condition/outward appearance such as long or round shape, white, red or black color and clean from husks, stones or other impurities. The term sustainable rice is rarely known and used in rice business. The term popular rice is ordinary rice or organic rice. There are also those who are starting to get to know premium rice which is usually packaged nicely and sold in modern stores, for example Rojolele rice, menthic and fragrant pandan. Consumers' understanding of sustainability partially calls semi-organic rice because it is known to start reducing chemical fertilizers, pesticides and is grown with due regard to environmental elements. There are also those who call it natural rice because it uses organic fertilizers and

no pesticides. The consumer informants in this research are Nanik (household consumers) and Retno Ambarwati (lecturer) who are experienced in consuming plain rice and sustainable as well as organic rice. The food stall consumers are sellers of Javanese food stalls around the Mojosongo market who get rice from rice seller Joko Susilo.

In Sragen, consumers' tastes (individuals or groups) for rice are mostly long-form rice (Inpari, Ramos, C4), white and the price ranges from 9,000- 10,000 Rupiah/kg for the medium class and the price is 11,000- 12,500 Rupiah/kg for head or premium rice. Meanwhile, the price of organic rice varies between 15,000-17,500 Rupiah/kg. For organic rice, consumers do not demand a certificate, the important thing is that the quality is good and produced by trusted farmers. Certificates will also increase consumer confidence. However, consumers also think that certified rice will make the price of rice more expensive.

Retno Ambarwati's suggestion that now switch to organic rice, consumers of sustainable rice should be explained about the quality changes, or at least inform the packaging or publications, so that consumers can distinguish it from ordinary rice.

Sustainable rice marketing can imitate the organic model. So far, consumers to get organic rice in Sragen can buy through groups that produce directly or at shops known to provide this product. It is also proposed that sustainable rice should be provided and marketed through a special channel in order to differentiate it from other rice and make it easier for consumers to obtain it.

For group consumers (food stalls or restaurants), the existence of sustainable rice also opens up opportunities to be provided or sold to restaurants that have consumers who understand the quality of the rice. Because to sell organic rice according to consumer groups the price is too expensive. So that with sustainable rice you have the opportunity to get semi-organic rice at an affordable price. So far, group consumers buy in larger quantities than household consumers. The average purchase is above 10 kg/week up to 25 kg/week depending on whether it's busy or not. They prefer to buy in limited quantities as needed rather than large quantities because the money is used for business turnover. In addition to buying rice in large quantities, it should provide loose financial capital, need a place to store it, and if it takes too long, it is afraid that the rice will get bug.

4.3 Closing

4.3.1. Conclusion

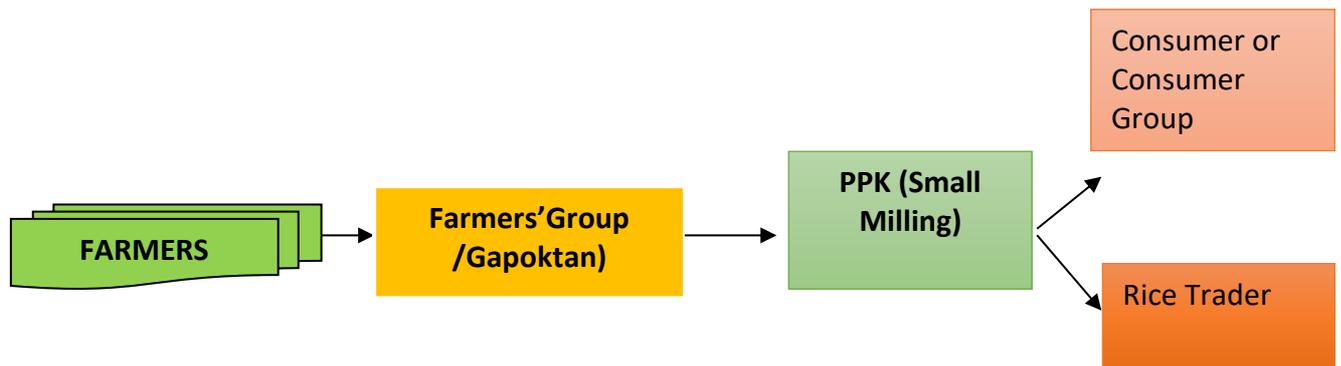
Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the following conclusions are drawn from the research results in Sragen Regency, as followed:

1. To encourage sustainable rice getting opportunities and share in the rice trade in Sragen, it seems that we have to imitate the pattern of organic rice. This is because besides the production volume is still small and not yet popular in all circles, rice needs to get its own space by means of strong branding. Sustainable rice branding must start from the production process from the farmers. Farmers must declare changes to their production processes. In addition, farmers must work together in groups and even Gapoktan to pursue the amount or volume of production that can be controlled efficiently in the processing

from grain to rice. The information system can be built by farmer groups like the Sri Rejeki farmer group. Because this is an important point after sustainable rice production after being produced by farmers. The scheme of a sustainable rice supply chain is illustrated in Figure 4.4 below.

Figure 4.4

Sustainable Rice Supply Chain Scheme in Sragen Regency



2. Rice plants that are cultivated to produce sustainable rice are characterized by better grain quality. This is recognized by slashers, processors to consumers. Therefore, it is very unfortunate if this rice has started to be produced and then mixed with lower quality rice. In Sragen Regency after there was no organic farming program, quite a lot of farmers who used to develop organic rice are now still practicing environmentally friendly methods. It's just not known the exact data on the number of these farmers. Judging from official data in 2014, the total area of organic rice farming in Sragen reached 3,256.77 ha. One of the areas that still operates organic rice is in the Sambirejo sub-district, namely Sukorejo village (134.38 ha), Jetis village with an area of 53 ha, and Jambeyan village with an area of 42.19 ha. Meanwhile, groups other than in the Sambirejo sub-district are still active, especially in producing organic fertilizers and pesticides.
3. The gap which is quite important besides the quantity factor or the amount of production and farmer information is the sustainable rice off taker. If it is submitted to the free market as is the case with grain today, then sustainable rice will not get a place. Learning from organic rice off takers, groups or Gapoktans can function as collectors or traders from farmers. Collectors by utilizing small-scale RMUs can process and process rice grain in a better sustainable manner. Likewise, it can help resolve price issues at the farm level. So far, farmers often get unfair prices from their production process. Even eco-friendly ways to produce rice sustainably don't fetch a better price. Daryadi's experience in producing rice in a sustainable manner, only benefited economically from the efficiency of using chemical inputs which were usually purchased but then he could produce himself. Grain that is wholesome from the production process does not guarantee a higher price if it is sold by wholesale or slashing.

4.3.2. Recommendation

Recommendation from this condition, the relevant business model to be carried out in Sragen refers to the business carried out by the Sri Rejeki farmer group is a business model between PPK and PPM which is open to operation by a fairly solid farmer organization. Sustainable rice producers must organize themselves with other farmers so that the rice they produce can reach large quantities. This can be done through cooperation between farmer groups even at the Gapoktan scale. Grain products produced by farmers will require other partners who act as collectors.

Learning from Sri Rejeki, collectors are played by farmer groups who have the financial capacity to be able to pay for the grain produced by farmers. If collectors are able to run it, then the rice milling process can be carried out by entrepreneurs whose RMU. Even to help market, it can be done by working with the parties.

The following are the efforts to build a canvas business model that can be chosen in running a sustainable rice business in Sragen Regency, namely:

1. Farmers and Farmer Groups are the main partners of PPK and PPM in supplying harvested dry grain. Several partners can be involved, starting from entrepreneurs who provide production facilities and equipment (combines, car rentals, etc.), financial institutions, BUMDes and BUMD, KUD to Village and Regency Governments. In addition to the ability to master technology, there is also a culture of literacy regarding sustainable agricultural cultivation.
2. Improving the quality of post-harvest processing services, especially sustainable rice products, is urgently needed by PPK and PPM. Some activity services that have the potential to be developed starting from harvesting, such as; harvesting services, transportation services, drying and storage of grain, milling into PK and polishing/glosor rice, and rice packaging to marketing.
3. To support sustainable rice production from producers to consumers, PPK and PPM need various supports from infrastructure, human resources (knowledge and skills) to finance. The financial capacity of PPK - PPM needs to be supported in order to be able for having transaction with rice producers, slashers, and sustainable rice traders.
4. Good infrastructure, starting from accommodating harvested dry grain for harvest, sustainable rice products from farmers, drying them, until they are ready to be processed in the mill. Milling machines need to be upgraded to make them more efficient both in terms of the fuel used and the processing. Sustainable rice products need to be documented and certified so that they have good "branding" from farmers to processing, marketing to end consumers.
5. Build cooperation with new partners (off taker) in absorbing sustainable rice produced by farmer groups. The development of market channels (Market Development) for sustainable rice can specifically be an intervention through an inclusive (not exclusive) market. This is because the potential of rice market players is quite significant and has large resources to absorb sustainable rice. The new rice distribution channel could be an

option in marketing it. In addition, the new product packaging will make sustainable rice have a market.

6. Strengthening literacy related to sustainable rice to consumers through campaigns and promotions by having offline and online media. The use of social media as an efficient and inexpensive medium can be done to organize sustainable rice consumers. This can be done by PPK who already have direct consumers as well as retailers (food stall sellers or rice retailers). The theme of campaigns and promotions is very easy if they are related to the theme of health, the impact of climate change or social issues related to the welfare of farmers.

CHAPTER 5

Sustainable Rice Supply Chain in Ngawi Regency

The term sustainable rice was not yet known by the interviewees in Ngawi Regency. There are three types of rice/paddies that are known in Ngawi Regency, namely; organic rice/rice, uncertified organic rice/rice, transitional rice/paddy³.

In addition to these terms, during interviews with informants, they often mentioned the terms healthy rice, environmentally friendly rice, and semi-organic rice. In the Baseline Study of Sustainable Rice Supply Chains, especially in the producer chain, the selected informants are those who develop agricultural cultivation low in chemical fertilizers and pesticides. And do not dig up information from farmers who develop organic rice cultivation.

The selection of the informants was done because of the considerations: 1) agriculture with low chemical fertilizers and pesticides is a sustainable cultivation model that is close to the SRP (sustainable rice platform) cultivation model and or which is more or less close to the SRP cultivation pattern. 2) In 2020 the Indonesian Organic Agriculture Network (JAKER PO) together with the People's Coalition for Food Sovereignty (KRKP) and supported by Oxfam Indonesia conducted research on organic rice supply chains in five sub-districts in Ngawi Regency. The assumption is that the organic rice supply chain in Ngawi Regency has not undergone significant changes in the last two years.

The presentation below is the result of sustainable rice supply chain research at the level of producers, collectors-processors, traders and consumers in Ngawi Regency. Farmers or farmer groups are the first link in a sustainable rice supply chain. Farmers or farmer groups have the role of supplying raw materials (grain) to the processing industry. The processing industry is a stakeholder that plays a role in grinding paddy into rice. Traders are supply chain stakeholders who do not carry out production activities, their role is to distribute and sell rice produced by farmers, and consumers are the last link in a sustainable rice supply chain that consumes the rice produced.

5.1 Baseline of Rice Agricultural Policy and Trade

Ngawi is one of the districts in East Java Province, which is directly contiguous to the north and west of Central Java Province. On the north side, Ngawi is directly contiguous to Grobogan and Blora Regencies (Central Java Province) and Bojonegoro Regency. In the west it is bordered by Karanganyar Regency and Sragen Regency (Central Java Province). Meanwhile, on the east side, Ngawi is directly contiguous to Madiun Regency, and to the west, it is bordered by Karanganyar and Sragen Regencies.

Ngawi Regency consists of 19 districts and 217 villages, with an area of 1,295.98 km², all of which are land. The typology of the Ngawi Regency area is mostly flat land. It is recorded that there are 4 sub-districts located in the highlands, namely Sine, Ngrambe, Jogorogo, and Kendal. Meanwhile, 15 other districts are located on flat land.

³ Transitional rice is rice produced from paddy fields which remains in the process of transitioning from previously using chemical fertilizers and pesticides to using organic materials or not using chemical fertilizers and pesticides.

