Study of Paddy Farmers' Livelihood in Sumber Ngepoh and Mulyoarjo Villages, Lawang Subdistrict, Malang District, Jawa Timur Province, Indonesia

Robert Wiliater Sibarani

A Thesis Submitted in Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Tropical Agricultural Resource Management Prince of Songkla University 2021

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This is to certify that the work here submitted is the result of the candidate's own investigations. Due acknowledgement has been made of any assistance received.

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I hereby certify that this work has not been accepted in substance for any degree, and is not being currently submitted in candidature for any degree.

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ABSTRACT

Farmers in Mulyoarjo village, as the neighbor for organic paddy farmers in Sumber Ngepoh village, are remain practicing conventional paddy farming by applying agricultural chemical inputs in their farming lands. Research has shown that organic farming is more profitable as compared to conventional farming, and livelihood assets play an important role to achieve sustainable livelihoods. This study aims to analyze the profit earned by farmers, the ownership of each livelihood asset, and assets earning profit in conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village.

Based on the review of litelature on sustainable livelihoods, conventional and organic farming, and economic performance, and also the review of empirical study about organic farming and sustainable livelihoods, a field survey was conducted to farmers as respondents in Sumber Ngepoh and Mulyoarjo villages. There were 32 organic paddy farmers from farmers group of Sumber Makmur 2 in Sumber Ngepoh village and 34 conventional paddy farmers from farmer group of Mulyo 1 in Mulyoarjo village who were interviewed.

Analysis of the responses from respondents demonstrated that profit earned by farmers in Sumber Ngepoh village is more that by farmers in Mulyoarjo village. In addition, the results of analysis also shown that the human and natural capitals which are owned by the respondents in both villages are similar while the financial, physical and social capital which are owned by the respondents in Sumber Ngepoh village are more than owned by the respondents in Mulyoarjo village, the natural capital increases the profit while the financial capital decreases the profit gotten by the respondents in Sumber Ngepoh village and the financial capital decrease the profit while the physical capital increase their profit gotten by the respondents in Mulyoarjo village, and

strategies are the similar components in the model of respondents' sustainable livelihoods between in Mulyoarjo village and in Sumber Ngepoh village that has a correlation with profit and the similar components in the model of respondents' sustainable livelihoods between in Mulyoarjo village and in Sumber Ngepoh village that has a correlation with profit are strategies while profit has a correlation with financial capital.

This study concludes that planting organic paddy done by respondents in Sumber Ngepoh village is more profit as compared to planting conventional paddy done by respondents in Mulyoarjo village and the natural capital is the capital that increases the profit gotten by the respondents in Sumber Ngepoh village. Therefore, the proposed recommendations are the respondents in Mulyoarjo village can do the change from planting conventional paddy to planting organic paddy; the government of Malang district must assist the respondents in conversion period from planting conventional paddy to planting organic paddy; and the higher education institutions (such as universities) in Malang regency must support the respondents in conversion process from planting conventional paddy to planting organic paddy.

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CHAPTER 1.
INTRODUCTION

1.1. Context of the Problem

Doing farming activities is a mean for farmers to making a living. Hence, agriculture has a very important role as a livelihood source for farmers. Chambers and Conway (1991) defined livelihood as sufficient supplies and streams of food and money to fulfill basic necessities of life, while sustainable is defined as the preservation or increase of resource productivity on a long-term basis. Based on this definition, farmers must realize sustainable livelihoods through their farming activities to guarantee sustainability to making a living. Da Cruz (2012) stated that achievement the sustainable livelihoods was only realized if the natural environment was sustainably managed. Altenbuchner *et al*. (2014) asserted more specific that organic farming could increase peasant farmer' livelihood.

Tsvetkov *et al*. (2018) express that organic farming guides to sustainability of natural resources, causes minimum negative impact on nature and could be defined as a self-sufficient system. Moreover, Kledal *et al*. (2006) asserted that organic farming depends on the use of natural resources, and concentrates on preservation, via (among other things) recycling resources and lowering pollution, so that it is a strive that contributes many of the worth and perspectives of ecological economics. However, in 2017, there was only 1.4 percent (69.8 million hectares) of organic agriculture land from total agricultural land in the world (FiBL and IFOAM, 2019). This data indicates that most farmers in the world are still practicing conventional farming.

Jagadeeswari (2016) states that conventional farming had been a general practice among farmer in increasing productivity to fulfill the demand that continuous increase. In line to this, United Nations (2003) reveals that reaching maximum yields of a specific plant is the concentration of conventional farming. To realize this achievement, Tal (2018) states that artificial-chemicals inputs are used in conventional agriculture. Mkhize (2016) affirms that farming-practice activities that utilize not only synthetic-chemical fertilizers, but also synthetic-chemical pesticides and synthetic-

chemical herbicides as well as apply heavy irrigation, intensive tillage, or focus on monoculture production, is well known as conventional farming

In Indonesia, most farmers are also practicing conventional farming. This indicated by total organic agricultural land in Indonesia that was only 0.6 percent (208,042 hectares) in 2017 (FiBL and IFOAM, 2019). In that year, there were 35,923,886 people working in agricultural sector[1] in Indonesia (Badan Pusat Statistik, 2018). Total of smallholders in Indonesia is 93 percent of total farmers and they done farming activities on simple farmland plots averaging 0.6 hectares (FAO, 2018). These data show that farming activity in Indonesia has a very important role as a source of livelihoods for the large number of small farmers. However, by practicing the conventional farming, they are very dependent on the use of chemical agricultural inputs such as chemical fertilizers, pesticides, insecticides and fungicides.

One of food crops commodity cultivated conventionally by Indonesian farmers is paddy. This commodity is the source of main foodstuff for Indonesian people, and paddy widely planted in all 34 provinces in this country. In 2017, harvested area for paddy in Indonesia was 15,890,073 hectares with production was 81,148,594 ton (Pusat Data dan Sistem Informasi Pertanian, 2018).

Jawa Timur province is the second-largest producer of paddy in Indonesia. In 2017, harvested area for paddy in this province was 2,285,232 hectares with production was 13,060,464 ton (Pusat Data dan Sistem Informasi Pertanian, 2018). Two villages as areas for planting paddy in this province are Mulyoarjo and Sumber Ngepoh villages. They are located in Malang district. In Mulyoarjo village, all of farmers plant paddy conventionally. In Sumber Ngepoh village, a part of farmers plant paddy organically.

BA and Barbier (2015) stated that compared to conventional farming system, organic farming is more profitable. This statement asserts clearly that there is the different of profit earned from conventional and organic farming. The different of profit is generated by using the different farming inputs between organic and conventional farming, which leads to the difference on total cost of production, total production, selling price of the yield, and profit earned from selling the yield.

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[1] This sector is included agriculture, forestry, hunting, and fisheries.

The difference of profit earned by conventional farmers and by organic farmers is a main issue in the context of its contribution to the income as the main factor to realize sustainable livelihoods from each farm. It is related to statement from Ma *at al*. (2018) who stated that income was the main factor of livelihood outcomes in the context of sustainable livelihoods. Therefore, to solve the issue, Bandanaa *et al*. (2016) stated that encouragement had to be done to the farmers so that farmers practice organic farming in order to make better the outcome (namely more income (DFID, 1999)) of their livelihoods. However, Baležentis, *et al*. (2019) asserted that the attraction to do or to divert an investment into another of farming activities was indicated by profitability. Related to this assertion, it is clear that profit can be an encouragement or an obstacle for the conventional farmers to do conversion from conventional to organic farming.

Läpple (2012) stated that if it is compared to organic farmers, conventional farmers are more profit oriented. Therefore, the knowledge owned by conventional paddy farmers in Mulyoarjo village related to results of calculation about profitability, which is generated from conventional farming and from organic farming, is a basis for the farmers to remain practicing the conventional paddy farming or to convert from practicing the conventional paddy farming to practicing the organic paddy farming. The more profit, which will potentially earned from organic farming, can encourage them to do the logical action, namely doing conversion from conventional to organic farming, *vice versa*.

Doing conversion from conventional to organic farming means having a change of using agricultural inputs, namely from using chemical fertilizers, pesticides, insecticides, and fungicides to using natural fertilizers, pesticides, insecticides, and fungicides. Thus, the conversion potentially not only leads to the change for cost of production, rate of production, selling price of the yield, and rate of profit from selling the yield, but also influences the efforts done by farmers to realize the sustainable livelihoods.

In the context to realize the sustainable livelihoods, DFID (1999) stated that the approach about livelihoods was based on a belief that people needed a series of assets consisting of human capital, natural capital, financial capital, physical capital, and social capital, to reach positive livelihood outcomes, particularly more income. This statement points out that the livelihood assets play an important role in effort to achieve

the livelihood outcome. It is in accordance with Ma *et al*. (2018) who asserted that livelihood assets had an important effect on society income.

Livelihood assets, which are the means of production for society to produce material resources by objective for a survival, are cores of sustainable livelihoods (Jaka and Shava, 2018). These livelihood assets are the basis of society livelihoods (Ma *et al*., 2018). More clearly, Carloni and Crowley (2005) stated that livelihood assets pointed to the resource base of the society and of different classifications of households. These different households have no similar levels of access to the types of the livelihood assets (Messer and Townsley, 2003). In other words, it can be stated that by different access to livelihood assets, it will have difference of ownership of livelihood assets. In turn, it has a different role to generate the different livelihood outcomes.

To attain the different livelihood outcomes, it needs the difference of assets (DFID, 1999). In this regard, diverse types of assets have different roles in people's livelihoods (Tamin and Anderson, 2010). Hence, the different kinds of assets, which owned and accessed by conventional paddy farmers in Mulyoarjo village and organic paddy farmer in Sumber Ngepoh village, have also potential different roles to their livelihoods. In the context of conversion from conventional paddy farming in Mulyoarjo village to organic paddy farming as done by farmers in Sumber Ngepoh village, then types of livelihood assets which previously play a role to realize sustainable livelihood for the conventional farmers are also changing when farmers have success of practicing organic paddy farming. In this regard, the types of livelihood assets owned and accessed by conventional paddy farmers in Mulyoarjo village are being the crucial issues when it cannot play as similar role as the types of livelihood assets used by organic paddy farmers in Sumber Ngepoh village to attain livelihood income in order to realize sustainable livelihoods.

Carloni and Crowley (2005) asserted that there is a variation of the amount and relative importance of each type of livelihood assets between societies. Therefore, with this variation, the role of each livelihood assets in order to realize sustainable livelihoods in conventional and organic farming is potentially different. In this regard, there is an asset which has a dominant role in each farming because it more owned and easy to be accessed as well as used optimally by farmers in each village and *vice versa*.

The potential of different role among different assets to realize sustainable livelihoods in conventional and organic farming is caused by the difference in the use of farming inputs. In the case of procuring farming inputs, conventional farmers use external inputs by purchasing chemical fertilizers, pesticides, insecticides, and fungicides while organic farmers use internal inputs namely natural fertilizers, pesticides, insecticides, and fungicides. Therefore, the asset that can support conventional farmers in purchasing external inputs has a dominant role to realize sustainable livelihoods while the asset that can support organic farmers to procurement internal inputs has a dominant role to realize sustainable livelihoods.

Kalainith (2013) stated that for individual farmers, the chemical agriculture was a menace to their livelihoods. Refer to this statement, each livelihood asset used in conventional farming plays a role in giving the threat to the conventional farmers' livelihoods. The magnitude of the role played by each asset in giving the threat to farmers' livelihoods is determined by the magnitude of the influence giving by the asset to the income earned from conventional farming as the main factor of livelihood outcomes in the context of sustainable livelihoods.

The magnitude of the influence of each asset to earning income is the issue in the context to realize sustainable livelihoods in conventional farming. Moreover, the magnitude of the influence of each asset to earning income in conventional farming is also being a crucial concern related to conversion from conventional paddy farming in Mulyoarjo village to organic paddy farming as done by farmers in Sumber Ngepoh village. In this regard, it is needed an adjustment to role similarity of the types of livelihood assets used by organic paddy farmers in Sumber Ngepoh village to attain livelihood income in order to realize sustainable livelihoods.

There is the use of agricultural chemical inputs by the paddy farmers in Mulyoarjo village and the agricultural organic (natural) inputs by the paddy farmers in Sumber Ngepoh village. Then it potentially leads to the difference on earning of profit by the farmers in both villages, the ownership of each livelihood asset by the farmers, the assets and their magnitudes to earn profit, and also the components of the sustainable livelihood framework to achieve the livelihood outcomes. Refer to the Sustainable Livelihoods Framework (SLF) from DFID (1999), the difference of sustainable livelihoods between that two villages is shown from the difference of the

vulnerability context, the role of livelihood assets, the transforming structures and processes, livelihood strategies, and the livelihood outcomes.

1.2. Research Questions

Refer to the context of problem above, a research was conducted to study the problem. The research questions in this study are:

1. The fact shows that the farmers in Mulyoarjo village are still planting paddy conventionally. It means that farmers must spend cost to procurement for the chemical inputs in each planting season. This regard has raised a question. Does the conventional paddy farming in Mulyoarjo village have more profitable if it is compared to organic paddy farming in Sumber Ngepoh village?

2. There is the difference in using agricultural inputs between conventional paddy farmers in Mulyoarjo village, who use chemical inputs, and organic paddy farmers in Sumber Ngepoh village, who use non-chemical inputs, is potentially to lead the difference of the ownership of livelihood assets between that two paddy farmer groups. This regard has raised a question. How is the ownership (owned and accessed) of each livelihood asset in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village?

3. The difference of the ownership of livelihood assets by conventional paddy farmers in Mulyoarjo village and by organic paddy farmers in Sumber Ngepoh village are potentially leading to the different assets and their magnitudes to earn profit from farmers' farming field as the main factor of livelihood outcomes in the context of sustainable livelihoods. This regard has raised a question. How is the difference of assets and their magnitude to earn profit in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village?

4. The difference of assets and their magnitudes to earn profit from farmers' farming field in Mulyoarjo village and in Sumber Ngepoh village is leading to the different of sustainable livelihoods between both villages. This regard has raised a question. How is the difference of components of the sustainable livelihood framework, which play the role to achieve the livelihood outcomes in the context of sustainable livelihoods between in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village?

1.3. Research Objectives

Based on the research questions, this study is conducted with the following objectives:

1. To analyze the profit earned in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village where the analysis is based on:
   a. the cost of paddy production,
   b. the total of paddy production, and
   c. the revenue from paddy sales;

2. To analyze the ownership of each livelihood asset in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village;

3. To analyze the difference of assets and their magnitudes to earn profit in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village; and

4. To analyze the difference of components of the sustainable livelihood framework, which plays the role to achieve the livelihood outcomes in the context of sustainable livelihoods between conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village.

1.4. Expected Advantages

The expected advantages of this study are the results of:

1. the profit analysis which is earned from conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village based on cost of paddy production, the total of paddy production, and also the selling price of paddy;

2. the descriptive analysis about the ownership of each livelihood asset in conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village;

3. the statistical analysis of the difference of assets and their magnitudes to earn profit in conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village;

4. the statistical analysis and the model of the difference of components of the sustainable livelihood framework which plays the role to achieve the livelihood outcomes in the context of sustainable livelihoods between conventional paddy

farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village; and

5. the suggestion which is related to the plan and policy implication of livelihoods between conventional paddy farming in Mulyoarjo village and organic paddy farming in Sumber Ngepoh village.

1.5. Importance of the Study

The findings of this study will contribute to:

1. the understanding of the paddy farmer's livelihood of both organic or conventional farming;

2. literature of farmer's paddy livelihood; and

3. the plan and policy implication of livelihoods between organic and conventional paddy farming.

1.6. Organization of the Study

The study is organized into six chapters. The first chapter highlights the context of the problem, the research questions, the research objectives, expected advantages, and the organization of the study. In Chapter 2, a literature review is presented, covering sustainable livelihoods, conventional farming, organic farming, economic performance, empirical study about organic farming and sustainable livelihoods, hypothesis of study, certification of organic products, paddy production for source of livelihoods, and research framework.

Chapter 3 sets out the methodology of the study. It starts with an explanation about study area, sampling method, collecting data, and data processing and analyzing. In chapter 4, the results of the research are presented. It presents the descriptive analysis, economic performance of respondent, analysis of livelihood assets, analysis of the influence of livelihood assets to profit, multiple linear regression test, analysis of components of sustainable livelihood framework, the results of testing of hypotheses, model of respondents' sustainable livelihoods and guideline to change from conventional to organic paddy farming. Chapter 5 discusses about conclusions and recommendations.

CHAPTER 2.
LITERATURE REVIEW

2.1. Sustainable Livelihoods

Chambers and Conway (1991) defined livelihood and sustainable livelihoods as follow:

"A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. A livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term" (p. 6).

Related to this definition, Knutsson and Ostwald (2006) recommend to utilized two approaches as a framework due to its potency as a guidance comprehensively and integrated evaluations about vulnerability to various stressors, namely the asset-based approach, which is started from a comprehension about resources mobilization on the local level, and the Sustainable Livelihoods Approach (SLA), which is an analytical and process-oriented approach by developing a tool for assessment of vulnerability. Meanwhile, Ashley and Carney (1999) asserted that the approaches done to sustainable livelihoods are derived from thriving thinking about poverty alleviation, the manner the impoverished people undergo their lives, and the significance of structural and institutional problems.

The way to understand and to analyze the sustainable livelihoods from a community is through approach by using the Sustainable Livelihoods Framework (SLF) submitted by DFID (DFID, 1999) as presented in Figure 2.1. The framework looked at that people live their lives in vulnerable conditions. However, even though they are in these conditions, the people have access to particular assets or poorness-reducing factors. The existence of the prevailing social, institutional and organization environment effects the people's livelihood strategies in efforts to realize of beneficial livelihood outcomes, which meet to their own livelihood objectives.
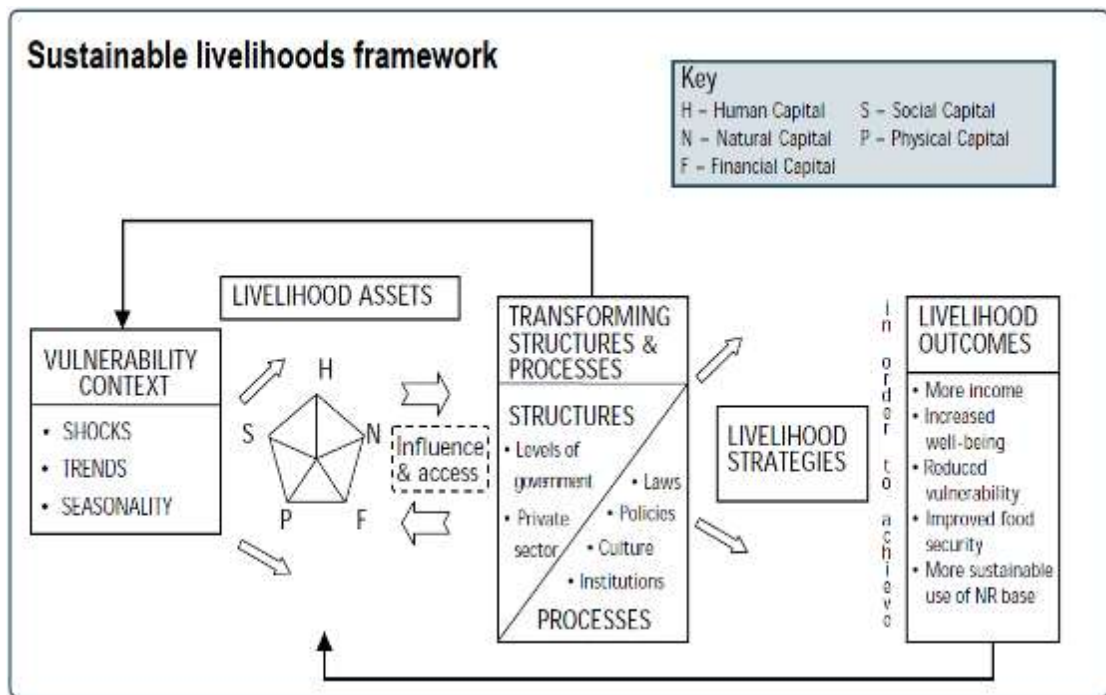
Figure 2.1. Sustainable Livelihoods Framework
Source: DFID (1999).

From the figure 2.1., it is intended that H means Human capital; N means Natural capital; F means Financial capital; P means Physical capital; and S means Social capital. In detail, De Satgé, *et al*. (2000) explain that:

a. human capital covers of individual capability (namely individual skills, knowledge, and ability to work, as well as good health) in order to realize various livelihood strategies;

b. natural capital covers of the available natural resource (namely land, water, wildlife, biodiversity, environmental resources) as the origin of the flow of useful resource for livelihoods;

c. financial capital covers of the available financial resources (such as savings, credit, remittance or pensions), which leads people to various livelihood choices;

d. physical capital covers of physical facilities, which enable people to realize livelihoods, namely basic infrastructure (such as transport, shelter, water, energy and communications) and also the production equipment; and

e. social capital covers of the social resources (networks, membership of groups, relationships of trust, access to wider institutions of society) which can be utilized by people to realize of livelihoods.

In the context of the role of livelihood capitals on farming, Longpichai, *et al.* (2012) stated that farm households mobilize livelihood capital, namely human, social, natural, physical and financial capital, by objective to contribute to the development of livelihood strategies. Pretty (2006) asserted that natural, social, human, physical and financial capital, which were five types of assets, were admitted as being importance due to agricultural systems at all levels relied on the value of services flowing from the total stock of assets that they influenced and controled.

LaFlamme (2010) states that the important components, which are used in the framework to plan livelihoods, are:

1. Vulnerability context, which is intended as the risks towards assets owned by people. Given the risks have relation to rules and affect assets, then, strong assets have the ability to refuse the risks or to manage the risk with more certainty by affecting the design of rules.

2. Assets, which is intended as what people have. There are many types of assets that interact with each other in different ways.

3. Influence and Access, which are intended as the capability to change rules by using assets. Interactions that influence each other show that access to the rules is needed to change it, otherwise, assets are the determinant towards the ability to affect the rules.

4. Transforming structures and processes, which are intended as the rules that determine who can do what. It is stressed that the interactions involve top-down and bottom-up, cross-sectoral and cross-scale.

5. Strategies, which are intended as what people do. The assets and rules, which determine what people can do with their assets, determine the strategies.

6. Outcomes, which are intended as what people get from what they do. In this thing, strategies produce outcomes, which must be sustained to build assets.

Related to sustainable livelihoods in rural area, Kumar *et al.* (2006) state that sustainable rural livelihood is a many-sided concept and refers to preservation or increase of access of rural households to food and income-generating activities on a

long-term. This thing covers warranted possession of, or access to, resources, assets, and income-earning activities to offset risks, ease shocks and meet contingencies. Furthermore, Sati and Vangchhia (2017) asserted that the utilize of natural resources in sustainable ways is the way to relize sustainable rural livelihoods.

2.2. Conventional Farming

Skoufogianni *et al.* (2015) states that by objective to confirming sufficient food for humanity, agricultural orientation in the last few years is industrial and it mainly applies intensive farming practices. This agriculture, which well known in various terms, namely "industrial farming", "modern agriculture" or "conventional farming", has brought tremendous advancement in productivity and efficiency (Gold, 2016).

Womach *et al.* (2005) defined that: "Conventional agriculture – Generally used to contrast common or traditional agricultural practice featuring heavy reliance on chemical and energy inputs typical of large-scale, mechanized farms to alternative agriculture or sustainable agriculture practices. Mold-board plowing to cover stubble, routine pesticide spraying, and use of synthetic fertilizers are examples of conventional practices that contrast to alternative practices such as no-till, integrated pest management, and use of animal and green manures". Cassady and Barton (2011) defined that: "Conventional agriculture or conventional farming referred to traditional agricultural practices such as a reliance on pesticides and synthetic fertilizers." Jacobs (2011) defined conventional farming as: "a system that emphasizes maintaining and increasing productivity by the application of yield-enhancing technologies and the high volume use of many inputs such as fossil energy and chemicals (pesticides, synthetic, fertilizers)". Campion *et al.* (2020) asserted that conventional farming was generally associated with high-input modern agriculture, which included the use of synthetic chemical fertilizers, fungicides, insecticides, and herbicides.

Conventional farming, which has been well known in term as industrial or high input agriculture, is highly related to the Green Revolution (Curtis, 2012). The green revolution has produced in a higher production as the result of the use of synthetic chemical fertilizers and pesticides that has encouraged production output per hectare in almost all cases (Rundgren, 2002). Related to the high production, the mainly center of

attention of conventional farming is to reach the highest yields of a certain agricultural crop (United Nations, 2003).

From the role of the conventional farming, Tu *et al*. (2006) stated that an important role which had played by conventional farming was in enhancing food and fiber productivity in order to fulfill human demands. FAO (2009a) predicts that, in 2050, the world population, who must be fed, will be more than 9.1 billion people. Related to this thing, Gold (2016) reveals that in the last 50 years, there has been increasing food production around the world, where between 70 percent and 90 percent of the food production that recent increases is produced by conventional agriculture rather. More specific, FAO (2008 to 2016) asserted that conventional farming has a role in effort to enhance production of food and fiber to meet the needs of food and fibers of the world population, where from year 2007/08 to 2016/17, the world production of cereals increased amount of 19.54 percent; wheat increased amount of 18.69 percent; coarse grains increased amount of 22.76 percent; rice increased amount of 12.83 percent; and cassava increased amount of 32.60 percent.

However, the enhancement significantly for land preparation, fertilizer (primarily nitrogen), and irrigation are the characteristic of today's model of industrial agriculture in the use exceedingly intensive energy, meanwhile the strong correlation between crop and oil price causing high-input agriculture seen less profitable and very unstable for consumers (Tandon and Palacios, 2014). Besides that, the use of intensive inputs of synthetic chemical fertilizers, pesticides, and herbicides in the conventional farming makes a great dependence on that inputs (Tu *et al*., 2006). Moreover, it is not only polluting soil, water, and air, but synthetic chemical pesticides and fertilizers are also harming both the environment and human health (Horrigan *et al*., 2002). More specific, the negative effect of Nitrogen which is applied to farmland, namely approximately 30 to 80 percent, run away to contaminate water systems and the atmosphere (Pretty, 2008). Therefore, in order to reliaze the purpose to maximize yields, it is generally happened in the conventional agriculture that environmental health and biodiversity are not conserved (Jagadeeswari, 2016).

In line to the things above, Rundgren and Parrott (2006) stated that stimulating and agriculture production system through the application of synthetic chemical fertilizes and pesticides in which has increasingly tried not to bound to natural

regulation processes and local resources, and that is highly rely on nonrenewable resources is the source cause of the issues in conventional farming. In this thing, the utilize heavily of synthetic chemical fertilizers and pesticides has given severe harm not only to the environment but also influence to human population indirectly (Kumari *et al.*, 2014). The impacts from heavy and unbalanced use of agro-chemicals are the rise of costs on farming production, the dependence on external inputs and energy, the decrease in soil productivity, the contaminate of surface and ground water, and the adverse impacts on human and animal health (Rasul and Thapa, 2004).

2.3. Organic Farming

The emergence of the issues as a result of the use of chemical inputs in practices of the conventional farming has encouraged the development of an alternative farming. Related to this matter, Ciccarese and Silli (2016) stated that based on the farm management and the farm production system, organic farming is as the alternative to conventional agricultural systems. Tridjaja (2016) revealed that organic farming was an agricultural system, which kept away from or mainly prohibits the use of synthetic chemical fertilizers and pesticides.

IFOAM (2017) defines organic agriculture as: "a production system that sustains the health of soils, ecosystems and people; relies on ecological processes, biodiversity and cycles adapted to local conditions rather than the use of inputs with adverse effects; and combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved". FAO (2017) defines that: "Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. FAO emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system".

Papendick *et al.* (1980) defined that: "Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent

feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds and other pets". Womach *et al*. (2005) defined that: "Organic farming – An approach to farming based on biological methods that avoid the use of synthetic crop or livestock production inputs and on a broadly defined philosophy of farming that puts value on ecological harmony, resource efficiency, and non-intensive animal husbandry practices".

System approach for the organic farming is shown by interactions among crops, animals, insect and soil in organic farming, in which the interactions have an equal significant role with the entire of the farm itself (Delate, 2003). As a replacement of the use synthetic chemical fertilizers, organic farmers do rotations among plants, plant cover crops and add compost to soil by objective to maintain or enhance soil fertility, meanwhile to replace the use synthetic pesticides, the farmers utilize biological, cultural, and physical methods to restrict pest increase in number and spread and to escalate populations of worthwhile insects. Ciccarese and Silli (2016) asserted that the role of organic farming was to diminish or to abolish the intake of synthetic chemical fertilizers, herbicides, pesticides, and pathogen. The ways which are recommended for weed control are only through manual, mechanical and thermal practices. Controlling to insects, mites, snails, which are as crop parasites, can be done through biotechnology measures or natural insecticides.

Related to organic farming as sustainable farming, there are three characteristics of sustainable farming, namely: (a) preserve the quality of environment, (b) keep stability of plant and animal productivity, and (c) acceptable by social environment (Rasul and Thapa, 2004). Therefore, the assessment towards sustainable farming must accommodate the perspective of *ecological health* (keeping the continuity and doing the recovery to the natural environment), *social acceptance* (independence, equality and enhancement quality of life), and *economic continuity* (preservation of harvest and productivity of farming plants and livestock).

IFOAM (2017) defines principles of organic agriculture as follow:

1. *"Principle of health: organic agriculture should sustain and enhance the health of soil, plant, animal, human, and planet as one and indivisible.*

2. *Principle of ecology: organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.*

3. *Principle of fairness: organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.*

4. *Principle of care: organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment"* (p. 2 – 3).

FiBL and IFOAM (2016) recorded that in 2014 that there were 172 countries which active in organic farming. In that year, there was 43.7 million hectares organic farming increasing almost 300 percent from 11 million hectares in 1999. The organic land shared 0.99 percent of total the world's agricultural land. Total producers active in organic farming were 2.3 million producers increasing 1,050 percent from 200,000 producers in 1999. The size of organic market reached 80 billion US dollars increasing 426 percent from 15.2 billion US dollars.

In the context of farmer's consideration about a farming practice, which will be applied in their farming field, OECD (2003) reveals in many cases that profitability in the short run is a matter considered by farmers when they select which farming system to use whether conventional or organic. In other words, it is reasonable at the farmer level that the choice to apply organic farming is mostly based on economic benefit consideration which will be compared to conventional farming. De Ponti *et al*. (2012) stated that the ability to become economically competitive compared to conventional agriculture was the actual role of organic farming.

Kniss *et al*. (2016) concluded that harvest gotten from organic farming are 20 percent lower than harvest gotten from conventional farming. However, OECD (2003) states that the lower harvest produced by organic farming as compared to harvest produced by conventional farming is compensated by higher selling prices for organic

harvest and lower variable costs in organic farming. Related to the costs, Neto *et al.* (2017) explained that given that the number of spraying in the conventional farming was a lot more than in the organic farming causing the cost of plant management in the conventional farming was 2.33 times higher than in organic farming. Meanwhile, related to profit, Crowder and Reganold (2015) asserted that the significant profit that was gotten from organic agriculture is more than 22 to 35 percent as compared to profit that was gotten from conventional agriculture. Therefore, MacRae *et al.* (2007) stated that a combination of the change of harvest result, the cost diminish of inputs, and price premiums leads to obtain more profit gotten from organic farming systems as compared to profit gotten from conventional farming systems.

Ciccarese and Silli (2016) reveals that fulfilling the consumers demand on healthy and safe food and supporting to the patronage of the environment, animal welfare and rural development in order to fulfill the public food are two important functions played by organic production techniques. By applying farming-native techniques of improving soil fertility and eradicating pests and diseases, organic farming system is categorized into certified organic farming and *de facto* organic farming (Parrott and Marsden, 2002). The certified organic farming has being a pioneer for the market development for farming products labelled as organic although there are still many land that managed following organic rules as required for certified organic farming is not certified as such, while *de facto* organic farming refer to the farming land that managed truly organically and located in resource-impoverished and/or agriculturally marginal zones, where local society have a less of access to the cash economy.

2.4. Economic Performance

Given that in the absence of profit will cause the business to stop in the long term, then, all business make efforts to make a profit (Evans, 2014). In line to this undeniable thing, the farm must produce the profit particularly in the long run so that it can stand in business (Johnson *et al.*, 1998). The two main aims of the operation of farm are farms that have a orientation to market attempt to achieve a maximum profit and farms that have a orientation to subsistence attempt to fulfill their household sustenance (McConnell and Dillon, 1977).

Kahan (2013) emphasized more specific purpose that, basically, market-oriented farming is encouraged by creating profits, which is achieved through selling farm products in the market on a regular basis. It is in line to Barroso *et al.* (2019) who stated that the ultimate measure of the economic performance of the farming activities was profit. Farmers gain the profit by subtracting the total costs of production from the value of production, where total cost of production consists of fixed cost and variable cost, while the value of production is the quantity of production sold multiplied by the market price that the farmer receives (Hilmi, 2006).