Figure 5.1

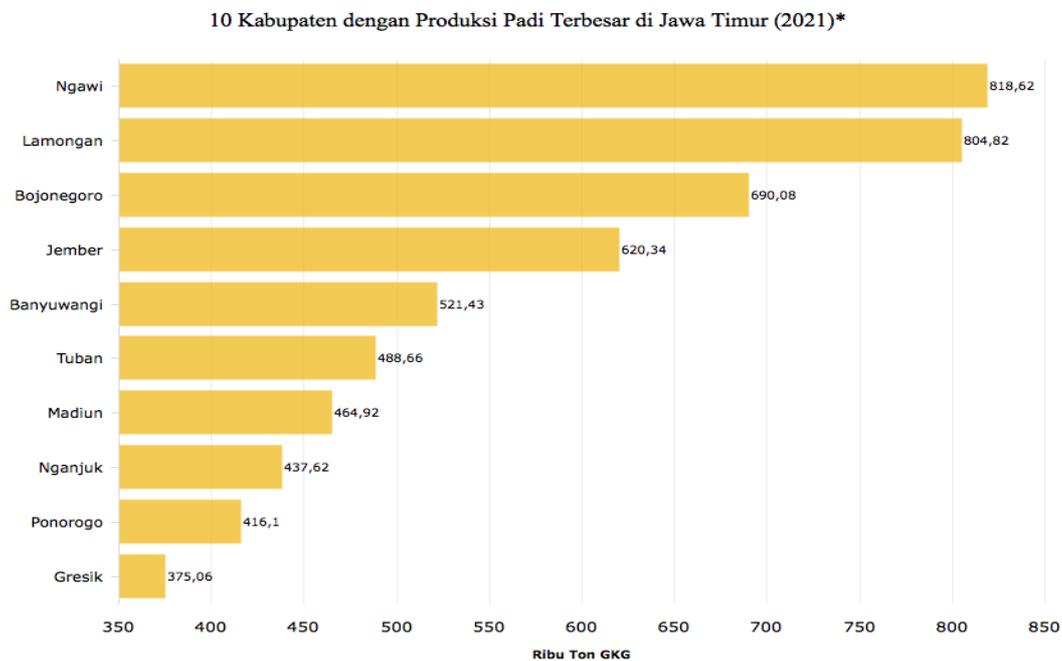
Administrative Map of Ngawi Regency



Ngawi Regency is the largest food granary for East Java Province. According to data from the Central Statistics Agency (BPS), in 2021 East Java will be able to produce 9.91 million tons of dry milled grain (GKG). Of the 9.91 million tons, 818.62 thousand tons came from Ngawi. The highest rice production in East Java during 2021 occurred in March, which reached 2.19 million tons. Meanwhile, the lowest production occurred in January, which amounted to 0.30 million tons. After Ngawi, the next largest rice centers in East Java are Lamongan Regency with 804.82 thousand tons of GKG and Bojonegoro Regency with 690.08 thousand tons of GKG. These three regions contribute more than 23 percent of rice production in East Java.

Graphic 5.1⁴

Distribution of the Top 10 Rice Producer Regencies in East Java Province



The emergence of Ngawi as the highest rice producer in East Java Province is an achievement in itself, and shows an increase in rice productivity in Ngawi Regency. When viewed from BPS data (2018), in 2019 Ngawi Regency was the third largest rice producer in East Java Province with an area of 93,310 hectares of rice fields and production of 753,199 tons per year.

The increase in rice productivity in Ngawi Regency was the result of an agricultural mechanization program carried out by the Ngawi District Agriculture Office, namely in the form of providing agricultural equipment and machinery (alsintan) and several other programs. With the help of these tools, cultivating farmers' land becomes faster, planting is faster, as well as harvesting is faster so that Ngawi farmers can plant and harvest 3 times/year (alsintan). In addition to alsintan assistance, the government also provided subsidized fertilizer and seed assistance⁵.

In addition to agricultural mechanization programs and subsidized fertilizer and seed assistance, the agriculture office has also developed several strategies for supporting farmers and supporting the agricultural sector. **First**, providing protection to farmers with crop failure insurance for rice crops. **Second**, holding a partnership with rice activists, namely farmers directly to the company. **Third**, security at the production level to maintain rice yields. As the

⁴ <https://databoks.katadata.co.id/datapublish/2022/01/18/kabupaten-ngawi-sentra-produksi-padi-terbesar-di-jawa-timur-pada-2021>

⁵ <https://tabloidsinartani.com/detail/indeks/agri-sarana/8957-Berkat-Mekanisasi-Produktivitas-Padi-di-Ngawi-Naik-8-TonHa>

spearhead, the agricultural service deploys field extension officers (PPL) scattered in each village. The role of PPL is to act as a bridge between farmers and the agriculture office. The agriculture office makes PPL as a data collector and funnel for official programs to farmers, while farmers make PPL as a carrier of farmers' aspirations to the agriculture office⁶.

Since 2001, in Ngawi Regency, organic farming has been developed. The program was initiated by the Ngawi Regency Government and the farming community in Ngawi Regency⁷. In 2019, in Ngawi Regency there are 32 hectares of organic rice land with production reaching 196 tons per year, as well as 100 hectares of 'semi-organic' land which is targeted to become organic rice land in the future⁸.

From research conducted by the Indonesian Organic Agriculture Network (JAKER PO) together with the People's Coalition for Food Sovereignty (KRKP) and supported by Oxfam Indonesia (2020), it was identified that the toughest challenge that arises in developing organic rice in Ngawi is certification. To obtain an organic certificate from an authorized institution, the process is not easy and requires high costs, which can reach up to 30 million rupiah per one certification. In addition, supporting technologies for the realization of organic requirements such as organic fertilizers, biological agents and provision of organic seeds are also limited. Meanwhile, in the cultivation process, rat pest attacks are very damaging to plants. Significant ecosystem shifts trigger increased pest and disease attacks⁹. At present, three types of rice are produced in Ngawi Regency, namely certified organic rice, non-certified organic rice and transitional rice¹⁰.

To encourage the absorption of organic rice produced by Ngawi farmers, on March 25, 2022 the Ngawi Regent issued a Regent Circular No. 144/03-72/404.102.1/2022 which requires ASN to buy organic rice every month. The amount of the purchase of organic rice is determined based on the echelon level. For echelon 2 as much as 15 kg, echelon 3 as much as 10 kg, and echelon 4 as much as 5 kg. The selling price to ASN per 1 kg is 15,000 Rupiah. The issuance of the Regent's SE is expected to encourage farmers to produce organic rice in Ngawi Regency and improve the welfare of farmers in Ngawi Regency.

5.1.1. Supply Chain of Organic Rice

In 2020, JAKER PO together with KRKP and supported by Oxfam Indonesia have traced the organic rice supply chain in five sub-districts in Ngawi Regency. From this research, it was mapped out that farmers managed a land area of 1 hectare, which was entirely planted with

⁶ <https://harianbangsa.net/kabupaten-ngawi-komitmen-jadi-penyangga-pangan-saat-pandemi-covid-19-luas-sawah-padi-bertambah>

⁷ One of the communities that still exists in Ngawi Regency is the Ngawi Organic Center (KNOC) Community. KNOC is a community or forum for organic farmers in Guyung Village and its surroundings. KNOC has several roles, including buying grain from farmers, post-harvest processing (drying, storage, milling, sorting, to packaging), and selling rice to the market. Apart from buying and then selling, KNOC also plays a role in providing biological agents and liquid organic fertilizers to farmers. Next, see the research results of JAKER PO and KRKP on <http://kedaulatanpangan.org/rantai-pasok-komoditas-beras-organik-di-kabupaten-ngawi/>

⁸ <http://kedaulatanpangan.org/rantai-pasok-komoditas-beras-organik-di-kabupaten-ngawi/>

⁹ *idem*

¹⁰ Transitional rice is rice produced from rice fields that are still in the process of transitioning from previously using chemical fertilizers and pesticides to using organic materials or not using chemical fertilizers and pesticides.

rice, three times in one year. Production yields range from 6 – 7 tons of GKP per harvest. The varieties commonly planted are Pulen Red Rice, Sintanur White Rice and Black Rice. The harvest is sold in the form of Harvested Dry Grain. Production results are paid to collectors (KNOC) in the form of unhusked rice, after which it is collected for family consumption needs and partly to fulfill their siblings.

In this chain, the role of the group, in this case is KNOC, looks very strategic. KNOC's role in this chain includes buying grain from farmers, post-harvest processing (drying, storage, milling, sorting, to packaging), and selling rice to the market. Apart from buying and selling, KNOC also plays a role in providing biological agents and liquid organic fertilizers to farmers. The actors seen in the organic rice supply chain in Ngawi Regency include: farmers, processors (KNOC/KT Rukun Jaya), retailers (stores/supermarkets/distributors), wholesale distributors/exporters, and consumers as illustrated in **Figure 5.2** below.

Figure 5.2
The Role of Actors in the Organic Rice Value Chain



5.2 Baseline of Sustainable Rice Supply Chain

Research on the sustainable rice supply chain in Ngawi District has found and explored information on the actors at the four links in the sustainable rice supply chain. In the producer chain, informants whose information were Sugiyono, a farmer from Sambirejo Village, Ngrambe District who was also active in the Margo Kencono Farmer Group, Jayadi and Wasisto, farmers in Pengkol Village, Mantingan District, Yeman Subeno (farmer, private extension worker, and member of the Koperasi Tani Mandiri Ngawi). On the chain between collectors and processors, information has been collected from Wawan (the owner of a small mill in Sambirejo Village, Ngrambe District) and Wahyudi, the owner of the UD Wahyu Mulya mill.

On the merchant chain, information was collected from Mayang and Anton (reseller) and Anton from Toko Kharisma. A shop selling sustainable rice in Ngrambe District. In-depth information was also carried out to Debby and Ami from Sumber Bhakti regional-owned enterprise (BUMD). Meanwhile, in the consumer chain, interviews were conducted with a civil servant (ASN) named Agung.

5.2.1. Baseline of Sustainable Rice Producer

Farmers or farmer groups are the first stakeholder in a sustainable rice supply chain. Farmers or groups have the role of supplying raw materials (grain) to the processing industry which in the next process becomes rice consumed by consumers. Margo Mulyo Farmer Group, Pengkol Village, Mantingan District and Margo Kencono Farmer Group in Sambirejo Village, Ngrambe District, Ngawi Regency farmer groups in Ngawi are two farmer groups that produce sustainable rice.

In Sambirejo, Sugiyono¹¹ as a leader of the farmer group producing sustainable rice¹² since 2017. **The interest in starting rice production that is low in chemical fertilizers and pesticides came after receiving counseling from the PPL of the Ngawi Regency Agriculture Office**, and after participating in various organic farming trainings held by various parties. **Even though it's not completely organic, the chemical content used has dropped drastically, which is approximately 30 percent.** Organic fertilizers are obtained from their own production. Unfortunately, even though it is under the umbrella of farmer groups, in Sambirejo Sugiyono remains alone in developing sustainable rice. The fear about the market and the hassle of organically managing rice fields are the reasons why other farmers have not started organic farming.

The rice varieties cultivated are milky menthic white rice, aromatic red rice, and black rice. The seeds were initially obtained from Cianjur. From the seeds he obtained, he then carried out his own seeding. The land being cultivated is bengkok (crooked) rice fields¹³ with an area of approximately 1 hectare. In one rice growing season, as much as 4 – 4.5 tons of harvested dry grain (GKP) are produced. In a year, the managed crooked rice fields can be planted 1-2 times, depending on the availability of water. The planting method used, 1 hectare land area is divided into several plots planted with seeds of white rice, brown rice and black rice. For black rice and red rice, because the market is not as large as white rice, production adjusts to the stock that is still available.

Post-harvest processing (drying) is usually done by themselves. After drying, sustainable red and black rice are milled in a small-scale mill in Sambirejo Village. One of the reasons for grinding red rice and black rice in neighboring mills is that it can keep maintaining the quality of the milled results. Not all of the harvested grain is milled in one process. For red and black rice, milling is usually done in stages according to market demand. Dry grain which has not been milled yet is usually stored in its own warehouse. Meanwhile for white rice, it will usually be taken to a mill appointed by a regional company that buys it in the form of GKP for 5,000 - 6,000 Rupiah per kilogram.

¹¹ Sugiyono adalah perangkat di Desa Sambirejo

¹² Beras berkelanjutan adalah istilah yang baru pertama kali didengar oleh Sugiyono. Istilah yang sudah akrab diketahui adalah beras sehat atau beras organik. Padi yang diproduksi Sugiyono merupakan padi yang dalam proses perawatannya mengkombinasikan antara bahan organik dengan pupuk dan pestisida kimia. Dengan kata lain, pupuk dan pestisida kimia yang dipakai lebih rendah dibandingkan yang digunakan petani pada umumnya.