Profit is defined as the amount of money a business earns above and beyond what business spends for salaries and other expenses needed to run the operation (Nickels *et al.*, 2016). More specifically, Evans (2014) defines the profit as the excess of revenue (income) above the costs (expenses) incurred in the process of producing the revenue (income). Debertin (2012) defined profit as the difference between the revenues obtained from what was sold and the costs incurred in producing the goods.

The formulas for components of economic performance in aim to achieve the profit the farmers are as following:

$$\textbf{TC} = \textbf{FC} + \textbf{VC} \tag{2.1}$$

where:
TC = Total cost
FC = Fixed cost
VC = Variable cost

Pindyck and Rubinfeld (2018) define variable cost (VC) as a cost that varies as output varies. Meanwhile, Debertin (2012) defines variable costs (VC) as the costs of production that vary with the level of output produced by the farmer. From these definitions, it is clear that variable cost spent by farmers follows the amount of output produced from their farming activities.

Fixed cost (FC) is a cost that does not vary with the level of output and that can be eliminated only by going out of business (Pindyck and Rubinfeld, 2018). Fixed costs (FC) are the costs that must be incurred by the farmer whether or not production takes place (Debertin, 2012). From these definitions, it is clear that fixed cost spent by farmers does not follow the amount of output produced from their farming activities.

$$TR = QP \times SP \qquad (2.2)$$

where:
TR = Total revenue
QR = Quantity of production
SP = Selling price

Hill (1990) stated that Total Revenue was the income that earned by selling a certain amount of outcome of production. More detail, Ragan (2020) asserted that Total Revenue (TR) was the total number that earned by the company from the sell of an outcome of production. Debertin (2012) explained that Total Revenue (TR) was the sale of all farm outcome that produced by farmers in accordance with the prevailing market price.

$$\pi = TR + TC \qquad (2.3)$$

where:
π = Profit
TR = Total revenue
TC = Total cost

Profit is the subtraction between the Total Revenue (TR) of every company obtains from the sale of company's outcome and the Total Cost (TC) spent to produce that outcome (Ragan, 2020). Total Revenue (TR) obtained by farmers *minus* Total Cost (TC) spent by them is called farmer's profit (Debertin, 2012). The greatest profit will be achieved when the difference between TR and TC is greatest.

2.5. Empirical Study about Organic Farming and Sustainable Livelihoods

Some empirical studies are used as evidences about organic farming and sustainable livelihoods. Sudheer (2013) studied from the economics side of three organic versus chemical crops farming namely, paddy, red gram, and groundnuts, in Andhra Pradesh, India by comparing the economy of 350 organic farmers and 200 chemical farmers who grow of that three crops. The findings of the study shown that the profits, with lower inputs costs, earned by organic paddy farmers was higher by 37 percent, organic red gram farmers was higher by 33 percent, and organic groundnut farmers was higher by 59 percent more compared to the chemical farmers. For all the crop or the size of farm, the costs and the returns of organic farming are commonly more beneficial as compared to chemical farming except for small red gram farms and large groundnut farms. The result of analysis also shown that the main driver for

farmers to run organic practices is electronic media (television). Farmers convinced that organic farming repair soil fertility and their profits in the long-term.

Doanh *et al*. (2018) examined affect of change to organic tea planting on family income in the Mountainous Areas of Northern Vietnam which objectives at determining where organic tea farming has results in higher net income than conventional tea farming. There are 226 traditional and 319 organic tea-producing households in the provinces of Thai Nguyen, Phu Tho, Ha Giang, and Lai Chau involved as the sample in this study. A propensity score matching approach was used in the study and the finding were income of farm' households in the study area had a positive affect as a result adopting of organic tea production. By using different matching algorithms, it is found that the organic tea farmers got higher income from 1038.8 to 1059.0 thousand Vietnamese Dong (VND) per hectare of cultivation plot than farmers who did not adopt the tea.

Lukas and Cahn (2008) studied about the livelihoods gotten by a group of farmers in Karnataka, South India as the impacts a convert from conventional to organic farming. The inductive qualitative method was used in the study, where, by aim to support qualitative findings, several quantitative data was also employed. The indication that the interview had covered discussion of the all significant issues was when there was no extra information gotten after 10 farmers interviewed. The study found that the farmers' livelihoods increased in the long term after the farmers did the conversion from conventional to organic farming. This is due to the reduce of both expenses for agricultural inputs from outside and necessity of labor on the similar or higher yields with premium prices that produced the higher net-farm incomes; the increase of the natural assets; the reduce for both the dependence on credits and for the risk of crop failure as a result of the attacking of pests and diseases as well as the droughts which reduced vulnerability; the improve of the food safety; the reduce of the poisonings risk of the use for pesticide; and the achieve of both the higher steps of self-sufficiency and the access to networks by objective to support the exchange of knowledge and the participate on politics as significant advantages for the conversion. The temporarily decreasing of the yields and, both a lack of information and experiences are the hard things noted by farmers and these are to be a main obstacle that prevent asset of the small farmers to adopt organic agriculture.

Ma *et al*. (2018) did the study about the livelihood asset that is based on the spatial differentiation of the income of natural tourism communities in the Jiuzhaigou Nature Reserve in Sichuan province, China. A case study carried out on 16 communities in and around study area. Based on the characteristics of the geographical and spatial of study area, the development level of tourism, and the variety of livelihood, the communities was divided into three types namely, the areas of core attraction, the areas of service support, and the areas of secondary service support. To get in-depth interviews, the study used the method of participatory assessment. While, to build 4 multivariate regression models by objective to find out the influence of livelihood assets on the income of community and the difference of spatial of the factors which influenced community income, the study employed questionnaire data from 256 rural households. The finding of the study are the income of community in tourist areas got a significant impact from livelihood assets with an extraordinary differences of spatial; the incomes of the farmers got a significant impact by the kinds of livelihoods and the effective use of livelihood assets; the option of livelihood got a certain impact by the kind and amount of livelihood assets; and the use method and the effective use of livelihood assets was determined by the kind of livelihood of a farmer.

Udin (2014) studied impact of organic farming on sustainable livelihoods of marginal farmers in Shimoga district of Karnataka. Methods used in the study were Rapid Rural Appraisal (RRA) and Participatory Rural appraisal (PRA). Data was collected by using semi-structured interviews and direct observation as well as doing talks with various stakeholders who are concerned with organic farming. The study stated that the organic farming was able to fulfilled the household consumption needs, and gave equitable amount of income, as well as reduced the cultivation cost through keeping a sustainability of agroecosystem. The study showed that there was a large scope of diversification of farming practices namely, manure, water and, pest management as well as creation of rural job that provides food security at the family level. All these are probable actions with a maximum utilization of local natural capital inputs that may propose the best prospects for reduction of poverty and rising sustainable livelihood outcomes.

Mwanza (2011) assessed capital or assets factors of family that affected smallholder farmers' income under International Development Enterprises (IDE) in

Zambia by using the Ordinary Least Square (OLS) regression model. The cross sectional data from targeting households from Kabwe region of central Zambia, which were supported by the International Development Enterprises (IDE) Zambia, was used. The supports by IDE's to smallholder farmers were in various linkages. They were credit, market, agricultural input, promotion of irrigation technologies, capacity building, and gender participation in income generating activities by means of agriculture as a method to decrease poverty among the village poor. The results of the study showed that during the 2009/10 season, 902 Euros was the income per capita in every year of family in the six areas. The 85.9 percent of agriculture and 9.1 percent of non-agricultural small businesses, such as petty trading, is the most driver of income. Refer to empirical findings, land owned by farmers and access to available water throughout the year for irrigation as factors of natural capital, had a positive corelation to the income; age, which is a demographic factor of human capital, has a negative corelation to the income, while family size and total of extension visits have a positive corelation to income; factor of financial capital namely, access to credit, and factor of physical capital namely, the productive assets, as well as factor of social capital namely, distance to the nearest market have positive corelation to the income.

Singh and Singh (2015) studied sustainable livelihood and rural development through organic farming which was conducted at Mooldaspur village and Shahdevpur village, Haridwar district of Uttarakhand. Data collection was from 60 organic and non-organic farmers. By doing comparisons towards both kinds of agricultural practice, the study found that cost to procurement input in organic farming was cheaper as compared to non-organic farming system. Considering affect on soil and water condition, then, the use of chemical inputs in organic farming was until to zero level. In organic farming system, the farmers' livelihood was more sustainable due to higher level of income gotten from organic products, the improvement the quality of water, maintaining crop to crop cultivation to keep soil fertility, better taste and healthier of food. For betterment of organic farming, improving institutional channels was needed and market structure had improve for organic products.

Kamwi *et al*. (2018) examined about the activities of livelihood and skills as well as its implications for policy and poverty decrease in rural areas of the Zambezi region, Namibia by interviewing 424 households using semi-structured interviews to

collect the data and processing data using a series of logistic regressions. The finding of the study showed that for rural livelihoods, the utilised of various activities of livelihood and skills in different combinations are being very important. The obtained of income from only one source had by 5 percent of the respondents, where ninety-five percent among them did a combination of activities between farming and non-farming. The variety of reasons for the respondents to do diversification into other activities are that they are vis-a-vis with income gotten from agriculture, restricted skills, big size of family, availability of opportunities, seasonal of agricultural products, profitable demand for goods and services or a combination of these. The choice of skills by family was significantly influenced by gender, age, designation, and education. The study concluded that to improved livelihoods in the study area had been caused by a combination of activities and skills of rural family which are influenced by various of factors. The policy suggested by the study is that a significant role in promoting more sustainable rural livelihoods can be done by state through interventions in rural livelihood skill development.

From all of these evidences, the study can be concluded that: (1) economic performance of organic farming is more profitable as compared to conventional farming; (2) conversion from conventional to organic give positive impact to households' farm income; and (3) livelihood assets exert a significant impact on farmer' income.

2.6. Hypothesis of Study

Given that economic performance of organic farming is more profitable as compared to conventional farming; the livelihood assets axert a significant impact on farmers' income; and the livelihood assets owned and accessed by conventional paddy farmers in Mulyoarjo village is potentially different to organic paddy farmers in Sumber Ngepoh village. Then the hypotheses in this study are formulated as follow:

a. Hypothesis 1 of this study is: the organic paddy farming in Sumber Ngepoh village is more profit if it compared to conventional paddy farming in Mulyoarjo village.

b. Hypothesis 2 of this study is: there is the difference of the ownership of each livelihood asset in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

c. Hypothesis 3 of this study is: there is the difference of assets and their magnitude to earn profit in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

d. Hypothesis 4 of this study is: there is the difference of components of the sustainable livelihood framework, which play the role to achieve the livelihood outcomes in the context of sustainable livelihoods between in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

2.7. Indonesia Government Policy on Organic Agriculture

Indonesia government concerned on organic agriculture development in Indonesia. This was showed by government policies which had been launched: "Go Organic 2010" in 2010 and *Program Seribu Desa Pertanian Organik* (Thousand Organic Agriculture Villages Program) in 2015. The "Go Organic 2010" program contains various activities such as developing of organic farming technology, forming of organic farmer groups, developing of rural areas through organic farming, and building of organic food marketing strategies (Mayrowani, 2012).

In 2013, the government launched the Regulation of The Minister of Agriculture of the Republic of Indonesia, Number: 64/Permentan/OT.140/5/2013 Concerning Organic Agriculture System. This regulation aims to ensure that the implementation of the organic farming system can provide guarantee and protection to the consumers that the organic products produced by farmers and bought by the consumers have attributes such as food safety attributes, nutritional attributes, and eco-labelling attributes (Yuriansyah, at al., 2020).

The *Program Seribu Desa Pertanian Organik* is the government agenda to achieve the increase of the food sovereignty with the target developing 1,000 organic farming villages (Juansah, at al., 2019). The program was carried out in 2016 which covered 4 commodity subsectors such as food crops in 600 villages, horticultural crops in 250 villages, and plantation crops and livestock in 150 villages. The location of the program implementation is determined based on the consideration of the potential of the land and the accessibility of the area.

2.8. Certification of Organic Products

Coulibaly and Liu (2006) stated that to show to consumer, who does not meet in person with producer, that a product is produced in a particular methode or has a specific characteristics, producer can used certification. In the context of organic product, IFOAM (2017) states that certified organic products are those, which have been produced, stored, processed, handle and marketed in accordance with precise technical specifications (standards) and certified as "organic" by a certification body. It is important to note that an organic label applies to the production process, ensuring that the product has been produced and processed in an ecologically sound manner. A increasing of demand for organic food in around the world is handeled by organic certification (Wren, 2014). The important objective of certification is to regulating and facilitating the marketing of organic products from producers to consumers.

Certification for organic products as a requirement of the recognition towards organic yield is still to be an issue for small farmers in Indonesia who will convert from conventional farming to organic farming. KAN (2017) asserted that organic certification is a means to provide assurance that organic products meet to the requirements specified in the standards and other normative documents through inspection activities undertaken by the Institute of Organic Certification. The overall objective of organic certification is to give confidence to all stakeholders that organic products meet to the requirements specified in accordance with the Regulation of the Ministry of Agriculture No. 64 Year 2013 and the SNI 6728: 2016 Organic Farming System.

The regulations of organic certification in Indonesia is stated in the Regulation of the Minister of Agriculture No. 64/Permentan/OT.140/5/2013 about Organic Agriculture System (USDA Indonesia, 2018). In this regulation, Chapter I: General Provisions, Article 1, Paragraph 9 and 10, it is declared that:

Paragraph 9 : National Accreditation Committee hereinafter referred to as KAN (*Komite Akreditasi Nasional*) is a national accreditation institution, which had a task of issuing accreditation to certification institutions and testing/calibrating laboratory.

Paragraph 10 : Organic Certification Institution hereinafter referred to as LSO (*Lembaga Sertifikasi Organik*) is institution which is responsible for certifying that the products being sold or labeled as "organic"

is produced, handled and imported according to Indonesia National Standard of Organic Food System and has been accredited by the National accreditation Committee. The LSO can be national or foreign LSO domiciled in Indonesia.

In the regulation, certification for every business unit, which has implemented organic agriculture system, is declared in Chapter IV: Certification, under Article 9, Paragraph 1 and 2 as follow:

Paragraph 1 : Every business unit, which has implemented Organic Agriculture System, can submit certification to Organic Certification Institution that has been accredited by KAN.

Paragraph 2 : Certification as intended in paragraph (1) is conducted as listed on Attachment V, which is an integral part of this Regulation.

Based on the regulation, Attachment V: Organic Product Certification Guidance, it is outlined the systems of organic certification in Indonesia as in Figure 2.2. follow:
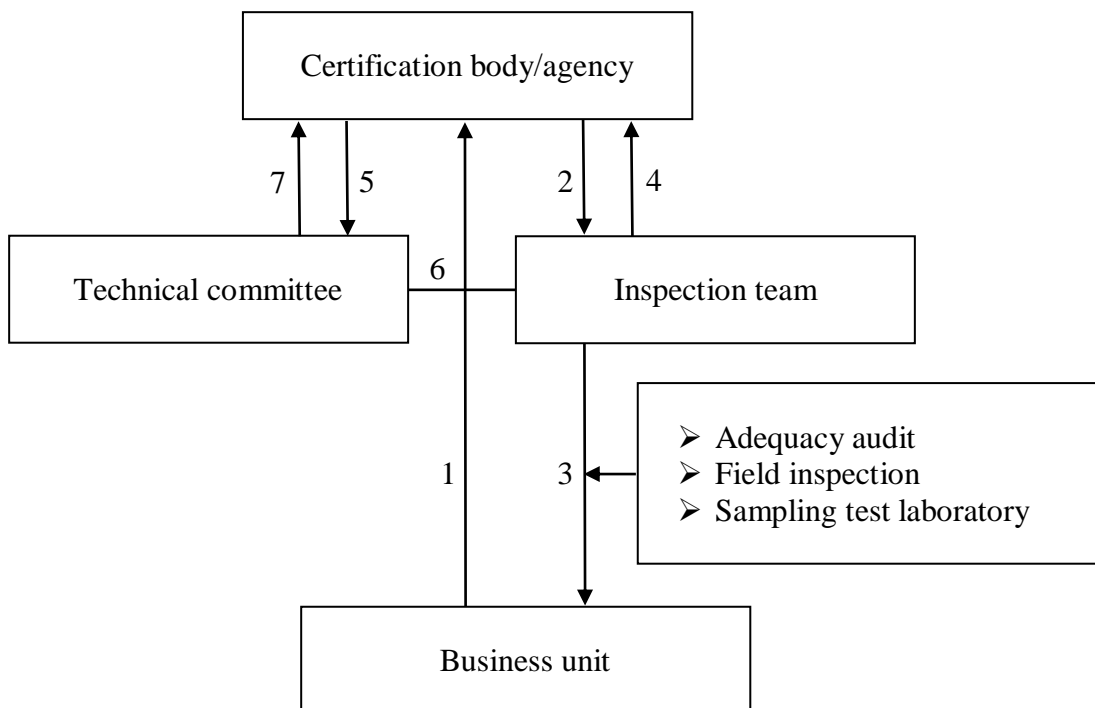
Figure 2.2. Certification system
Source: USDA Indonesia (2018)

The explanations of process to get a certification for business unit are as follow:

1. Application can be sent by Business Unit (BU) to the Certification Agency (CA). In this regard, the BU should attach the required data namely, administration requirement, business unit identity and document. The CA will do evaluation on the completeness of requirement.

2. Team that will do inspection on appraisal of the completeness of the quality assurance implementation document and field inspection will be appointed by CA.

3. The inspection of audit of completeness, field inspection, sampling for laboratory testing performed by the team.

4. The results of inspection will be sent by the inspection team to the CA.

5. Technical committee, who will appraise the report result submitted by the inspection team, will be appointed by the CA.

6. the inspection result will be evaluated by the technical committee, and to give recommendation of approval or rejection of certificate to the BU, the committee will coordinate with the inspection team.

7. Recommendations will be made by the technical committee and it will be reported to the head of the CA. If the BU has a qualify based on the recommendations, the CA will provide certificate and right of use of organic logo.

Nowadays, there are 8 agencies of organic certification[2] in Indonesia (BUMPPTS, 2018). Cost of organic certification is vary and high. Est and Nur (2013) reported that cost of organic crops certification for a farmer group which is issued by PT. Sucofindo (Persero) is around IDR 15 million to IDR 30 million (US$ 1,433.9 to US$ 2,867.7)[3]. This certificate will be valid for 3 years. The cost of surveillance is around IDR 7.5 million to IDR 15 million (US$ 716.9 to US$ 1,433.9) per year. While, the cost of organic certification which is issued by the Agency of Organic Certification

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[2] The agencies are:
  1. Agency of Organic Certification LeSOS
  2. Agency of Organic Certification SUCOFINDO
  3. Agency of Organic Certification MAL
  4. Agency of Organic Certification INOFICE
  5. Agency of Organic Certification Sumatera Barat
  6. Agency of Organic Certification BIOCert Indonesia
  7. Agency of Organic Certification PERSADA
  8. Agency of Organic Certification PT. SDS Indonesia

[3] In 2013, 1 US$ is equivalent to IDR 10,461.2 as LCU (The World Bank, 2016)

INOFICE is between IDR 9 million to IDR 15 million (US$ 645.1 to US$ 1,075.2)[4] (INOFICE, 2018). This cost is calculated based on the location, total areal and the complexity of coverage requested by applicants. The validity of certificate is during 3 years. During which period, INOFICE will undertake surveillance and renew of certificate every year, unscheduled visits based on risk (complain from customer, suspicious, etc.) with or without prior notice to the operators.

2.9. Paddy Production for Source of Livelihoods

A staple food that consumed by many people in around the world and planted in more than 100 countries is rice (Mohamed *et al*., 2019). The rice systems helped lessen hunger and poverty, and to sustain livelihoods (Singh, 2002). Rice is an important food in the world. Then production of paddy, where rice comes from, is being a main concern. The world paddy production is presented at table 2.1.

From the table, it can be seen that the majority of paddy producer countries in the world are in Asian regions. Total rice production of all countries in this regions is more than 90 percent of total world paddy production in each year. Trend of world paddy production was increasing from 2013–2015 to 2018 about 3.6 percent or around 26.7 million ton. The increasing of trend of world paddy production was mainly influencing by the increasing of trend of Asia paddy production, namely about 3.5 percent or around 23.4 million ton from 2013–2015 to 2018. Hence, the total of world paddy production (up or down) is very determined by the total of Asia paddy production (up or down).

Table 2.1. World Paddy Production (in million Tons)

Regions	Years			
	2013 – 2015 *	**2016**	**2017 ****	**2018 *****
Asia	672.1	681.8	686.7	695.5
America	36.9	36.3	36.1	36.4
Africa	29.2	32.6	32.1	33.3
Europe	4.1	4.1	3.9	3.9
Oceania	0.9	0.3	0.8	0.8
World	743.2	755.1	759.6	769.9

Source: FAO. 2018. a)
Notes: * means average values; ** means estimate values; and *** means forecast values.

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[4] On 31 May 2018, 1 US$ is equivalent to IDR 13,951 based on the rate of exchange from Jakarta Interbank Spot Dollar Rate (JISDOR) (Bank Indonesia, 2018)

The main paddy producers in Asia are presented in Table 2.2. There are ten countries as the main paddy producers in this region. Among those countries, there are five ASEAN countries as the main paddy producers. They are Indonesia, Viet Nam, Thailand, Myanmar, and Philippines. Total paddy production of all these ASEAN countries was around 29 percent of total Asia paddy production or around 26 percent of total world paddy production in each year. As the third largest paddy producer in Asia, the trend of Indonesia paddy production was increasing from 2013–2015 to 2018 about 3.9 percent or around 2.8 million ton.

Table 2.2. Countries in Asia as the Main Paddy Producers (in million Tons)

Countries	Years			
	2013 – 2015 *	2016	2017 **	2018 ***
China	207.7	208.7	210.3	208.1
India	158.3	164.5	166.5	169.5
Indonesia	71.7	72.6	73.9	74.5
Bangladesh	51.8	52.1	50.8	53.0
Viet Nam	44.7	43.2	42.8	44.2
Thailand	31.9	32.4	33.7	34.5
Myanmar	28.1	28.6	29.5	30.4
Philippines	18.4	18.5	19.3	19.7
Pakistan	10.3	10.3	11.1	11.3
Japan	10.7	10.7	10.4	10.4
Other	38.5	40.2	38.4	39.9
World	672.1	681.8	686.7	695.5

Source: FAO. 2018. a)
Notes: * means average values; ** means estimate values; and *** means forecast values.

For Indonesian farmers, paddy is one of the main important agricultural commodities. Table 2.3. presents provinces as the main producers in Indonesia. From the table it can be seen that there are four provinces as the main paddy producers. They are West Java, East Java, Central Java, and South Sulawesi. Total paddy production of these provinces is more than 50 percent of total national paddy production.

From the table, it could be seen that in 2013, production of paddy in Indonesia was 71,279,709 Ton. The production increased 16.5 percent to be 83,037,150 Ton in 2018. The increase of this national paddy production was supported by the increase of paddy production in each province, which is as the main paddy producer in Indonesia. Hence, the total of national paddy production (up or down) is very determined by the

total of paddy production in each that province (up or down). The total production at the national level determine the total national supply of rice to domestic rice market.

Table 2.3. Provinces as the Main Paddy Producers in Indonesia (in Tons)

Provinces	Years					
	2013	2014	2015	2016	2017	2018
West Java	12,083,162	11,644,899	11,373,144	12,540,550	12,299,701	12,494,919
East Java	12,049,342	12,397,049	13,154,967	13,633,701	13,060,464	13,000,475
Central Java	10,344,816	9,648,104	11,301,422	11,473,161	11,396,263	11,401,821
South Sulawesi	5,035,830	5,426,097	5,471,806	5,727,081	6,055,404	6,196,737
Others	31,766,559	31,730,316	34,096,502	35,980,274	38,336,762	39,943,198
Indonesia	71,279,709	70,846,465	75,397,841	79,354,767	81,148,594	83,037,150

Source: Pusat Data dan Sistem Informasi Pertanian, 2018 and Kementerian Pertanian Republik Indonesia. 2019.

2.10. Research Framework

The research framework in this study that is based on the research objective presented in Figure 2.3. The framework is based on the basic idea of this study, namely the difference of farming inputs, which are used by group of conventional and organic paddy farmers. The group of conventional paddy farmers uses chemical fertilizers and pesticides, while the group of organic paddy farmers use organic fertilizers and pesticides. The difference of the use of these farming inputs leads to the difference of vulnerability context faced by each farmers group. The vulnerability is seasonality condition. In this context, the conventional paddy farmers face higher production and lower selling price, while the organic paddy farmers face lower production and higher selling price.

Based on the framework, the key factor to overcome the issues of the seasonality condition faced by conventional and organic paddy farmers is the assets owned by the farmers in each group. Hence, analysis carried out in this study is focused on the intended assets. However, the separate analysis is carried out before carrying out the analysis of assets owned by farmers in each farmer group. The separate analysis is a comparative analysis to the profit earned by farmers in the conventional paddy farming and in the organic paddy farming. This analysis is intended to see which is farming more profitable between both farming.

The next analysis is analyzing the role of each asset in conventional farming and in organic farming. The result of analysis points out which asset has the biggest and the smallest role to create the profit to the farmers in each farmer groups.

Conventional	←	Paddy farming	→	Organic

Chemical fertilizers and pesticides	←	Inputs	→	Organic fertilizers and pesticides

Seasonality: Higher production Lower selling price	←	Vulnerability context	→	Seasonality: Lower production Higher selling price

Livelihood assets:

H

S   N

P   F

Conditions of livelihoods assets of each conventional paddy farmer	Conditions of livelihoods assets of each organic paddy farmer

Transforming

Structures:
By government
By private sectors

Processes:
In laws
In policies
In culture
In institutions

Transforming of structures and processes which were happened to conventional paddy farming	Transforming of structures and processes which were happened to organic paddy farming

Strategies by conventional paddy farmers	←	Livelihood strategies	→	Strategies by organic paddy farmers

Production rate and profit from conventional paddy farming	←	Livelihood outcomes: Production and profit	→	Production rate and profit from conventional paddy farming

Model and guideline of conventional and organic paddy

Conclusion

Figure 2.3. Conceptual Framework of the Research
Source: Author concept (2018)

The analysis of assets is continued to see the influence of assets to the profit gotten by farmers in conventional and organic farming. The analysis involves the transforming of structures, which is built by government and private sectors, and processes that exist in conventional and organic farming and also the strategies used by farmers.

The analysis of the profit gotten by farmers is carried out by involving the production and the profit from selling the paddy. The analysis of the profit is the main factor of livelihood outcomes in the context of sustainable livelihoods in conventional and organic farming. The last analysis is designing the model of sustainable livelihood for each farming.

CHAPTER 3.
METHODOLOGY

3.1. Study Area

This study carried out in two villages, namely Mulyoarjo village and Sumber Ngepoh village. The villages are located in Lawang sub-district, Malang district, Jawa Timur province, Indonesia. The Mulyoarjo and Sumber Ngepoh villages are an adjoining village. Mulyoarjo village is the first village that is encountered in journey from the city of Lawang sub district to these two villages, followed by Sumber Ngepoh village. Mulyoarjo village is approximately 1 kilometer away from the city of Lawang sub district, and Sumber Ngepoh village is 1 kilometer away from Mulyoarjo village.

Mulyoarjo village is bordered by Sumber Porong village in the North, by Sumber Ngepoh village in the East, by Sidodadi village in the South and by Lawang village in the West. While, Sumber Ngepoh village has boundary area with Pasuruan regency in the North and the East, with Mulyoarjo and Sumber Porong villages in the West, and with Srigading village in the South.

Table 3.1. Data of Sumber Ngepoh and Mulyoarjo villages 2019

Data of	Villages	
	Sumber Ngepoh	**Mulyoarjo**
Total population:	4,890 people	6,894 people
a. Men	2,520 people	3,438 people
b. Women	2,370 people	3,456 people
Village land area	709.0 hectare	228.4 hectare
Total area of paddy land field	123 hectare	93.5 hectare
Total farmers	374 farmers	112.0 farmers

Source: Secunder Data from Head Villages Office of Sumber Ngepoh and Mulyoarjo (2019)

Road condition inside Sumber Ngepoh and Mulyoarjo villages as well as that connect the two villages are good and with paved. The road from Sumber Ngepoh village to Mulyoarjo village is directly connected. So that, the road support resident mobility and activities. Besides that, house of residents is in good condition. Almost all houses are stone house.

The reason in selecting the villages as the study area is that the organic and conventional paddy farmers are available in these villages. As an adjoining village,

planting area of paddy in both villages have similar characteristics. In this thing, the steps in planting paddy done by farmers in both villages and the conditions of the farming community are also similar.

There are two paddy farmer groups in Mulyoadjo village, namely Mulyo 1 and Mulyo 2, and two paddy farmer groups in Sumber Ngepoh village, namely Sumber Makmur 1 and Sumber Makmur 2. All paddy farmers in two paddy farmer groups in Mulyoarjo village plant paddy conventionally. While, all paddy farmers in paddy farmer group of Sumber Makmur 1 plant paddy organically. A part of paddy farmers in Sumber Makmur 2 plants paddy conventionally and other plants paddy half-organically.
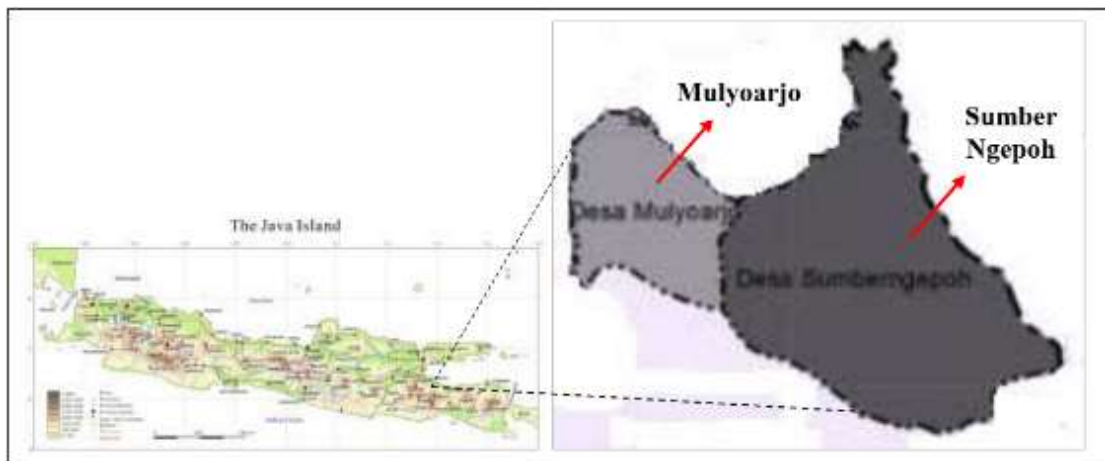
Figure 3.1. Map of Lawang Sub-district
Source: Damayanti et al. (2017) with modification and balkhheritage.org. 2020

Choosing one of paddy farmer group from each villages is intended to create an equality in doing comparison between organic paddy farmers from Sumber Ngepoh village and conventional paddy farmers from Mulyoarjo village. Paddy farmer group of Mulyo 2 is chosen from Mulyoarjo village, and paddy farmer group of Sumber Makmur 1 is chosen from Sumber Ngepoh village. There are 38 paddy farmers in farmer group of Mulyo 2 and 35 paddy farmers in farmer group of Sumber Makmur 1.

3.2. Sampling Method

Population of respondents in this study is total farmers in farmer group of Mulyo 2 and in farmer group of Sumber Makmur 1. Related to this thing, there are 38 farmers,

who are from farmer group of Mulyo 2, and 35 farmers, who are from farmer group of Sumber Makmur 1. Meanwhile, the sample of respondents in this study is farmers, who are chosen from among 38 farmers in farmer group of Mulyo 2 and 35 farmers in farmer group of Sumber Makmur 1.

This research is quantitative research. Therefore, the determinant of the sample size is based on probability sampling technique. Related to this technique, simple random sampling, which is a probability sampling technique, is used. By using this technique, each farmer in each farming group has an equal probability of selection. Every farmer is selected independently of every other farmer, and the sample is drawn by a random procedure from a sampling frame (in this study is the list of name of farmers in farmer group of Mulyo 2 and in farmer group of Sumber Makmur 1).

In this study, the equation from Krejcie and Morgan (1970) is used to determine the sample size of respondents from total farmers in each farmers group. The equation is written as follow:

$$s = \frac{X^2 NP(1 - P)}{d^2(N - 1) + X^2 P(1 - P)} \tag{3.1}$$

where:
s   =   Required sample size
X^2 =   The table value of chi-square for 1 degree of freedom at the desired confidence level (1.960 x 1.960 = 3.841)
N   =   The population size
P   =   The population proportion (assumed to be 0.50 since this would provide the maximum sample size)
d   =   The degree of accuracy expressed as a proportion (0.05)

By using the formula, this study uses the number of sample respondents in this research which is 32 organic paddy farmers from farmers group of Sumber Makmur 2 and 34 conventional paddy farmers from farmer group of Mulyo 1. These sample sizes have fulfilled the requirement for minimum sample size from Cohen *et al*. (2018) who states that a minimum sample size for quantitative research which using some form of statistical on data collected is 30. Moreover, Hogg, *et al*. (2015) confirmed that generally, sample size greater than 25 or 30 would produce a good approximation.