¹³ Sawah atau tanah bengkok adalah tanah yang pengelolaannya diberikan kepada kepala desa dan perangkat desa sebagai gaji selama mereka menjabat sebagai kepala desa dan perangkat desa

From the mill, sustainable red rice and black rice are usually packaged by themselves using vacuum packing equipment. After going through the packing process, Sugiyono sells the rice through resellers and customers who come directly to his house. Red rice in packaged form is sold for 13,000 to 14,000 Rupiah per kg. Meanwhile, black rice is sold for 20,000 Rupiah per kg. The payment method is made in cash. In determining the price, Sugiyono will usually peek at the market price through his network of farmers.

Sugiyono once marketed his rice online. But he does not have enough time to serve customers online. Because of this, he once offered the Karang Taruna of Sambirejo Village to manage online marketing, but his offer did not get a response from the Karang Taruna management.

Almost the same in Sambirejo, in Pengkol Village there are Jayadi and Wasisto who are also developing organic farming. Jayadi planted red rice and black rice seeds, while Wasisto planted white rice seeds with milk. The role of the PPL of the Department of Agriculture in Pengkol Village is also strategic in motivating farmers to switch to organic methods. In the early days of switching to organic in 2017, PPL also provided the seeds.

The land being managed is 1 hectare of bengkok (crooked) rice fields. Because the farming system uses a water pump, in a year you can plant rice 3 times, with a yield of approximately 7-8 tons per harvest. Besides providing fertilizer needs by himself, Jayadi usually also buys it from fellow organic farmers who produce organic fertilizers. While Wasisto has produced his own organic fertilizer used.

Similar to Sugiyono in Sambirejo Village, sustainable rice grown by Wasisto is usually brought to a mill appointed by a local company which buys it in the form of GKP for 5,000 Rupiah per kilogram. Meanwhile, for sustainable red rice and black rice, Jayadi usually does post-harvest processing himself. Initially, the milling process was carried out at a mobile mill, but because the results were not good, Jayadi finally switched to a home mill.

After milling, Jayadi sells his sustainable brown and black rice online directly to consumers or to resellers. There are buyers from Solo, Bekasi, Tangerang and Jakarta. The selling price of brown rice is 13,000 to 14,000 Rupiah per kg, and 20,000 Rupiah for black rice. Jayadi knows that resellers will usually sell red rice and black rice for 30,000 up to 45.000 Rupiah, however, he did not increase the price of rice sold online. The most sales ever made were sending 3 quintals of rice to Solo.

From the series of production processes carried out, they stated that there were around 7-8 farm workers who were usually involved. Of these, it is usually 50 percent are women. The involvement of women is such a concerned note. They considered women to be more painstaking and diligent in their work.

5.2.2. Baseline of Sustainable Rice Collector – Processor

The processing industry is a stakeholder that plays a role in milling paddy into rice. The processing is carried out by the milling industry when there are orders from consumers. This sustainable rice supply chain research in Ngawi Regency did not find the role of collectors in

the chain. Sustainable rice produced by farmers is mostly absorbed by regional-owned enterprise (BUMD) Sumber Bhakti. The process of transporting rice in the form of GKP is usually carried out by farmers escorted by BUMD staff to mills in collaboration with BUMD.

For post-harvest processing (drying, milling and packaging) BUMD cooperates with medium and large mills that are part of the Perpadi network or not, and not many mills cooperate with BUMD. It is at least 10 tons of GKP are processed once, so that the mills get a commensurate profit. As Wahyudi recalls, Chair of Perpadi Ngawi Regency, there was an MoU with BUMD in post-harvest processing just the last 3 months.

In managing rice from farmers purchased by BUMD, Wahyudi's mill area with a capacity of 1 ton per hour does not provide special treatment, but it keeps maintaining quality. Efforts are made to ensure that the grain produced by farmers in cooperation with BUMD results is not wasted and nothing is broken. Once the process starts from drying, milling, and packaging, the fee charged to BUMD is 800 rupiah per kg.

One of the things that must be maintained by the milling company is to carry out routine maintenance on the milling machine. The power source used to drive the machine uses electricity so it is low in pollution. UD Wahyu Mulya, which is managed by Wahyudi, has been serving milling services from all over Ngawi. For general rice besides acting as a mill, it also acts as a collector.

Meanwhile, sustainable red and black rice produced by Jayadi and Sugiyono are usually milled in small mills which are not mobile. In the small mill owned by Wawan, information was obtained that in grinding brown rice and black rice produced by farmers there was a special treatment that was different from rice in general.

Before being used to grind red and black rice, the milling machine is usually cleaned first so that the remnants of the previous rice mill do not mix with the red rice and black rice to be milled. Wawan's milling machine is a small machine with a capacity of less than 1 ton per hour. Wawan's milling business has been serving farmers from Sambirejo Village and farmers from neighboring villages. Wawan is not a member of the Perpadi network and is not aware of the existence of Perpadi.

Wawan said that many mobile mills began to die because they did not maintain quality. According to him, this is due to the owner of the mobile mill only pursuing the revenue target without considering the quality of the rice produced. In the future, Wawan wants to expand his business to be bigger, for example by becoming a collector for non-sustainable rice.

5.2.3. Baseline of Sustainable Rice Trader

The next link in the sustainable rice supply chain is traders. Supply chain stakeholder traders who do not carry out production activities, their role is to distribute and sell rice produced by farmers.

1. Reseller

Mayang is one of the resellers interviewed in a sustainable rice supply chain study in Ngawi District. She told that the role of resellers is to take products from producers in the form of packaged rice from farmers. Then distribute it to shops and markets in Ngawi Regency, especially in shops and markets in Ngrambe, Sine, Widodaren, Kendal Districts, and around Ngawi city.

Besides Mayang, there is another reseller named Anton. Unlike Mayang, Anton mostly serves buyers from outside Ngawi Regency. He usually sells sustainable rice to individuals who are ideologically pro-environmental health and empowering farmers who are outside the Ngawi district, such as Sragen, Magetan, Malang, Madura and Jakarta. In addition, he also serves companies in Surabaya.

Sustainable rice is obtained from farmers at a price of 13,000 Rupiah - for brown rice and 20,000 Rupiah for black rice. While the selling price of brown rice is 15,000 Rupiah and the selling price of black rice is 23,000 Rupiah. In determining the purchase price, resellers will usually negotiate with rice-producing farmers. Resellers do not collect the rice. He will buy rice from farmers according to market needs.

The first market for sustainable red rice and black rice are people who consume them for health reasons. The second market is those who see organic or low chemical farming ideologically. And the third market is people who consume red rice and black rice for reasons of lifestyle and trends in society: consuming low-chemical rice gives the impression of being more prestigious.

2. Shop

One of the shop which sells sustainable rice is Toko Kharisma. Shop owners who sell sustainable rice obtain rice from resellers at a price of 15,000 Rupiah for red rice and 23,000 Rupiah for black rice. From this price, the shop sells it for 17,000 Rupiah for red rice and for black rice 25,000 Rupiah. The store only sells sustainable brown rice and black rice products that have been packaged and labeled by the manufacturer.

The sales and demand for sustainable red rice and sustainable black rice began to emerge 3 years ago. Until now, market demand tends to be flat. Consumers buy sustainable brown rice and sustainable black rice for health reasons. Meanwhile, demand for sustainable white rice is low.

3. Regional – Owned Enterprise/BUMD (Local Company/Perusda)

In particular, Perusda serves 'healthy rice' for all Civil Servant (ASN) in Ngawi Regency, amounting to 8,875 people. They consist of 8,195 civil servants, 232 CPNS and 548 PPPK. Perusda sells 'healthy rice' to ASN at a price of 15,000 Rupiah per kg.

5.2.4. Baseline of Sustainable Rice Consumer

Consumers are the last link in the sustainable rice supply chain. Interviews with informants who consume 'healthy rice' obtained from the Ngawi District Government program and also consume sustainable rice produced by farmers, obtained information that the price of rice

from the government is considered to be more expensive than other sustainable rice on the market. The price of sustainable rice (healthy rice) from the local government is 15,000 Rupiah per kg. While the price of sustainable rice in the market can be obtained at a price of 12,000 Rupiah per kg.

According to Anton (Civil Servant/ASN) in terms of the quality of sustainable rice, it feels better and doesn't smell like rice in general. In terms of health and safety, sustainable rice is healthier and safer because cultivation practices are healthier because that rice uses fewer chemicals.

5.3 Closing

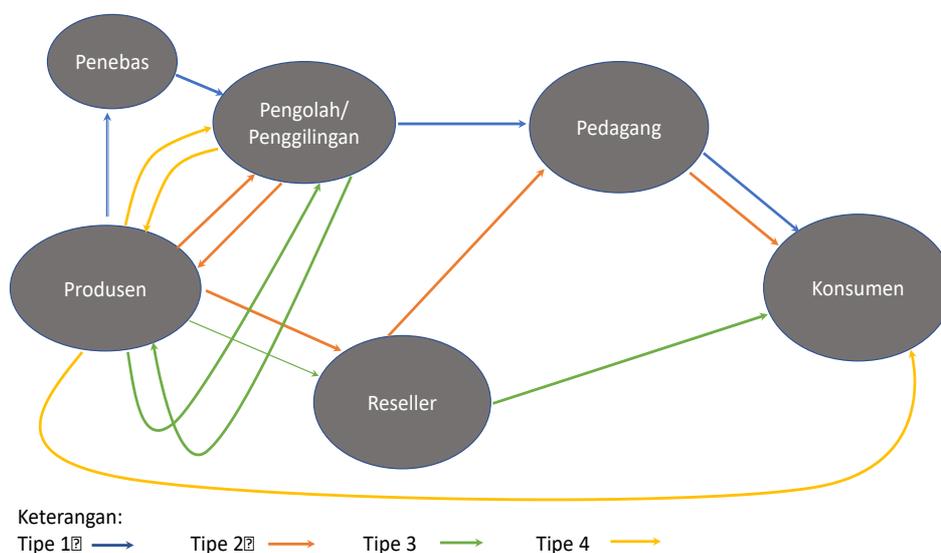
5.3.1. Conclusion

Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the results of research in Ngawi Regency can be concluded as followed:

First, there are at least 4 types of information systems and sustainable rice supply chain actors in Ngawi Regency.

Figure 5.3

Sustainable Rice Supply Chain in the Ngawi Regency



Based on **Figure 5.3**, each type of sustainable rice supply chain in Ngawi district can be described:

1. **Supply chain type one.** The role of producers is to produce sustainable white rice. After harvesting, in the form of GKP, the rice is purchased by BUMD and then transported to the mill. The role of milling is to process post-harvest grain into packaged rice, namely drying, grinding from grain into rice, and packing. Rice in

packaged form is sent to BUMD, then by BUMD it is distributed to ASN of the Ngawi Regency Government. The actors in this type one supply chain are as follows:

Table 5.1

Supply Chain Actor Type One

Producer	Slasher	Processor/ Milling	Trader	Consumer
Sugiyono (Farmers Group Margo Kencono) Sambirejo Village Ngrambe District Wasisto, a farmer in di Pengkol Village Mantingan District	BUMD	Milling in collaboration with BUMD. One of the mills that cooperates with BUMD is UD Wahyu Mulya	Regional- Owned Enterprise (BUMD)	Civil Servant (ASN)

2. **Supply chain type two.** The role of producers is to produce sustainable rice (brown rice and black rice), dry the post-harvest grain, the grain is brought to the mill, after the rice mill is packaged and then packaged. After being packaged, the producer sells the rice in packaged form to resellers. In this type two supply chain, the role of the processor/mill is to process grain from farmers into rice. Resellers sell rice in packaged form to stores and then the stores sell them directly to consumers. The actors in the type two supply chain are as followed:

Table 5.2

Supply Chain Actor Type Two

Producer	Processor/ Milling	Reseller	Trader	Consumer
Sugiyono (Farmers Group Margo Kencono) Sambirejo Village Ngrambe District	Small Milling	Mayang	Kharisma shop in Ngrambe District	Public Public whose health issue

3. **Supply chain type three.** The role of producers is to produce sustainable rice (white rice, brown rice and black rice), dry the post-harvest grain, then bring the grain to the mill, from the rice mill to packaging and then selling to resellers directly or online via YouTube and Facebook. The role of the processor/miller processes grain from farmers

into rice. Resellers sell rice in packaged form to consumers directly or online. In type three whose sales are online, both resellers and consumers are people from outside Ngawi Regency. The actors in the type three supply chain are as followed:

Table 5.3
Supply Chain Actor Type Three

Producer	Processor/ Milling	Reseller	Consumer
Sugiyono (Farmers Group Margo Kencono) Sambirejo Village Ngrambe District	Small Milling located on Sambirejo and Pengkol village	Anton and other unidentified reseller as they are outside of Ngawi Regency	Public Public whose health issue Companies located on outside Ngawi Regency (Ice Cream Campina) Unidentified as located on outside Ngawi Regency
Jayadi (Kelompok Tani Margo Mulyo) Pengkol village, Mantingan district			

4. **Supply chain type four.** The sustainable rice supply chain in this type four is the shortest link. In this type, the role of the producer is to produce sustainable rice (white rice, brown rice and black rice), dry the post-harvest grain, bring the rice to the mill, then do the packaging, and sell packaged rice directly to consumers. The role of the processor/miller is only to process the grain from the farmer into rice. After the rice is packaged, the producers directly sell the rice to consumers online. In type four, most consumers come from outside Ngawi Regency. The actors in the type four supply chain are as follows:

Table 5.4
Supply Chain Actor Type Four

Producer	Processor/ Milling	Consumer
Jayadi (Kelompok Tani Margo Mulyo) Pengkol village, Mantingan district	Small Mill located on Pengkol village	Unidentified as located on outside Ngawi Regency

Of the four types of sustainable rice supply chains, it can be seen that supply chain one is the most obvious link for consumers to see. This means that the issuance of the Ngawi Regent's Circular which requires ASN to buy organic rice is a policy that is able to encourage sustainable rice absorption in Ngawi Regency. The existence of village officials who in the last 5 years started producing sustainable rice is also an interesting fact to see. On the one hand, this

shows the enthusiasm of farmers to develop sustainable rice, but on the other hand it also raises new challenges.

There are still concerns from farmers when they reduce chemical fertilizers and pesticides. Their time devoted to managing the rice fields will increase so that they will not have the opportunity to develop other sources of livelihood. For village officials, the source of livelihood is safe enough, because apart from managing the crooked land, they also get a salary every month as village officials.

For farmers who are already producing sustainable rice, one of the challenges is how to develop it at the village level and build a wider network down to the district level. It is important to strengthen farmer networks in order to increase the bargaining power of farmers, especially to slashers and resellers who buy them online. Imagine, there are resellers who sell sustainable red and black rice at a price of 30,000 to 40,000 Rupiah while farmers sell it for 13,000 Rupiah for sustainable red rice and 20,000 Rupiah for sustainable black rice.

Likewise for the case of sustainable rice purchased by regional companies. BUMD buys rice from farmers for Rp. 5,000 – 6,000 per kg of GKP, then selling it in the form of packaged rice for Rp. 15,000 per kg, considered by consumers to be too expensive. This fact shows that in determining the price the position of farmers, BUMD, and consumers is not in the same position, and there has not been a fair process of exchanging information. BUMD has not been transparent in communicating with consumers so that it raises the potential for consumer distrust to BUMD.

Second, the largest consumer of sustainable rice in Ngawi Regency is ASN, which totals 8,875 people. In addition to ASN, consumers of sustainable rice are people who have health problems, even though there is a trend that the share of the market for sustainable rice consumers is getting wider. This is an opportunity to develop sustainable rice in Ngawi Regency. Unfortunately, the market share for which purchases are made through online networks has not been optimally exploited. Even though this market share is quite a large niche because of its national and even global scale.

Another potential market is hotels and restaurants in Ngawi Regency. In the context of market expansion in Ngawi Regency, the important to do is branding and promotion to consumers. Education about the importance of maintaining health by consuming low-chemical rice is an important part of promotion and branding of sustainable rice¹⁴.

Third, the Circular Letter of the Ngawi Regent obliging ASN to buy organic rice on the one hand is able to encourage sustainable rice absorption in Ngawi Regency, but on the other hand it has not been able to encourage an even distribution of roles, especially in the processing-milling chain. PPK has yet to get a role so that it can become an important part of a sustainable rice supply chain. From the Focus Group Discussion (FGD) activities, it was revealed that this problem occurred because PPK did not have enough capacity, both knowledge and infrastructure, to process GKP from farmers.

¹⁴ Salah satu rekomendasi yang dihasilkan dari kegiatan FGD di Kabupaten Ngawi pada tanggal 23 September 2022

PPK also does not have a relatively strong network like that of farmers who develop sustainable rice. Although the network of farmers is still relatively not solid and well organized, the exchange of information and knowledge between farmers has been going well, while the same thing has not happened in the milling chain, especially for PPK.

Fourth, the development of a sustainable rice business model that is relevant and feasible to develop in Ngawi Regency is the PPK business model which is owned and operated by individuals who collaborate with BUMD (Perusda).

5.3.2. Recommendation

The recommendation for the sustainable rice business model suggested for Ngawi Regency is **the PPK business model which is owned and operated by individuals who collaborate with BUMD (Perusda)**. There are several important steps to support this business model, namely:

1. PPK needs to collaborate and partner with farmers, farmer groups, Pemdés, BUM Desa, Pemda, BUMD, and NGOs in order to strengthen literacy of sustainable rice cultivation models and the benefits obtained
2. The main activity required for the value proposition for KDP is the provision of sustainable rice post-harvest services. In this case the service activities that can be developed are transporting GKP, drying grain, storing GKG, milling into PK and polishing/glosor rice, and rice packaging, using a regional approach.
3. The main resources needed for the value proposition for KDP are infrastructure, knowledge resources, human resources, and finance. In terms of facilities and infrastructure, PPK requires buildings for warehouse storage, drying, milling, including an adequate milling machine unit (RMU). Strengthening knowledge and strengthening human resources is one of the main resource packages needed so that PPK has a strong network, and there is an exchange of information and knowledge between PPK. Meanwhile, from a financial point of view, it is necessary to support financial institutions such as banks for PPK in order to have a strong and sustainable financial capacity.
4. The value proposition of sustainable rice commodities for consumer satisfaction is to strengthen literacy related to sustainable rice to consumers. The campaign on sustainable rice must be encouraged continuously so as to create a market share that is "fanatic" towards sustainable taste.
5. Expanding consumer reach can be done by encouraging hotels and restaurants to buy sustainable rice that has been produced by farmers.

CHAPTER 6

SUSTAINABLE RICE SUPPLY CHAIN IN MADIUN REGENCY

Sustainable rice is not yet known and understood by actors in the rice supply chain in Madiun Regency. They are more familiar with rice and healthy or semi-organic rice. Paddy and rice commodities are cultivated by technically reducing chemical fertilizers, or approaching the SRP (Sustainable Rice Platform) cultivation standard. Therefore, sustainable rice research in Madiun Regency is focused on healthy or semi-organic rice and rice commodities.

6.1 Baseline of Rice Agricultural Policy and Trade

Madiun Regency is one of the regencies in East Java with an area of 1,010.86 square kilometers or 101,086 Ha, which is divided into 15 sub-districts. Madiun Regency is located at 7°12°-7°48 South Latitude, 111°25°-111°51 Longitude East.

The boundaries of Madiun Regency are:

1. North Boundary : Bojonegoro Regency
2. South Boundary : Ponorogo Regency
3. East Boundary : Nganjuk Regency
4. West Boundary : Magetan Regency and Ngawi Regency

The Vision of Madiun Regency 2018 -2023 is "The Realization of a Safe, Independent, Prosperous and Moral Madiun Regency. Agriculture is included in mission 3 of the five existing missions, namely "Increasing Independent Economic Development Based on Agribusiness, Agro-industry and Sustainable Tourism." From this mission it is clear, agriculture is the leading sector, and one of the main commodities is paddy/rice which is the staple food. Agriculture is the leading sector because it contributes more than 30% to the Gross Regional Domestic Product (GRDP) of Madiun Regency. One of the leading agricultural commodities in Madiun Regency is paddy/rice. During the Covid-19 pandemic, farmers became one of the livelihoods that quite existed in Madiun Regency.

Madiun Regency in the last two years (2020 – 2021) is the number seven food barn (rice) in the province of East Java. The top six rice producers in East Java Province are Lamongan, Ngawi, Bojonegoro, Jember, Banyuwangi and Tuban. While the bottom six rice/rice producers in East Java are urban areas, namely Kediri City, Probolinggo City, Pasuruan City, Blitar City, Batu City and Mojokerto City.

Table 6.1

Rice Production in East Java by Regency/City the Year of 2020 - 2021
(in Tons GKG)

No	Regency/City	Paddy Production	
		2020	2021

1	Lamongan	886,061	792,662
2	Ngawi	837,773	786,476
3	Bojonegoro	728,915	674,002
4	Jember	590,263	615,698
5	Banyuwangi	470,833	513,490
6	Tuban	507,054	489,419
7	Madiun	446,052	461,798
8	Nganjuk	436,884	429,311
9	Ponorogo	377,333	404,665
10	Gresik	407,717	379,666
11	Jombang	343,164	326,827
12	Magetan	309,053	307,280
13	Mojokerto	312,686	297,042
14	Lumajang	290,688	295,076
15	Malang	274,390	273,359
16	Pasuruan	272,936	264,951
17	Bondowoso	261,018	258,951
18	Blitar	196,848	247,366
19	Tulungagung	214,398	237,917
20	Sumenep	228,980	221,979
21	Sidoarjo	209,110	202,501
22	Kediri	215,913	198,222
23	Sampang	191,735	195,601
24	Bangkalan	207,295	195,523
25	Probolinggo	192,600	190,180
26	Situbondo	159,928	151,157
27	Trenggalek	108,446	116,456
28	Pamekasan	101,827	96,724
29	Pacitan	83,941	88,117
30	Kota Madiun	15,167	13,506
31	Kota Malang	11,724	11,311
32	Kota Surabaya	11,138	9,833
33	Kota Kediri	10,284	9,555
34	Kota Probolinggo	7,543	8,924
35	Kota Pasuruan	10,115	8,305
36	Kota Blitar	5,274	5,793
37	Kota Batu	4,988	5,750
38	Kota Mojokerto	4,462	4,415

To maintain this condition, Regional Regulation No. 3 of 2020 concerning Protection of Sustainable Food Agricultural Land was issued which was clarified by Regional Regulation No. 36 of 2021 concerning Designation of Sustainable Food Agricultural Land Areas of 21,587.4 Ha. Meanwhile, for post-harvest management, Perbup No. 40/2019 was issued concerning Rice Milling Business Permits in Madiun Regency.

As of April 2022, harvested area, paddy production and rice production in Madiun Regency have also increased by an average of almost 3% (Table 1). This condition also makes Madiun Regency a rice surplus of more than 120,000 tons/year.

Table 6.2
Harvest Area, Rice Production and Rice Production in Madiun Regency
The Year of 2020-2022

Harvest Area (Thousand Ha)	The year 2020	The year 2021	The year 2022
Januari - April	26,36	28,27	27,67
Mei - Agustus	27,23	27,91	
September - Desember	19,41	19,54	
	73,00	75,72	
Rice Production (Thousand Tons of GKG)			
Januari - April	163,37	169,55	165,95
Mei - Agustus	158,14	168,50	
September - Desember	124,55	123,74	
	446,06	461,79	
Rice Production (Thousand Tons)			
Januari - April	94,33	97,90	95,82
Mei - Agustus	91,313	97,31	
September - Desember	69,786	71,45	
TOTAL	255,429	266,66	95,82

In order to maintain the position of East Java's rice barn, citing the 2021 LKIP (Report on Performance of Regional Apparatus Agencies) of the Agriculture and Fisheries Service of the Madiun Regency, there are still nine main issues that must be resolved. These problems include: 1) land conversion. 2) access to production/input production facilities and capital. 3) attack by Plant Pest Organisms/OPT. 4) post-harvest handling. 5) climate change. 6) carrying capacity of land and water. 7) mastery of technology and information. 8) farmer regeneration. And 9) limited agricultural extension workers.