Hair *et al*. (2014) revealed that the minimum sample size recommended for multiple regression should be 5 observations per independent variable. In this research,

independent variable used are 5 variables, namely human capital, natural capital, financial capital, social capital, and physical capital. Dependent variable is livelihood outcome, namely profit gotten by farmer from selling their conventional or organic paddy. Hence, 32 organic paddy farmers from Sumber Ngepoh village and 34 conventional paddy farmers from Mulyoarjo village have fulfilled the requirement for minimum sample size to do quantitative data analysis.

3.3. Collecting Data

The data collection in this research was carried out by doing direct interview to the farmers. By using the structured questionnaire, this study had prepared the list of pre-determined questions asked to each respondent. The questions asked to the farmers are about:

a. characteristics of paddy farmers and their paddy farming,

b. vulnerabilities faced by the paddy farmers regarding to their paddy farming,

c. paddy farmers' livelihood assets, which consists of human capital, natural capital, financial capital, physical capital, and social capital,

d. transforming of structures and processes related to the farmers' paddy farming,

e. livelihood strategies used by the paddy farmers to achieve livelihood outcome, and

f. livelihood outcome which want to be achieved by the paddy farmers.

The livelihood assets, namely human capital, natural capital, financial capital, physical capital and social capital, and their indicators as well as their representativeness in the questionnaire are presented in Table 3.2. Each indicator is measured by categorical values similar in range length among the scales (e.g. 5 scale is 1, 2, 3, 4, and 5). However, the number of categories for indicator can be different (e.g. 3 categories, 5 categories or 7 categories).

Interview used the *semi-structured questionnaire* is enable the respondents to give the answers by their own words. During the interview, the researcher did exploration towards the questions which are submitted to the respondents and the respondents can freely answer that questions based on their own thought. Then the researcher obtained more detailes answered from the respondents towards the questions which are deemed necessary to be explored.

Hilton (2015) asserted that a checking procedure on a questionnaire by objective to ensure that questions function as intended and they are comprehended by respondents that posibly give the answer to them is stated as pretesting of a questionnaire. Pilot testing (also called a field test of pre-testing (De Fossard, 2008)), which is no sample size determined and is carried out to evaluate the entire questionnaire in the real survey conditions, give an advantage to identifing the issues before the complete survey is held (Chaudhary and Israel, 2014). For sample survey, the researcher has to decide about the number of respondents needed to involve in pilot testing for the results to be believable (Fink, 2017). Moreover, Bullen (2014) asserted that compared to not doing a testing at all, then, doing a testing with one respondent is better. In this research, 10 percent from total population (three respondents from each farmer group) is being participant to follow pre-testing questionnaire.

Table 3.2. Livelihood Assets and Its Indicators

Livelihood Assets	Indictors	References
Human capital	• Education level • Health status • Knowledge • Labour resources	Ndeilenga (2013) UNDP (2017) DFID (1999) Rakodi (2002)
Natural capital	• Land for planting • Water availability	DFID (1999) Nicol (2000)
Financial capital	• Savings • Cash at hand • Liquid assets: livestock	DFID (1999) Goodwin (2007) FAO (2006)
Physical capital	• Roads in the village • Fertilizers • Agricultural equipment • Medical clinics and hospital • Communications	DFID (1999) Serrat (2017) FAO (2006) Thái (2018) DFID (1999) Serrat (2017)
Social capital	• Social relations • Participation in collective activities • Networks and connectedness	Krantz (2001) Abenakyo, *et. al.* (2007) DFID (1999)

Source: Author concept (2018)

Besides using questionnaire, this researcher also used *Focus Group Discussion* (*FGD*) and *nonparticipation observation* to gather data from respondents in the research field. Nyumba *at al.* (2018) defined focus group discussions as "a technique where a researcher assembles a group of individuals to discuss a specific topic, aiming to draw from the complex personal experiences, beliefs, perceptions and attitudes of the participants through a moderated interaction". Williams (2008) defined "nonparticipation observation as a relatively unobtrusive qualitative research strategy for gathering primary data about some aspects of the social world without interacting directly with its participants". Urquhart (2015) asserted that "non-participant observation means that the observer was "looking on", and not playing an active role".

Focus Group Discussion (*FGD*) in this research is carried out by assembling some organic paddy farmers into one group and conventional paddy farmers into another group. The total number of participants in each group discussion is around 5 farmers. The researcher is the moderator in this discussion. The topics discussed in each group are focused on:

a. the farmers' reason, perceptions and attitudes for choosing farm the organic or conventional paddy,

b. the farmers' experience in carrying out the organic or conventional paddy farning and its relationship to their livelihood, and

c. the farmers' ideas and suggestions related to the organic or conventional paddy and their livelihoods.

Therefore, from the FGD, the opinions of the farmers in each group discussion about the role of paddy farming are known that they are working on in influencing their livelihoods.

In this research, the *non-participation observation* is carried out by researcher with looking on the activities done by the organic and conventional paddy farmers. The activities observed consist the activities undertaken by farmers on their paddy farms (i.e. taking care of the paddy plants) and also activities outside of their paddy farms (i.e. processing of paddy or the procurement of farming inputs such as fertilizers and pesticides).

This research is focused and is limited only to analysis the livelihoods of paddy farmers who practiced organic and conventional paddy farming. Data analysed

statistically are only farmer's data while the family member's data are not analysed. Therefore, some limitation are stated as follow:

1. The family members intended in this research are the head of the family (generally as respondent), wife and children.

2. Profit calculated in this research is gotten from the paddy farming land.

3. The data collected in this research is only for 1 (one) harvesting season.

3.4. Data Processing and Analyzing

The data processing is carried out to all data, which are collected from the respondents. The processing consists of data checking and tabulating them into Microsoft Excel. The tabulated data are processed by using the Microsoft Excel and SPSS software. The results of data processing are analysed and interpreted to explain the research results. The statistical data analysis carried out in this research are the following:

3.4.1. Analysis of Economic Performance

The analysis of economic performance in this study aims to see the difference of economic performance between organic paddy in Sumber Ngepoh village and conventional paddy in Mulyoarjo village. To achieve the aim, comparison analysis towards the mean of cost paddy production, total of paddy production, revenue from paddy sales, and profit earned by the farmers in farmer group of Mulyo 2 and Sumber Makmur 1 are carried out.

The economic performance analysis uses the continuous (quantitative) data that are collected from the respondents who are as the sample. Stark (2019) defines that "the sample mean of a simple random sample is an unbiased estimator of the population mean, in which the average of the sample means gets close to the population mean when the more sample is taken". Related to this matter, the central limit theorem states that by increase in sample size causes the sampling distribution of the sample means to move towards a normal distribution (Statistics How To, 2020).

Given that the sample in this study is a large sample (more than 30 respondents from each group of farmers) and to avoid bias of the sample mean, then, before doing the data analysis, a test is needed to check whether the continuous and categorical data,

which are produced by the sample, are following the normal distribution or not. Field (2009) states that Kolmogorov-Smirnov test is utilized to examine whether a sample was from a population that has a normal distributed or not. Therefore, in this study, the normal distribution of data is tested using the Kolmogorov-Smirnov test. The equation of the Kolmogorov-Smirnov test is presented as follow (Antoneli *et. al.*, 2018): The equation of the Kolmogorov-Smirnov test is present as follow (Antoneli *et. al.*, 2018):

$$\mathbf{D_{KS} = \sup|F_N(x) - F_E(x)|}^5 \tag{3.2}$$

where:
D_{KS} = Kolmogorov-Smirnov test
$F_N(x)$ = The Empirical Cumulative Distribution Function (ECD)
$F_E(x)$ = The Expected Cumulative Distribution Function
x = Random sample

The hypotheses used in the test are:

H_0 = The data follow a normal distribution if the significant value is more than 0.05 ($p \geq 0.05$)

H_1 = The data do not follow a normal distribution if the significant value is less than 0.05 ($p \leq 0.05$)

Giving that the farming land area owned by each farmer in both villages varies, this study includes the use of farming inputs, cost of production, production, revenue and profit are different. Therefore, to overcome the varied data, the data of farming land area, farming inputs, cost of production, production, revenue, and profit in both villages are converted into one Hectare.

Kim (2015) stated that "A t-test is a type of statistical test that is used to compare the means of two groups. There is the independent t-test which can be used when the two groups under comparison are independent of each other". Based on these statements, the independent sample t-test will be used in this research. The formula of the independent sample t-test, which will be used in this research is:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}} \tag{3.3}$$

---

[5] sup is abbreviation of supremum

where:

t =   t-test value

$\bar{x}_1$ =   The means for components of economic performance in organic farming

$\bar{x}_2$ =   The means for components of economic performance in conventional farming

s_1^2 =   Variance for components of economic performance in organic farming:

$$\frac{\sum(x_1 - \bar{x}_1)^2}{n_1} \tag{3.4}$$

s_2^2 =   Variance for components of economic performance in conventional farming:

$$\frac{\sum(x_2 - \bar{x}_2)^2}{n_2} \tag{3.5}$$

n_1 =   Number of respondents in organic farming

n_2 =   Number of respondents in conventional farming

The hypotheses which will be used to find out the different of components of economic performance are:

H_0 = $p \geq 0.05$ means there is no the significant different of the components of economic performance between organic and conventional farming

H_1 = $p \leq 0.05$ means there is the significant different of the component of economic performance between organic and conventional farming

The significant level (α) which is used to accept or to reject the hypothesis is 5 percent (0.05). The hypothesis null (H_0) will be rejected if $t_{calculated} > t_{table}$ and vice versa. The result of the t-test will be used to determine the more profitable farming.

3.4.2. Analysis of Livelihood Assets

To acquire relevant information in greatest reliable and valid way is the major aim of questionnaire in research (Taherdoost, 2016). In this matter, the significant aspects of research methodology are validity and reliability, which reflect the accuracy and consistency of survey/questionnaire forms. Moreover, concepts that can be used to assess the quality of research are reliability and validity (Middleton, 2020). The concepts show how good a method, technique or test measures something. Meanwhile, Otieno-Odawa and Kaseje (2014) stated that by objective to interpretation and generalization of findings from the research, reliability and validity of measurements are being important.

Heale and Twycross (2015) defined define validity as the extent to which a concept was accurately measured in a quantitative study. In this study, the validity is tested by using Pearson's correlation coefficient. Salkind (2012) had written the Pearson's correlation coefficient as follow:

$$r_{xy} = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}} \tag{3.6}$$

where:

r_{xy}	=	The correlation coefficient between X and Y
$\sum$	=	The summation sign
n	=	The size of the sample
X	=	The individual's score on the X variable
Y	=	The individual's score on the Y variable
XY	=	The product of each X score times its corresponding Y score
X^2	=	The individual X score, squared
Y^2	=	The individual Y score, squared

The criteria is as follow:

$r_{xy} > r_{table}$ = Valid

$r_{xy} < r_{table}$ = Invalid

Heale and Twycross (2015) defined reliability as the extent to which a research instrument consistently had the same results if it was used in the same situation on repeated occasions. When a test consists of many items, then, coefficient alpha, which is usually presumed of as a measure of internal consistency, is usually used to test the reliability of total test scores (Salkind, 2007). The population value of coefficient alpha (Cronbach's alpha) is calculated as follows:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} \sigma_i^2}{\sigma_{Total}^2}\right) \tag{3.7}$$

where:

k	=	The number of measurements
σ_i^2	=	The population variance of the ith measurement
σ_{Total}^2	=	The population variance of total scores on the k measurements

Following the general accepted rule, the criteria of Cronbach's alpha value, which indicates an acceptable level of reliability, is for $\alpha = 0.6 - 0.7$ (Ursachi *et al.*, 2015).

The analysis of livelihood assets in this study aims to identify each of livelihood asset consisted of human capital, natural capital, financial capital, physical capital and social capital, on each farmer group in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village. The identification is based on response (in score form) given by the respondents to the questions in questionnaire. The score to questions that support the livelihood assets indicators are tabulated and weighted. The result of weighting of the scores shapes a composite index. The indexes display on the livelihood assets pentagon and allow for comparison among the five livelihood assets.

Given that data in each indicator of livelihood assets are categorical data (3 categories, 5 categories, or 7 categories). Then normalization of data which is based on maximum and minimum value given by each respondent to each indicator is done. The objective of the normalization of data is to produce an index value of each indicator. The calculation result of the normalization of data is expressed as a value between 0 and 1. The formula which is used to produce the index value is the index value formula from Fernando (2011). The formula is stated as follow:

$$IV_x = \frac{(AV_x - MinV_x)}{(MaxV_x - MinV_x)} \tag{3.8}$$

where:
x = Score value given by each respondent to the livelihood assets indicator
IV_x = Index value of x
AV_x = Actual value of x
$MinV_x$ = Minimum value of x
$MaxV_x$ = Maximum value of x

Based on equation 3.8, the formula to calculate a composite index value for each indicator of livelihood assets is written as follow:

$$CIV_x = \frac{\sum_{x=1}^{n} IV_x}{N} \tag{3.9}$$

where:
CIV_x = Composite index of IV_x
IV_x = Index value of x
N = Total respondent

Based on equation 3.9, the formula to calculate value of each livelihood asset is written as follow:

$$\textbf{Asset value} = \frac{\sum_{x=1}^{n} \textbf{CIV}_X}{\textbf{R}} \qquad (3.10)$$

where:
CIV_x = Composite index of IV_x
R   = Total CIV_x

Each asset value of livelihood asset is plotted into the spider-diagram in the form of pentagon. There are two plots of asset value are put on one pentagon. Each plot represents of organic and convention livelihood capital assets. The position of each value asset in each pentagon presents visually the information about the ownership (owned and accessed) of livelihood assets in the organic and conventional farming. The shape of the pentagon can be used to show schematically the variation in people's access to assets (DFID, 1999). The idea is that the center point of the pentagon, where the lines meet, represents zero access to assets while the outer perimeter represents maximum access to assets.
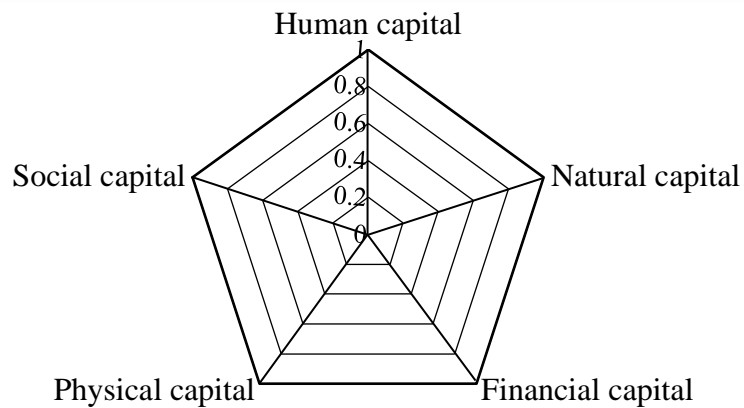
Figure 3.2. Spider-diagram

3.4.3. Analysis of Influence of the Livelihood Assets to Profit

The analysis of livelihood assets in this study aims to analyse the influence of each livelihood assets to the profit (outcome of livelihood), both in organic and conventional paddy farming. The analysis is done by using regression analysis. Related to regression analysis, Kutner *et al.* (2005) defined the regression analysis as "a

statistical methodology that utilize the relation between two or more quantitative variables so that a response or outcome variable could be predicted from the other, or others". Uyanik and Güler (2013) asserted that "regression analysis was performed so as to determine the correlation between two or more variables having cause-effect relations, and to make predictions for the topic by using the relation".

The data used in regression analysis in this study are ordinal data. However, MacKenzie (2013) states that due to the interval is not intrinsically equal between successive points on the scale, it makes as the major restriction of ordinal data. Meanwhile, Graddy and Wang (2008) state that interval data is needed used in regression analysis. Therefore, the ordinal data in this study are converted into interval data before they are used in regression analysis.

3.4.3.1. Methods of Successive Interval (MSI)

By objective to convert ordinal data into interval data, a method that can be used is Methods of Successive Interval (MSI) (Istighfaroh and Nuraeni, 2020). In line to this thing, Mondiana, *et al*. (2018) suggest that in the application of regression analysis, interval data, which has been transfromed to be ordinal data using Method of Successive Interval (MSI), can be utilized. Based on these definition and suggestion, the Method of Successive Interval (MSI) is used in this study to convert ordinal data into interval data. The steps used in Method of Successive Interval (MSI) to calculate the successive interval (Meyliana *et al*., 2012; Asdar and Badrullah. 2016; Nasution, 2016; Mondiana *et al*., 2018; Nur, 2019; and Richie. 2020), are presented in Appendix A.

3.4.3.2. Multiple Linear Regression Model

To analyze the influence of livelihood assets to profit, this study utilizes the multiple linear regression. It is due to the livelihood assets which play a role as an independent variable in regression analysis that consists of human capital, natural capital, financial capital, physical capital, and social capital. Greene (2003) stated that "the multiple linear regression model is used to study the relationship between a dependent variable and one or more independent variables".

In using multiple regression, testing of assumptions is being an important task (Williams *et al.*, 2013). Biased estimates of relationships, over or under-confident estimates of the precision of regression coefficients (i.e., biased standard errors), and untrustworthy confidence intervals and significance tests are the results of serious violations to assumption. Related to this thing, the tests of assumptions are:

a. Linearity test

The linear form is a require in the relationship between dependent variable and independent variable(s) that is shown by linearity (Crossman, 2019; Bekele and Guadie, 2020). Therefore, the objective of linearity test is to determine whether the relationship between independent variables and the dependent variable is linear or not (SPSS Test, 2018). The linearity test is a requirement in the correlation and linear regression analysis where good research in the regression model there should be a linear relationship between the independent variables and dependent variable.

The linearity assumption is referred to as the assumed linear relationship between the mean response $E(y_i \mid x_i)$ and the predictors x_i (Yan and Su, 2009). This assumption leads to $E(\varepsilon_i) = 0$, where ε_i is error term. A relatively small the sum of squares of error (SEE) can be interpreted as a "good fit" of the model and the usefulness of the regression model is tested using F test as a global evaluation of the regression model (Kim, 2018). In the F test, F value is defined as the ratio of mean of squares of regression (MSR) and mean of squares of error (MSE). Freund and Wilson (2003) formulated the F test as follow:

$$\mathbf{F} = \frac{\mathbf{MSR}}{\mathbf{MSE}} \qquad (3.11)$$

where:
F   =   F statistic
MSR   =   Mean Square due to Regression
MSE   =   Mean Square due to Error

In this study, the linearity test uses analysis of variance (ANOVA), where the significant value of deviation from linearity presented in ANOVA table is consulted to α value ($p = 0.05$). The decision of the result of test is as follow:

- If the significant value of deviation from linearity > 0.05, then the relationship between the independent variable and dependent variable is linear.

- If the significant value of deviation from linearity < 0.05, then the relationship between the independent variable and dependent variable is not linear.

b. Heteroscedasticity test

Heteroscedasticity occurs when the residuals at each level of the predictor variable(s) have unequal variances (Field, 2009). In other words, the heteroscedasticity arises when the variance of the error term differs across observations (Feinstein and Thomas, 2002). Heteroscedasticity is given when variance (S^2) takes a positive value (Klein *et al*., 2016).

Glen (2015) stated that if data that would be used in regression analysis showed heteroscedasticity, then it could ruin the regression results (at the very least, it would give biased to coefficients). While, Kumar (2020) asserted that in the presence of heteroscedasticity, the Standard Errors (SEs) would be biased and the t-test became invalid. More details, the severe heteroscedasticity data can give a variety of problems Glen (2015). The problems are (a) Ordinary Least Square (OLS)[6] will not give the estimator with the smallest variance (i.e. estimators will not be useful); (b) Significance tests will run either too high or too low; and (c) Standard errors will be biased along with their corresponding test statistics and confidence intervals.

If the heteroscedasticity can arise the consequence of problems to the regression model, then the heteroscedasticity test is needed when building a multiple regression model. In this regard, heteroscedasticity testing can be done by Glejser test method (Ainiyah *et al*., 2016). Glejser test is conducted by regression between independent variable and absolute residual as dependent variable. Gujarati (2004) stated that Glejser suggested regressing the absolute value of residual on the independent

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[6] Ordinary Least Squares (OLS) or linear least squares is a method for estimating the unknown parameters in a linear model. The OLS goal is to minimize the difference between the observed responses in some arbitrary dataset and the responses predicted by the linear approximation of the data. As visually this is seen as the sum of the vertical distances between each data point in the set and the corresponding point on the regression line, where the smaller the differences, the better the model fits the data (Ohri, 2018). The OLS estimators are best when they are Best Linear Unbiased Estimators (BLUE): (1) Best means achieving the smallest possible variance among all similar estimators, (2) Linear indicates that the estimates are derived using linear combinations of the data values, and (3) Unbiased means the estimators (coefficients) on average equal their true parameter values (Pedace, 2013).

variable that was thought to be closely associated with variance. Hence, the test heteroscedasticity equation can be written as follow:

$$|\mathbf{Un}| = \mathbf{a} + \mathbf{b_n X_n} + \mathbf{V_n} \tag{3.12}$$

where:
$|Un|$ = Absolute value of residuals
X_n = Variable of independent
V_n = Variable of residual (errors)

The decision of the result of test is as follow:

If the significance value > 0.05, then there is no heteroscedasticity.

If the significance value < 0.05, then the heteroscedasticity occurs (Hill, Griffiths and Lim, 2018).

c. Multi-collinearity test

"Multi-collinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated meaning that one can be linearly predicted from the others with a non-trivial degree of accuracy (Chi and Sullivan, 2018; Ohri, 2018)". If there is a high correlation between the independent variables, then relation between the independent variables of the dependent variable will be disrupted (Ainiyah *et al*., 2016). As such, a good regression model should not be a correlation between independent variables or may be mutually collinear but not highly correlated.

To determine existence of high correlation between variables, then the multi-collinearity test is needed when building a multiple regression model. The Variance Inflation Factor (VIF) and tolerance are both widely used measure of the degree of multi-collinearity of the ith independent variable with the other independent variables in a regression model (O'brien, 2007). Tolerance for the ith independent variable is 1 minus the proportion of variance it shares with the other independent variable in the analysis $(1 - R^2{}_i)$ while the VIF is the reciprocal of tolerance:

$$\mathbf{VIF} = \frac{\mathbf{1}}{\left(\mathbf{1} - \mathbf{R_i^2}\right)} \tag{3.13}$$

where:
R_i^2 = The proportion of variance in the ith independent variable
i = Number of independent variable (1, 2, …, i)

Basis of decision is as follow (Ainiyah *et al*., 2016):

If VIF < 10 and value of Tolerance > 0.10, then not multi-collinearity.

If VIF > 10 and value of Tolerance < 0.10, then there is multi-collinearity.

Montgomery *at al*. (2012) wrote the formula of multiple linear regression model as follow:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon \tag{3.14}$$

where:
y	=	Response[7] variable
β_0	=	Intercept
$\beta_{1, 2, \dots k}$	=	Parameters
$x_{1, 2, \dots k}$	=	Regressor[8] variables
ε	=	Statistical error

In this research, *t-test* (t-statistical) is used to test the influence of each independent variable (x) towards dependent variable (y). Eregno (2013) stated that "the t-statistics was used to test whether a particular variable contributes significantly to the regression model or not so as to eliminate statistically insignificant variables". Sunrhornjittanon (2015) asserted that "the t-test is used to check the significant of individual regression coefficients in the multiple linear regression model. Adding a significant variable to a regression model makes the model more effective, while adding an unimportant variable may make the model worse".

The level of significance (α) used in this research is 0.05 for the inclusion of a variable in the model. The hypotheses used to test the significance of a particular regression coefficient are stated as follow:

H_0: $\beta_j = 0$

H_1: $\beta_j \neq 0$

For the t-statistic, the equation is stated as follow:

$$t = \frac{\beta_j}{s_{\beta_j}} \tag{3.15}$$

where:
t	=	t-statistic test
β_j	=	Regression coefficient j
s_{β_j}	=	Standard deviation of the respective coefficient β_j

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[7] This variable is also called dependent or regressand variable
[8] This variable is also called independent or covariate variables

In this research, *F-test* is also used to test the simultaneous influence of all independent variables towards dependent variable. Levine *at al*. (2017) stated that "the overall *F-test* is used to determine whether there is a significant relationship between the dependent variable and the entire sets of independent variables (the overall multiple regression model)".

In this research, the hypotheses used in this *F-test*, are:

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

$H_1:$ At least one of $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$

For the F-statistic, the equation is stated as follow:

$$F = \frac{MSR}{MSE} \tag{3.16}$$

where:
F   = F-statistic test
MSR   = Regression mean square
MSE   = Mean square error

The decision towards the hypotheses is as follow:

H_0 is accepted at the level of significance α (0.05) if $F_{statistic} < F_\alpha$ and H_0 is rejected, and receiving H_1, at the level of significance α (0.05) if $F_{statistic} > F_\alpha$.

Refer to figure 2.1., the components of sustainable livelihood assets in the FDID's framework consist of human capital, natural capital, financial capital, physical capital and social capital. Therefore, the human capital, natural capital, financial capital, physical capital, and social capital stand as independent variables. They influence together the profit which stand as dependent variable.

3.4.4. Analysis of Components of Sustainable Livelihood Framework

Analysis of components of sustainable livelihoods framework is based on components in the framework from FDID (Figure 2.1.). The analysis is carried out to understand the correlation among components in sustainable livelihoods in organic paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village and in conventional paddy farming group of Mulyo 2 in Mulyoarjo village.

Lane (2020) defined the Pearson product-moment correlation coefficient as a measure of the strength of the linear relationship between two variables. Field (2009)

stated that the assumptions for the coefficient were (a) there were the linear relationship between variables and (b) the sampling distribution had to be normally distributed.

The coefficient of Pearson product-moment correlation is denoted by r (Laerd Statistics, 2018). The values of Pearson's correlation coefficient always lie between $r = (-1)$ and $r = (+1)$ where the closer the correlation coefficient is to $r = (+1)$ the stronger the linear positive relationship is between the variables and *vice versa* (Cleff, 2019). The formula for the Pearson product-moment correlation coefficient is written as follow (Obilor and Amadi, 2018):

$$r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{\{N \sum x^2 - (\sum x)^2\}\{N \sum y^2 - (\sum y)^2\}}} \qquad (3.17)$$

where:

r	=	Pearson's Product Moment Correlation Coefficient
N	=	Number of pairs of values or scores
$\sum xy$	=	Sum of the products of x and y
$\sum x$	=	Sum of the x values (or x scores)
$\sum y$	=	Sum of the y values (or y scores)
$\sum x^2$	=	Sum of squares of x values (or x scores)
$\sum y^2$	=	Sum of squares of y values (or y scores)
$(\sum x)^2$	=	Square of the sum of x values (or x scores)
$(\sum y)^2$	=	Square of the sum of y values (or y scores)

In this research, the hypotheses used to test the Pearson product-moment correlation, are:

H_0 : if significant value of correlation is < 0.05, it means that there is a correlation between the variables

H_1 : if significant value of correlation is > 0.05, it means that there is no correlation between the variables

The significant r values produced from the data processing are interpreted its magnitude. The results of interpretation show whether independent and dependent variable have a relationship or not. Table 3.3. presents the points as the guidelines for interpreting the correlation coefficient. The r values denote the relationship between dependent and independent variables. Thus, the amount of each r value represents the strength of relationship between variables and the minus sign states the direction of the relationship between variables.

Table 3.3. The Guidelines for Interpreting the Correlation Coefficient

r values	Strength of relationship between variables
–1	A perfect negative linear relationship
–0.7 to –1	A strong negative linear relationship
–0.3 to –0.7	A moderate negative linear relationship
0 to –0.3	A weak negative linear relationship
0	No linear relationship
0 to 0.3	A weak positive linear relationship
0.3 to 0.7	A moderate positive linear relationship
0.7 to 1	A strong positive linear relationship
1	A perfect positive linear relationship

Source: Ratner (2009)

Refer to figure 2.1., the component pairs of sustainable livelihood assets in organic paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village and in conventional paddy farming group of Mulyo 2 in Mulyoarjo village analyzed using the Pearson product-moment correlation, are presented in table 3.4.

Table 3.4. Component in Correlation Tests

Tests	Component Pairs	
01	Vulnerability	Human Capital
02	Vulnerability	Natural Capital
03	Vulnerability	Financial Capital
04	Vulnerability	Physical Capital
05	Vulnerability	Social Capital
06	Human Capital	Structures
07	Natural Capital	Structures
08	Financial Capital	Structures
09	Physical Capital	Structures
10	Social Capital	Structures
11	Human Capital	Processes
12	Natural Capital	Processes
13	Financial Capital	Processes
14	Physical Capital	Processes
15	Social Capital	Processes

Table 3.4. Component in Correlation Tests (*continued*)

16	Structures	Strategies
17	Processes	Strategies
18	Strategies	Profit
19	Profit	Human Capital
20	Profit	Natural Capital
21	Profit	Financial Capital
22	Profit	Physical Capital
23	Profit	Social Capital
24	Structure	Vulnerability
25	Processes	Vulnerability

Source: Authors concept, 2019

From the figure 2.1., it can be seen that relationship between livelihood assets and transforming structures and processes is a reciprocal relationship. This mater is shown by the influence and access' arrow between livelihood assets and transforming structures and processes. However, the values for Pearson correlation and Sig. (2 tailed) in output of bivariate correlation test for components of livelihood assets and transforming structures and processes, or *vice versa*, are similar. Therefore, analysis for relationships of components of sustainable livelihood in the type of reciprocal relationships is only done once time that is for the relationship shown by the forward or backward arrows only, and not *vice versa*.

Besides that, it is needed to understand that Pearson's coefficient of correlation is a measure of the degree of relationship between the two variables (Rayat, 2018). Related to this, positive correlation is a relationship between two variables in which both variables move in tandem–that is, in the same direction, namely it is happened when one variable decreases as the other variable decreases, or one variable increases while the other increases (Hayes and Westfall, 2020). Meanwhile, negative correlation is a relationship between two variables in which one variable increases as the other decreases, and vice versa (Picardo, 2019). Based on these two types of correlation, then the analysis of components of sustainable livelihood in this research is done based on the causes the increase or the decrease of each component.

CHAPTER 4.
RESEARCH RESULTS

4.1. Descriptive Analysis

The descriptive analysis shows the characteristic of respondents who are from paddy farming group of Mulyo 2 in Mulyoarjo village and from paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village. The analysis covers gender, age, education level, and household members of respondents. Moreover, analysis also covers land area owned by respondents, variable cost of production, fixed cost of production, total cost of production, total production, total revenue, and total profit.

4.1.1. Gender of Respondents

The respondents interviewed in this research are male. These all male respondents show that the farmers conventional paddy farmer group of Mulyo 2 in Mulyoarjo village and in organic paddy farmer group of Sumber Makmur 1 in Sumber Ngepoh village have a dominant role as a head of household to be responsible cultivating their farming lands as a source of livelihoods for their household members.

Table 4.1. Gender of Respondents

| Gender | Paddy farming | | | |
| | Organic | | Conventional | |
	Total respondents	%	Total respondents	%
Male	32	100	34	100
Female	0	0	0	0

Source: survey data processed by author, 2019

From table 4.1., the total of respondents in paddy farmer group of Mulyo 2 in Mulyoarjo village are 34 respondents and total of respondents in paddy farmer group of Sumber Makmur 1 in Sumber Ngepoh village are 32 respondents. The larger total of respondents in paddy farmer group of Mulyo 2 is due to the number of farmers in this group are 38 farmers while the total farmers in paddy farmer group of Sumber Makmur 1 are 35 farmers.

4.1.2. Age of Respondents

The ages of respondents both in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village are in the range of 30 to 80 years old. The youngest respondent is 37 years old who is a member of paddy farmer group of Mulyo 2 in Mulyoarjo village, and the oldest respondent is 76 year old who is a member of paddy farmer group of Sumber Makmur 1 in Sumber Ngepoh village.

Table 4.2. Age of Respondents

Range of age	Paddy farming			
	Organic		Conventional	
	Total respondents	%	Total respondents	%
35 to 45 year	2	6.25	4	11.76
46 to 55 year	11	34.38	8	23.53
56 to 65 year	11	34.38	12	35.29
66 to 75 year	7	21.88	10	29.41
76 to 85 year	1	3.13	0	0

Source: survey data processed by author, 2019

From table 4.2., 75 percent of the respondents who are the members of paddy farmer group of Sumber Makmur 1, are in the productive age[9] and 64.70 percent of the respondents who are the members of paddy farmer group of Mulyo 2 are also in the productive age. Thus, the respondents in the unproductive age are more in paddy farmer group of Sumber Makmur 1 namely 35.30 percent as compared to 25 percent in paddy farmer group of Mulyo 2.

4.1.3. Education Level of Respondents

Table 4.3. presents the educational level of respondents. The educational level of respondents which is in the range from low to high level do not go to school or do not graduate from primary school, graduated from primary school, graduated from junior high school, graduated from senior high school, and graduated from D3 program or university.

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[9] The productive age is 15 to 64 year old (Satiti, 2019).