The Madiun Regency Agriculture and Fisheries Strategic Plan 2018-2023 which was decided in the Decree of the Madiun Regency Agriculture and Fisheries Office No. 21/958/KPTS/402.109/2019 tries to solve problems related to three main strategies, as followed:

1. Increasing production of food crops with policies, namely; identification of sustainable food agricultural land, application of environmentally friendly based agricultural management, appropriate post-harvest handling and use of appropriate agricultural technology

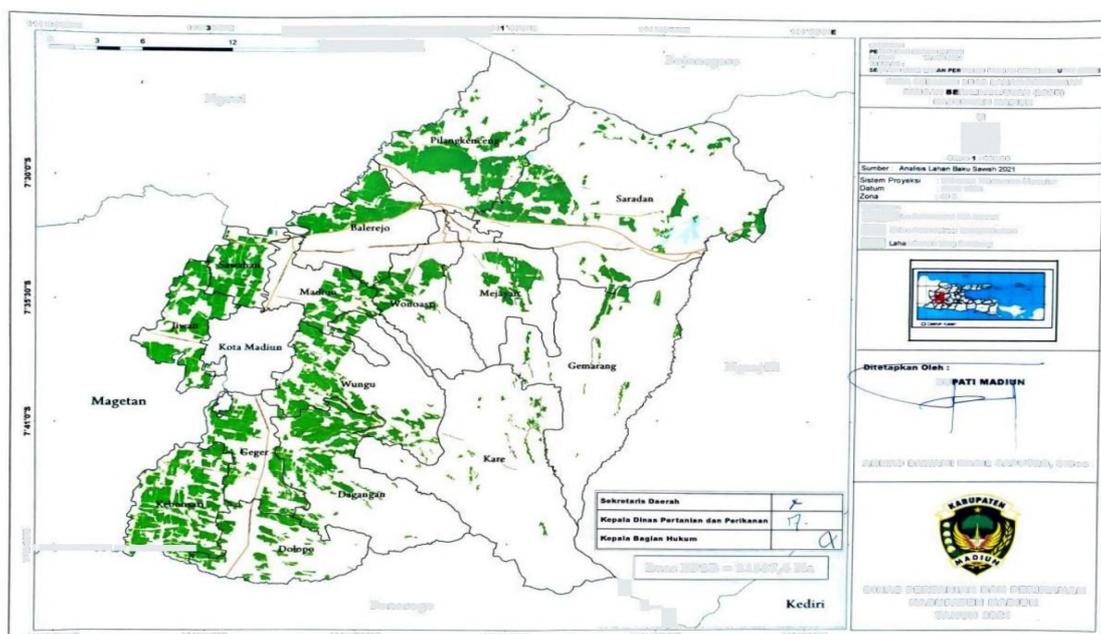
2. Increasing the capacity and capability of farmer organizations with policies: building partnerships with communities and research institutions and universities, increasing the participation of farmers in various competition activities

3. Increasing the availability of agricultural facilities and infrastructure, with policies: provision of production facilities and agricultural machinery, increasing the supply of irrigation water at the farm level.

From an informal discussion of the Regional Apparatus Organization (OPD) in Madiun Regency, namely; The Department of Agriculture and Fisheries, the Service for Food Security and Animal Husbandry, the Office for Cooperatives, Trade and Micro Enterprises, it is known that Madiun Regency does not yet have a policy or understanding of sustainable rice. However, in the Madiun District Agriculture and Fisheries Service Strategic Plan for 2018 – 2023, there are environmentally friendly/sustainable agricultural activities to reduce dependence on manufactured chemical inputs in the form of fertilizers and pesticides. Through farmer groups, demonstration plots were made during one growing season. Farmers learn agro-ecosystems by making weekly observations to find out the condition of pests, natural enemies and the environment (water, weather) so they can take action on their land. In the assistance, the practice of making/training of vegetable pesticides and organic fertilizers is also carried out to overcome existing problems. Because it is a training and demonstration plot, there is no follow-up assistance which causes no data on the area of land that has implemented this environmentally friendly practice.

Figure 6.1

Map of Distribution of Land Areas for Sustainable Agricultural Food in Madiun Regency



The policy on the Protection of Sustainable Food Agricultural Land, which is outlined in the form of a Regional Regulation and a map of the sustainable food agricultural land area in the form of a Regent's Regulation (Perbup), is a concrete step for the Madiun Regency Government to protect land conversion. This condition is one of the guarantees for rice producers in Madiun Regency, so that the managed rice fields are not threatened by their use for housing or industry.

6.2 Baseline of Sustainable Rice Supply Chain of Madiun Regency

6.2.1. Baseline of Sustainable Rice Producer

The number of farmer groups (Poktan) and combined farmer groups (Gapoktan) registered at the Agriculture and Fisheries Service of Madiun Regency is 206 Gapoktan and 789 poktan. On average, during the Covid-19 pandemic, farmers' groups and associations of farmer groups did not carry out many activities. Only the administrators are active, especially to fill in the Definitive Plan for Group Needs (RDKK) with PPLs related to the need for subsidized chemical fertilizers.

Since sustainable rice in Madiun district has not been understood and has not become a Government policy, official data on sustainable rice producers in the relevant technical offices (Agriculture and Fisheries Service, Food Security and Livestock Service) are not yet available. The information obtained is the names of groups and contact persons who have received training in making organic fertilizers and vegetable pesticides as well as contact persons who are active in participating in the Integrated Pest Management Field School (SLPHT). Armed with this information and a Google search, some credible names of informants were obtained. On average, the informants were spread across Wungu District, Geger District, Datangan District, Saradan District and one informant was in Kartoharjo District, Madiun City. This shows that there is a network between healthy/semi-organic rice producers in Madiun City and Madiun Regency.

Of the five respondents who were healthy/semi-organic rice producers who were respondents, based on their knowledge/skills, healthy/semi-organic rice could be classified into two, namely:

1. Government Program (Agriculture and Fisheries Department)

- a. Through the SLPHT program, the government facilitates training and demonstration plots on environmentally friendly agriculture at the farmer group level. Through field schools, farmers learn to reduce the intake of manufactured chemicals (fertilizers and pesticides), to make organic fertilizers and botanical pesticides to be applied in the experimental field. Regular weekly observations are carried out during one growing season, farmers are guided by Field Agricultural Extension Officers (PPL) to carry out these activities, and to see the results are carried out using a tiling system. Tiles were used to compare rice production between control/local plots (treat farmers) and IPM plots. With this Field School model, farmers can learn about agroecosystem analysis,

can assess pests and natural enemies, make organic saprotans and make decisions to control Plant Pest Organisms (OPT) based on observations made.

- b. The farmers who finished participating in the Integrated Pest Control Field School/SLPHT (SLPHT alumni) activities then committed to the Biological Agent Service Post (PPAH) which aims to provide organic saprotan and provide assistance to farmers who are interested in implementing environmentally friendly/healthy/semi-organic agriculture. The PPAHs in Madiun Regency are Mr. Baidi (Kec. Dagangan), Mr. Asep (Kec. Wungu), Mr. Sutris (Kec. Pilangkenceng) who are networked with Mr. Earthquake (Kec. Kartoharjo, Madiun City).
- c. The PPAH network of Madiun Regency and Madiun City, agreed to make Prima organic standards, with categories Prima 3, Prima 2 and Prima 1. This category indicates the level of chemical reduction in the rice cultivation process. Prime 1 is the highest level because there are 16 indicators used, Prime 2 has 9 indicators and Prime 3 has only 2 indicators. The most basic indicator used is the reduction of chemical fertilizers and chemical pesticides, so that when tested in the laboratory, the rice produced is free from heavy metal residues and chemical pesticide residues.
- d. The principle used by PPAH activists is to improve soil fertility which has been damaged by the application of chemical fertilizers and chemical pesticides for decades. Currently, healthy rice practitioners in Madiun Regency and Madiun City are still in the Prima 3 stage. To improve soil fertility, a process is needed so that the reduction of chemical inputs/saprotans must be done slowly.
- e. The experience of PPAH activists is that organic farming must be carried out in stages, because in 3 growing seasons there is a decrease in production of almost 35% (from 8.6 tonnes/ha to 5.7 tonnes/ha). And currently the production of healthy rice cultivation is only 7% different from the productivity of conventional rice cultivation (healthy cultivation of 6.5 tonnes/Ha and conventional cultivation of 7 tonnes/Ha). This condition is achieved after practicing healthy cultivation by reducing chemical intake and increasing organic intake for five years. Therefore these producers sell their rice at a higher price than regular rice. The difference in selling prices ranges from IDR 2000 - IDR 3000/kg. The average consumer who buys is a health-conscious consumer.
- f. This production will increase starting in the 2nd year, and in the 4th year, the average GKP production is 7.11 tons/Ha. semi-organic cultivation in stages. This of course will be different if the land being cultivated is a rental or profit-sharing system.

Productivity/yield is the main goal, so the goal to improve the environment is often ignored

Table 6.3
Production of Harvested Dry Grain (GKP) Healthy Rice
SLPHT alumni farmers in Madiun Regency

Name	Address	Cultivated land area	Total GKP Production	Average Production
		Ha	Ton	Ton/Ha
Gempa	Kartoharjo District, city of Madiun	3,50	25	7,14
Asep	Desa Bantengan, Wungu District, Madiun Regency	0,28	2	7,14
Baidi	Dagangan District, Madiun Regency	0,56	3,94	7,04
Total		43,3		21,31
Average		1,45		7,11

Source: Interviewing the Farmers, September 2022

- h. The selected seeds are fragrant varieties because they are pest resistant. Fragrant seeds tend to have thicker grain skin, making them resistant to pest attacks. The varieties that are widely planted are Sekar Arum, Sinta Nur and Pandan Wangi and Rojo Lele. Seeds are obtained from self-refining in paddy fields or bartering with other farmers who develop them. This shows that for fragrant seeds, these healthy rice producers are starting to be independent because they are able to meet their own seed needs, either by producing themselves or bartering with other farmers.
- i. Many organic inputs (organic fertilizers and vegetable pesticides) are developed by utilizing existing local potential (plants, animal manure, local micro-organisms) and these farmers actively exchange information and exchange recipes. The average farmer has a simple laboratory at home to develop and test new recipes. They also serve other farmers (buy or barter) in need. Pak Asep, in Bantengan village, Wungu district, in 2020/2021 was able to organize farmers in his 20 ha area to control planthopper pests using vegetable pesticides and engineering technology to extend the tank sprayer hose. Technological engineering to extend this hose is done because of the habit of farmers who don't want to go down to the fields when spraying. On average, farmers spray from the rice field bunds. To motivate farmers so that the plant-based pesticides used reach the middle of the fields, Pak Asep extended the sprayer hose.
- j. In the management of healthy rice cultivation, it is carried out with families and farmers who cultivate the same. It is still being done on a small scale because only a few people have done it. During the planting season, it is carried out by human labor, using labor in the neighborhood and surrounding villages. For maintenance (weeding, fertilizing, pest control, irrigation) is carried out by the farmers themselves. Harvest

using combi, and the grain is brought home in the form of GKP. The grain is then dried in the sun for approximately 2 days, then the grain is stored and milled as needed. The drying process is mostly done by family members (wife and children).

- k. From the cultivated land, the farmers divide it in two ways, 50% of the harvest is sold directly to the collectors in the form of Harvested Dry Grain/GKP, the money is used for the following season's cultivation costs and family needs. Meanwhile, 50% of the harvest is brought home for self-consumption and sale. Yields are self-consumed and about 50% of social needs, of which 50% are sold to household consumers.
- l. GKG (dry milled grain) is stored for a maximum of 4 months, milled in selepan around at a rate of Rp. 12,000/bag or for every 2 buckets of rice, you pay 1 scoop of rice. The husks and rice bran belong to the farmer who grinds the grain. Rice bran is used for animal feed, husk is used for making organic fertilizer.
- m. Rice consumers who buy the average household and agency consumers (individuals organized in one agency) are aware of this healthy rice cultivation process
- n. Apart from being sold in the form of rice, Mr. Mujiyanto (Bantengan village, Wungu District) sells dry harvested unhusked rice (GKP) to collectors and the collectors process the unhusked rice into superior seeds. For daily consumption, Pak Mujiyanto sets aside some of his harvest and then mixes it with the healthy rice produced by farmers in his village. On average, in a month Mr. Mujiyanto buys 25 kg of healthy rice. The harvested rice is mixed with healthy rice because healthy rice tastes good (fluffier).

2. Private Program

- a. Bank Indonesia Kediri's CSR (Corporate Social Responsibility Program) facilitated organic rice in 2016 in Kaibon village, Geger district in collaboration with the Department of Agriculture and Fisheries of Madiun Regency. The recipients of this program are the Sejahtera 1 farmer group and the Sejahtera Gapoktan in Kaibon village. The farmers in Kaibon village do not know why they receive CSR assistance from BI Kediri. Quoting Pak Sutrisno's statement (Chairman of the Prosperous Gapoktan, Kaibon village, Geger district), "I don't know the reason why we were chosen, only as soon as I knew everything was free and got knowledge, I immediately accepted it".
- b. Bank Indonesia facilitated the financing of field school demonstration plots and the construction of a laboratory for the development of natural decomposer microbes

under the brand name Microbacter Alfaafa -11 (MA-11). The demonstration plot assistance process was carried out by PPL from the Madiun Regency Agriculture and Fisheries Service.

- c. Until 2022, there are only two farmers (Mr. Sutrisno and Mr. Supriyadi) who are still consistent in implementing healthy rice cultivation as a family business.