Table 4.3. Education Level of Respondents

| Level of education | Paddy farming | | | |
| | Organic | | Conventional | |
	Total respondents	%	Total respondents	%
Do not go to school or do not graduate form primary school	2	6.25	5	14.71
Graduated from primary school	26	81.25	15	44.12
Graduated from junior high school	4	12.50	8	23.53
Graduated from senior high school	0	0	4	11.76
Graduated from D3[10] or University	0	0	2	5.88

Source: survey data processed by author, 2019

From table 4.3., all of respondents who are organic farmers from paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village have lower education level[11]. They do not go to school. They do not graduate form primary school. They graduated from primary school. Meanwhile, there is 82.36 percent of respondents who are conventional farmers from paddy farming group of Mulyo 2 in Mulyoarjo village have lower educational level, and there is 17.64 percent have higher educational level. They graduated from senior high school. They graduated from D3. They graduated from University.

4.1.4. Household Member of Respondents

Total of household member of respondents is in the range of 1 to 6 people. The respondents who have the smallest and the biggest number of household member are farmers from paddy farming group of Mulyo 2 in Mulyoarjo village. Total household member of respondents is presented in Table 4.4.

From the table, respondents in this study do not have too many of household members. There are 93.75 percent of respondent from paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village, and 79.41 percent of respondent from paddy

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[10] The D3 is diploma three, which is equivalent to an associate's degree.
[11] Article 17 of the Act of the Republic of Indonesia Number 20 Year 2003 on National Education System states that basic education takes the form of primary schools and junior secondary schools. While, Article 18 states that secondary education takes the form of senior secondary schools. Therefore, in this research, education level is stated as the lower education level, consisting of primary school and junior secondary school and the higher education level, consisting of senior secondary school.

farming group of Mulyo 2 in Mulyoarjo village have 2 to 4 household members. This means that those respondents have a maximum of two children.

Table 4.4. Household Member of Respondents

Total household member	Paddy farming			
	Organic		Conventional	
	Total respondents	%	Total respondents	%
1 person	0	0	1	2.94
2 people	10	31.25	8	23.53
3 people	12	37.50	10	29.41
4 people	8	25.00	9	26.47
5 people	2	6.25	4	11.76
6 people	0	0	2	5.88

Source: survey data processed by author, 2019

4.1.5. Land Area Owned by Respondents

Farming land cultivated by all of the respondents both in paddy farming group of Mulyo 2 in Mulyoarjo village and in paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village are owned by themselves. This indicates that there is no one of them who works as a farm labor. Thus, they have a freedom to make decision about all activities carried out on their farming lands, such as kind of plant that they plant and kind of farming inputs that they use.

Table 4.5. Land Area Owned by Respondents

Land area in square meter (m²)	Paddy farming			
	Organic		Conventional	
	Total respondents	%	Total respondents	%
Less than 5,000	2	6.25	27	79.41
5,000	17	53.13	6	17.65
6,000	0	0	1	2.94
7,500	6	18.75	0	0
8,000	1	3.13	0	0
10,000	6	18.75	0	0

Source: survey data processed by author, 2019

From table 4.5., farming land owned by the respondents in organic paddy farming group of Sumber Makmur 1 in Sumber Ngepoh village are wider than farming land owned by the respondents in conventional paddy farming group of Mulyo 2 in Mulyoarjo village. There are 93.75 percent of respondents in paddy farming group of Sumber Makmur 1 who have farming land with wide 5,000 m^2 or more compared to 20.59 percent of respondents in paddy farming group of Mulyo 2 who have farming land with wide 5,000 m^2 or more.

4.1.6. Water Sources for Paddy Field

Water sources for organic paddy field in Sumber Ngepoh village is from the springs on the hills surrounding the village. The main springs at the highest location are Barek and Gondang. Another small spring which is lower location than the main springs and is at the right side of the hills is Pasu. Water which comes out from these springs flows throughout the year. The water discharge is somewhat reduced during the dry season.

The location of Sumber Ngepoh village is lower than the spring. The water, which comes out from the spring, is flowed through ditch from the spring to the village. The ditch divides the center of the village and the water flow away from the village to Sumber Porong village and Pasuruan regency.

Respondents' organic paddy fields in Sumber Ngepoh village are terraced with the highest position close to the springs (Barek and Gondang) and the lowest close to the respondents' residence in the village. These paddy fields are located at the right and left sides of the ditch. Therefore, the respondents can flow the water from the ditch into their paddy fields. The water which flows directly from the springs, of course, can be avoided from a contamination with substances prohibited for organic farming before it flows into the farmers' organic paddy field.

Water sources for conventional paddy field in Mulyoarjo village is disposal water from the city of Lawang subdistrict. The water is a collection of disposal water, such as from households, restaurants, or factories (such as tofu factory). The water which comes out from these various places is flowed through big ditch from the city to the Mulyoarjo village. In the village, the water goes into a river located at back of the

village. From the river, the water is flowed through small ditch towards the respondents' conventional paddy field.

Certainly, the disposal water from the city of Lawang subdistrict undergoes a contamination process with various chemical substances before it flows into the respondents' conventional paddy field in Mulyoarjo village. In other words, the water contains various chemical substances that have the potential to be harmful to human health. However, the respondents do not have another water source for their paddy fields. Therefore, they still use the disposal water from the city.

4.1.7. Cultivating Organic and Conventional Paddy by Respondents

All respondents in Mulyoarjo village and in Sumber Ngepoh village plant paddy three times and harvest the paddy plants two times every year. They plant paddy continuously without changing the planting pattern to the other crops such as corn or groundnut between two paddy-planting seasons.

The stages of activities to cultivate both conventional paddy in Mulyoarjo village and organic paddy in Sumber Ngepoh village are almost similar. This similarity due to both villages are adjoining area so that both villages have the similar characteristics of the paddy farming. The difference in cultivating organic paddy in Sumber Ngepoh village and conventional paddy in Mulyoarjo village is the use of farming inputs such as type of seed, fertilizers, and pesticides.

The stages of paddy cultivation activities and the use of farming inputs for paddy in Sumber Ngepoh village and in Mulyoarjo village are explained as follow:

1. Land preparation

   Soil of paddy field is ploughed by using hand tractor. The tractor is rented and the owner of the tractor is the technician, who operates the tractor and ploughs the paddy field. Meanwhile, respondents do re-construct of the paddy dikes (or paddy bunds) and spillways at the dikes (channels for carrying away excess water at the paddy field).

2. Prepare paddy seedlings for transplanting

   There is the difference between the paddy seed used by respondents in Mulyoarjo village and in Sumber Ngepoh village. The respondents in Mulyoarjo village use paddy seed which they buy from farm shops. These shops are located in Mulyoarjo

village or the city of Lawang subdistrict. The shops sell farming inputs such as plants seed, chemical fertilizers and pesticides, and also farm tools and equipment such as hand sickle and hoe.

Table 4.6. The Use of Paddy Seed by Respondents in Mulyoarjo Village (Kg)

Paddy varieties	Total respondents using the varieties	%	The use of paddy seed	
			Total	Average
Ciherang	28	82.35	387	13.82
IR64	6	17.65	100	16.67

Source: survey data processed by author, 2019

The varieties of paddy seed bought by respondents are Ciherang and IR64. From table 4.6., the most respondents buy and plant the Ciherang variety. However, the average of IR64 variety bought and planted by the respondents is more than that of Ciherang variety.

Table 4.7. The Use of Paddy Seed by Respondents in Sumber Ngepoh Village (Kg)

Paddy variety	Total respondents using variety	%	The use of paddy seed	
			Total	Average
Mentik Wangi	32	100	938	29.31

Source: survey data processed by author, 2019

The respondents in Sumber Ngepoh village use paddy seed which they get from the previous-paddy harvest. From table 4.7., the variety of paddy seed are planted by all respondents in this village is Mentik Wangi.

Paddy seedlings for transplanting are produced by growing paddy seeds at nursery. The nursery is located at the paddy field owned by respondents. Selection of paddy seeds is done by putting it into a container (i.e. a bucket) filled with water. The good quality seeds go down to the base of the container while the poor quality seeds float on the water surface.

The good quality seeds are put into a sack and stored them at a low light place for 1 to 2 days. After going through a storage period, respondents bring the paddy seeds to the nursery and spread the seeds on the surface of the ground at the nursery and cover them by banana leaves to protect them from the sunlight. When the seeds

grow to be seedlings, the banana leaves are taken out. The time needed to grow the paddy seedling until achieving transplanting time is around 3 weeks.

Table 4.8. Labor to Prepare Paddy Seedlings for Transplanting

	Paddy farming			
	Organic		Conventional	
Labor	**Total respondents using labor**	**%**	**Total respondents using labor**	**%**
1 person	24	75	34	100
2 people	8	25	0	0

Source: survey data processed by author, 2019
Notes: 1 person means respondents himself, and 2 people means respondents and his wife

The activity to prepare paddy seedlings for transplanting is done by the respondents and their wives. From table 4.8., most respondents who plant organic paddy in Sumber Ngepoh village are growing paddy seeds at nursery by themselves. Meanwhile, all respondents who plant conventional paddy in Mulyoarjo village will grow paddy seeds at nursery by themselves.

3. Transplanting of paddy seedling in paddy field

Activity to transplant paddy seedling from nursery to paddy field is done by uprooting the paddy seedlings from the ground at the nursery and collecting them into some bonds. These paddy seedling bonds are distributed in paddy fields. Meanwhile, planting distance is made on surface of the ground at paddy field. This planting distance is as a guide in planting of paddy seedling. The objective of using this guide is to maximize plant spacing to achieve the maximum yield of paddy. The planting distance is made by using the row maker made from wood. The form of planting distance is in square with size 20 cm x 20 cm or 25 cm x 25 cm. The paddy seedlings taken out from the bonds of paddy seedling are planted at four corner points of each square. The number of paddy seedlings planted at each hole at each point are 2 to 3 paddy seedlings.

All both respondents who plant organic paddy in Sumber Ngepoh village and who plant conventional paddy in Mulyoarjo village use labor who come from outside their family members to plant paddy seedlings in their paddy fields. This is due to that the children of the respondents are students. Therefore, the respondents do not

involve their children in their farming paddy activities. Thus, respondents' family members involved in the farming paddy activities are only respondent and his wife.

Table 4.9. Labor to Plant of Paddy Seedling in Paddy Field

| Labor come from | Paddy farming | | | |
| | Organic | | Conventional | |
	Total labor	Average	Total labor	Average
Farmers' family member	0	0	0	0
Outside of farmers' family member	464	15	291	9

Source: survey data processed by author, 2019

From table 4.9., respondents in Sumber Ngepoh village use more labor who come from outside their family members than those of respondents in Mulyoarjo village. The amount of labor used to plant of paddy seedling in paddy field depends on the area of land owned by respondents in Sumber Ngepoh village.

4. Fertilizer application

    Respondents who plant organic paddy in Sumber Ngepoh village and who plant conventional paddy in Mulyoarjo village apply fertilizer to paddy plants in their paddy fields three times during the paddy-planting season. The time to applying organic fertilizer for organic paddy plants in Sumber Ngepoh village is as follow:

    *   The first fertilizer application is between 7 to 15 HST[12].
    *   The second fertilizer application is between 25 to 30 HST.
    *   The third fertilizer application is between 40 to 45 HST.

    The time to applying chemical fertilizers for conventional paddy plants in Mulyoarjo village is as follow:

    *   The first fertilizer application is around 15 HST.
    *   The second fertilizer application is between 35 to 40 HST.
    *   The third fertilizer application is between 60 to 65 HST.

    Organic fertilizer applied to organic paddy plants by respondents in Sumber Ngepoh village can be cow manure, buffalo manure, or goat manure. These animal manures are produced by livestock owned by each respondent.

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[12] HST is abbreviation of *Hari Setelah Tanam* which means day after paddy seedling transplanted in paddy field

Table 4.10. The Livestock Ownership by Respondents in Sumber Ngepoh Village

| Livestock | The livestock ownership | | | |
	Total respondents have livestock	%	Total livestock	Average livestock ownership
Cow	20	62.50	62	3
Buffalo	1	3.10	3	3
Goat	10	31.30	117	12
Cow and goat	1	3.10	2 and 4	6

Source: survey data processed by author, 2019

Chemical fertilizer applied to conventional paddy plants by respondents in Mulyoarjo village, can be Urea[13], ZA[14], NPK[15], and TSP[16]. Respondents buy these chemical fertilizers at farm shops located in Mulyoarjo village or the city of Lawang subdistrict.

Table 4.11. The Use Chemical Fertilizers by Respondents in Mulyoarjo Village

| Chemical fertilizers | The use chemical fertilizers | | | |
	Total respondents buying fertilizers	%	Total Fertilizers (Kg)	Average of fertilizers (Kg)
Urea	34	100.00	2,195	64.56
ZA	31	91.18	1,955	63.06
NPK	28	90.32	1,890	67.50
TSP	2	7.14	45	22.50

Source: survey data processed by author, 2019

The method of application fertilizer used by respondents is the traditional method. Respondents apply the organic and chemical fertilizers in paddy-farming fields by spreading the fertilizers to the paddy plants. This traditional method requires respondents to be able to spread evenly of the available fertilizers on their paddy-

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[13] Urea is known as Nitrogen (N) fertilizer.
[14] ZA is known as Nitrogen (N) with Sulfur (S) fertilizer.
[15] NPK is known as compound (Nitrogen (N), Phosphorus (P), and Potassium (K)) fertilizer.
[16] TSP is the Triple Super Phosphate fertilizer.

farming fields. The objective of this requirement is to give opportunity to all paddy plants to get enough supply of fertilizers for the growth.

Table 4.12. Labor to Apply Fertilizers by Respondents in Paddy Field

Labor	Paddy farming					
	Organic			Conventional		
	Time to apply fertilizers			Time to apply fertilizers		
	First	Second	Third	First	Second	Third
1 person	27	27	25	29	29	27
2 people	5	5	5	5	5	5

Source: survey data processed by author, 2019
Notes: 1 person means respondents himself, and 2 people means respondents and his wife

From table 4.12., most respondents in Sumber Ngepoh village and in Mulyoarjo village apply fertilizers to paddy plants by themselves in their farming paddy fields. From the table, there are farmers who do not do the third fertilizer application both in Sumber Ngepoh village and in Mulyoarjo village. They see that their paddy plants are healthy, so that fertilizers are not needed.

5. Replacing dead-paddy plants and weeding

Some of the paddy seedlings planted in the paddy farming field have a potential death. Therefore, the dead-young paddy plants need to be replaced. Activity to replace the dead-young paddy plants is called as *penyulaman* (replacing dead plants with fresh ones). The *penyulaman* is done around 7 HST. In this activity, the dead-young paddy plants are uprooted and the new fresh paddy seedlings are planted as a replacement.

There are two stage activities which are done to weed the weed in the organic paddy farming field in Sumber Ngepoh village and in the conventional paddy farming field in Mulyoarjo village. The first stage is called *matun*, and the second stage is called *mindoni*. The *matun* is done between 25 to 30 HST while the *mindoni* is done around 55 HST. In both stages, the weeds which grow around paddy plants are uprooted. The objective of this activity is to stop competition in fighting over the soil nutrient element, water, and sunlight between the paddy plants and the weeds. The types of weeds met in the farming paddy field in Sumber Ngepoh village and in Mulyoarjo village are genjer (*Umnocharis flava* (L.) *buch*), kayu

apu/janji (*Pistia stratiotes* L.), lancuran (*Acalypha hispida Burm. F.*), rumput das-dasam (*Fimbristylis milicea*), semanggi (*Marsilea crenata presl.*), and wewehan (*Monochoria vaginalis* (*burm.f.*) *presi*).

From table 4.13., all respondents who plant organic paddy in Sumber Ngepoh village use labor coming from outside of farmers' family members to doing *matun*. Meanwhile, most of respondents who plant conventional paddy in Mulyoarjo village use labor coming from outside of farmers' family member to doing *matun*, and only a small portion of respondents use labor coming from farmers' family members. The average of labor coming from outside of farmers' family members used by respondents in Mulyoarjo village to doing *matun* is more than those in Sumber Ngepoh village.

Table 4.13. Labor to Do *Matun* and *Mindoni*

| Labor come from | Paddy farming | | | | | |
| | Organic | | | Conventional | | |
	Total respondents using labor	Total labor	Average	Total respondents using labor	Total labor	Average
Matun:						
IF	0	0	0	9	9	1
OF	34	411	12.84	25	339	13.56
Mindoni:						
IF	2	2	1	12	12	1
OF	32	359	11.22	22	217	9.86

Source: survey data processed by author, 2019
Notes: IF is an abbreviation of inside of farmers' family members, and OF is an abbreviation of outside of farmers' family members

From the table, most of respondents who plant organic paddy in Sumber Ngepoh village and who plant conventional paddy in Mulyoarjo village use labor coming from outside of farmers' family members to doing *mindoni* and only a small portion of respondents in both villages use labor coming from farmers' family members. The average of labor coming from outside of farmers' family member used by respondents in Sumber Ngepoh village to doing *mindoni* is more than those in Mulyoarjo village.

6. Spraying pesticides

   Activity to spray pesticides in the paddy field in Sumber Ngepoh village and in Mulyoarjo village is to eradicate the pests. The intended pests consists of insects, rodents, and unwanted plants, particularly weeds. Respondents in Sumber Ngepoh village use organic pesticides to eradicate pest in their organic paddy fields. The ingredients of the organic pesticides are *dringu daun* (the leaf of *Acorus calamus*) and *daun sirsak* (the leaf of *Annona muricata*). This pesticide is used to control *sundep* (*Scirpophaga innotata*). Activity to spray organic pesticides is done by themselves.

Table 4.14. The Use Organic Pesticides by Respondents in Sumber Ngepoh Village

| Pesticides | The use organic pesticides (liter) | | | |
	Total respondents using pesticides	%	Total pesticides	Average pesticides
Organic pesticides	28	87.50	329	11.75

Source: survey data processed by author, 2019

Activity to spray organic pesticides is done by respondents themselves. From table 4.14., not all respondents do pests eradication. In this regards, there are 4 respondents or 12.5 percent of respondents who do not do pests eradication. It is due to that there is no *sundep* attack to their organic paddy fields.

Table 4.15. The Use of Chemical Pesticides by Respondents in Mulyoarjo Village

| Pesticides | Packaging | The use chemical fertilizers | | | |
		Total respondents buy pesticides	%	Total pesticides	Average pesticides
Decis	Bottle	9	26.47	10	1.11
Furadan	Bag	3	8.82	5	1.67
Ally	Bag	3	8.82	6	2.00

Source: survey data processed by author, 2019

There are some types the chemical pesticides used by respondents in Mulyoarjo village. The pesticides are Decis, Furadan, and Ally. Decis is used by respondents

to eradicate *wereng* (*Nilaparvata lugens*). Meanwhile, Furadan is used to eradicate *penggerek batang* (*Tryoiryza innotata*). To destroy the unwanted vegetation such as weeds, respondents use Ally. From table 4.15., there are more *wereng* attacking respondents' paddy fields than *penggerek batang*. It can be known from total of respondents who buy the Decis are more than the total of respondents who buy the Furadan. In this regard no one of those 12 respondents who buys Decis and buy Furadan at once. Meanwhile, total respondents who buy Ally are not many. It is due to that the most respondents uproot the unwanted vegetation such as weeds at the *matun* and *mindoni* activities where they do the uproot activity by themselves, or they pay labor from outside their family members to do the uproot activity.

Table 4.16. Labor to Spray and/or Apply Pesticides in Mulyoarjo Village

Labor come from	Conventional			
	Total respondents using labor	%	Total labor	Average
Decis:				
IF	8	23.53	8	1
OF	1	2.94	2	2
Furadan:				
IF	3	8.82	3	1
OF	0	0	0	0
Ally:				
IF	3	8.82	3	1
OF	0	0	0	0

Source: survey data processed by author, 2019
Notes: IF is an abbreviation of inside of farmers' family members, and OF is an abbreviation of outside of farmers' family members

From table 4.16., it can be seen that activity to spray Decis use the largest number of labor. The labor comes not only from respondents' family members but also from outside of respondents' family members. Meanwhile, application of Furadan and Ally uses only labor from respondents' family members. In this regards, respondents do this activity by themselves.

7. Control of birds and paddy-field rats

The attack of paddy-field rat (*Rattus argentiventer*) is happened in organic paddy field in Sumber Ngepoh village and in conventional paddy field in Mulyoarjo

village. To control the rat, respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village use the *gadung KB* (*Dioscorea composita*). This tuber is used only to control the breeding of the rat. All respondents in Sumber Ngepoh use the *gadung KB*, and they apply the gadung *KB* in their organic paddy fields by themselves. Meanwhile, respondents in farmer group of Mulyo 2 in Mulyoarjo village use Klerat or Pospit to eradicate *Rattus argentiventer* (paddy-field rat).

Table 4.17. The Use Chemical Pesticides to Control Paddy-field Rats

| Pesticides | Packaging | The use chemical fertilizers | | | |
		Total respondents buy pesticides	%	Total pesticides	Average pesticides
Klerat	Bag	30	88.24	41	1.37
Pospit	Bag	5	14.71	5	1.00

Source: survey data processed by author, 2019

From table 4.17., respondents purchase and use Klerat as compared to Pospit to eradicate the paddy-field rats. The total of Klerat purchased by respondents is over than the total of respondents. In fact, there are respondents who purchase Klerat and Pospit at the same time. These facts show that the attack of rats in respondents' paddy fields in Mulyoarjo village is very serious.

Table 4.18. Labor to Control Paddy-field Rats

| Labor | Paddy farming | | | |
| | Organic | | Conventional | |
	Total respondents using labor	%	Total respondents	%
1 person	32	100	29	85.30
2 people	0	0	2	5.88

Source: survey data processed by author, 2019
Notes: 1 person means respondents himself, and 2 people means respondent and his wife

From table 4.18., all respondents in Sumber Ngepoh village do a control for the rats by themselves. Meanwhile, most of respondents in Mulyoarjo village do a control for the rats by themselves. There are only two respondents who do a control for the rats by themselves and are also helped by their wives. However, there are

two respondents of total 34 respondents in Mulyoarjo village, who do not purchase either Klerat or Pospit.

Besides doing control to the rat attack, respondents in Sumber Ngepoh village and in Mulyoarjo village also do a control to the bird attack which steal paddy seeds from paddy plants in respondents' paddy fields. The types of birds which come to the paddy field in both two villages, are *burung*[17] *pipit tudung putih* (*Lonchura leucogastroides*), *burung pipit haji* (*Lonchura raffles*) and *burung derkuku* (*Streptopelia chinensis*).

Table 4.19. Labor to Control Birds

	Paddy farming			
	Organic		**Conventional**	
Controller	**Total respondents using controller**	**%**	**Total respondents using controller**	**%**
Labor:				
1 person	5	15.60	8	23.50
2 people	0	0	0	0
Net	28	87.50	26	76.50

Source: survey data processed by author, 2019
Notes: 1 person means respondent himself, and 2 people means respondent and his wife

From table 4.19., there are two ways which are done by the respondents in both two villages to control the bird attack. For example, control done by respondents themselves, and control is using nets. Control by respondents is by putting the scarecrow in the paddy field controlled by the respondents using a rope. The scarecrow is to imitate the paddy field workers. Meanwhile, control that use the net is by putting the nets on the top of paddy plants. Thus, the nets cover the top side of paddy plants and prevent the bird stealing the paddy seeds from the paddy plants. From the table, respondents in Mulyoarjo village are doing more control to the bird by themselves as compared to respondents in Sumber Ngepoh village. However, in the contrary, respondents in Sumber Ngepoh village are doing more control to the bird by using nets as compared to respondents in Mulyoarjo village.

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[17] Burung means bird in English.

8. Harvesting

   Respondents in Mulyoarjo village and in Sumber Ngepoh can do harvesting paddy between 110 to 120 HST. Harvesting of paddy consists of some activities such as cutting paddy stalks, threshing paddy grain from its stalks, collecting the paddy grain into plastic sacks, transporting the plastic sacks to respondents' house, and storing the plastic sacks at their house. Respondents can do harvesting paddy by themselves, or they can subcontract these activities to other workers with a payment agreement by the respondents to the workers after all harvesting activities completed by the workers.

Table 4.20. Labor to Harvest Paddy

Labor	Paddy farming			
	Organic		Conventional	
	Total respondents	%	Total respondents	%
Harvesting by respondents:				
1 person	0	0	1	2.94
2 people	0	0	2	5.88
Subcontract harvesting	32	100	31	91.20

Source: survey data processed by author, 2019
Notes: 1 person means respondent himself, and 2 people means respondent and his wife

From table 4.20., all respondents in Sumber Ngepoh village and most respondents in Mulyoarjo village do the subcontract harvesting to other workers. There are only three respondents in Mulyoarjo village who do harvesting paddy activities by themselves.

9. Selling harvested paddy

   Respondents in Sumber Ngepoh village sell their organic paddy grains to the head of farming group of Sumber Makmur 1. This sale is under an unwritten-mutually agreed upon agreement among the members of farming group of Sumber Makmur 1 in their quarterly group meeting. The agreement also agreed for some things as follow:

   a. the amount of organic paddy grain that can be sold to the head of farming group, namely 70 percent of total harvested paddy in every paddy harvesting season, while the rest 30 percent is to fulfill of members' family needs,

b. group-selling price for the sale of members' paddy grains to the head of group is determined above of the market price for conventional paddy grain,

c. sanctions for every member who breaks the agreement.

By following the agreement, every respondent gets guarantee for the sale of their organic paddy grains and high selling price of the grains above the selling price for conventional paddy grains. Certainly, every member gets big profit. The head of group mills the paddy grain to be rice. Furthermore, the rice is sold to the loyal consumers of organic rice who can purchase the rice with the purchasing price above the purchasing price for conventional rice.

Meanwhile, respondents in Mulyoarjo village sell their conventional paddy grains to *tengkulak* (middleman). The respondents receive the selling price for their paddy grains based on the market price for conventional paddy grains. However, the respondents are loyal to sell their paddy grains to the *tengkulak* due to that the *tengkulak* can help the respondents whenever they want to borrow money without an interest and time of refunding of money at the harvesting time. From the *tengkulak* side, this is possible because there are 4 paddy traders who are known close to the *tengkulak* and provide the financial support to the *tengkulak*. Therefore, the existence of the *tengkulak* is needed by respondents in Mulyoarjo village.

10. Organic certificate

The ownership of organic certificate is a very important thing for the farmer group of Sumber Makmur 1 in Sumber Ngepoh village. This is due to that the certificate can be a proof owned by the group to claim to consumers that organic paddy or rice that is produced in their paddy fields have indeed been organically produced. The claim is based on their efforts and discipline to continue practice of organic farming in their paddy fields as they have practiced it as a requirement in order to get the certificate.

Lembaga Sertifikasi Organik Seloliman (LeSOS)[18] is the organic certificate institution which issues the organic certificate to farmer group of Sumber Makmur 1 in Sumber Ngepoh village. LeSOS is an official institution which has the mandate from Organic Food Competency Authority, the Ministry of Agriculture of the

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[18] Lembaga Sertifikasi Organik Seloliman in English means Seloliman Organic Certification Institute

Republic of Indonesia to certify organic food. LeSOS is also the organic certification institution, which is officially accredited by Komite Akreditasi Nasional (KAN)[19].

The organic certificate owned by farmer group of Sumber Makmur 1 is accredited based on the Standard Nasional Indonesia (SNI)[20]. The certificate is valid only for 3 years, and it can be extended for the next 3 years. In this issue, three months before the expiring date of the certificate, the LeSOS informs to the operator of the farmer group to extend the certificate. The amount of cost which must be spent by the farmers in farmer group of Sumber Makmur 1 to get the organic certificate is IDR 33 Million. This cost is being the responsibility for the member of farmer group. Each farmer must contribute about IDR 26,191[21] per month to pay the certificate cost. By paying jointly, the cost for the organic certificate is mitigating for the farmers. Moreover, by having the organic certificate give a benefit to increasing the positive image of their organic rice to consumers.

4.2. Statistical Analysis

Statistical analysis consists of analysis of economic performance, analysis of livelihood assets value, and analysis of influence of the livelihood assets. The analysis of economic performance consists of Kolmogorov-Smirnov test for continuous data and independent sample t-test. Meanwhile, the analysis of livelihood assets value consists of test of validity, test of reliability, and livelihood assets analysis. And, the analysis of influence of the livelihood assets consists of Kolmogorov-Smirnov test for categorial data, multi-collinearity test, heteroscedasticity test, and multiple linear regression analysis.

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[19] Komite Akreditasi Nasional in English means National Accreditation Committee
[20] Standard Nasional Indonesia in English means Indonesia National Standard
[21] This IDR 26,191,- is obtained from a calculation as follow:
IDR 33,000,000,- ÷ 36 (months) = IDR 916,667,- ÷ 35 (farmers) = IDR 26,191,-.

4.2.1. Analysis of Economic Performance

4.2.1.1. Kolmogorov-Smirnov Test for Continuous Data

The results of Kolmogorov-Smirnov test which test the normality of continuous data, show that all continuous data are distributed normally. This thing is shown by Significant (Sig.) values for all data is more than 0.05. The results of the Kolmogorov-Smirnov test is presented in the Table 4.21. Based on this result, the data can be processed by using the parametric inferential statistical test such as t-test.

Table 4.21. Test of Normality

The mean of	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Variable cost of organic farming	.119	32	.200
Variable cost of conventional farming	.116	34	.200
Fixed cost of organic farming	.135	32	.147
Fixed cost of conventional farming	.066	34	.200
Total cost of organic farming	.110	32	.200
Total cost of conventional farming	.114	34	.200
Production of organic farming	.120	32	.200
Production of conventional farming	.137	34	.103
Revenue of organic farming	.120	32	.200
Revenue of conventional farming	.138	34	.101
Profit of organic farming	.114	32	.200
Profit of conventional farming	.138	34	.097

Source: Data processed by authors, 2019

4.2.1.2. Independent Sample t-Test

The result of analysis of independent sample t-test shown in Table 4.22. shows that all p values of profit and their components are less than 0.05. These p values show that there is the difference of the mean values among variable cost, fixed cost, total cost, production, revenue and profit between farmer group of Mulyo 2 in Mulyoarjo village and farmer group of Sumber Makmur 1 in Sumber Ngepoh village.

The difference of the mean values is due to the difference of basic principle in practicing organic and conventional paddy farming. The principle is the use of the agricultural inputs. Respondents in farmer group of Mulyo 2 purchase paddy seeds and chemical fertilizers and pesticides. Meanwhile, respondents in farmer group of Sumber Makmur 1 select paddy seeds from the previous harvest and apply animal manures as

fertilizers as well as apply pesticides made from plant leaves. The difference of the use of the agricultural inputs influences to the cost of production which must be spent by the farmers. In turn, it also influence to the profit earned by the farmers.

Table 4.22. t-Test Results

Profit and its components	P(T≤z) two-tail
Variable cost	1.68E-07
Fixed cost	7.11E-07
Total cost	1.44E-07
Production	0,030169
Revenue	0,001046
Profit	3.76974E-18

Source: Data processed by authors, 2019

Table 4.23. presents the mean values of profit and their components such as variable cost, fixed cost, total cost, production, selling price, and revenue which both are in farmers group of Sumber Makmur 1 and Mulyo 2. From the table, the mean values of variable cost, fixed cost, and total cost in farmer group of Sumber Makmur 1 are less than in farmer group of Mulyo 2. This means that variable cost, fixed cost, and total cost which must be spent by the farmers in farmer group of Sumber Makmur 1 to run their organic paddy farming is lower than variable cost, fixed cost, and total cost which must be spent by the farmers in farmer group of Mulyo 2 to run their conventional paddy farming.

Table 4.23. The Mean of Cost, Production, Price and Profit

Mean of	Unit	Organic	Conventional	Percent O to C
Variable cost	IDR	7,027,126	17,783,603	(-) 153
Fixed cost	IDR	243,879	442,258	(-) 81
Total cost	IDR	7,271,006	18,225,861	(-) 151
Production	KG	7,119	6,074	15
Price	IDR	5,000	4,612	8
Revenue	IDR	35,596,667	28,005,294	21
Profit	IDR	28,325,661	9,779,433	66

Source: Data processed by author, 2019
Note: O means Organic; and C means Conventional

Variable cost is the cost that is spent by respondents in Sumber Ngepoh village and in Mulyoarjo village to financial activities cultivating paddy in their paddy fields. The cost consists of cost for purchasing farming input (paddy seeds, fertilizers,

pesticides, and bird nets) and labor payments (land preparing, planting paddy seedlings, replacing dead-paddy plants, and weeding, as well as harvesting). The lower of variable cost is due to that respondents in Sumber Ngepoh village do not purchase some of farming inputs such as fertilizers and pesticides. All farmers in farmer group of Sumber Makmur 1 have livestock as source for animal manure. Thus, they have a free source of organic fertilizers throughout the paddy-planting season. They can apply the animal manure to organic paddy plant throughout the paddy-planting season. This helps them to reduce the cost to procurement of the fertilizer, such as buying chemical fertilizers. Moreover, they have an opportunity to raising and breeding the livestock to increase the number of the livestocks they already have. Besides as source of the animal manure, the livestock also has an important function as a saving for the farmers. They can sell it if they need more money.

To control pest attack, all farmers in farmer group of Sumber Makmur 1 use organic pesticides. They make the pesticides by using the tubers and leaves of plants. They carry out them by themselves. By using the leaves plants as ingredient for making organic pesticides to encourage the farmers and their family members to plant the plants which are needed for the ingredient for making organic pesticides. There is an example of the plant, namely *Annona muricata*, that can be taken its leaves as ingredient for making organic pesticides and its fruit to be consumed by farmers or to be sold as source of income.