Table 6.4

The average production of GKP Healthy Rice
Bank Indonesia CSR Program Assistance

Name	Address	Cultivated land area	Total of GKP Production	Average Production
		Ha	Ton	Ton/Ha
Sutrisno	Desa Kaibon, Kec Geger, Kab Madiun	1,0	6,3	6,3
Supriyadi	Desa Kaibon, Kec Geger, Kab Madiun	3,0	24	8,0
Total		4,0		14,3
Average		2,0		7,15

- d. Land managed on average 2 Ha, and own. Because they own themselves and have limited capital and labor, this farmer allocates 1 ha of semi-organic cultivated land (reducing chemical fertilizers) and 1 ha of healthy cultivation land (increasing organic fertilizers and vegetable pesticides). Grain produced by semi-organic cultivation is sold to collectors in the form of dry harvested grain (GKP). The GKP price for healthy/semi-organic rice for ordinary varieties (inpari, Logawa) is the same as for conventional unhusked rice, while for fragrant varieties (rojo lele, menthik Wangi, Sekar arum) the price difference is IDR 20,000 – IDR 30,000/quintal. Healthy cultivated grain is brought home for self-consumption (25%) and the rest is sold to consumers (households, shops)
- e. The varieties planted were fragrant rice (Rojo lele, Menthik Wangi) and long white (IR-64, Ciherang). This variety is planted because it is in accordance with consumer demand, which chooses fluffier rice. Seeds are obtained by setting aside crops from the land.

- f. The cultivation model is in accordance with the Standard Operating Procedures (SOP) that has been agreed upon within the group, in principle reducing the use of chemical fertilizers and chemical pesticides. Irrigation is also regulated; the system is flooded and disat at certain phases can save almost 25% on irrigation costs (Spr. Sutrisno's estimate).
- g. The harvested healthy grain is brought home, dried on the drying floor or tarpaulin for about 2 days using daily labour. After drying, the grain is stored in warehouses and milled in mobile mills. Mobile mills play an important role because they can be summoned at any time, pick up grain and deliver rice to the house.
- h. One producer cooperates with PPK (buys his own mill with a capacity of 1 ton/day) because his wife and family can do it at home. The design of the rice mill is kept simple and female friendly.
- i. Rice is sold in packs of 5 kg at a price of IDR 14,000/kg, and in bulk at IDR 13,000/kg. Stores that become resellers are given a price of IDR 13,000/kg, and sell to consumers a maximum of IDR 14,000. So, between producers and resellers there is already an agreement on the highest selling price of IDR 14,000/kg.
- j. Assurance of rice quality with laboratory tests for heavy metal residues and pesticide residues by testing No. PS/196/VIII/2016, dated 10 May 2016 which resulted in that heavy metal residues and chemical pesticides were not detected.
- k. The average healthy rice sales turnover is 1 ton per month. Due to consumer demand, the varieties of rice sold are also increased with brown rice and black rice. To meet the demand for red and black rice, producers buy dry milled unhusked rice from farmers around Wungu sub-district whose cultivation is known and take from well-known Ngawi district.

6.2.2. Baseline of Sustainable Rice Collector – Processor

Producers of healthy rice or semi-organic rice are still limited in Madiun Regency. Therefore, there is no collector who specifically manages this business. The COVID-19 pandemic has changed the trend of increasing consumption of healthy food, one of which is rice. This trend only occurs in cities and communities with middle to upper economies.

Pak Gelo (a grain collector and rice trader), stated that more and more household consumers and civil servants are asking for healthy/organic rice. However, because they do not have unhulled rice stocks, they mostly bring in or buy healthy rice from other areas (Ngawi/Magetan/Ponorogo). This is done to ensure that the rice sold has a certificate.

According to Pak Gelo, it is very unprofitable to process 1-2 tons of healthy harvested dry grain, compared to the capacity of the rice milling machine which can be milled 4 tons once. Competition between collectors and large companies makes many small and medium scale rice collectors and mills out of business. In the last three years, Pak Gelo has chosen to change his role from a slasher to a collector and trader of dry milled grain. According to him, this is more profitable, because the slasher must have complete harvesting equipment (combine harvester), while the collector only needs money and transportation/truck. Means of transportation can also be rented. So that his rice customers are not disappointed, Pak Gelo cooperates with PPM and PPB in other districts (Jombang, Magetan, Ponorogo) by supplying them with GKG, then buying rice to sell at his shop.

Grain collectors provide different prices for the regular varieties of GKP and the fragrant varieties (rojo lele, menthik fragrant, sinta nur) and white long (IR-64 and Ciherang). The difference in GKP prices ranges from Rp. 20,000 – Rp. 30,000. Fragrant and long white rice are more expensive because they taste good, are hot (when cooked more) so they are often used to mix other varieties of rice (Logawa, Inpari, M-70, etc.).

Mr. Junaidi and Mr. Suparman (owners of PPK/PPM in Wungu Subdistrict), usually buy GKP and then dry it in the sun/oven, then sell it in the form of GKG to rice mills or rice entrepreneurs in the Ngawi and Sragen areas. This is done because it is more profitable, with the price of GKP 5,300/kg, after being processed into GKG it can be sold for Rp. 6,500. This is done when the quality of the grain is not good due to pest attack (wereng).

Grain collectors of fragrant and long white varieties sell to rice mills that have business in this special rice. The experience of Mr. Suparman, the owner of a Medium Scale Rice Mill in Wungu sub-district, in the last two years the demand for fragrant and long white rice has increased. On average, in a month, you have to provide 30 – 50 tons of rice, with customers from rice shops, BULOG Divre Madiun Raya (commercial scheme), PT PPI (Indonesian Trading Company) and several individual resellers (rice shops in Madiun City and mobile rice traders in villages). Almost in the rice mills there is no stock of grain and rice, because once they are milled they are immediately distributed to customers. The challenges faced include limited producers of fragrant and long white rice, forced to look for grain to other districts (Ngawi, Magetan, Jombang, Demak, etc.)

Mr. Suparman does not know how the cultivation of fragrant and long white rice is carried out, only the reference that this rice is good is the color of the grain is bright, the grain is ripe and when it is opened it smells fresh. This fresh smell is also found in the rice, when it is held it does not clot. Allegedly some rice mill workers Pak Suparman, smell good because in cultivation a lot of animal waste is used. And that's usually mostly done by farmers in the upper regions.

Mrs. Retno, a grain collector in Nglambangan village, Wungu sub-district, buys dry-harvested brown rice from farmers in the Madiun area who are healthy cultivators to be processed into superior rice seeds with the brand Padi Kuning. Pak Mujiyanto and Pak Joko are farmers who always buy their grain, because of their high growth potential (above 90%, full grain grain, few trees and other mixed varieties).

6.2.3. Baseline of Sustainable Rice Producer

Sustainable rice traders (healthy rice, semi-organic rice, fragrant and long white rice) in Madiun Regency are divided into:

1. **Healthy/semi-organic rice producing farmers.** Farmers have a dual role, because farmers cultivate, manage post-harvest as well as market their rice. This is done because the resulting grain production is still small (2 – tons of rice per MT), so it can be managed alone. Farmers cooperate with mobile rice mills to carry out processing. Because it is processed with selepan around, the final result of the resulting rice is in the medium category. The cash payment system, after the rice is delivered, is paid immediately. To expand marketing and increase the number of consumers, Mr. Supriyadi and Mr. Sutrisno are assisted by their children and nephews for online marketing via Whatsapp and Instagram. The impact of this online marketing has been greatly felt by Mr. Supriyono whose turnover has increased, both because of the increase in the amount of rice, but also the increase in the variety of rice sold (red rice and black rice).
2. **Shop.** The average store that becomes a reseller of this healthy rice is a grocery store or rice shop. A grocery store in Kaibon village (Bu Wedjang) sells in 5 kg packaging according to the packaging used by the producer (Rojo catfish brand) with a selling price of Rp. 14,000/kg. In a month it can sell 10 packs, with consumers of State Civil Apparatus / ASN and people suffering from diabetes. Meanwhile, large rice shops sell in 5kg and 20kg packages using their own brand. They send the packaging to the rice mill and later it is sent in packaged form. On average they sell 1 ton/month of fragrant rice.
3. **Rice miller entrepreneurs.** Rice millers and rice manufacturers specifically for fragrant and long white varieties. The average is carried out by small rice mills (production capacity of less than 1 ton/hour) and medium scale rice mills (production capacity of 1-2 tons/hour). Apart from being grain collectors, these entrepreneurs also have a role in processing and selling grain to medium or large rice mills outside Madiun district and processing unhulled rice into rice for sale themselves. The grain processing of the fragrant and long white varieties is carried out separately, starting from the process of buying, drying, milling, grading and packing the rice. The packaging used is also different, usually the packaging has been prepared by the rice customer, in the form of 5kg and 20kg packages. Rice shops usually get supplies from rice mills in 5kg packages that have been prepared by the shop. The price given is the reseller price, then sold with a difference of IDR 500 – IDR 1,000/kg. The payment system is within a maximum of 2-3 days after the rice is sent. The amount sent on request or according to the stock in the rice mill.
4. **Mobile rice traders/individuals** in the village usually buy directly from the mill in the amount of 1-2 quintals per week in 20 kg packs with a cash payment system. These

traders on average already have loyal household consumers. Price is not a problem, and quality is a priority.

5. **Institutions** (BULOG, PPI). Rice millers cooperate with BULOG in a special (fragrant) rice commercial scheme. There are a number of requirements that must be met to become a BULOG partner (NIB, NPWP, etc.), and delivery of at least 1 truck (6-8 tonnes, in 5kg packaging, 20kg with ordering agency packaging), cash payment system via bank transfer.

6.2.4. Baseline of Sustainable Rice Consumer

Consumers of sustainable rice (healthy, semi-organic, fragrant and long white) in Madiun Regency, are:

1. Household consumers. The average consumer is as follows:
 - a. People who are health conscious (sufferers of diabetes mellitus, hypertension, gout, heart disease), and the average age is over 50 years. They get this information from the environment and buy about 10 kg – 20 kg of rice per month.
 - b. People who know sustainable rice tastes better, so they buy healthy rice over conventional rice. On average in a month buy 20-30kg.
2. Restaurant/restaurant. Some of the restaurants we met, still understand that sustainable rice is certified organic rice and must be expensive. Because the price is expensive, it will affect the selling price, so no one has specifically presented it.

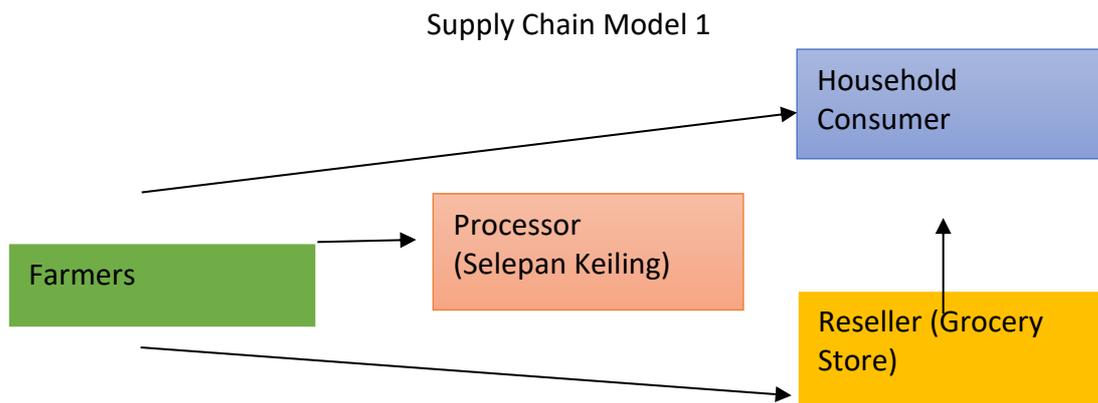
6.3 Closing

6.3.1. Conclusion

Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the results of research in Madiun Regency can be concluded as follows.