This is different to cost that must be spent by respondents in Mulyoarjo village to buy chemical fertilizers and pesticides. In this issue, the respondents have a high dependence on outsiders in procurement of chemical fertilizers and pesticides for their paddy fields. This dependency leads the respondents as the price follower for prevailing market price for the chemical fertilizers and pesticides sold in the farming shops. The price of chemical fertilizers and pesticides paid by the respondents to the farming shops contributes directly to variable cost that must be spent by them. Thus, the increase of the price of chemical fertilizers and pesticides will increase the variable cost for their farming activities.

Fixed cost is the cost that is spent by respondents in Sumber Ngepoh village and in Mulyoarjo village to pay tax for their farming lands. Tax for farming land is paid by the respondents every year. For respondents in Sumber Ngepoh village, fixed cost also

means the cost that is spent by them to get the organic certificate for their farming groups.

The amount of land tax that must be paid by respondents is based on the area of land owned by them. Land area owned by respondents in Sumber Ngepoh village and in Mulyoarjo village is different such as more or less than 1 hectare. Thus, this difference of land area leads to the difference of the amount of land tax and, in turn, it leads to the difference of fixed cost that must be spent by respondents in Sumber Ngepoh village and in Mulyoarjo village. To overcome this issue, all fixed costs from different land areas are converted to fixed costs that equivalent to 1 hectare land area. The result of converting show that fixed costs which must be paid by respondents in Sumber Ngepoh village are lower than fixed cost that must be paid by respondents in Mulyoarjo village.

Total cost is a sum of variable cost and fixed cost spent by respondents in Sumber Ngepoh village and in Mulyoarjo village. The amount of variable cost and fixed cost determine to the amount of total cost. In other words, the increase or decrease of variable cost and fixed cost can increase or decrease of total cost. The lower of total cost that is spent by respondents in Sumber Ngepoh village as compared to respondents in Mulyoarjo village is due to the lower of variable cost and fixed cost that is spent by respondents in Sumber Ngepoh village as compared to variable cost and fixed cost that is spent by respondents in Mulyoarjo village.

From table 4.23., it can also be seen that the mean value of production of organic paddy is higher as compared to conventional paddy. While the mean value of selling price of organic paddy grain is also higher than that of conventional paddy grain.

Total paddy production is total paddy that is harvested by respondents in Sumber Ngepoh village and in Mulyoarjo village. This total production is varied from one respondent to the others. Farming land area owned by each respondent in Sumber Ngepoh village and in Mulyoarjo village contributes to total production of paddy that is harvested by respondents in each village. Farming land area owned by the farmers in farmer group of Sumber Makmur 1 is more wide compared to the farming land area owned by the farmers in farmer group of Mulyo 2. The more farming land area owned by each respondent, the more total production of paddy they can potentially harvest. Therefore, the difference in total of farming land area owned by respondents in each

village influence total paddy production produced in each village. Besides that, the attack of paddy-field rats and *wereng* (*Nilaparvata lugens*), which come into paddy field in Mulyoarjo village also contributes to the low total production of paddy harvested by respondents in that village as compared to total production of paddy harvested by respondents in Sumber Ngepoh village.

The difference of selling price between organic paddy from Sumber Ngepoh village and conventional paddy from Mulyoarjo village is based on the way to determine the price. The determination of selling price of organic paddy is done by all farmers in farmers group of Sumber Makmur 1. The price is determined in the group meeting carried out in every 4 month, namely on 15 April, 15 August and 15 December. Before the meeting take place, the survey of the price of paddy in central market at Lawang sub district and Malang city is done by two to three of the members of the farmer group.

The price gotten from the survey is the price of conventional paddy. Based on this price, the farmers in farmers group of Sumber Makmur 1 determine the selling price for their paddy above of the surveyed price. Meanwhile, the farmers in farmer group of Mulyo 2 sell their paddy is followed on the price for conventional paddy, which is sold in the central market at Lawang sub district and Malang city.

Total revenue received by respondents in Sumber Ngepoh village and in Mulyoarjo village is total paddy sold by them in kilogram times with selling price of paddy for each kilogram. Therefore, the amount of revenue that is received by the respondents depends on the amount of total paddy that they sell and the selling price of paddy. The more of paddy they sell and the higher of selling price of paddy, the more revenue they receive.

The difference of revenue which earned by respondents in Sumber Ngepoh village and in Mulyoarjo village is due to the difference of total paddy production that is sold by respondents in Sumber Ngepoh village and in Mulyoarjo village and selling price for paddy they sell. Total organic paddy that is sold by respondents in Sumber Ngepoh village and the selling price for that organic paddy is higher than total conventional paddy that is sold by respondents in Mulyoarjo village and the selling price for that conventional paddy. Thus, these things contribute to high revenue earned

by respondents in Sumber Ngepoh village as compared to revenue earned by respondents in Mulyoarjo village.

Total profit received by respondents in Sumber Ngepoh village and in Mulyoarjo village is total revenue that they earn from the sale of paddy minus to total production cost that they spend. Therefore, the high or low of profit is determined by the high or low of total revenue and total production cost. The more total revenue they earn and the lower total production cost they spend, the more profit they get, and *vice versa*. The mean value of total profit higher for respondents in Sumber Ngepoh village as compared to mean value of total profit for respondents in Mulyoarjo village show the higher of total revenue earned by respondents in Sumber Ngepoh village and the lower of total cost that is spent by them.

4.2.2. Analysis of Livelihood Assets

4.2.2.1. Test of Validity

Results of validity test show that there are some invalid variables. If these variables are involved in a statically analysis, they will give an inaccurate result for conclusion. Therefore, these invalid variables are not involved in the next analysis. The results of validity test are presented in table appendix B.

4.2.2.2. Test of Reliability

Result of reliability test shows that Cronbach's Alpha is more than 0.7 for 33 variables. Based on this value of Cronbach's Alpha, it is stated that the variables are reliable collecting information needed from respondents. The results of reliability test is presented in table 4.24.

Table 4.24. Reliability Values of Variables

Cronbach's Alpha	Number of items
0.701	33

Source: Author analyzed (2019)

4.2.2.3. Livelihood Assets Analysis

Data processing of the ownership (owned and accessed) of respondents' livelihood asset in each farming group produce the result of data processing, namely

the ownership of livelihood asset by respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village and by respondents in farmer group of Mulyo 2 in Mulyoarjo village. Each result of data processing consists of livelihood asset components, namely human capital, natural capital, financial capital, physical capital and social capital which are owned and accessed by respondents in each farmer group. Furthermore, the data are used to create spider-diagram of livelihood asset components owned by respondents in each farmer group.
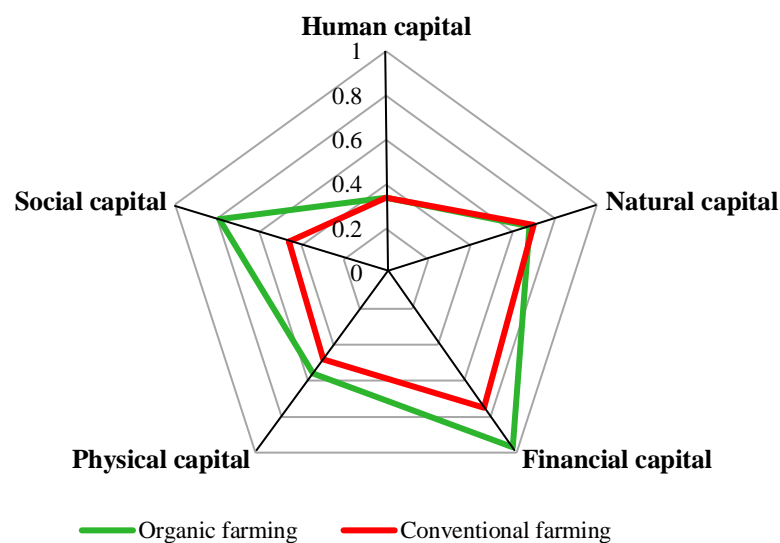
Figure 4.1. Spider-diagram of Livelihood Asset

From figure 4.1., the livelihood asset owned by respondents and its roles in Sumber Ngepoh village and in Mulyoarjo village. The diagram shows that human capital for respondents in both villages have a similar value, namely at 0.34. This value means that human capital owned by respondents in both village is relatively similar.

The components of human capital in these villages consist of education, the health, and the use of workers to do work in the paddy field. Majority respondents in each village have low educational level. For example, 6.25 percent of respondents in Sumber Ngepogh village do not go to school, and 81.25 percent of respondents graduated from elementary school. In Mulyoarjo village, 14.71 percent of respondents do not go to school, and 44.12 percent of respondents graduated from elementary school.

The health of respondents is quite good. There is 18.75 percent of respondents in Sumber Ngepogh village and 11.76 percent in Mulyoarjo village who are always healthy. The others, 37.50 percent respondents in Sumber Ngepoh village and 70.59 percent respondents in Mulyoarjo village are sick once in a while. And, 43.76 percent respondents in Sumber Ngepoh village and 14.71 percent respondents in Mulyoarjo village are occasionally sick.

Respondents in Sumber Ngepoh village and in Mulyoarjo village use the labor from outside of their family members. In these, 40.63 percent respondents in Sumber Ngepoh village often use the labor from outside and 46.88 percent respondents always use the labor from outside. Meanwhile, 5.88 percent respondents in Mulyoarjo village often use the labor from outside, and 88.24 percent respondents always use the labor from outside.

The diagram also shows that natural capital for respondents in both villages have almost similar values. The values are at 0.68 for respondents in Sumber Ngepoh village and 0.70 respondents in Mulyoarjo village. The components of natural capital in these villages consist of the ease in a practice to processing soil in paddy field and availability of water to watering the paddy field.

The similarity of soil condition in these villages is due to location of both villages that are adjacent. There are 68.75 percent of respondents in Sumber Ngepoh village and 64.71 percent of respondents in Mulyoarjo village which state that it is easy for them to prepare the land for planting paddy in their paddy fields. Besides the land, the availability of water as source to watering the paddy field is the important component of natural capital for respondents in both villages. In these, there is 53.13 percent of respondents in Sumber Ngepoh village and 73.53 percent of respondents in Mulyoarjo village which state that water to watering their paddy fields is available throughout the year. Therefore, the respondents in both villages do not face a problem in watering their paddy fields.

Financial capital had by respondents in Sumber Ngepoh village and in Mulyoarjo village are good. From the figure, financial capital for respondents in Sumber Ngepoh village is 0.97 and for respondents in Mulyoarjo village is 0.75. The components of financial capital in theses villages consist of sources of finance to pay the labor from outside of their family members and to pay for the paddy field activities;

the available finance for the activities in their paddy field; and livestock owned by respondents.

All respondents in Sumber Ngepoh village use their owned savings to pay the labor from outside of their family members and to pay for the paddy field activities. Meanwhile, there is only 70.59 percent respondents in Mulyoarjo village use their owned saving to pay the labor from outside of their family members and to pay for the paddy field activities and 29.41 percent of respondents ask for debt from *tengkulak* (middleman). The ability of respondents to pay for the activities in their paddy fields by their owned selves contributes to the value of financial capital of respondents in Sumber Ngepoh village as compared to respondents in Mulyoarjo village.

There are 62.50 percent of respondents in Sumber Ngepoh village and 73.53 of respondents in Mulyoarjo village who state the finance to pay for the activities in their paddy fields, definitely available. Meanwhile, all respondents in Sumber Ngepoh village have livestocks and only 44.12 percent of respondents in Mulyoarjo village have livestocks. These things give a contribution to the value of financial capital in both villages.

From the table, it also can be seen that value of physical capital for respondents in Sumber Ngepoh village is 0.56, and value for respondents in Mulyoarjo village is 0.48. The components of physical capital in theses village consists of road condition in both villages, access from paddy field to the main road in the village, availability of farming inputs (paddy seed, and chemical fertilizers and pesticides) for their paddy plants, and the availability of medical facilities.

There are 56.25 percent of respondents in Sumber Ngepoh village and 29.41 percent of respondents in Mulyoarjo village that state the roads in each village are in good condition. The ease to access the main road in the village from paddy field is stated by 56.25 percent of respondents in Sumber Ngepoh village and 29.41 percent of respondents in Mulyoarjo village. Meanwhile, there are 71.88 percent of respondents in Sumber Ngepoh village who states that fertilizer for their paddy plants is available in every paddy-planting season, and 76.50 percent of respondents in Mulyoarjo village, who states that farming inputs for their paddy plant are available in every paddy-planting season. Related to the availability of medical facilities, there are 25 percent of

respondents in Sumber Ngepoh village and 21 percent of respondents in Mulyoarjo village who go to *Puskesmas* (primary health care center) as compare to go to hospital.

The value of social capital of respondents in Sumber Ngepoh village is higher as compared than that if respondents in Mulyoarjo village. In this, the values of social capital of respondents in Sumber Ngepoh village and Mulyoarjo village are 0.79 and 0.46 percent, respectively. The components of social capital in theses village consists of the ease to make relationship between the members of farmer paddy group, follow the group activity, and the ease to follow procedural thing in the office of village head.

There are 53.12 percent of respondents in Sumber Ngepoh village and 88.24 percent of respondents in Mulyoarjo village who state that it is ease to make relationship between the members of farmer paddy group. All respondents in Sumber Ngepoh village follow the group activities. Meanwhile, a part of respondents in Mulyoarjo village do not follow the group activities. There are 46.88 percent of respondents in Sumber Ngepoh village and 67.65 percent of respondents in Mulyoarjo village who state that it is easy to follow procedural thing in the office of village head. These give contribution to the value of social capital in both villages.

4.2.3. Analysis of Influence of the Livelihood Assets to Profit

The results of test for regression assumptions and multiple regression are presented in this section. The regression assumptions tests consist of normality test, linearity test, heteroscedasticity test, and multi-collinearity test.

4.2.3.1. Normality Test

Test of normality uses Kolmogorov-Smirnov. In this test, the unstandardized residual of categorical data of respondents in Sumber Ngepoh village and in Mulyoarjo village are examined by objective to verify that the data are at least approximately normally distributed. The results of normality test of Kolmogorov-Smirnov is presented in Appendix C. From the table under Appendix C, the values of Asymp. Sig. (2-tailed) of the categorical data of respondents in Sumber Ngepoh village and in Mulyoarjo village are above 0.05. These mean that all data can be involved in the linear regression analysis.

4.2.3.2. Linearity Test

The linearity tests for data from respondents in Sumber Ngepoh village and in Mulyoarjo village are carried out by testing an independent variable and a dependent variable using the F test. The result of the test is shown as a significant value of deviation from linearity (it is presented in ANOVA table), and this value is consulted to α value ($p = 0.05$). All the significant values of deviation from linearity are presented in Appendix D. From table under Appendix D, all Sig. (significant) values of deviation from linearity both for data that come from respondents in Sumber Ngepoh village and in Mulyoarjo village are more than 0.05 and none among them have null values. This thing shows that all data fulfill a requirement of linearity assumption, and they can be involved in the linear regression analysis.

4.2.3.3. Heteroscedasticity Test

The results of heteroscedasticity test for data from respondents in Sumber Ngepoh village and in Mulyoarjo village are presented as t values and Sig. values. The t values and Sig. values are gotten from Glejser test. All values for t values and Sig. values are presented in Appendix E. From table under Appendix E, all Sig. (significant) values both for data that come from respondents in Sumber Ngepoh village and in Mulyoarjo village are more than 0.05 and none among them have null values. Thus, all data can be involved in the linear regression analysis.

4.2.3.4. Multi-collinearity Test

The results of multi-collinearity test for data from respondents in Sumber Ngepoh village and in Mulyoarjo village are presented as tolerance values and VIF (Variance Inflation Factor) values. The tolerance values and VIF values are gotten from regression analyses. All values for tolerance and VIF are presented in Appendix F. From the table under Appendix F, all of tolerance values for respondents' data in Sumber Ngepoh village and in Mulyoarjo village are more than 0.10. They are in between the range of values 0.787 to 1.000. Meanwhile, the VIF values are less than 10. They are in between the range of values 1.000 to 1.271. Thus, all data can be involved in the linear regression analysis.

4.2.3.5. Multiple Linear Regression Test

The influence of livelihood assets to profit in organic paddy farming in Sumber Ngepoh village and in conventional paddy farming in Mulyoarjo village is analyzed using multiple linear regression. In the analysis, the five assets of livelihood such as human capital, natural capital, financial capital, physical capital, and social capital are tested to see which of the assets influences the profit. The results of the test in organic paddy farming in Sumber Ngepoh village are presented in table 4.25.

Table 4.25. Results of Regression Test in Organic Paddy Farming in Sumber Ngepoh

Regression tests	Results of regression test					
	B	**F**	**Sig.**	**t**	**Sig.**	**R^2**
Regression test 21:						
IVs: LAs to DV: Profit:	2.608	6.668	0.001	1.277	0.214	0.581
a. IV: HC to DV: Profit	0.130			1.832	0.079	
b. IV: NC to DV: Profit	**0.378**			**3.738**	**0.001***	
c. IV: FC to DV: Profit	**-0.533**			**-4.438**	**0.000***	
d. IV: PC to DV: Profit	0.055			0.846	0.408	
e. IV: SC to DV: Profit	0.099			1.272	0.216	

Source: Data processed by author, 2019
Notes: IV is an abbreviation of Independent Variable; DV is an abbreviation of Dependent Variable; HC is an abbreviation of human capital; NC is an abbreviation of natural capital; FC is an abbreviation of financial capital; PC is an abbreviation of physical capital; and SC is an abbreviation of social capital

From the table, it can be concluded that:

1. The profit gotten by respondents from organic paddy farming in Sumber Ngepoh village is influenced of 58.10 percent[22] by sustainable livelihood assets.

2. Significant value of F, which is 0.001 (< α = 0.05), points out that sustainable livelihood assets have simultaneously significant effect on the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village.

3. Significant value of natural capital, which is 0.001 (< α = 0.05) and significant value of financial capital, which is 0.000 (< α = 0.05), point out that natural capital and financial capital has partially significant effect on the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village.

4. The regression equation for the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village is written as follow:

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[22] R^2 values of 0.25 is weak, 0.50 is moderate and 0.75 is substantial (Hair *et al.*, 2011)

$$\textbf{Profit} = \textbf{2.608} + \textbf{0.378 natural capital} - \textbf{0.533 financial capital}$$

The equation states that if the natural and financial capitals have not changed (or equal to null), the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village is about IDR 2,608,000,-[23]. The increase of the natural capital will increase the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village. However, increasing the financial capital will decrease the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village.

For the respondents in Sumber Ngepoh village, the easy preparing the land for planting paddy shows that the role of organic fertilizer such as cow manure, buffalo manure, or goat manure, has formation of soil quality. In this matter, the soil is more easy to be plowed. Besides that, organic fertilizer also increases the soil fertility which contribute to the increase of paddy production and increases the profit gotten by the respondents. The availability of water to watering paddy field throughout the year also contributes to the soil quality in increasing the paddy production. Based on the regression equation for the profit gotten by respondents from organic paddy farming in Sumber Ngepoh village, the efforts of respondents to increase the quality of natural capital. For example, by applying organic fertilizer to the paddy planting land and keeping the availability of water to the paddy planting land, this will influence to increase of profit gotten by them from their organic paddy farming about IDR 378,000.

It is understood that all respondents in Sumber Ngepoh village use their owned saving to pay the labor from outside of their family members and to pay for the paddy field activities; and the finance to pay for the activities in their paddy fields is definitely available. Therefore, the additional to financial capital had by the respondents from any sources has close relationship to the use of the capital to pay the labor from outside of their family members and to pay for the paddy field activities. In this issue, if the respondents use IDR 1,000,000,- from the additional of financial capital to pay the labor from outside of their family members and to pay for the paddy field activities, it will decrease the profit gotten by them from their organic paddy farming about IDR 533,000,-. Therefore, the respondents have efforts to use the free agricultural inputs,

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[23] This amount is gotten from 2.608 times with IDR 1,000,000,- due to amount of profit used in data processing, namely in IDR million.

such as organic fertilizer produced by their own livestock, reduces the use of the additional of financial capital to pay the labor from outside of their family members and to pay for the paddy field activities. In turn, it helps to keep the availability of the finance to pay for the activities in their paddy fields.

The regression test of the influence of livelihood assets to profit in conventional paddy farming in Mulyoarjo village give different result to the result of regression test in organic paddy farming in Sumber Ngepoh village. The results of the test in conventional paddy farming in Mulyoarjo village are presented in table 4.26.

Table 4.26. Results of Regression Test in Conventional Paddy Farming in Mulyoarjo

Regression tests	Results of regression test					
	B	**F**	**Sig.**	**t**	**Sig.**	**R^2**
Regression test 21:						
IVs: LAs to DV: Profit:	5.320	5.336	0.002	2.686	0.013	0.516
a. IV: HC to DV: Profit	-0.035			-0.347	0.731	
b. IV: NC to DV: Profit	0.025			0.222	0.826	
c. IV: FC to DV: Profit	**-0.544**			**-4.194**	**0.000***	
d. IV: PC to DV: Profit	**0.189**			**2.229**	**0.035***	
e. IV: SC to DV: Profit	-0.056			-0.496	0.624	

Source: Data processed by author, 2019
Notes: IV is an abbreviation of Independent Variable; DV is an abbreviation of Dependent Variable; HC is an abbreviation of human capital; NC is an abbreviation of natural capital; FC is an abbreviation of financial capital; PC is an abbreviation of physical capital; and SC is an abbreviation of social capital

From the table, it can be concluded that:

1. The profit gotten by respondents from conventional paddy farming in Mulyoarjo village is influenced at 51.60 percent by sustainable livelihood assets.

2. Significant value of F, which is 0.002 (< α = 0.05), points out that sustainable livelihood assets have simultaneously significant effect on the profit gotten by respondents from conventional paddy farming in Mulyoarjo village.

3. Significant value of financial capital, which is 0.000 (< α = 0.05) and significance value of physical capital, which is 0.035 (< α = 0.05), point out that financial capital and physical capital partially have significant effect on the profit gotten by respondents from conventional paddy farming in Mulyoarjo village.

4. The regression equation for the profit gotten by respondents from conventional paddy farming in Mulyoarjo village is written as follow:

$$\textbf{Profit } = \textbf{5.320} - \textbf{0.544 financial capital} + \textbf{0.189 physical capital}$$

The equation states that increasing the financial capital will decrease the profit gotten by respondents from conventional paddy farming in Mulyoarjo village. However, increasing the physical capital will increase the profit gotten by respondents from conventional paddy farming in Mulyoarjo village.

There are two sources of finance for respondents in Mulyoarjo village to pay the labor from outside of their family members and to pay for the paddy field activities, namely form their owned saving (70.59 percent respondents) or from *tengkulak* (middleman) debt (29.41 percent of respondents). The additional to financial capital had by the respondents from any sources also has close relationship to the use of the capital to pay the labor from outside of their family members and to pay for the paddy field activities. In this issue, if the respondents use IDR 1,000,000,- from the additional of financial capital to pay the labor from outside of their family members and to pay for the paddy field activities, it will decrease the profit gotten by them from their conventional paddy farming about IDR 544,000,-. The high dependence of the respondents using chemical fertilizers and pesticides has a potential to increase the use the additional of financial capital to pay the labor from outside of their family members and to pay for the paddy field activities. In turn, it interferes to keep the availability of the finance to pay for the activities in their paddy field.

The components of physical capital in Mulyoarjo village consists of road condition in village, access from paddy field to the main road in the village, availability of fertilizer for respondents paddy plant, and the availability of medical facilities. Based on the regression equation for the profit gotten by respondents from conventional paddy farming in Mulyoarjo village, the efforts to increase the road condition in village, access from paddy field to the main road in the village, availability of fertilizer for respondents paddy plant, and the availability of medical facilities have a potential to increase the profit gotten by respondents from their conventional paddy farming about IDR 189,000,-. The government play an important role to increase the road condition in village and the availability of medical facilities. While, private parties can take the role to increase the availability of fertilizer for respondent's paddy plant.

4.2.4. Analysis of Components of Sustainable Livelihood Framework

The correlation among components of sustainable livelihoods in organic paddy farming in Sumber Ngepoh village and in conventional paddy farming in Mulyoarjo village are tested using the Pearson product-moment correlation. The results of the correlation test for organic paddy farming in Sumber Ngepoh village are presented in table 4.27. (the complete table is presented in Appendix G., and Appendix H.).

Table 4.27. Correlation Test of Organic Paddy Farming

Tests	Component Pairs		Pearson correlation	Sig. (2 tailed)
07	Natural capital	Structures	0.458	0.008
15	Social capital	Processes	-0.385	0.030
16	Structures	Strategies	0.376	0.034
18	Strategies	Profit	0.352	0.048
21	Profit	Financial capital	-0.351	0.049
25	Processes	Vulnerability	-0.448	0.010

Source: Data processed by authors, 2019

From the table above, the variables have a significant correlation with the other variables. Refer to table 3.3., a part of the values of Pearson correlation in the table above has moderate positive linear relationship and the others have moderate negative linear relationship. The positive correlation value means the increase a variable correlate to the increase of its variable pairs, while the negative correlation value means the increase a variable correlate to the decrease of its variable pairs. By entering the values of Pearson correlation from table 4.27. to the framework of sustainable livelihood for organic paddy farming in Sumber Ngepoh village, the correlation among the framework components is calculated. These correlations are presented in Figure 4.2.

Based on table 4.27. and figure 4.2., it is outlined several things as follow:

1. Test number 07:

   Relationship between natural capital to transforming of structures is indicated by the increase of the natural capital associated with the increase of transforming of structures. The components of natural capital consist of:

a. The ease for soil in respondents' paddy field to be plowed. This matter is achieved by increasing the quality of soil in paddy farming land by applying organic fertilizer such as cow manure, buffalo manure, or goat manure.

b. The availability of water to watering the paddy field. This matter is achieved by keeping the flow of water entering to the paddy fields, so that it continuously keeps the quality of soil in farming land. This is also supported by the availability of an abundant supply of water from the water spring and its distribution evenly to each respondents' paddy field.
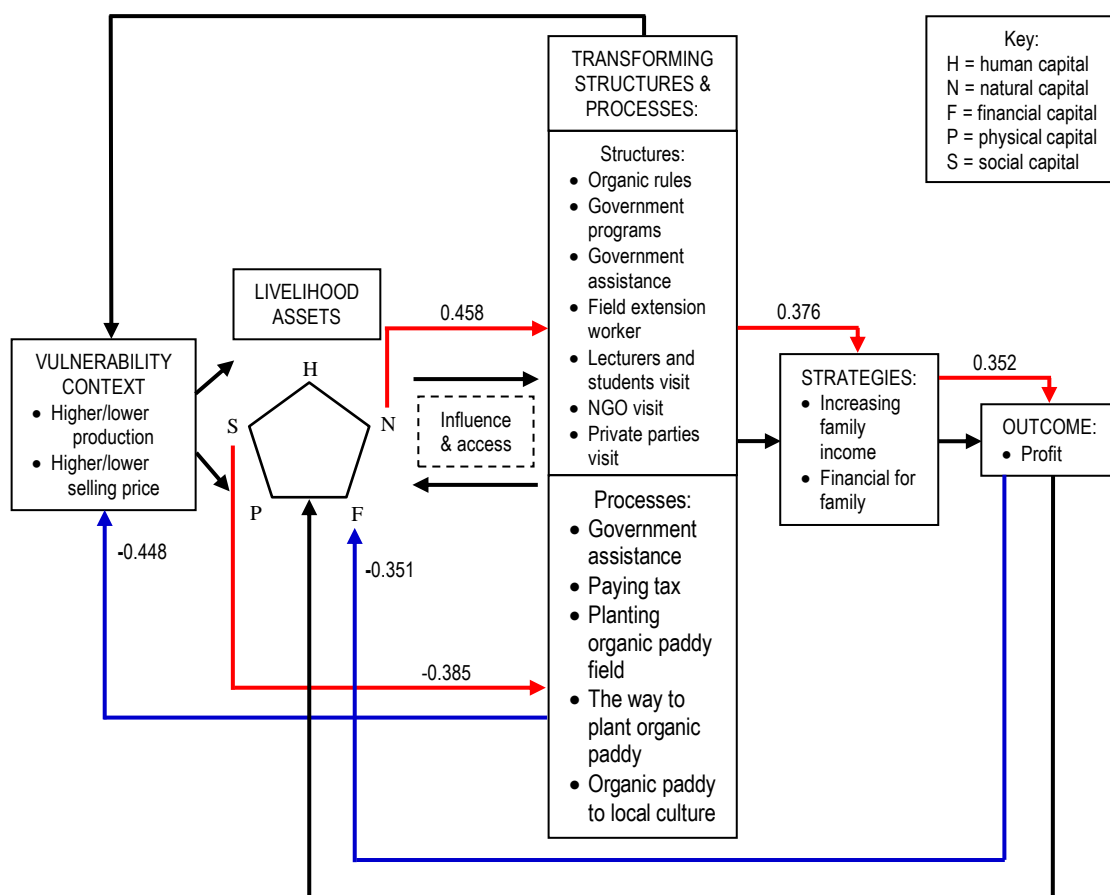
Figure 4.2. Framework of Sustainable Livelihood for Organic Paddy Farming in Farmer Group of Sumber Makmur 2 in Sumber Ngepoh Village

Notes: → Arrow that is based on the DFID's Sustainable Livelihoods Guidance Sheets
→ Forward arrow that is based on the results of this study
→ Backward arrow that is based on the results of this study

Meanwhile, the role and activities of components of the transforming structures consist of:

a. The direct practice of organic farming based on certification rules from the government is not burdensome for the respondents. This encourages the respondents to follow the correct guidance to practice the organic farming, included to increase the quality of soil in their paddy farming lands by applying organic fertilizer such as cow manure, buffalo manure, or goat manure.

b. The direct practice of organic farming based on certification rules from the government also gives benefit to the respondents. Applying organic fertilizer is not only increasing the quality of soil, but also increasing the paddy production. In turn, this increases the profit gotten by respondents.

c. Government programs, such as the program that encourages the use of paddy seed and organic fertilizers encourages the respondents to use the organic agricultural inputs in their paddy farming land in every paddy-planting season. This matter continuously keeps the quality of soil in their farming land.

d. Government assistance about farming tools helps the respondents' farming activities in their paddy farming lands. Hoe which is commonly used by the respondents that help them in preparing lands for planting paddy. This tool is used to re-construct of the paddy dikes (or paddy bunds) and spillways at the dikes (channels for carrying away excess water at the paddy field). Thus, these activities help keep the flow of water entering to the paddy fields so that it continuously keeps the quality of soil in their farming land.

e. The presence of the field extension worker in Sumber Ngepoh village provides the knowledge and information about practice of organic farming to the respondents. This helps the respondents to enrich their knowledge in practicing the organic paddy farming, particularly the ways to increase soil quality and arranging the water needs, which enter into and leave from their paddy field, by objective to increase production of organic paddy harvested from their paddy fields.

f. The presence of lecturers and students from various educational institutions to do research and/or field work practice helps a transfer of knowledge of organic paddy farming into the academic level for the respondents. This helps to increase their knowledge about organic farming practice. The knowledge is based on the results of national and international research.

g. NGO and private sector do not actively involve on the development of organic paddy farming in Sumber Ngepoh village. However, this does not give impact to the correlation of the structures to the natural capital.

From explanation for correlation test number 07 above the increase of the natural capital in sustainable livelihood faced by respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village is followed by the increase of the transforming of structures in Sumber Ngepoh village. The increase transforming of structures is to support the efforts to increase the quality of soil in the respondents' paddy farming fields.

2. Test number 15:

Relationship between social capital to transforming of processes is indicated by the increase of the social capital that is associated with the decrease of transforming of processes. The components of social capital which can increase consist of:

a. The ease making relationship to another member in farmer group which encourages mutual benefit cooperation among the respondents in the context of development of organic farming.

b. Following the farmer group activities which gives an opportunity to exchange information and to plan activities which have a related to develop their organic paddy farming.

c. The ease following the procedure in the office of the village head which helps the respondents to get support from staff from the village head's office without having to follow any lengthy procedures and to assist the respondents for activities which deal with external parties.