1. Information systems and actors in the sustainable rice supply chain in Madiun Regency have several models.

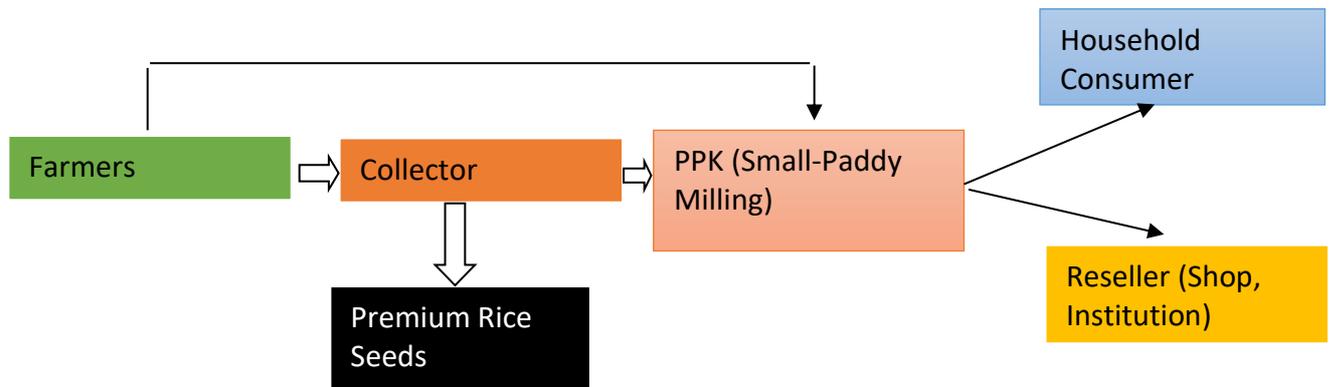
Figure 6.2



Model 1 is carried out by farmers who have cultivated land for healthy rice cultivation of a maximum of 1 Ha or Total Dry Grain which is produced around 2 – 7 tons per Growing Season. After harvesting using a combi harvester, the grain is brought home to be dried in the sun for 2-3 days (if the sun is good) and then stored in a warehouse. This grain will be milled if there are buyers or household needs (consumed alone or for buwuhan social activities). Farmers grind the grain in a mobile selepan which has good service, they can be called to come to the house and serve the milling of 1 sack of grain. From selepan around, producers will pack their rice in 5 kg packs to be sold to resellers (grocery stores) and household consumers.

The processor is a mobile selepan whose role is to grind the grain into medium quality rice 2. Physically the rice produced is not good because of the limited technology used. According to Mr. Sudarsono, the owner of a traveling selepan in Bantengan Village, he had to run this business more than ten years ago because many farmers sold their unhusked rice in the field. As a result, farmers rarely bring grain home and they don't grind the grain in selepan. Even when grinding, the amount is small (1-2 sacks). Therefore, Mr. Sudarsono began to modify his selepan to become a traveling selepan as a ball pick-up system in the 3 nearby villages. Initially, the existence of this mobile selepan was protested by the owner of the rice mill. But because of the high interest of farmers who will grind their grain, now it is not a problem.

Figure 6.3
Supply Chain Model 2



Model 2 is mostly carried out by farmers who have arable land of more than 2 hectares or dry grain harvested more than 7 tons per planting season. Farmers manage grain into dry grain harvested, then milled to PPK (small scale rice mill) around their place of residence (one village or outside the village) with a minimum of 500kg once milled. The rice produced is better than milling / selelepan around. This is because the technology used is more sophisticated (using conveyor belts), so that broken rice is reduced, scattered rice is reduced, and more whole rice is produced.

The experience of Pak Supriyono, a healthy rice farmer in Kaibon Village, Geger District, stated that his family worked on rice milling equipment two years ago because there were complaints from consumers who stated that a lot of the rice was broken/crushed. After collaborating with PPK, the number of consumers is increasing. By using KDP, the milled grain capacity also increases, so that it can meet consumer demand.

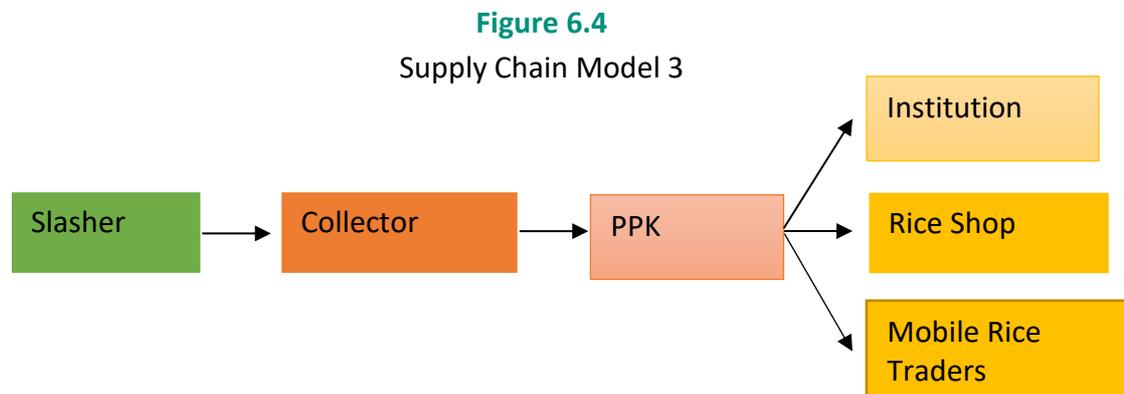
On average, Pak Supriyono's consumers come from families in Madiun City as well as individual consumers who are organized in one agency. Meanwhile, Mr. Gempa's consumers, PPAH activists and chairman of the Madiun City KTNA, are PPI (Indonesian Trading Companies).

Aside from being producers, these healthy rice farmers also act as collectors of grain from neighboring farmers who practice healthy cultivation. This is done to meet consumer demand.

Mrs. Retno, a grain collector, chose another path in steaming healthy rice grain. He knows that healthy rice grain is of good quality. Therefore, she processes healthy rice grain into rice seeds at home. This quality grain is purchased at a higher price than other grain, the difference is Rp. 50 - Rp. 100/kg, the production area of 600 square meters is used to dry the grain in the sun for 3 days, and laboratory tests are carried out at BPSB (Seed Certification and Supervision Center). Madiun every planting

season. If it passes quality control, then it is packed in 5 kg. These superior rice seeds are branded Yellow Paddy.

Model 2, with healthy rice as the final product, is a healthy rice business model that benefits farmers, because production capacity is still limited, farmers work with PPK to produce good quality (medium) rice so that consumer expectations can be met.



We found this model 3 during interviews with KDP owners in the Wungu and Geger sub-districts. Pak Junaidi and Pak Parman stated that in the last two years the demand for fragrant rice (pandan fragrant, sinta nur, rojo catfish) and long white (IR-64, Ciherang) has been increasing. And the quality or characteristic demanded by consumers is rice that is uniform in integrity, smells fresh when spit it out and when it is held it doesn't clump.

To meet these consumer demands, these PPKs cooperate with slashers and grain collectors in Madiun Regency and outside Madiun Regency (Ngawi, Magetan, Ponorogo, Jombang), even to Sragen and Demak (Central Java) Regencies. Because the rice that consumers expect is specific, PPK/PPM also buys grain under certain conditions, namely; uniform color, high yield, fresh smell. This PPK/PPM does not know who the producer is and how the production process works. Whether it is cultivated in a healthy/semi-organic or conventional manner is not a consideration. The purchased grain is treated separately since transportation, drying, storage, milling and packaging.

These rice consumers are institutions (BULOG and PPI), rice traders in Madiun city, and itinerant rice traders in villages. BULOG and PPI require one truck (6-8 tons) to be sent once, while rice traders demand an average of 1-2 tons/week (4-8 tons/month) and rice traders traveling around the village average 2 quintals/week. (0.8 tons/month).

The flow and sources of information on sustainable rice are limited. This situation is clearly visible, both at the level of producers, processors, rice traders and consumers.

Limited information and technology mean that the position of healthy/semi-organic rice in Madiun Regency is only known by local people around the source of production. Efforts made by young people (children, in-laws, nephews) by marketing online, are one of the efforts to promote healthy rice more globally. Apart from being a promotion, this effort is also media literacy for consumers.

2. Market response and identification of sustainable rice consumer groups in Madiun Regency show a positive trend. Since the covid pandemic, even though the economic issue is the decline in people's purchasing power, public awareness to consume healthy rice has increased. This is evidenced by the large number of household consumers from ASN families (active and retired) as well as pre-elderly and elderly age groups (jelita = approaching fifty years old and lolita = passing fifty years) who are aware of the importance of consuming healthy food.

The rice variety they are looking for is the pulen flavor (a mixture of long white and fragrant) for city consumers, while for consumers in rural areas the long white variety. The price range of IDR 13,000 – 15,000/kg (for white and fragrant rice) and IDR 18,000 – IDR 20,000/kg (for brown and black rice) is still within reasonable prices and can be reached by consumers. Of course, this price is reasonable for farmers, because fragrant rice is usually sold at IDR 10,000/kg from the rice mill.

3. There is still a gap between supply chain actors in implementing sustainable rice traceability in Madiun Regency. On the consumer side, there is an awareness to consume healthy rice, especially young household consumers who are civil servants and ASN retirees and health-conscious consumers who suffer from certain diseases (hypertension, DM, etc.). This is inversely proportional to the producer level, where the average Madiun Regency farmer is a sharecropper and tenant farmer, so it is very risky economically for them to implement this cultivation model. Moreover, in the last two years attacks by leafhoppers and rats have caused crop failure in most of the agricultural areas of Madiun Regency. Likewise, at the rice milling level, not all small-scale rice mills are willing to accept rice milling services under 1 ton
4. The development of a relevant and feasible sustainable rice business model to be developed in Madiun Regency is model 2 (PPK in collaboration with collectors and connected directly to consumers).

6.3.2. Recommendation

Recommendations for developing a sustainable rice business model in Madiun Regency are **Business Model 2 Farmers – Collectors – PPK – Consumers**. This business model is relevant and feasible to develop because the chain is short, so it will provide the following positive things, namely:

1. Share resources (especially financial and technology/equipment) and share profits more fairly. Farmers after harvest using the services of a combine harvester, can immediately sell to collectors using the GKP weighing system or bringing home the grain to be managed by themselves until it is ready to become GKG (Milled Dry Unhulled Grain).
2. Collectors benefit, because acting as collectors does not require high costs such as the role of slashers who have to prepare harvesting machines. It is enough for collectors to provide transportation facilities, and now there are many truck rentals in Madiun Raya. The role of this slasher has the opportunity to be replaced by grain slashers which incidentally are carried out by women. Women with limited financial capital can access these jobs. These healthy/semi-organic grain collectors can sell their grain directly to PPK in the form of GKP or GKG. In fact, collectors have the opportunity to sell GKG to healthy/semi-organic rice producing farmers.
3. PPK with more adequate equipment (drying floor, drying machine, warehouse) can be the last post for GKG to be stored for processing into rice. The market share/consumers of PPK are, of course, rice traders (institutions, rice resellers/shops).
4. Rice producing farmers with limited production capacity, can work together with PPK in their surroundings. In every village, there must be a PPK that is not functioning due to a lack of grain raw materials for milling. Of course, PPK, which is in suspended animation, needs to be upgraded, both in terms of technology, management and administrators. This means that here it is necessary to map out KDP who are ready to cooperate and are still operating, even though their operations are not continuous. By grinding the grain in PPK, the quality of the rice is good (reduced broken rice, the appearance of the rice is attractive/whiter) so that the selling price is stable and feasible for farmers and consumers.

CHAPTER 7 CLOSING

Based on the existing condition of the sustainable rice supply chain that has been described in chapters 2 to 6, it can finally provide an overview of the value chain of sustainable rice commodities and their feasible business model. The method of analyzing the agri-food value chain of the rice agroindustry (Fitriani, et al., 2021), can be used as a diagnostic tool for the sustainability of the rice business being developed by the Low Carbon Rice project in these 5 districts. The following table 7.1 describes the core processes and activities of actors in the sustainable rice agro-industry value chain in 5 regencies.

Table 7.1

Core Processes and Activities of Actors in the Sustainable Rice Agroindustry Value Chain

	PRODUCER Paddy Agricultural Input	COLLECTOR - PROCESSOR Intermediate supplier, post- harvest processor, Grinder	TRADER Intermediary traders, Retailers, Wholesalers		
ACTOR	Farmers and farmer groups rice with sustainable cultivation	<ol style="list-style-type: none"> 1. Farmers who steam their own harvested rice 2. Rice collectors from farmers and farmer groups 3. Rice collectors, post-harvest processors and grinders (PPK, PPM) 4. PPK operated at home (not around) 	Intermediary traders who buy sustainable rice from PPK/PPM to sell to retailers or consumers	Retailers who buy sustainable rice from middlemen and/or buy rice from PPK/PPM to sell to consumers	Wholesalers who obtain sustainable rice supplies from PPK/PPM in the form of PK or polished rice
ACTIVITIES	<ol style="list-style-type: none"> 1. Rice farming with sustainable cultivation 2. Harvest and post-harvest processes are carried out by themselves, including packaging and sales 3. Harvest is sold to Guarantee Organizations 	<ol style="list-style-type: none"> 1. Literacy of rice farming with sustainable cultivation 2. Financial support and provision of organic seeds and fertilizers 3. Harvesting, transporting, drying and milling services 4. Establish criteria and standards for sustainable grain products 	<ol style="list-style-type: none"> 1. Purchase of polished rice, 2. Transportation, 3. Storage, 4. Packing 5. Sales to Resellers and their community consumers 6. Create sustainable rice branding 	<ol style="list-style-type: none"> 1. Purchase of polished rice, 2. Transportation, 3. Storage, 4. Packing 5. Sales to consumers 6. Building trade routes from retailers to consumers 7. Facilitate availability 	<ol style="list-style-type: none"> 1. Purchase of PK rice, 2. Transportation, 3. Storage, 4. Packing 5. Sales of polished rice with various traders and consumers

	<p>4. Gather information from cultivation experience</p> <p>5. Sharing between farmers</p> <p>6. Documenting learning outcomes.</p> <p>7. Sharing sustainable agricultural techniques</p> <p>8. Standardization of sustainable rice products</p> <p>9. Sharing in determining the selling price</p>	<p>5. Packaging and branding of sustainable rice, as well as sales to traders and consumers</p> <p>6. Distribution of rice products to consumers based on purchasing orders from distributors</p> <p>7. Drying, milling, and packaging (in the case of rice for civil servants)</p> <p>8. Identify unhusked rice or rice produced by sustainable rice cultivation</p>	<p>7. Packaging, labeling, building markets and promoting sustainable rice</p>	<p>at the consumer level, for example; DO, and more</p>	
INPUT	Harvested Dry Grain (GKP)	<p>1. Bulk rice in the form of PK (brown rice) and polished rice</p> <p>2. Packaged rice with label (healthy rice)</p>	<p>Packaged Rice (Example: Pamor organic label)</p>	<p>Packaged Rice (labelled unknown)</p>	<p>Packaged Rice (labelling unknown)</p>

7.1 Conclusion

Based on the description of the sustainable rice supply chain and value chain that has been narrated above, the results of the research in 5 regencies can be concluded as followed:

1. Information systems and actors in the sustainable rice supply chain in 5 regencies apparently rely on collectors and processors. Most of these actors play multiple roles, where the most strategic role is as a rice mill actor (small production capacity/PPK, and medium/PPM).
2. The market response and the results of the identification of sustainable rice consumer groups in 5 districts appear to be varied. For regencies where have policies that favor sustainable rice consumption (Klaten, Ngawi, Madiun), the market or consumers for this commodity is widely open. There is a tendency to increase the number of consumers of sustainable rice in this area. However, for regencies that are not firm and do not have local policies in favor of sustainable rice (Boyolali, Sragen), the market or consumer response to this commodity is still limited.

3. The gap in implementing sustainable rice traceability is still obvious in 5 regencies. Traceability of sustainable rice products at the producer (farmer) level already exists, but it is not uniformly orderly and disciplined in documenting the SRP model cultivation process or identical to the SRP model. Traceability of the collector-processor actors (penebas, PPK-PPM), is still weak. Except for the collectors-processors (PPK-PPM) which are operated by farmer organizations which are the nodes of sustainable rice knowledge (APOB, PPO ML, APPOLI, KOMPAK). Sustainable rice traceability at the level of traders and consumers is even more concerning. They generally lack the knowledge and awareness to document the traceability of this sustainable rice commodity. There are no “sustainable” labels or “SRP” labels for sustainable rice products in packaging, either at the producer, processor-processor, and trader levels. The labels for rice products used have various terms for this sustainable rice, for example; Healthy Rice (APOB), PAMOR Organic Rice (Warung Hijau Trukajaya), Srinuk Rice (Klaten), and others.
4. Development of a sustainable rice business model that is relevant and feasible for these 5 districts has two model options, namely; 1) sustainable rice mill business model with small production capacity owned and operated by competent and experienced farmer organizations in sustainable rice chain, 2) a sustainable rice mill business model with a small production capacity that is owned and operated by individuals by cooperating with regional-owned enterprise (BUMD) local company (Perusda)

7.2 Recommendation

The recommended sustainable rice business model recommendations are as followed:

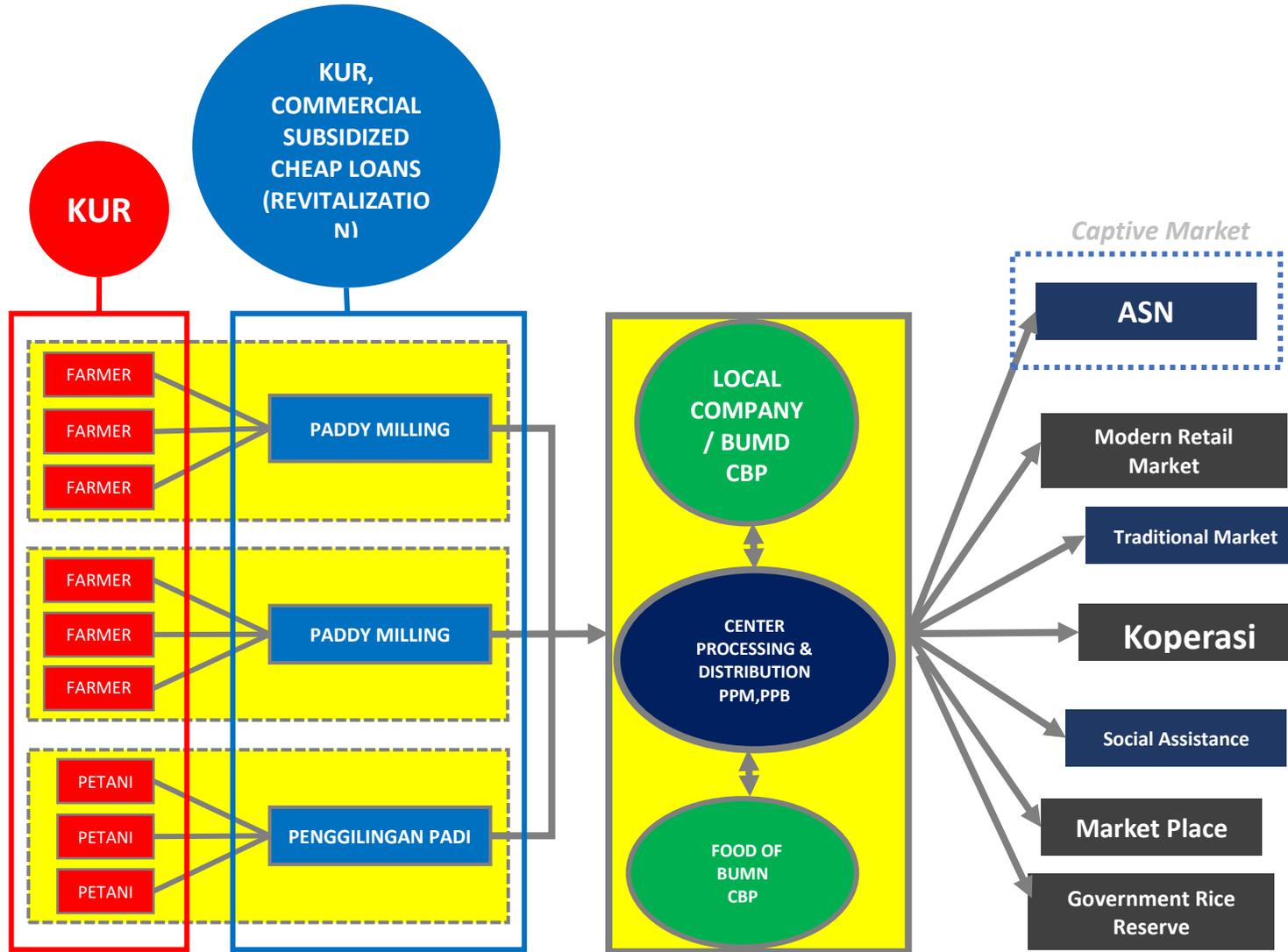
1. The PPK-PPM business model which its operations rely on organizations that have been developing rice farming practices with sustainable cultivation. The way this business model works is the collaboration between rice farmers with sustainable cultivation with PPK and/or PPM.
2. The PPK business model which its operations are based on regencies’ local government policies.

This recommendation can be implemented through strengthening steps for actors in sustainable rice milling, including:

1. Strengthening capacity in PPK-PPM owned by farmer organizations and individuals (organization, management, finance, business network with PPM-PPB)
2. PPK develops cooperation with farmer organizations that have not mastered RMU
3. Reactivate individual-owned PPK that is no longer operational by conducting KSO (Operational Cooperation) with farmer organizations which do not have RMU yet
4. PPM-PPB which have collaborated with regional companies (BUMD) involve PPK in developing sustainable rice commodity value chains
5. PPK who have limited facilities for post-harvest processing of rice (drying, storage) are advocated to obtain procurement assistance from the regencies’ government.

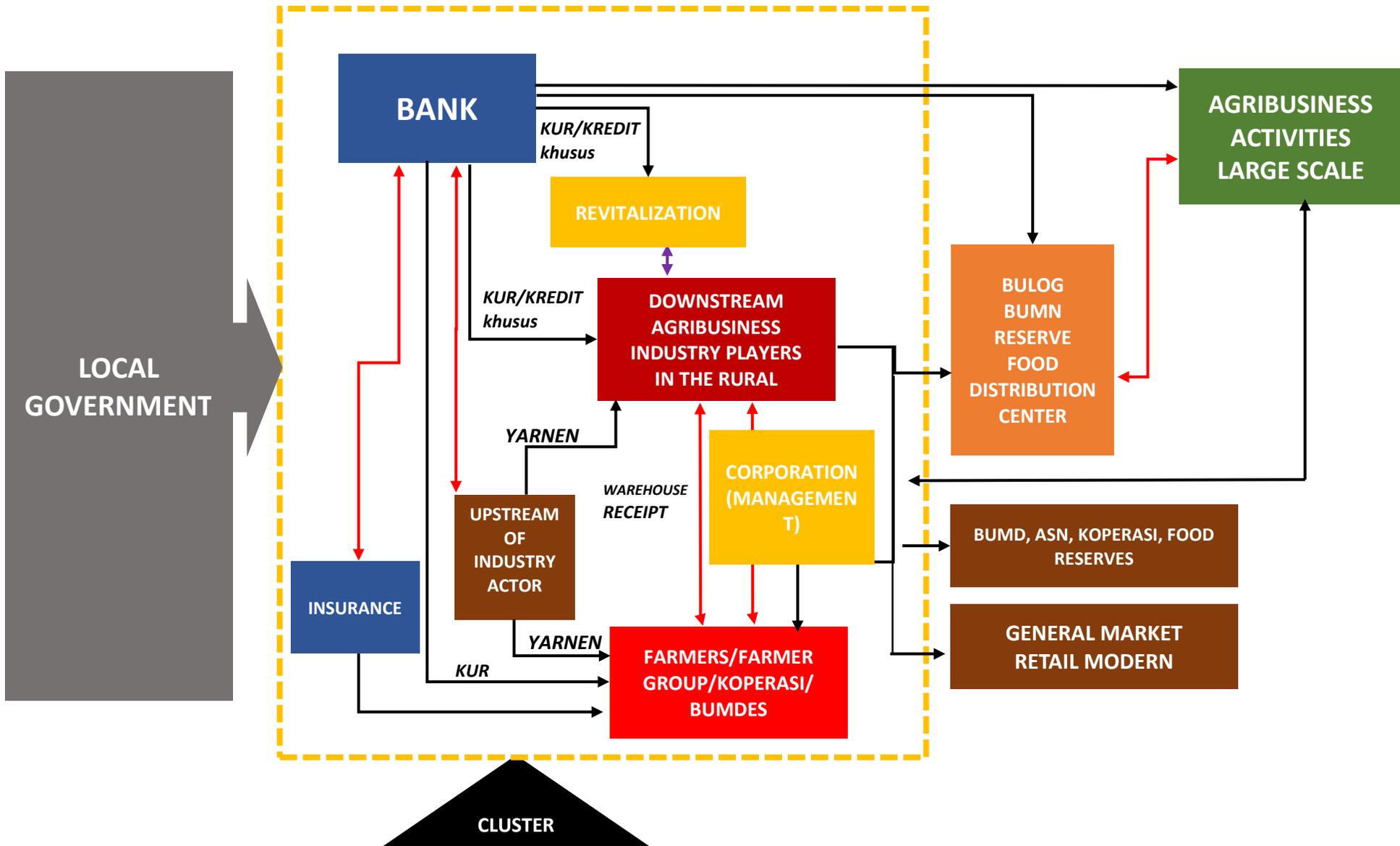
Figure 7.1

The general flow of the sustainable rice market scheme



Gambar 7.2

The proposed business model will be consulted with partners, KRKP and Perpadi



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