Meanwhile, the components which can decrease transforming processes consist of:

a. The benefit of government assistance about farming tools which is due to the ability of respondents, individually or together with the other farmers in farmers group, to fulfil their needs about farming tools. Therefore, to overcome this issue, the government assistance to the respondents should be something that can contribute to the sustainability of their organic paddy farming such as livestock as a source for organic fertilizers.

b. The burdensome for respondents to pay the tax such as tax for their paddy field land which reason for this is due to the procedure to pay the tax that should be

done by themselves at the tax office; location of the tax office is far from respondents' house; and the availability of money to pay the tax. Therefore, to overcome this issue, the respondents in farmer group can appoint a farmer among them as a representative to go to the tax office to pay the tax for all respondents' paddy land fields. The representative can also be a staff from the head village office. Besides that, the treasury of farmer group can collect money from all members. The money can be borrowed to farmer who cannot be able to pay tax for his paddy land field.

c. The restriction to the respondents which is done by another party to doing activities in their organic paddy fields is the reason which is due to the respondents have a potential to violate the procedures of the rule for planting organic paddy. Therefore, the supervision to the violation is done by the institution certification. The institution gives an organic certificate to farmer group as a fastener for the members of the farmer group to follow the procedures of the rule for planting organic paddy in a discipline manner.

d. The burden for respondents to follow and apply the way to plant organic paddy which reason is due to the way to plant organic paddy which must follow the strict procedures as required to obtain the certificate for their paddy farming. Besides that, the way to plant organic paddy which is done by a farmer is monitored by the member of the farmer group. Therefore, to overcome this issue, the member of the farmer group can help each other to apply the way to plant organic paddy in their organic paddy fields.

e. The contradiction organic paddy to local culture, which reason is due to the respondents raise individually the livestock as source of organic fertilizers. Meanwhile, the local culture in Sumber Ngepoh village is *gotong royong* (mutual cooperation). Therefore, besides raising individually the livestock, it can apply raising the livestocks together. The livestocks are owned by the members of farming group and raised in one particular place. Thus, this way can guarantee the availability the livestock dung as source for organic fertilizers.

From explanation for correlation test number 15 above, the increase of the social capital in sustainable livelihoods faced by respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village is followed by the decrease of transforming of

processes. The increase of the social capital support will help overcome the decrease of transforming of processes.

3. Test number 16:

Relationship between transforming of structures to strategies is indicated by the increase of the transforming of structures that is associated with the increase of strategies. The components of transforming of structures consist of:

a. The direct practice of organic farming based on certification rules from the government is not burdensome for the respondents. This encourages the respondents to follow the correct guidance to practice the organic farming, included applying organic fertilizer, such as cow manure, buffalo manure, or goat manure, by objective to increase the quality of soil in their paddy farming lands.

b. The direct practice of organic farming is based on certification rules from the government that also gives benefit to the respondents. Applying organic fertilizer is not only increases the quality of soil but also increases the paddy production. In turn, this increases the profit gotten by respondents.

c. Government programs, such as the program that encourages the use of paddy seed and organic fertilizers and encourages the respondents to use the organic agricultural inputs in their paddy farming land in every paddy-planting season. This matter continuously keeps the quality of soil in their farming lands.

d. Government assistance about farming tools helps the respondents' farming activities in their paddy farming lands. The tools play an important role in helping to increase paddy production, and in turn, it contributes to increasing the profit.

e. The presence of the field extension worker in Sumber Ngepoh village provides the knowledge and information about practice of organic farming to the respondents. This helps the respondents to enrich their knowledge in practicing the organic paddy farming, particularly the ways to increase production of organic paddy harvested from their paddy fields.

f. The presence of lecturers and students from various educational institutions to do research and/or field work practice helps a transfer of knowledge of organic paddy farming into the academic level for the respondents. This helps increase their knowledge about organic farming practice. The knowledge is based on the results of national and international research.

g. NGO and private sector do not actively involve on the development of organic paddy farming in Sumber Ngepoh village. However, this does not give impact to the correlation of the transforming of structures to strategies.

Meanwhile, the components of strategies consist of:

a. Increasing family income which is achieved through side job, planting other plant besides paddy, and raising livestock and fish. By doing of these activities, the respondents have efforts to get the profit from paddy farming as a main objective for them running their organic paddy farming is not disturbed.

b. Finance for family which finance is always provided by the respondents every month. By the availability of this finance, the respondents' efforts to get the profit from paddy farming is not disturbed.

From explanation for correlation test number 16 above, the increase of the transforming of structures Sumber Ngepoh village is followed by the increase of strategies used by the respondents to get profit. The increase of the transforming of structures Sumber Ngepoh village suports the respondents' strategies to get profit from their organic paddy farming fields in every harvesting season.

4. Test number 18:

Relationship between strategies to profit is indicated by the increase of the strategies that is associated with the increase of profit. The components of strategies consist of:

a. Increasing family income which activity is carried out by respondents through utilizing the potential of resources around of their residence and paddy farming fields. The activities are side job, planting other plant besides paddy, and raising livestock and fish. By doing of these activities, the respondents optimize the utilization of the resources. Besides that, their efforts to get the profit from paddy farming as a main objective for them running their organic paddy farming is not disturbed.

b. Financial for family which finance is always provided by the respondents every month. By the availability of this finance, their efforts to get the profit from paddy farming is also not disturbed.

Meanwhile, profit which are the component of outcome is the main objective to be gotten by the respondents and the reason for them running their organic paddy

farming. All capabilities had by the respondents (such as farming knowledge based on the local culture and wisdom, as well as knowledge in practicing the organic paddy farming), the availability of finance, natural carrying capacity, the availability of physical facilities, and social relationship among the respondents are utilized by respondents to get profit from their organic paddy fields. The components that form the profit consist of paddy production, cost of production, and selling price.

From explanation for correlation test number 18 above, the increase of the respondents' strategies to get profit from their organic paddy farming fields in every harvesting season is followed by the increase of profit gotten by them from their organic paddy farming fields in every harvesting season.

5. Test number 21:

Relationship between profit to financial capital is indicated by the increase of the profit that is associated with the decrease of financial capital. Profit which are the component of outcome is the main objective to be gotten by the respondents and the reason for them running their organic paddy farming. The profit consists of paddy production, cost of production, and selling price.

Meanwhile, the components which can decrease financial capital consist of:

a. Sources of finance to pay the labor from outside of respondents' family members and to pay for the paddy field activities which is saving is the main financial sources for the respondents to pay for the labor from outside of respondents' family members and to pay for the paddy field activities. However, saving also has a role as a financial source to pay for the needs of respondents and their family members. Therefore, saving which comes from the profit gotten by the respondents from their organic paddy farming fields is distributed to pay for the activities in and out of organic paddy farming fields. The contribution of the profit gotten by the respondents from their organic paddy farming fields to financial capital potentially reduced if the profit is also used to fulfill the needs of respondents' family members.

b. The availability of the finance to pay for the activities in respondents' paddy fields which the increase the finance to pay for the activities in their paddy field contribute to the increase the use of finance had by them. In turn, this contributes to the decrease of the financial capital.

c. Livestocks that are owned by respondents which increase the total of livestocks that are purchased by respondents contribute to the increase the use of finance that had by them. In turn, this contributes to the decrease of the financial capital.

From explanation for correlation test number 21 above, the increase of the profit gotten by the respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village is associated with the decrease of financial capital in the respondents' sustainable livelihood. The decrease of financial capital is due to potential of the use of profit to pay for the needs of respondents' family members.

6. Test number 25:

Relationship between transforming of processes to vulnerability is indicated by the increase of the transforming of processes that is associated with the decrease of vulnerability. The components of the transforming of processes which can increase consist of:

a. The benefit of government assistance about farming tools which assistance is better if it accompanied or combined by something that can contribute to the sustainability of their organic paddy farming such as livestock as a source for organic fertilizers.

b. The burden for respondents to pay the tax such as tax for their paddy field land. In this issue, the respondents in farmer group can appoint a farmer among them as a representative to go to the tax office to pay the tax for all respondents' paddy land fields. The representative can also be a staff from the head village office. Besides that, the treasury of farmer group can collect money from all members. The money can be borrowed to farmer, who cannot be able to pay tax for his paddy land field.

c. The restriction to the respondents which is done by another party to doing activities in their organic paddy fields. The supervision to the violation done by the institution certification which is the institution gives an organic certificate to farmer group as a fastener for the members of the farmer group to follow the procedures of the rule for planting organic paddy in a discipline manner.

d. The burden for respondents to follow and apply the way to plant organic paddy which the member of the farmer group can help each other to apply the way to plant organic paddy in their organic paddy fields.

e. The contradiction organic paddy to local culture which has to follow the local culture in Sumber Ngepoh village is *gotong royong* (mutual cooperation), besides raising individually the livestock, it can be applied to raise the livestock together. The livestocks are owned by the members of farming group and raised in one particular place. Thus, this way can guarantee the availability the livestock dung as source for organic fertilizers.

Meanwhile, the components which can decrease vulnerability consist of:

a. Higher or lower production which the higher achievement of organic paddy production contributes not only to higher profit gotten by the respondents but also to availability of the main foodstuff (rice) for respondents and their family members. Thus, this decreases vulnerability in the context of sustainable livelihood in organic paddy farming in Sumber Ngepoh village. On the contrary, the lower achievement of organic paddy production also decreases vulnerability. The respondents follow the role that determined by farmer group of Sumber Makmur 1 in Sumber Ngepoh village. The role of each member of farmer group is saving about 30 percent from total of paddy production which they get at every harvesting season. The paddy which is saved by respondent has function as (1) main foodstuff (after it is processed to be rice) for respondents and their family members, (2) paddy seeds grown to be paddy seedlings and then planted in their paddy farming fields, and (3) paddy (or rice after being processed) for selling if the respondents need the cash. Therefore, even though the respondents get lower paddy production, and they do not get higher profit, however, they have the paddy reserves. This paddy contributes to decrease vulnerability.

b. Higher or lower selling price which the selling price for organic paddy had by respondents is determined based on the mutual agreement among member of farmer group. This group-selling price is determined above of the market price for conventional paddy grain. Therefore, the higher or lower selling price for organic paddy in farming group of Sumber Makmur 1 is also above the market price for conventional paddy grain. On the other words, it always gives profit to the respondents. Thus, the higher or lower selling price for organic paddy in farming group of Sumber Makmur 1 contributes to decrease vulnerability.

From explanation for correlation test number 25 above, the increase of the transforming of processes in Sumber Ngepoh village is associated with the decrease of vulnerability faced by the respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village. The increase of the transforming of processes contributes to the decrease of vulnerabilities. The results of the correlation test for conventional paddy farming in Mulyoarjo village are presented in table 4.28.

Table 4.28. Correlation Test of Conventional Paddy Farming

Tests	Component Pairs		Pearson correlation	Sig. (2 tailed)
04	Vulnerability	Physical capital	0.402	0.019
09	Physical capital	Structures	0.357	0.038
17	Processes	Strategies	0.349	0.043
18	Strategies	Profit	0.364	0.034
21	Profit	Financial capital	-0.630	0.000
24	Structures	Vulnerability	0.341	0.049

Source: Data processed by authors, 2019

From the table above, the variables have a significant correlation with the other variables. Refer to table 3.3., most of the values of Pearson correlation in the table above have moderate positive linear relationship. There is only one value which has a moderate negative linear relationship. The positive correlation values means that the increase of a variable correlates to the increase of its variable pairs, while the negative correlation values means that the increase of a variable correlates to the decrease of its variable pairs. By entering the values of Pearson correlation from table 4.28. to the framework of sustainable livelihood for organic paddy farming in Mulyoarjo village, there will be the correlation among the framework components. These correlations are presented in Figure 4.3.

Based on table 4.28. and figure 4.3., it is outlined several things as follow:

1. Test number 04:

Relationship between vulnerability to physical capital is indicated by the increase of the vulnerability that is associated with the increase of physical capital. The component of vulnerability consists of:
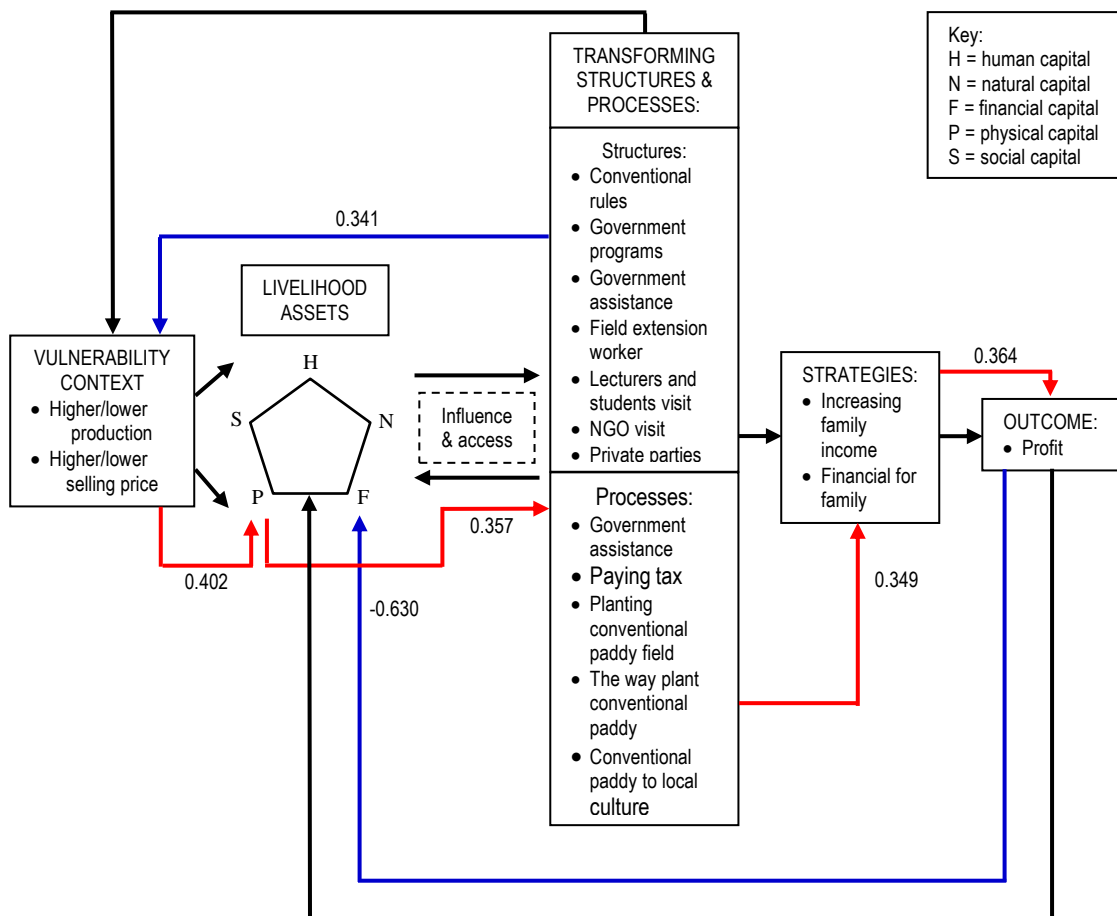
Figure 4.3. Framework of Sustainable Livelihood for Conventional Paddy Farming in Farmer Group of Mulyo 2 in Mulyoarjo Village

Notes: ➔ Arrow that is based on the DFID's Sustainable Livelihoods Guidance Sheets
➔ Forward arrow that is based on the results of this study
➔ Backward arrow that is based on the results of this study

a. Higher or lower production which the higher achievement of conventional paddy production by respondents in farmer group of Mulyo 2 in Mulyoarjo village is always faced with fluctuation of selling price for the conventional paddy due to the respondents following the market price. This contributes to the lower achievement of profit from selling the paddy grain. Besides that, the respondents tend to save a little paddy grains to be processed to be rice for consumption by their family members. These things increase the vulnerability of sustainable livelihood for the respondents' conventional paddy in farmer group of Mulyo 2 in Mulyoarjo village. On the contrary, the lower achievement of conventional paddy production is clearer to lead to the lower achievement of profit from

selling the paddy grains. Besides that, the respondents tend to save more paddy grains to be processed to be rice for consumption by their family members. These increase the vulnerability of sustainable livelihood for the respondents' conventional paddy in farmer group of Mulyo 2 in Mulyoarjo village.

b. Higher or lower selling price which the selling price of respondents' conventional paddy follows the market price. This selling price tends to fluctuation and unpredictable. Therefore, this thing contribute to the achievement of fluctuating profit from selling the paddy grain. In turn, the higher or lower selling price for conventional paddy in farming group of Mulyo 2 contribute to increase vulnerability.

Meanwhile, the components of the physical capital consists of:

a. Road condition in Mulyoarjo villages which the main road in Mulyoarjo village is in the good condition. In harvesting season, the respondents bring their paddy grains harvested from their paddy farming field and loaded in sacks to this roadside. After the agreement between respondents and the buyer (the paddy trader) is reached, then the paddy grains are brought by the trader. Based on the function of the main road to support the farming activities in Mulyoarjo village, the local government has efforts to increase the quality and role of the main road. Besides the road has the role as a supporting facility to marketing the paddy, the road also has the role as a supporting facility on supplying of farming inputs (such as paddy seed, and chemical fertilizers, and pesticides) to farm shop in the Mulyoarjo village. The availability of farming inputs contributes to respondents' effort to increase of paddy production in their paddy farming fields.

b. Access from respondents' paddy field to the main road in Mulyoarjo village which the respondents' paddy fields are not far from the main road. To reach the main road from their paddy fields, the respondents use footpath which can be passed by a motorcycle. Therefore, this footpath has a function for the respondents to bring farming inputs into their paddy fields during paddy-planting season and also to bring paddy grains from their paddy fields to the main road during the harvesting season.

c. Availability of farming inputs (paddy seed, chemical fertilizers, and pesticides) for respondents' paddy plants which the farming inputs for respondents' paddy

farming field are always available in farm shop located in Mulyoarjo village. The availability of farming inputs supports the respondents to do farming activities during paddy-planting season and to increase paddy production.

d. The availability of medical facilities namely *Puskesmas* (primary health care center) which is built by local government and located in Mulyoarjo village, helps the respondents and their family members to keep their health. The respondents' health supports them to do all farming activities in their paddy farming fields. This thing includes their efforts to increase paddy production in their paddy farming fields.

From explanation for correlation test number 04 above, the increase of vulnerability in sustainable livelihood faced by respondents in farmer group of Mulyo 2 in Mulyoarjo village is followed the increase of physical capital in Mulyoarjo village by the objective to support the efforts to overcome (decrease) the vulnerability. The increase physical capital is to support the efforts to increase the conventional paddy production.

2. Test number 09:

Relationship between physical capital to transforming of structures is indicated by the increase of the physical capital that is associated with the increase of transforming of structures. This is similar to previous explanation about physical capital in Mulyoarjo village, then the components of physical capital are re-stated which consist of:

a. Road condition in Mulyoarjo village which the main road in Mulyoarjo village is in the good condition. In the harvesting season, the respondents bring their paddy grains harvested from their paddy farming fields loaded in sacks to this roadside. After the agreement between respondents and the buyer (the paddy trader) is reached, then the paddy grains are bought by the trader. Based on the function of the main road to support the farming activities in Mulyoarjo village, the local government has efforts to increase the quality and role of the main road. Besides the road has the role as a supporting facility to marketing the paddy, the road also has the role as a supporting facility on supply of farming inputs (such as paddy seed, chemical fertilizers, and pesticides) to farm shop in the Mulyoarjo

village. The availability of farming inputs contributes to respondents' effort to increase of paddy production in their paddy farming fields.

b. Access from respondents' paddy field to the main road in Mulyoarjo village which the respondents' paddy fields are not far from the main road. To reach the main road from their paddy fields, the respondents use footpath which can be passed by a motorcycle. Therefore, this footpath has a function for the respondents to bring farming inputs into their paddy fields during paddy-planting season and also to bring paddy grains from their paddy fields to the main road during the harvesting season.

c. Availability of farming inputs (paddy seed, chemical fertilizers, and pesticides) for respondents' paddy plant which the farming inputs for respondents' paddy farming field are always available in farm shop located in Mulyoarjo village. The availability of farming inputs supports the respondents to do farming activities during paddy-planting season and to increase paddy production.

d. The availability of medical facilities namely *Puskesmas* (primary health care center) which is built by local government and located in Mulyoarjo village helps the respondents and their family members to keep their health. The respondents' health supports them to do all farming activities in their paddy farming fields. This thing includes their efforts to increase paddy production in their paddy farming fields.

Meanwhile, the role and activities of components of the transforming structures consist of:

a. The direct practice of conventional farming is not based on special rules from the government and is not burdensome for the respondents. This encourages the respondents to apply the usual practice for the conventional farming included to increase the quality of soil in their paddy farming lands by applying chemical fertilizer such as Urea, ZA, NPK, and TSP.

b. The direct practice of conventional farming is not based on special rules from the government also gives benefit to the respondents. Applying chemical fertilizer not only increase the quality of soil but also increase the paddy production. In turn, this increases the profit gotten by respondents.

c. Government programs such as the program that encourages the use of paddy seed and chemical fertilizers encourages the respondents to use the conventional agricultural inputs in their paddy farming land in every paddy-planting season. This continuously keeps the quality of soil in their farming lands.

d. Government assistance about farming tools helps the respondents' farming activities in their paddy farming lands. Hoe which is commonly used by the respondents helps them in preparing land for planting paddy. This tool is used to re-construct of the paddy dikes (or paddy bunds) and spillways at the dikes (channels for carrying away excess water at the paddy field). Thus, these activities help keep the flow of water entering to the paddy fields so that it continuously keeps the quality of soil in their farming lands.

e. The presence of the field extension worker in Mulyoarjo village provides the knowledge and information about practice of conventional farming to the respondents. This helps the respondents to enrich their knowledge in practicing the conventional paddy farming particularly the ways to increase soil quality and arrange the water needs which water enters into and leaves from their paddy fields, by the objective to increase production of conventional paddy harvested from their paddy fields.

f. The presence of lecturers and students from various educational institutions to do research and/or field work practice helps a transfer of knowledge of conventional paddy farming into the academic level for the respondents. This helps to increase their knowledge about conventional farming practice. The knowledge is based on the results of national and international research.

g. NGO and private sector do not actively involve on the development of conventional paddy farming in Mulyoarjo village. However, this does not give impact to the correlation of the physical capital to the transforming of structures.

From explanation for correlation test number 09 above, the increase of the physical capital in Mulyoarjo village is followed by the increase of transforming of structures in Mulyoarjo village. The increase physical capital is to support the efforts to increase the conventional paddy production.

3. Test number 17:

   Relationship between transforming of processes to strategies is indicated by the increase of the transforming of processes that is associated with the increase of strategies. The components of transforming of processes consist of:

   a. The benefit of government assistance about paddy seed, chemical fertilizers, pesticides, and farming tools which the assistance contributes to the sustainability of their conventional paddy farming.

   b. The burden for respondents to pay the tax such as tax for their paddy field land. In this issue, the respondents in farmer group can appoint a farmer among them as a representative to go to the tax office to pay the tax for all respondents' paddy land field which the representative can also be a staff from the head village office. Besides that, the treasury of farmer group can collect money from all members. The money can be borrowed to farmer who cannot be able to pay tax for his paddy land fields.

   c. The restriction to the respondents done by another party to doing activities in their conventional paddy fields which the supervision to the respondents is done by government institution. The institution oversees the respondents activities planting conventional paddy. The aim is the achievement of the high paddy production.

   d. The respondents have no burden to apply the conventional paddy which the respondents can get all farming inputs from the farm shop.

   e. There is no contradiction planting conventional paddy to local culture. The way of respondents to plant paddy does not contradict to the local culture in Mulyoarjo village.

   Meanwhile, the role and activities of components of the strategies consist of:

   a. Increasing family income which this is achieved through side job, planting other plant besides paddy and raising livestock and fish. By doing of these activities, the respondents have efforts to get the profit from paddy farming as a main objective for them running their organic paddy farming is not disturbed.

   b. Finance for family which this finance is always provided by the respondents every month. By the availability of this finance, the respondents have efforts to get the profit from paddy farming is not disturbed.

From explanation for correlation test number 17 above, the increase of the transforming of processes is followed by the increase of strategies. In this the increase for the transforming of processes is to support the efforts to increase the conventional paddy production as the objective of strategies.

4. Test number 18:

Relationship between strategies to profit is indicated by the increase of the strategies that is associated with the increase of profit. The components of strategies consist of:

a. Increasing family income which this activity is carried out by respondents through utilizing the potential of resources around their residence and paddy farming fields. The activities are side job, planting other plant besides paddy and raising livestock and fish as well as running a small shop selling daily necessities for villagers. By doing of these activities, the respondents optimize the utilization of the resources. Besides that, their efforts to get the profit from paddy farming as a main objective for them running their conventional paddy farming is not disturbed.

b. Finance for family which this finance is always provided by the respondents every month. By the availability of this finance, their efforts to get the profit from paddy farming is also not disturbed.

Meanwhile, profit which is the component of outcome is the main objective to be gotten by the respondents and the reason for them running their conventional paddy farming. All capabilities had by the respondents (such as farming knowledge and experience in practicing the conventional paddy farming), the availability of finance, the availability of chemical farming inputs, the availability of physical facilities and social relationship among the respondents are utilized by respondents to get profit from their organic paddy fields. The components that forms the profit consist of paddy production, cost of production, and selling price.

From explanation for correlation test number 18 above, the increase of the respondents' strategies to get profit from their conventional paddy farming fields in every harvesting season is followed by the increase of profit gotten by them from their organic paddy farming fields in every harvesting season.

5. Test number 21:

Relationship between profit to financial capital is indicated by the increase of the profit that is associated with the decrease of financial capital. This is similar to previous explanation about profit gotten by respondents from conventional paddy farming fields in Mulyoarjo village, then the profit is re-stated. Profit which is the component of outcome is the main objective to be gotten by the respondents and the reason for them running their conventional paddy farming. In this, all capabilities had by the respondents (such as farming knowledge and experience in practicing the conventional paddy farming), the availability of financial, the availability of chemical farming inputs, the availability of physical facilities, and social relationship among the respondents are utilized by respondents to get profit from their organic paddy fields. The components that form the profit consist of paddy production, cost of production, and selling price.

Meanwhile, the components which can decrease financial capital consist of:

a. Sources of finance to pay the labor from outside of respondents' family members and to pay for the paddy field activities. Saving is the main financial sources for the respondents to pay for the labor from outside of respondents' family members and to pay for the paddy field activities. However, saving also has a role as a financial source to pay for the needs of respondents and their family members. Therefore, saving which comes from the profit gotten by the respondents from their conventional paddy farming fields is distributed to pay for the activities in and out of conventional paddy farming fields. The contribution of the profit gotten by the respondents from their conventional paddy farming fields to financial capital potentially is reduced if the profit is also used to fulfill the needs of respondents' family members.

b. The availability of the finance to pay for the activities in respondents' paddy fields which the increase of the finance to pay for the activities in their paddy fields contributes to the increase the use of finance that had by them. In turn, this contributes to the decrease the financial capital.

c. Livestocks are owned by respondents although the respondents in Mulyoarjo village apply the chemical fertilizers in their conventional paddy farming fields, however, they also have livestocks. The increase of the total of livestocks that

are purchased by respondents contributes to the increase of the use of finance that had by them. In turn, this contributes to the decrease the financial capital.

From explanation for correlation test number 21 above, the increase of the profit gotten by the respondents in farmer group of Mulyo 2 in Mulyoarjo village is associated with the decrease of financial capital in the respondents' sustainable livelihoods. The decrease of financial capital is due to potential for the use of profit to pay for the needs of respondents' family members.

5. Test number 24:

Relationship between the transforming of structures to vulnerability is indicated by the increase of the transforming of structures that is associated with the increase of vulnerability which is similar to previous explanation about the transforming of structures in Mulyoarjo village, then the components of the transforming of structures are re-stated which consist of:

a. The direct practice of conventional farming which is not based on special rules from the government is not burdensome for the respondents. This encourages the respondents to apply the usual practice for the conventional farming, included to increase the quality of soil in their paddy farming lands by applying chemical fertilizer such as Urea, ZA, NPK, and TSP.

b. The direct practice of conventional farming which is not based on special rules from the government also gives benefit to the respondents. Applying chemical fertilizer not only increases the quality of soil, but also increases the paddy production. In turn, this increases the profit gotten by respondents.

c. Government programs such as the program that encourages the use of paddy seed and chemical fertilizers encourages the respondents to use the conventional agricultural inputs in their paddy farming lands in every paddy-planting season. This continuously keeps the quality of soil in their farming lands.

d. Government assistance about farming tools helps the respondents' farming activities in their paddy farming lands. Hoe which is commonly used by the respondents helps them in preparing land for planting paddy. This tool is used to re-construct of the paddy dikes (or paddy bunds) and spillways at the dikes (channels for carrying away excess water at the paddy field). Thus, these

activities help to keep the flow of water entering to the paddy fields so that it continuously keeps the quality of soil in their farming lands.

e. The presence of the field extension worker in Mulyoarjo village provides the knowledge and information about practice of conventional farming to the respondents. This helps the respondents to enrich their knowledge in practicing the conventional paddy farming, particularly the ways to increase soil quality and arrange the water needs which enters into and leaves from their paddy fields, by objective to increase production of conventional paddy harvested from their paddy fields.

f. The presence of lecturers and students from various educational institutions to do research and/or field work practice helps a transfer of knowledge of conventional paddy farming into the academic level to the respondents. This helps increase their knowledge about conventional farming practice. The knowledge is based on the results of national and international research.

g. NGO and private sector do not actively involve on the development of conventional paddy farming in Mulyoarjo village. However, this does not give impact to the correlation of the physical capital to the transforming of structures.

Meanwhile, the role and activities of components of the vulnerability consist of:

a. Higher or lower production which the higher or lower achievement of conventional paddy production is divided as (1) main foodstuff (after it is processed to be rice) for respondents and their family members, and (2) paddy (or rice after processed) for selling if the respondents need the cash. However, the respondents in farmer group of Mulyo 2 in Mulyoarjo village highly depend on the use of paddy seeds, chemical fertilizers, and pesticides. To buy these farming inputs, they need financial support. It is potentially for them to sell the paddy grains which they harvest from their conventional paddy farming fields at every harvesting season in large quantity. In this issue, they save the paddy grains as main foodstuff (after it is processed to be rice) for respondents and their family members in small quantity. This contributes to increase vulnerability in the context of the availability of paddy production to fulfill the respondents and their family member needs for rice.

b. Higher or lower selling price which the selling price for conventional paddy which is sold by the respondents follows the market price for conventional paddy grain. Therefore, the higher or lower selling price for conventional paddy in farming group of Mulyo 2 in Mulyoarjo village is unpredicted by the respondents. On the other words, they are followers of market price. This issue potentially gives impact to the lower profit gotten by the respondents from selling their paddy grains. Thus, the higher or lower selling price for conventional paddy in farming group of Mulyo 2 in Mulyoarjo village contributes to increase vulnerability in context of the adequacy of profit which is gotten from conventional paddy farming field to pay for the farming activities and to fulfill the respondents and their family member needs.

From all explanations above, there are the differences of components in the framework of sustainable livelihood for organic paddy farming in Sumber Ngepoh village and for conventional paddy farming in farmer group of Mulyo 2 in Mulyoarjo village included their correlations although several components in the framework of sustainable livelihood and their correlations are similar.

Therefore, the efforts to achieve the sustainable livelihoods in each paddy farming should be focused on the differences and the similarity of components and correlations between the frameworks of sustainable livelihood for each paddy farming. This is included for the efforts of respondents in farmer group of Mulyo 2 in Mulyoarjo village who want to move from planting conventional paddy to planting organic paddy.

4.3. The Results of Testing of Hypotheses

From statistical analysis presented in sub chapter 4.2., the results of testing of hypotheses in this study are explained as follow:

1. The results of independent sample t-test presented in sub chapter 4.2.1.2. show that the mean value of total profit gotten by respondents in Sumber Ngepoh village is higher compared to mean value of total profit gotten by respondents in Mulyoarjo village. These results are consistent with the hypothesis 1 in this study: the organic paddy farming in Sumber Ngepoh village is more profit if it is compared to conventional paddy farming in Mulyoarjo village. Such results fits with the argument stated by Crowder and Reganold (2015), who asserted that organic

agriculture was more significantly profitable than conventional agriculture. The results also in line to argument stated by MacRae *et al*. (2007), who argued when it is compared to conventional farming systems which organic agriculture systems are usually more profitable.

2. The analysis of Hypothesis 2, Hypothesis 3, and Hypothesis 4 are explained as follow:

   a. The results of livelihood assets analysis presented in sub chapter 4.2.2.3. show that the ownership of the livelihood assets by respondents in farmer group of Mulyo 2 in Mulyoarjo village and in farmer group of Sumber Makmur 1 in Sumber Ngepoh village is different. The financial, social, and physical capitals are more owned respectively by respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village compared to respondents in farmer group of Mulyo 2 in Mulyoarjo village. These results are in accordance with the hypothesis 2 in this study: there is the difference of the ownership of each livelihood asset in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

   b. The results of multiple linear regression test presented in sub chapter 4.2.3.5. show that the assets to earn profit in organic paddy farming in Sumber Ngepoh village are natural capital with magnitude 0.378 and financial capital with magnitude minus 0.533 meanwhile the assets to earn profit in organic paddy farming in conventional paddy farming in Mulyoarjo village are financial capital with magnitude minus 0.544 and physical capital with magnitude 0.189. These results are in line with the hypothesis 3 in this study: there is the difference of assets and their magnitude to earn profit in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

   c. The results of analysis of components of sustainable livelihood framework presented in sub chapter 4.2.4. show that the correlation among components of sustainable livelihoods in organic paddy farming in Sumber Ngepoh village is different with in conventional paddy farming in Mulyoarjo village (presented in table 4.27 and 4.28). These results agree with the hypothesis 4 in this study: there is the difference of components of the sustainable livelihood framework,

which play the role to achieve the livelihood outcomes in the context of sustainable livelihoods between in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village.

The results in point a., b., and c. above are rooted to the difference of agricultural inputs used in conventional paddy farming in Mulyoarjo village and in organic paddy farming in Sumber Ngepoh village. This fits with the arguments stated by Campion *et al*. (2020) who asserted that conventional farming was generally associated with high-input modern agriculture, which includes the use of synthetic chemical fertilizers, fungicides, insecticides, and herbicides, and Papendick *et al*. (1980) who stated that organic farming was a production system, which avoids or largely excludes the use of synthetically compounded fertilizers and/or pesticides.

4.4. Model of Respondents' Sustainable Livelihoods

Based on the analysis of components of sustainable livelihood framework presented in sub chapter 4.2.4., the similar components, which are involved in the model of respondents' sustainable livelihoods between in Mulyoarjo village and in Sumber Ngepoh village are (1) strategies that have a correlation with profit and (2) profit that has a correlation with financial capital.

The difference of components in the model of respondents' sustainable livelihoods between Mulyoarjo village and Sumber Ngepoh village and their correlations create the difference on path to achieve of sustainable livelihood for the respondents in each village. The respondents in a village (e.g. respondents in Mulyoarjo village) can achieve the similarity of sustainable livelihood that is achieved by the respondents in another village (e.g. respondents in Sumber Ngepoh village) by applying the similar paddy farming done by the respondents in another village (in Sumber Ngepoh village). Thus, the components in the model of respondents' sustainable livelihoods and their correlation (in Mulyoarjo village) change to be similar to the components in the model of respondents' sustainable livelihoods in another village (in Sumber Ngepoh village).
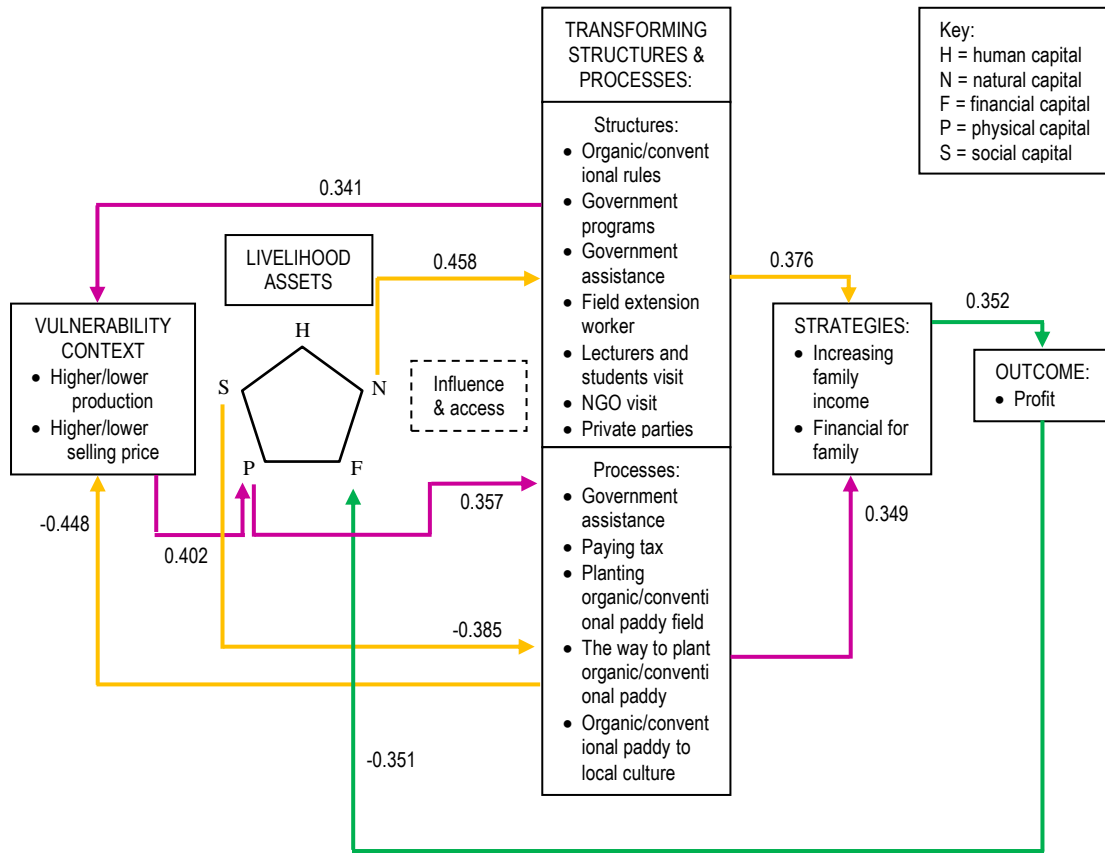
Figure 4.4. Framework of Sustainable Livelihood for Organic and Conventional Paddy Farming in Sumber Ngepoh and Mulyoarjo Village

Notes: → Arrow sign for the similar components
→ Arrow sign for components of sustainable livelihood for organic paddy
→ Arrow sign for components of sustainable livelihood for conventional paddy

The change from conventional to organic farming means the change that uses the farming inputs, namely from using chemical inputs to be natural (organic) inputs. Thus, sustainable livelihood is also achieved by following the path used to achieve of sustainable livelihood organic paddy farming.

Conventional paddy farming	**Organic paddy farming**
Component pairs:	Component pairs:
• Vulnerability and Physical capital • Physical capital and Structures • Processes and Strategies • Structures and Vulnerability	• Natural capital and Structures • Social capital and Processes • Structures and Strategies • Processes and Vulnerability
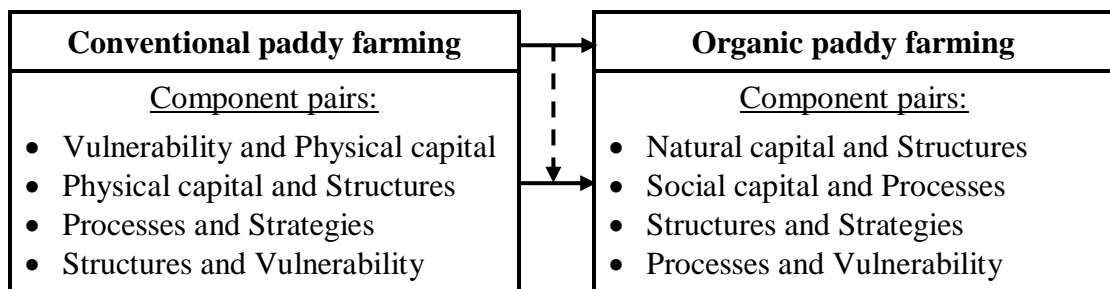
Figure 4.5. The Change the Paddy Farming and Components of Sustainable Livelihood

4.5. Sustainable Livelihoods Framework of Sumber Ngepoh and Mulyoarjo villages

Sustainable livelihoods frameworks in Sumber Ngepoh and Mulyoarjo villages are arranged based on framework components. The components are presented in Appendix I. Results of the arranging of the framework components are presented in Figure 4.6. and 4.7.
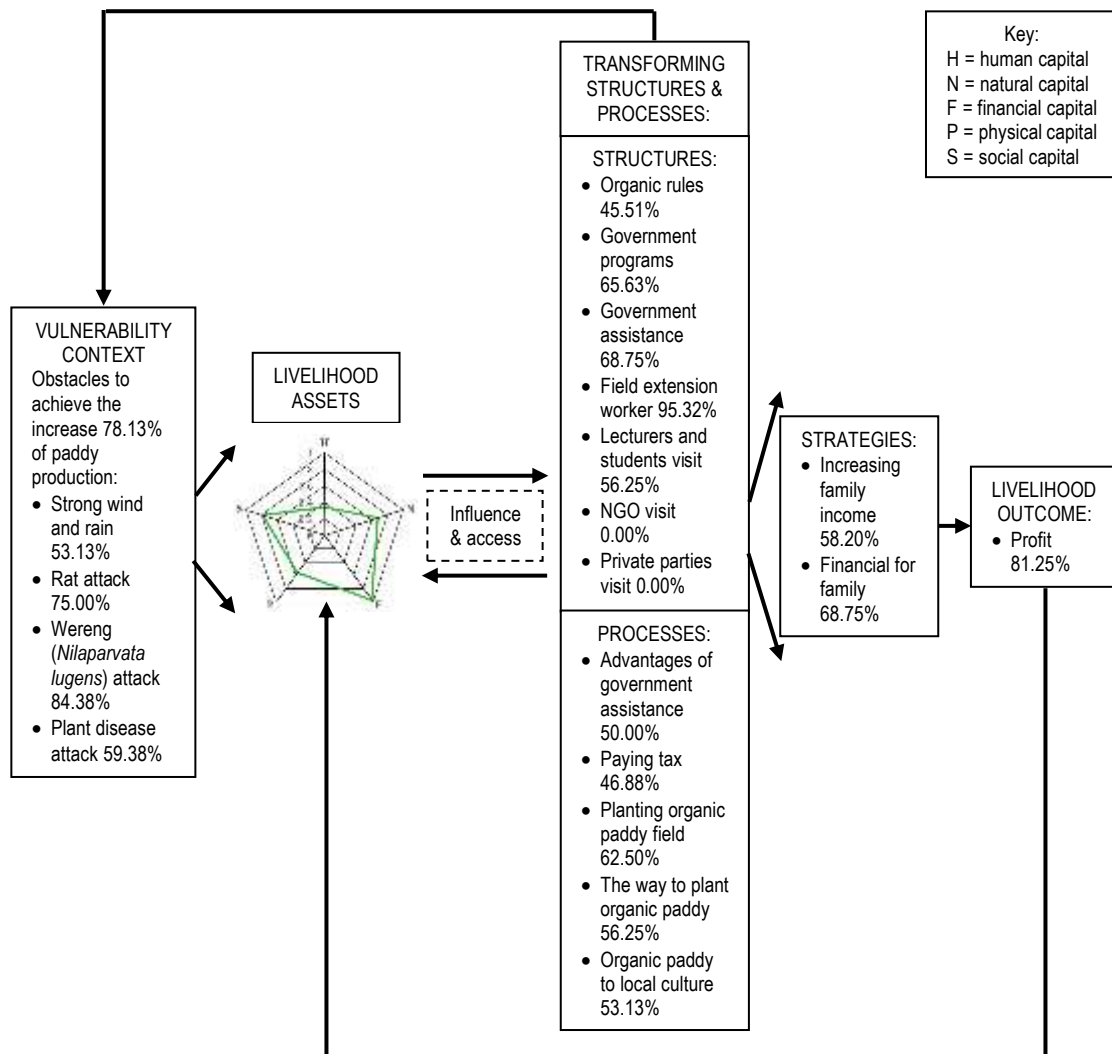
Figure 4.6. Framework of Sustainable Livelihood for Organic Paddy Farming in Farmer Group of Sumber Makmur 2 in Sumber Ngepoh Village

The effort of 78.13 percent respondents in Sumber Ngepoh village who achieve the increase of organic paddy production faced the vulnerability to be failure due to strong wind and rain, rat attack, wereng (*Nilaparvata lugens*) attack, and plant disease

attack. However, the livelihood assets that could be accessed and owned by the respondents influenced and accessed transforming structures and processes. These influence and access produced the strategies used by respondents to achieve the increease of profit. There were 81.25 percent of respondents that achieve the increase of profit.
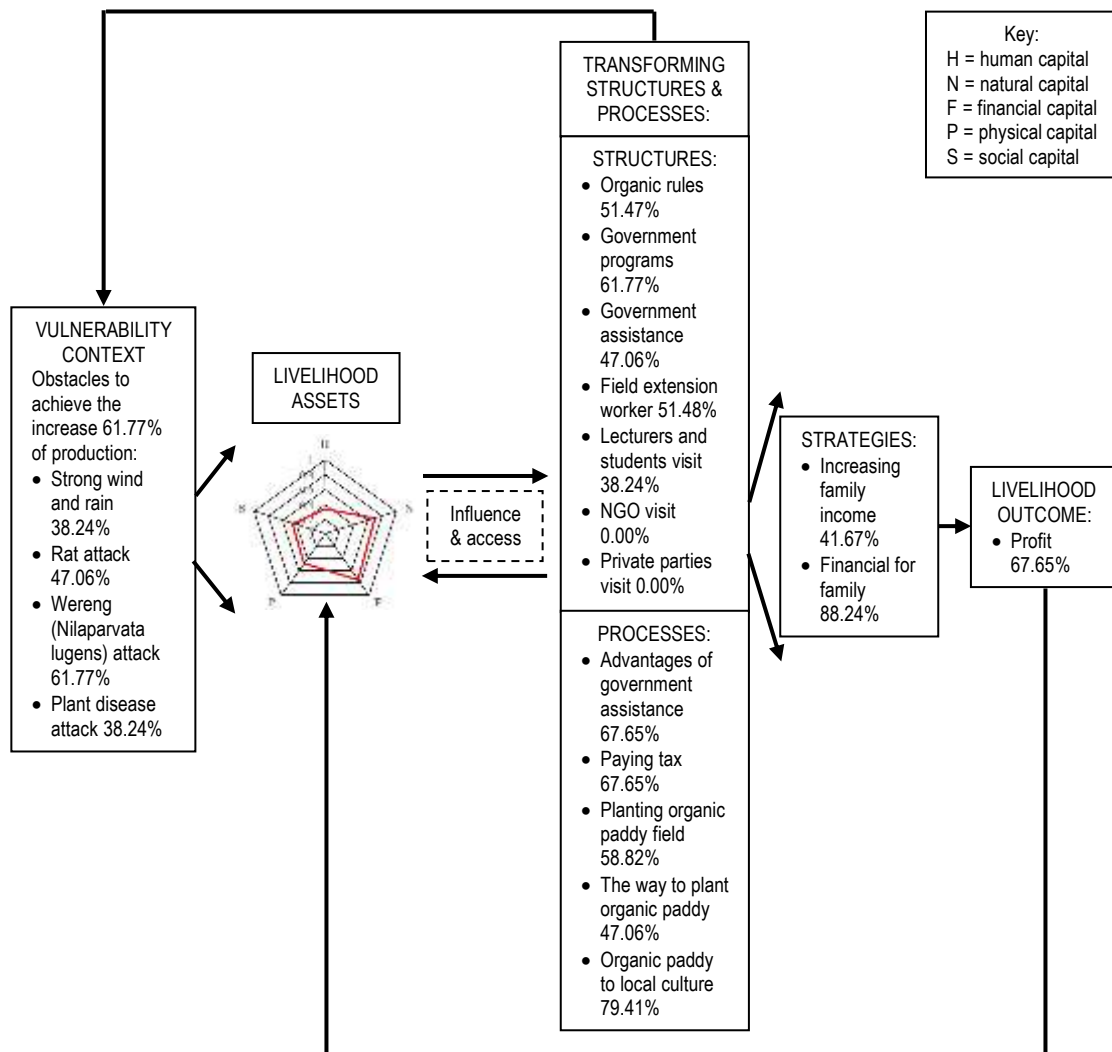
Figure 4.7. Framework of Sustainable Livelihood for Conventional Paddy Farming in Farmer Group of Mulyo 2 in Mulyoarjo Village

The similar vulnerability was faced by 61.77 percent respondents in Mulyoarjo village who achieve the increase of conventional paddy production. The vulnerability were strong wind and rain, rat attack, wereng (*Nilaparvata lugens*) attack, and plant disease attack. However, the livelihood assets that could be accessed and owned by the

respondents in this village influenced and accessed transforming structures and processes. These influence and access produced the strategies used by respondents to achieve the incerease of profit. By using the strategies, there were 67.65 percent of respondents that achieve the increase of profit.

The respondents in Sumber Ngepoh village were more achieving the increase of production and profit compared to the respondents in Mulyoarjo village. Therefore, the awareness and willingness owned by respondents in Mulyoarjo village to take action to move from practising planting conventional paddy to practising planting organic paddy by objective to achieve the sustainable livelihood must be based on the guidline that lead them to do the correct steps.

4.6. Guideline to Move from Conventional to Organic Paddy Farming

The guidelines for respondents in farmer group of Mulyo 2 in Mulyoarjo village in order to achieve the sustainable livelihood, which can give more better profit, as achieved by respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village are as follow:

1. Water that is used to watering the paddy farming field should not be disposal water from households, restaurants, or factories (such as tofu factory), which undergo a contamination process with various chemical substances that have the potential to be harmful to human health. As an alternative, the respondents can get uncontaminated water to watering their paddy farming fields by digging a new well near their farming fields. The respondents can also use the other alternatives such as using the water filter (such as Filter Inlet Outlet (FIO) (Anwar, 2018)) or natural-water filter (such as water spinach (*Ipomoea aquatica*). These water filters can be put in the irrigation channels. Thus, the water which flows on the channels and pass the water filter becomes clean water when it goes into the paddy farming field. The water also supports to increase the quality of the soil in the paddy farming field.

2. Raising the livestock such as cow, water buffalo, or goat which the objective to do this activity is to produce the livestock dung as source for organic fertilizers. By using the organic fertilizer to increase the quality of the soil in the paddy farming field. Besides that, the livestocks are also as saving for the respondents which can be sold if the respondents need money.

3. In effort to change from planting conventional paddy to planting organic paddy, respondents can reduce the use of chemical fertilizers and, at the same times, can increase the use of organic fertilizers. For example, reducing the use 1 Kg chemical fertilizers in each planting season is followed by increasing the use 1 Kg organic fertilizer. This way is done to achieve the full use of organic fertilizer. During reducing the use of chemical fertilizers and increasing the use of organic fertilizer, respondents must sell their paddy grains as conventional paddy.

4. When respondents are success using full of organic fertilizers, then planting organic paddy must use the organic paddy seeds. The seeds gotten from paddy grains harvested from previous harvesting paddy season. Therefore, respondents in farmer group of Mulyo 2 in Mulyoarjo village can buy the organic paddy seeds from the respondents in farmer group of Sumber Makmur 1 in Sumber Ngepoh village. Furthermore, the respondents in Mulyoarjo village can use organic paddy seeds harvested from their paddy farming fields.

5. During reducing the use of chemical fertilizers and increasing the use of organic fertilizer, respondents must sell their paddy grains as conventional paddy. The time for this transition period (conversion period) can be 3 years (IFOAM-Organic International, 2017).

6. During the transition time, the respondents have to find the potential customers for their organic paddy. The objective is to build early communication with customers and to introduce their conversion-farming activities. The respondents can also sell their paddy to costumers with label "in-conversion paddy" after 12-month conversion period (IFOAM-Organic International, 2017) with selling price similar to the selling price of conventional paddy.

7. The respondents in farmer group of Mulyo 2 in Mulyoarjo village determine total paddy grains that must be sold to the market, saved to be consumed by their family members, and used as paddy seeds on the next planting season. Besides that, they determine the selling price for their organic paddy.

CHAPTER 5.
CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

This study is focused to study the paddy farmers' sustainable livelihoods in Mulyoarjo and Sumber Ngepoh villages in Indonesia. There are several things gotten from statistical analysis and are the conclusions as follow:

1. Planting organic paddy done by respondents in Sumber Ngepoh village is more profit as compared to planting conventional paddy done by respondents in Mulyoarjo village. This conclusion is based on the lower of total cost of organic paddy production spent by respondents in Sumber Ngepoh village, the higher of total of paddy production achieved by them, the higher of selling price for their paddy grains, the higher of revenue and profit that they get from paddy farming fields.

2. Human and natural capitals are similar components of the livelihood assets owned by the respondents in both villages. Meanwhile, the ownership of the financial, physical, and social capitals by the respondents in Sumber Ngepoh village are more than those of the respondents in Mulyoarjo village.

3. The natural capital owned and accessed by the respondents in Sumber Ngepoh village influences and supports the efforts of the respondents to increase of profit gotten from their organic paddy farming. On the contrary, the financial capital decreases the profit gotten from their organic paddy farming. Meanwhile, the financial capital decreases the profit gotten by the respondents in conventional paddy farming in Mulyoarjo village. However, the physical capital has a potential to increase the profit gotten from their conventional paddy farming.

4. Based on the similarity and different components of sustainable livelihoods' framework, and the correlations among them between Sumber Ngepoh village and Mulyoarjo village, the respondents in Mulyoarjo village can change from planting conventional paddy to planting organic paddy by objective to achieve the sustainable livelihood which can give more better profit. The success of the change is based on several things as follow:

a. the availability of clean water (not disposal water from households, restaurants, or factories) to watering the paddy farming fields,

b. the availability of organic fertilizers from livestocks,

c. the change from using chemical fertilizers to organic fertilizer,

d. the use of organic paddy seed,

e. the discipline to apply the rules for planting organic paddy during 3 years transition time.

5.2. Recommendations

There are some recommendations that are stated based on the results of this study as follow:

1. The respondents in farmer group of Mulyo 2 in Mulyoarjo village can do the change from planting conventional paddy to planting organic paddy by finding the potential customers and applying in a discipline manner of the rules for planting organic paddy.

2. The government of Malang district must assist the respondents in farmer group of Mulyo 2 in Mulyoarjo village in conversion period from planting conventional paddy to planting organic paddy by:

a. Giving information about the true ways to planting organic paddy to respondents,

b. Giving financial assistance to respondents to buy livestocks.

c. Facilitating the respondents to follow the organic farming exhibitions by objective to help the respondents to find the potential customers for their organic paddy.

3. The higher education institutions (such as universities) in Malang regency must support the respondents in conversion process from planting conventional paddy to planting organic paddy by doing research and/or field work practice by objective to help a transfer of knowledge about planting practice of organic paddy into the academic level to the respondents.

4. The government policy about building of organic food marketing strategies must be more strengthened by building organic food market for products which products in the development 1,000 organic farming villages by aims to give guaranttee the sold of organic products produced by the organic farmers.

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APPENDIX

A. Successive Interval

Steps to calculate the successive interval are as follow:

1. Calculate the frequency of the score values (f_x) given by respondents to the livelihood asset indicators. For example, the frequency for 3 categories of indicator (i.e. 1 is disagree; 2 is neutral; and 3 is agree) with 30 respondents can be written as follow: category 1 scored by 8 respondents ($f_1 = 8$); category 2 scored by 12 respondents ($f_2 = 12$); and category 3 scored by 10 respondents ($f_3 = 10$).

Table Appendix 1. Frequency of the Score Values from Respondents

Categories	Total score from respondents	Frequency
Disagree	8	8
Neutral	12	12
Agree	10	10

Source :Author concept (2018)

2. Calculate proportion of the value with dividing each frequency of the data by the total number of respondents. The formula to calculate the proportion is as follow:

$$P_x = \frac{f_x}{N}$$

where:
x = Score value given by each respondent to the indicator
P_s = Proportion value on x^{th} score
f_s = Frequency of the score value (x) given by respondents to the indicator
N = Total of respondents

For example, the proportion for previous example of $f_1 = 8$; $f_2 = 12$; and $f_3 = 10$ with 30 respondents can be calculated as follow: $P_1 = 8 \div 30 = 0.2667$; $P_2 = 12 \div 30 = 0.4000$; and $P_3 = 10 \div 30 = 0.3333$.

Table Appendix 2. Proportion Values of the Score Values from Respondents

Categories	Frequency (f_x)	Proportion value (P_x)
Disagree	8	$8 \div 30 = 0.2667$
Neutral	12	$12 \div 30 = 0.4000$
Agree	10	$10 \div 30 = 0.3333$

Source :Author concept (2018)

3. Calculate proportion cumulative value with summing the proportion sequentially. The formula to calculate the proportion cumulative value is as follow:

$$PC_x = PC_{x-1} + P_x$$

where:
PC_x = Proportion cumulative value of xth score
PC_{x-1} = Proportion cumulative value of $x^{th} - 1$ score
P_x = Proportion on x^{th} score

For example, the proportion cumulative value for previous example of $P_1 = 0.2667$; $P_2 = 0.4000$; and $P_3 = 0.3333$ can be calculated as follow: $PC_1 = 0 + 0.27 = 0.2667$; $PC_2 = 0.2667 + 0.4000 = 0.6667$; and $PC_3 = 0.6667 + 0.3333 = 1.0000$.

Table Appendix 3. Proportion Cumulative Values of the Score Values from Respondents

Categories	Proportion value (P_x)	Proportion cumulative value (PC_x)
Disagree	$8 \div 30 = 0.2667$	$0.00 + 0.27 = 0.2667$
Neutral	$12 \div 30 = 0.4000$	$0.27 + 0.40 = 0.6667$
Agree	$10 \div 30 = 0.3333$	$0.67 + 0.33 = 1.0000$

Source :Author concept (2018)

4. Calculate Z value for each proportion cumulative value. To calculate the Z value, the data is assumed as a normal distribution data. The steps to calculate the Z value are:

a. Determine calculated-proportion value (Cal-P_X) in the Z table. If the proportion cumulative value (PC_X) is more than 0.5, calculated-proportion value (Cal-P_X) in the Z table is determined by reducing the proportion cumulative value (PC_X) with 0.5. Conversely, if the proportion cumulative value (PC_X) is less than 0.5, calculated-proportion value (Cal-P_X) in the Z

table is determined by reducing 0.5 with the proportion cumulative value (PC_X).

b. The absence of calculated-proportion value (Cal-P_X) in the Z table can be overcome by interpolation. The formula for interpolation is:

$$INTV_x = \frac{R_1 + R_2}{CalP_x}$$

where:
$INTV_x$ = Interpolation values
R_1, R_2 = Values that closed to calculated-proportion value (Cal-P_X)
Cal-P_X = Calculated-proportion value

c. Based on equation 3.11, the Z value from interpolation value is calculated using formula as follow:

$$ZINT_x = \frac{Z_1 + Z_2}{INTV_x}$$

where:
$ZINT_X$ = Z value from interpolation value
Z_1, Z_2 = Summing values of column and row of values that closed to calculated-proportion value (Cal-P_X)
$INTV_x$ = Interpolation values

d. If proportion cumulative value is more than 0.5, then Z value is positive. If proportion cumulative value is less than 0.5, then Z value is negative. For example, the Z value from interpolation value for previous example of $PC_1 = 0.2667$; $PC_2 = 0.6667$; and $PC_3 = 1.0000$ can be calculated as follow:

- The value of PC_1 is 0.2667, which is less than 0.5. The calculated-proportion value (Cal-P_1) for PC_1 is calculated as 0.5 – 0.2667 = 0.2333. In table Z (Wegner, 2013), there is no value of 0.2333. Therefore, it is chosen the values of 0.2324 and 0.2357 as values which are closed to value of 0.2333. The value of 0.2324 is in column 0.6 and row 0.02 while the value of 0.2357 is in column 0.6 and row 0.03. Hence, interpolation values for PC_1 is (0.2324 + 0.2357) ÷ 0.2333 = 2.0064295 and Z value from interpolation value for PC_1 is (0.62 + 0.63) ÷ 2.0064295 = 0.6229972. Given that the value of PC_1 is 0.2667 which is less than 0.5.,

then the Z value from interpolation value for PC_1 is in negative value, namely – 0.6229972.

- The value of PC_2 is 0.6667 which is more than 0.5. The calculated-proportion value (Cal-P_2) for PC_2 is calculated as 0.6667 – 0.5 = 0.1667. In table Z, there is no value of 0.1667. Therefore, it is chosen the values of 0.1664 and 0.1700 as values, which are closed to value of 0.1667. The value of 0.1664 is in column 0.4 and row 0.03 while the value of 0.1700 is in column 0.4 and row 0.04. Hence, interpolation values for PC_2 is (0.1664 + 0.1700) ÷ 0.1667 = 2.0179964 and Z value from interpolation value for PC_1 is (0.43 + 0.44) ÷ 2.0179964 = 0.4311207. Given that the value of PC_2 is 0.6667, which is more than 0.5., then the Z value from interpolation value for PC_2 is in positive value, namely 0.4311207.

- The value of PC_2 is 1.0000. Given that the value of PC_2 is 1.0000 and based on Z table, this PC_2 is given value of infinity (∞).

Table Appendix 4. Z Values of the Score Values from Respondents

Categories	Proportion value (P_x)	Proportion cumulative value (PC_x)	Z values
Disagree	8 ÷ 30 = 0.2667	0.00 + 0.27 = 0.2667	– 0.62299
Neutral	12 ÷ 30 = 0.4000	0.27 + 0.40 = 0.6667	0.4311207
Agree	10 ÷ 30 = 0.3333	0.67 0.33 = 1.0000	∞

Source **:**Author concept (2018)

5. Calculate density values for each value of Z. The formula to calculate the density value is as follow:

$$F(z) = \frac{1}{\sqrt{2\pi}} Exp\left(-\frac{1}{2}Z^2\right)$$

where:
F(z) = Density value
π = 3.142857
Exp = e^x, (e is natural logarithm with value = 2.718
Z = Z value from interpolation value

For example, the density value of Z value from interpolation value as presented in previous example can be calculated as follow:

- For Z_1 = – 0.6229972, the density value is (0.4) Exp (-0.5)(0.38813) = (0.4) Exp (-0.194065) = 0.329404.

- For $Z_2 = 0.4311207$, the density value is (0.4) Exp $(-0.5)(0.185865) = (0.4)$ Exp $(-0.092933) = 0.364502$.
- For $Z_3 = \infty$, the density value is 0.

Table Appendix 5. Density Values of the Z Value from Interpolation Value

Categories	Proportion cumulative value (PCₓ)	Z values	Density values (F(z))
Disagree	$0.00 + 0.27 = 0.2667$	-0.62299	0.329404
Neutral	$0.27 + 0.40 = 0.6667$	0.4311207	0.364502
Agree	$0.68\ 0.33 = 1.0000$	∞	0

Source **:**Author concept (2018)

6. Calculate scale value by using the density values and the proportion cumulative values. The formula to calculate the scale values is as follow:

$$SV_x = \frac{D_l - D_u}{A_u - A_l}$$

where:
SV_x = Scale value
D_l = Density at lower limit
D_u = Density at upper limit
A_u = Area under upper limit (area is proportion cumulative value)
A_l = Area under lower limit

For example, the scale value from previous example can be calculated as follow:

- For $PC_1 = 0.2667$ and $SV_1 = 0.329404$, the scale value is $(0 - 0.329404) \div (0.2667 - 0) = -1.23511$.
- For $PC_2 = 0.6667$ and $SV_2 = 0.364502$, the scale value is $(0.329404 - 0.364502) \div (0.6667 - 0.2667) = -0.087745$.
- For $PC_3 = 1.0000$ and $SV_3 = 0$, the scale value is $(0.364502 - 0) \div (1.0000 - 0.6667) = 1.093615$.

Table Appendix 6. Scale Values of the Density Values

Categories	Proportion cumulative value (PCₓ)	Density values (F(z))	Scale values (SVₓ)
Disagree	$0.00 + 0.27 = 0.2667$	0.329404	-1.23511
Neutral	$0.27 + 0.40 = 0.6667$	0.364502	-0.087745
Agree	$0.69\ 0.33 = 1.0000$	0	1.093615

Source **:**Author concept (2018)

7. Calculate successive interval. This step consists of two steps, namely calculate the minimum scale value and calculate the successive interval. The formula to calculate the minimum scale value is as follow:

$$|SV_{min}| = 1 - SV_x$$

where:

SV$_{min}$ = The minimum of scale value which is used as basic reference to be added to other scale value

SV$_x$ = Scale value

For example, the SV$_{min}$ from previous example can be calculated as follow: (1) – (-1.23511) = 2.23511.

The formula to calculate the successive interval is as follow:

$$Y_x = SV_x + |SV_{min}|$$

where:

Y$_x$ = The successive interval value

SV$_x$ = Scale value

SV$_{min}$ = The minimum of scale value, which is used as basic reference to be added to other scale value

For example, the Y$_x$ from previous example can be calculated as follow:

- Y$_1$ = (-1.23511) + 2.23511 = 1.

- Y$_2$ = (-0.087745) + 2.23511 = 2.147365.

- Y$_3$ = (1.093615) + 2.23511 = 3.328725.

Table Appendix 7. Scale of the Method of Successive Interval

Categories	(f_x)	(P_x)	(PC_x)	Z values	($F(z)$)	(SV_x)	MSI ($Y)_x$
Disagree	8	0.2667	0.2667	-0.6230	0.3294	-1.2351	1
Neutral	12	0.4	0.6667	0.4311	0.3645	-0.0878	2.1474
Agree	10	0.3333	1	∞	0	1.0936	3.3287

Source :Author concept (2018)

B. Validity Values of Variables

Table Appendix 8. Validity Values of Variables

Variables	r$_{calculated}$ (r_{xy})	r$_{table}$	Valid/ Invalid
Human capital (H$_1$)	0.669	0.246	Valid
Human capital (H$_2$)	0.614	0.246	Valid
Human capital (H$_3$)	0.167	0.246	Invalid
Human capital (H$_4$)	0.540	0.246	Valid
Natural capital (N$_1$)	0.706	0.246	Valid
Natural capital (N$_2$)	0.769	0.246	Valid

Source: Author analyzed (2019)

Table Appendix 8. Validity Values of Variables (*continued*)

Financial capital (F_1)	0.816	0.246	Valid
Financial capital (F_2)	0.314	0.246	Valid
Financial capital (F_3)	0.519	0.246	Valid
Physical capital (P_1)	0.711	0.246	Valid
Physical capital (P_2)	0.699	0.246	Valid
Physical capital (P_3)	0.439	0.246	Valid
Physical capital (P_4)	0.000	0.246	Invalid
Physical capital (P_5)	0.304	0.246	Valid
Physical capital (P_6)	0.142	0.246	Invalid
Social capital (S_1)	0.577	0.246	Valid
Social capital (S_2)	0.485	0.246	Valid
Social capital (S_3)	0.787	0.246	Valid
Structures ($STCT_1$)	0.526	0.246	Valid
Structures ($STCT_2$)	0.655	0.246	Valid
Structures ($STCT_3$)	0.185	0.246	Invalid
Structures ($STCT_4$)	0.311	0.246	Valid
Structures ($STCT_5$)	0.642	0.246	Valid
Structures ($STCT_6$)	0.677	0.246	Valid
Structures ($STCT_7$)	0.660	0.246	Valid
Structures ($STCT_8$)	0.000	0.246	Invalid
Structures ($STCT_9$)	0.000	0.246	Invalid
Processes ($PROC_1$)	0.182	0.246	Invalid
Processes ($PROC_2$)	0.599	0.246	Valid
Processes ($PROC_3$)	0.626	0.246	Valid
Processes ($PROC_4$)	0.484	0.246	Valid
Processes ($PROC_5$)	0.589	0.246	Valid
Strategies ($STRY_1$)	0.834	0.246	Valid
Strategies ($STRY_2$)	0.644	0.246	Valid
Vulnerability ($VULN_1$)	0.451	0.246	Valid
Vulnerability ($VULN_2$)	0.448	0.246	Valid
Vulnerability ($VULN_3$)	0.578	0.246	Valid
Vulnerability ($VULN_4$)	0.799	0.246	Valid
Vulnerability ($VULN_5$)	0.769	0.246	Valid
Vulnerability ($VULN_6$)	0.814	0.246	Valid

Source: Author analyzed (2019)

C. Test of Normality

Table Appendix 9. Test of Normality

Kolmogorov-Smirnov test	Paddy farming	
	Organic Asymp. Sig. (2-tailed)	**Conventional** Asymp. Sig. (2-tailed)
Test 01: IV: Vulnerability to DV: Human capital	0.094	0.602
Test 02: IV: Vulnerability to DV: Natural capital	0.093	0.162
Test 03: IV: Vulnerability to DV: Financial capital	0.075	0.214
Test 04: IV: Vulnerability to DV: Physical capital	0.893	0.868
Test 05: IV: Vulnerability to DV: Social capital	0.103	0.135
Test 06: IVs: Livelihood assets to DV: Structures	0.567	0.972
Test 07: IVs: Livelihood assets to DV: Processes	0.658	0.810
Test 08: IV: Structures to DV: Human capital	0.222	0.375
Test 09: IV: Structures to DV: Natural capital	0.166	0.896
Test 10: IV: Structures to DV: Financial capital	0.155	0.214
Test 11: IV: Structures to DV: Physical capital	0.630	0.775
Test 12: IV: Structures to DV: Social capital	0.302	0.058
Test 13: IV: Processes to DV: Human capital	0.764	0.566
Test 14: IV: Processes to DV: Natural capital	0.094	0.351
Test 15: IV: Processes to DV: Financial capital	0.168	0.311
Test 16: IV: Processes to DV: Physical capital	0.911	0.959
Test 17: IV: Processes to DV: Social capital	0.265	0.222
Test 18: IV: Structures to DV: Strategies	0.836	0.610
Test 19: IV: Processes to DV: Strategies	0.150	0.710
Test 20: IV: Strategies to DV: Profit	0.688	0.147
Test 21: IVs: Livelihood assets to DV: Profit	0.588	0.553
Test 22: IV: Profit to DV: Human capital	0.640	0.451
Test 23: IV: Profit to DV: Natural capital	0.055	0.239
Test 24: IV: Profit to DV: Financial capital	0.157	0.091
Test 25: IV: Profit to DV: Physical capital	0.262	0.862
Test 26: IV: Profit to DV: Social capital	0.052	0.089

Table Appendix 9. Test of Normality (*continued*)

Test 27: IV: Structure to DV: Vulnerability	0.482	0.805
Test 28: IV: Processes to DV: Vulnerability	0.071	0.472

Source: Data processed by author, 2019
Notes:
IV is an abbreviation of Independent Variable
DV is an abbreviation of Dependent Variable
Livelihood assets consist of Human capital, Natural capital, Financial capital, Physical capital, and Social capital

D. Test of Linearity

Table Appendix 10. Test of Linearity

The test for linearity	Paddy farming	
	Organic Sig. value[1]	Conventional Sig. value[2]
Test 01: IV: Vulnerability to DV: Human capital	0.066	0.667
Test 02: IV: Vulnerability to DV: Natural capital	0.695	0.376
Test 03: IV: Vulnerability to DV: Financial capital	0.980	0.197
Test 04: IV: Vulnerability to DV: Physical capital	0.281	0.540
Test 05: IV: Vulnerability to DV: Social capital	0.826	0.158
Test 06: IVs: Livelihood assets to DV: Structures:		
a. IVs: Human capital to DV: Structures	0.481	0.991
b. IVs: Natural capital to DV: Structures	0.538	0.202
c. IVs: Financial capital to DV: Structures	0.804	0.349
d. IVs: Physical capital to DV: Structures	0.723	0.748
e. IVs: Social capital to DV: Structures	0.910	0.906
Test 07: IVs: Livelihood assets to DV: Processes:		
a. IVs: Human capital to DV: Processes	0.905	0.708
b. IVs: Natural capital to DV: Processes	0.389	0.522
c. IVs: Financial capital to DV: Processes	0.986	0.185
d. IVs: Physical capital to DV: Processes	0.908	0.481
e. IVs: Social capital to DV: Processes	0.339	0.608
Test 08: IV: Structures to DV: Human capital	0.103	0.587
Test 09: IV: Structures to DV: Natural capital	0.196	0.741
Test 10: IV: Structures to DV: Financial capital	0.789	0.325
Test 11: IV: Structures to DV: Physical capital	0.495	0.688
Test 12: IV: Structures to DV: Social capital	0.396	0.131
Test 13: IV: Processes to DV: Human capital	0.662	0.985

Table Appendix 10. Test of Linearity (*continued*)

Test 14: IV: Processes to DV: Natural capital	0.072	0.689
Test 15: IV: Processes to DV: Financial capital	0.900	0.618
Test 16: IV: Processes to DV: Physical capital	0.138	0.445
Test 17: IV: Processes to DV: Social capital	0.062	0.697
Test 18: IV: Structures to DV: Strategies	0.562	0.791
Test 19: IV: Processes to DV: Strategies	0.364	0.136
Test 20: IV: Strategies to DV: Profit	0.991	0.920
Test 21: IVs: Livelihood assets to DV: Profit:		
a. IVs: Human capital to DV: Profit	0.483	0.311
b. IVs: Natural capital to DV: Profit	0.162	0.678
c. IVs: Financial capital to DV: Profit	0.965	0.181
d. IVs: Physical capital to DV: Profit	0.696	0.946
e. IVs: Social capital to DV: Profit	0.178	0.985
Test 22: IV: Profit to DV: Human capital	0.670	0.860
Test 23: IV: Profit to DV: Natural capital	0.770	0.070
Test 24: IV: Profit to DV: Financial capital	0.154	0.914
Test 25: IV: Profit to DV: Physical capital	0.389	0.471
Test 26: IV: Profit to DV: Social capital	0.787	0.059
Test 27: IV: Structure to DV: Vulnerability	0.797	0.417
Test 28: IV: Processes to DV: Vulnerability	0.079	0.124

Source: Data processed by author, 2019
Notes:
Sig. value[1] and Sig. value[2] are the significant values of deviation from linearity
IV is an abbreviation of Independent Variable
DV is an abbreviation of Dependent Variable
Livelihood assets consist of Human capital, Natural capital, Financial capital, Physical capital, and Social capital

E. Test of Heteroscedasticity

Table Appendix 11. Test of Heteroscedasticity

Regression tests of organic paddy farming	**t value**	**Sig. value**
Test 01: IV: Vulnerability to DV: Human capital	-1.408	0.169
Test 02: IV: Vulnerability to DV: Natural capital	-0.085	0.933
Test 03: IV: Vulnerability to DV: Financial capital	1.756	0.090
Test 04: IV: Vulnerability to DV: Physical capital	-1.107	0.277
Test 05: IV: Vulnerability to DV: Social capital	-1.462	0.154

Table Appendix 11. Test of Heteroscedasticity (*continued*)

Test 06: IVs: Livelihood assets to DV: Structures

a. IVs: Human capital to DV: Structures	-0.328	0.745
b. IVs: Natural capital to DV: Structures	-0.158	0.876
c. IVs: Financial capital to DV: Structures	-0.271	0.788
d. IVs: Physical capital to DV: Structures	-.0425	0.674
e. IVs: Social capital to DV: Structures	1.902	0.068

Test 07: IVs: Livelihood assets to DV: Processes

a. IVs: Human capital to DV: Processes	-0.557	0.582
b. IVs: Natural capital to DV: Processes	-0.646	0.524
c. IVs: Financial capital to DV: Processes	1.225	0.232
d. IVs: Physical capital to DV: Processes	0.475	0.639
e. IVs: Social capital to DV: Processes	0.013	0.990
Test 08: IV: Structures to DV: Human capital	1.411	0.168
Test 09: IV: Structures to DV: Natural capital	-1.442	0.160
Test 10: IV: Structures to DV: Financial capital	0.009	0.993
Test 11: IV: Structures to DV: Physical capital	0.620	0.540
Test 12: IV: Structures to DV: Social capital	0.159	0.875
Test 13: IV: Processes to DV: Human capital	1.587	0.123
Test 14: IV: Processes to DV: Natural capital	1.504	0.143
Test 15: IV: Processes to DV: Financial capital	-1.830	0.077
Test 16: IV: Processes to DV: Physical capital	0.165	0.870
Test 17: IV: Processes to DV: Social capital	0.738	0.466
Test 18: IV: Structures to DV: Strategies	-1.890	0.068
Test 19: IV: Processes to DV: Strategies	0.725	0.474
Test 20: IV: Strategies to DV: Profit	0.829	0414

Test 21: IVs: Livelihood assets to DV: Profit

a. IVs: Human capital to DV: Profit	0.125	0.902
b. IVs: Natural capital to DV: Profit	1.590	0.124
c. IVs: Financial capital to DV: Profit	1.232	0.229
d. IVs: Physical capital to DV: Profit	0.235	0.816
e. IVs: Social capital to DV: Profit	-0.280	0.782
Test 22: IV: Profit to DV: Human capital	1.520	0.139
Test 23: IV: Profit to DV: Natural capital	-1.883	0.069
Test 24: IV: Profit to DV: Financial capital	-1.657	0.108
Test 25: IV: Profit to DV: Physical capital	-0.786	0.438
Test 26: IV: Profit to DV: Social capital	-1.814	0.080
Test 27: IV: Structure to DV: Vulnerability	0.025	0.981
Test 28: IV: Processes to DV: Vulnerability	-0.396	0.695

Table Appendix 11. Test of Heteroscedasticity (*continued*)

Regression tests of conventional paddy farming	t value	Sig. value
Test 01: IV: Vulnerability to DV: Human capital	-0.515	0.610
Test 02: IV: Vulnerability to DV: Natural capital	1.601	0.119
Test 03: IV: Vulnerability to DV: Financial capital	1.149	0.259
Test 04: IV: Vulnerability to DV: Physical capital	0.916	0.366
Test 05: IV: Vulnerability to DV: Social capital	-0.620	0.540
Test 06: IVs: Livelihood assets to DV: Structures		
a. IVs: Human capital to DV: Structures	-0.642	0.526
b. IVs: Natural capital to DV: Structures	0.204	0.840
c. IVs: Financial capital to DV: Structures	-0.599	0.554
d. IVs: Physical capital to DV: Structures	0.149	0.882
e. IVs: Social capital to DV: Structures	0.753	0.458
Test 07: IVs: Livelihood assets to DV: Processes		
a. IVs: Human capital to DV: Processes	-0.964	0.343
b. IVs: Natural capital to DV: Processes	1.578	0.126
c. IVs: Financial capital to DV: Processes	0.795	0.433
d. IVs: Physical capital to DV: Processes	1.038	0.308
e. IVs: Social capital to DV: Processes	0.759	0.454
Test 08: IV: Structures to DV: Human capital	-0.350	0.729
Test 09: IV: Structures to DV: Natural capital	-0.598	0.554
Test 10: IV: Structures to DV: Financial capital	1.256	0.218
Test 11: IV: Structures to DV: Physical capital	1.060	0.297
Test 12: IV: Structures to DV: Social capital	-0.234	0.817
Test 13: IV: Processes to DV: Human capital	0.244	0.809
Test 14: IV: Processes to DV: Natural capital	-1.290	0.206
Test 15: IV: Processes to DV: Financial capital	0.598	0.554
Test 16: IV: Processes to DV: Physical capital	0.541	0.592
Test 17: IV: Processes to DV: Social capital	1.834	0.076
Test 18: IV: Structures to DV: Strategies	1.465	0.153
Test 19: IV: Processes to DV: Strategies	-0.575	0.569
Test 20: IV: Strategies to DV: Profit	1.997	0.054
Test 21: IVs: Livelihood assets to DV: Profit		
a. IVs: Human capital to DV: Profit	0.175	0.863
b. IVs: Natural capital to DV: Profit	1.715	0.107
c. IVs: Financial capital to DV: Profit	-0.580	0.571
d. IVs: Physical capital to DV: Profit	0.481	0.637
e. IVs: Social capital to DV: Profit	1.115	0.283
Test 22: IV: Profit to DV: Human capital	-0.312	0.757

Table Appendix 11. Test of Heteroscedasticity (*continued*)

Test 23: IV: Profit to DV: Natural capital	0.406	0.688
Test 24: IV: Profit to DV: Financial capital	-1.099	0.280
Test 25: IV: Profit to DV: Physical capital	0.343	0.734
Test 26: IV: Profit to DV: Social capital	1.554	0.130
Test 27: IV: Structure to DV: Vulnerability	-1.983	0.056
Test 28: IV: Processes to DV: Vulnerability	-1.012	0.319

Source: Data processed by author, 2019
Notes:
IV is an abbreviation of Independent Variable
DV is an abbreviation of Dependent Variable
Livelihood assets consist of Human capital, Natural capital, Financial capital, Physical capital, and Social capital

F. Test of Multi-collinearity

Table Appendix 12. Test of Multi-collinearity

Regression tests of organic paddy farming	Tolerance value	VIF value
Test 01: IV: Vulnerability to DV: Human capital	1.000	1.000
Test 02: IV: Vulnerability to DV: Natural capital	1.000	1.000
Test 03: IV: Vulnerability to DV: Financial capital	1.000	1.000
Test 04: IV: Vulnerability to DV: Physical capital	1.000	1.000
Test 05: IV: Vulnerability to DV: Social capital	1.000	1.000
Test 06: IVs: Livelihood assets to DV: Structures		
a. IVs: Human capital to DV: Structures	0.824	1.214
b. IVs: Natural capital to DV: Structures	0.903	1.108
c. IVs: Financial capital to DV: Structures	0.797	1.255
d. IVs: Physical capital to DV: Structures	0.885	1.130
e. IVs: Social capital to DV: Structures	0.827	1.209
Test 07: IVs: Livelihood assets to DV: Processes		
a. IVs: Human capital to DV: Processes	0.824	1.214
b. IVs: Natural capital to DV: Processes	0.903	1.108
c. IVs: Financial capital to DV: Processes	0.797	1.255
d. IVs: Physical capital to DV: Processes	0.885	1.130
e. IVs: Social capital to DV: Processes	0.827	1.209
Test 08: IV: Structures to DV: Human capital	1.000	1.000
Test 09: IV: Structures to DV: Natural capital	1.000	1.000
Test 10: IV: Structures to DV: Financial capital	1.000	1.000

Table Appendix 12. Test of Multi-collinearity (*continued*)

Test 11: IV: Structures to DV: Physical capital	1.000	1.000
Test 12: IV: Structures to DV: Social capital	1.000	1.000
Test 13: IV: Processes to DV: Human capital	1.000	1.000
Test 14: IV: Processes to DV: Natural capital	1.000	1.000
Test 15: IV: Processes to DV: Financial capital	1.000	1.000
Test 16: IV: Processes to DV: Physical capital	1.000	1.000
Test 17: IV: Processes to DV: Social capital	1.000	1.000
Test 18: IV: Structures to DV: Strategies	1.000	1.000
Test 19: IV: Processes to DV: Strategies	1.000	1.000
Test 20: IV: Strategies to DV: Profit	1.000	1.000
Test 21: IVs: Livelihood assets to DV: Profit		
a. IVs: Human capital to DV: Profit	0.824	1.214
b. IVs: Natural capital to DV: Profit	0.903	1.108
c. IVs: Financial capital to DV: Profit	0.797	1,255
d. IVs: Physical capital to DV: Profit	0.885	1.130
e. IVs: Social capital to DV: Profit	0.827	1.209
Test 22: IV: Profit to DV: Human capital	1.000	1.000
Test 23: IV: Profit to DV: Natural capital	1.000	1.000
Test 24: IV: Profit to DV: Financial capital	1.000	1.000
Test 25: IV: Profit to DV: Physical capital	1.000	1.000
Test 26: IV: Profit to DV: Social capital	1.000	1.000
Test 27: IV: Structure to DV: Vulnerability	1.000	1.000
Test 28: IV: Processes to DV: Vulnerability	1.000	1.000

Regression tests of conventional paddy farming	Tolerance value	VIF value
Test 01: IV: Vulnerability to DV: Human capital	1.000	1.000
Test 02: IV: Vulnerability to DV: Natural capital	1.000	1.000
Test 03: IV: Vulnerability to DV: Financial capital	1.000	1.000
Test 04: IV: Vulnerability to DV: Physical capital	1.000	1.000
Test 05: IV: Vulnerability to DV: Social capital	1.000	1.000
Test 06: IVs: Livelihood assets to DV: Structures		
a. IVs: Human capital to DV: Structures	0.832	1.202
b. IVs: Natural capital to DV: Structures	0.896	1.116
c. IVs: Financial capital to DV: Structures	0.795	1.257
d. IVs: Physical capital to DV: Structures	0.787	1.271
e. IVs: Social capital to DV: Structures	0.895	1.118

Table Appendix 12. Test of Multi-collinearity (*continued*)

Test 07: IVs: Livelihood assets to DV: Processes		
a. IVs: Human capital to DV: Processes	0.832	1.202
b. IVs: Natural capital to DV: Processes	0.896	1.116
c. IVs: Financial capital to DV: Processes	0.795	1.257
d. IVs: Physical capital to DV: Processes	0.787	1.271
e. IVs: Social capital to DV: Processes	0.895	1.118
Test 08: IV: Structures to DV: Human capital	1.000	1.000
Test 09: IV: Structures to DV: Natural capital	1.000	1.000
Test 10: IV: Structures to DV: Financial capital	1.000	1.000
Test 11: IV: Structures to DV: Physical capital	1.000	1.000
Test 12: IV: Structures to DV: Social capital	1.000	1.000
Test 13: IV: Processes to DV: Human capital	1.000	1.000
Test 14: IV: Processes to DV: Natural capital	1.000	1.000
Test 15: IV: Processes to DV: Financial capital	1.000	1.000
Test 16: IV: Processes to DV: Physical capital	1.000	1.000
Test 17: IV: Processes to DV: Social capital	1.000	1.000
Test 18: IV: Structures to DV: Strategies	1.000	1.000
Test 19: IV: Processes to DV: Strategies	1.000	1.000
Test 20: IV: Strategies to DV: Profit	1.000	1.000
Test 21: IVs: Livelihood assets to DV: Profit		
a. IVs: Human capital to DV: Profit	0.832	1.202
b. IVs: Natural capital to DV: Profit	0.896	1.116
c. IVs: Financial capital to DV: Profit	0.795	1.257
d. IVs: Physical capital to DV: Profit	0.787	1.271
e. IVs: Social capital to DV: Profit	0.895	1.118
Test 22: IV: Profit to DV: Human capital	1.000	1.000
Test 23: IV: Profit to DV: Natural capital	1.000	1.000
Test 24: IV: Profit to DV: Financial capital	1.000	1.000
Test 25: IV: Profit to DV: Physical capital	1.000	1.000
Test 26: IV: Profit to DV: Social capital	1.000	1.000
Test 27: IV: Structure to DV: Vulnerability	1.000	1.000
Test 28: IV: Processes to DV: Vulnerability	1.000	1.000

Source: Data processed by author, 2019
Notes:
IV is an abbreviation of Independent Variable
DV is an abbreviation of Dependent Variable
Livelihood assets consist of Human capital, Natural capital, Financial capital, Physical capital, and Social capital

G. Correlation Test of Organic Paddy Farming

Table Appendix 13. Correlation Test of Organic Paddy Farming

Tests	Component Pairs		Pearson correlation	Sig. (2-tailed)
01	Vulnerability	Human Capital	0.001	0.997
02	Vulnerability	Natural Capital	-0.003	0.986
03	Vulnerability	Financial Capital	-0.172	0.346
04	Vulnerability	Physical Capital	0.170	0.353
05	Vulnerability	Social Capital	0.185	0.311
06	Human Capital	Structures	0.047	0.798
07	Natural Capital	Structures	0.458	0.008
08	Financial Capital	Structures	-0.035	0.850
09	Physical Capital	Structures	-0.065	0.725
10	Social Capital	Structures	-0.080	0.663
11	Human Capital	Processes	0.220	0.227
12	Natural Capital	Processes	-0.041	0.823
13	Financial Capital	Processes	0.152	0.407
14	Physical Capital	Processes	-0.162	0.375
15	Social Capital	Processes	-0.385	0.030
16	Structures	Strategies	0.376	0.034
17	Processes	Strategies	-0.266	0.141
18	Strategies	Profit	0.352	0.048
19	Profit	Human Capital	0.222	0.222
20	Profit	Natural Capital	0.330	0.065
21	Profit	Financial Capital	-0.351	0.049
22	Profit	Physical Capital	-0.005	0.979
23	Profit	Social Capital	-0.102	0.577
24	Structure	Vulnerability	0.048	0.793
25	Processes	Vulnerability	-0.448	0.010

Source: Data processed by author, 2019

H. Correlation Test of Conventional Paddy Farming

Table Appendix 14. Correlation Test of Conventional Paddy Farming

Tests	Component Pairs		Pearson correlation	Sig. (2 tailed)
01	Vulnerability	Human Capital	0.137	0.440
02	Vulnerability	Natural Capital	0.134	0.450
03	Vulnerability	Financial Capital	0.076	0.669
04	Vulnerability	Physical Capital	0.402	0.019
05	Vulnerability	Social Capital	-0.217	0.217
06	Human Capital	Structures	-0.024	0.895
07	Natural Capital	Structures	0.263	0.133
08	Financial Capital	Structures	0.084	0.635
09	Physical Capital	Structures	0.357	0.038
10	Social Capital	Structures	0.017	0.922
11	Human Capital	Processes	0.099	0.578
12	Natural Capital	Processes	0.236	0.180
13	Financial Capital	Processes	0.150	0.396
14	Physical Capital	Processes	0.267	0.128
15	Social Capital	Processes	0.323	0.062
16	Structures	Strategies	-0.133	0.455
17	Processes	Strategies	0.349	0.043
18	Strategies	Profit	0.364	0.034
19	Profit	Human Capital	0.178	0.313
20	Profit	Natural Capital	0.254	0.147
21	Profit	Financial Capital	-0.630	0.000
22	Profit	Physical Capital	0.172	0.330
23	Profit	Social Capital	-0.276	0.115
24	Structure	Vulnerability	0.341	0.049
25	Processes	Vulnerability	-0.048	0.789

Source: Data processed by author, 2019

I. **Framework Components of Sustainable Livelihoods**

Table Appendix 15. Framework Components of Sustainable livelihoods

No.	Framework Component Values	Villages	
		Sumber Ngepoh	Mulyoarjo
		(in percent)	
A.	**VULNERABILITY CONTEXT**		
1.	Obstacle to achieve the increase of paddy production:	78.13	61.77
	a. Strong wind and rain:		
	• Sometimes occured	53.13	-
	• Often occured	-	38.24
	b. Rat attack:		
	• Not severe	75.00	47.06
	c. Wereng (*Nilaparvata lugens*) attack:		
	• There is no attack	84.38	-
	• Not severe	-	61.77
	d. Plant disease attack:		
	• There is no attack	59.38	-
	• Rather severe	-	38.24
B.	**TRANSFORMING STRUCTURE & PROCESSES**		
1.	Structures:		
	a. Government regulations:		
	• Rarely burdensome and sometimes give benefit	45.51	51.47
	b. Government programs:		
	• Often give benefit	65.63	61.77
	c. Government assistance:		
	• Sometimes	68.75	47.06
	d. Field extension worker:		
	• Visiting often in duration 1 times for a month	95.32	51.48
	e. Lecturers and students visit:		
	• Often	56.25	-
	• Sometimes	-	38.24
	f. NGO visit:		
	• Never visiting	0.00	0.00
	g. Private party visit:		
	• Never giving an assistance	0.00	0.00

Table appendix 15. Framework Components of Sustainable livelihoods (*continued*)

2.	Processes:		
	a. Advantages of government assistance:		
	• Sometimes give benefit	50.00	-
	• Often give benefit	-	67.65
	b. Paying tax:		
	• There is not burdensome or detrimental	46.88	67.65
	c. Planting organic paddy field:		
	• Often free influenching from other party	62.50	-
	• Always free influenching from other party	-	58.82
	d. The way to plant organic paddy:		
	• Rarely burdensome	56.25	47.06
	e. Organic paddy to local culture:		
	• It is not contradicting	53.13	79.41
C.	**STRATEGIES**		
	a. Increasing family income:		
	• Raising and selling livestock and its products	58.20	-
	• Doing the additional (second) job	-	41.67
	b. Financial for family:		
	• Having always money to finance farming activities	68.75	88.24
D.	**LIVELIHOOD OUTCOME**		
	a. Profit:		
	• Increase	81.25	67.65

Source: Data processed by authors, 2019

J. Kuesioner (Questionnaire)

KUESIONER

Kuesioner ini adalah alat riset:

Study of Paddy Farmers' Livelihood in Sumber Ngepoh and Mulyoarjo Villages, Lawang Subdistrict, Malang District, Jawa Timur Province, Indonesia.

Kuesioner digunakan dalam melakukan interview dengan tujuan untuk mengumpulkan data dari petani padi organik di desa Sumber Ngepoh dan petani padi konvensional di desa Mulyoarjo. Kuesioner ini hanya digunakan untuk tujuan penelitian akademik. Mohon menjawab pertanyaan dengan sebenarnya. Terima kasih banyak atas kerjasamanya.

Nama pewawancara : …………………………………………………………

Tanggal wawancara : …………………………………………………………

A. Informasi individual responden:

01. Nama: …………………………………………………………………

02. Jenis kelamin: ☐ Laki-laki
☐ Perempuan

03. Umur: ……………………… tahun

04. Pendidikan: ☐ Tidak pernah sekolah
☐ Tidak tamat SD (Ibtidaiyah)
☐ Tamat dari SD (Ibtidaiyah)
☐ Tamat dari SMP (Tsanawiyah)
☐ Tamat dari SMU (Aliyah)
☐ Lainnya: …………………………………………

05.　Status perkawinan:　　☐ Kawin

☐ Tidak kawin

☐ Janda

☐ Duda

B.　Informasi responden dan keluarga:

06.　Jumlah anggota keluarga inti yang saat ini tinggal di rumah responden:

☐ Responden

☐ Isteri

☐ Anak-anak:　　…………………… orang

☐ Lainnya:　　………………… orang

07.　Pekerjaan utama anggota keluarga responden:

☐ Responden　　Bekerja sebagai ………　Pendapatan Rp. ……

☐ Isteri　　Bekerja sebagai ………　Pendapatan Rp. ……

☐ Anak　　Bekerja sebagai ………　Pendapatan Rp. ……

☐ Lainnya……　Bekerja sebagai ………　Pendapatan Rp. ……

08.　Pekerjaan sampingan anggota keluarga responden: …………………

☐ Responden　　Bekerja sebagai ………　Pendapatan Rp. ……

☐ Isteri bapak　　Bekerja sebagai ………　Pendapatan Rp. ……

☐ Anak　　Bekerja sebagai ………　Pendapatan Rp. ……

　　Lainnya ……　Bekerja sebagai ………　Pendapatan Rp. ……

C.　Pertanian padi yang diusahakan oleh responden:

09.　Padi yang ditanam:　　☐ Organik　　(tidak pakai bahan kimia 100%)

☐ Semi organik　　(ada pakai bahan kimia dan bahan organik)

☐ Tidak organik　　(pakai bahan kimia 100%)

10.　Sudah berapa lama menanam padi organik:
…… bulan atau …… tahun

11.　Sudah berapa lama menanam padi semi organik:
…… bulan atau …… tahun

12. Sudah berapa lama menanam padi tidak organik:
…… bulan atau …… tahun

13. Jenis varietas padi yang ditanam:
      ☐ IR 64
      ☐ Chiherang
      ☐ Mikongga
      ☐ Mentik wangi
      ☐ Others: ....

14. Berapa kali menanam padi selama 1 tahun: ………… kali

15. Apakah menanam padi-nya dilakukan terus-menerus atau diselingi menanam tanaman lain:
    ☐ Terus-menerus
    ☐ Diselingi penanaman tanaman lain: ………………………………

D. Lahan pertanian padi:

16. Luas lahan padi-nya berapa: …………… Ha^2

17. Lahan padi itu milik sendiri atau sewa?:
    ☐ Milik sendiri
    ☐ Sewa

18. Sumber air untuk tanaman padi dari mana:
    ☐ Sungai
    ☐ Irigasi
    ☐ Air hujan
    ☐ Air tanah
    ☐ Air dari mata air pegunungan
    ☐ Lainnya: ………………………………………………………

19. Benih padi (butir padi untuk disemai) berasal dari:
    ☐ Padi sendiri yang dipanen pada musim panen sebelumnya
    ☐ Membeli dari toko Pertanian
    ☐ Lainnya: ………………………………………………………

20. Bibit padi (tanaman padi yang muda siap tanam) berasal dari:
    ☐ Persemaian di persawahan sendiri
    ☐ Membeli dari persemaian milik petani lain
    ☐ Lainnya: ………………………………………………………

E. Biaya tetap pertanian padi:

21. Biaya sewa lahan berapa:

    Rp. …………………   untuk ……… bulan atau ……… tahun

22. Biaya bayar pajak tanah berapa:

    Rp. …………………   untuk ……… bulan atau ……… tahun

23. Biaya:
    a. membeli cangkul   Rp. …………………
    b. membeli sabit   Rp. …………………
    c. membeli golok   Rp. …………………
    d. membeli semprotan   Rp. …………………
    e. bajak: Rp. …………………
       ☐ membeli   Rp. …………………
       ☐ menyewa   Rp. …………………
    f. Traktor tangan: Rp. …………………
       ☐ membeli   Rp. …………………
       ☐ menyewa   Rp. …………………
    g. Lainnya: …………………….....   Rp. …………………

24. Biaya untuk sertifikat organik: Rp. …………………

25. Biaya tetap lainnya:
    a. …………………………   Rp. …………………
    b. …………………………   Rp. …………………
    c. …………………………   Rp. …………………

F. Biaya variabel pertanian padi:

26. Biaya untuk membeli benih padi untuk ditanam di persemaian:

    Rp. ………………… per kilogram

27. A. Input untuk pertanian padi organik:

    1. Pupuk organik:
       - Kotoran sapi   ………… Kg   Rp. ………
       - Kotoran kerbau   ………… Kg   Rp. ………
       - Kotoran kambing   ………… Kg   Rp. ………

- Kotoran ayam   ………… Kg   Rp. ………
- Lainnya: ……………………   ………… Kg   Rp. ………

2. Pestisida organik:

- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- Lainnya: …………………..   ………… Liter   Rp. ………

3. Herbisida organik:

- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- Lainnya: …………………..   ………… Liter   Rp. ………

B. Input untuk pertanian padi non-organik:
   1. Pupuk kimia:

- ……………………………..   ………… Kg   Rp. ………
- ……………………………..   ………… Kg   Rp. ………
- ……………………………..   ………… Kg   Rp. ………
- ……………………………..   ………… Kg   Rp. ………
- Lainnya: …………………..   ………… Kg   Rp. ………

2. Pestisida kimia:

- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Kg   Rp. ………
- Lainnya: …………………..   ………… Kg   Rp. ………

3. Herbisida kimia:

- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Liter   Rp. ………
- ……………………………..   ………… Kg   Rp. ………
- Lainnya: …………………..   ………… Kg   Rp. ………

28. Tenaga kerja yang bekerja di lahan padi:

- Persiapan lahan : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Penyemaian benih padi : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Penanaman bibit padi di lahan : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Pemupukan pertama : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Matun : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Pemupukan kedua : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Mindoni : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Pemupukan ketiga : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Penyemprotan : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Mengusir tikus : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Mengusir burung : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Panen (menyabit) : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Perontokan gabah : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Mengangkut gabah ke pinggir jalan : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

- Aktivitas lainnya : Anggota keluarga …… orang
Diluar anggota keluarga …….
orang
Rp. …………

29. Total biaya untuk menggiling padi menjadi beras: Rp. …………

30. Biaya variable lainnya untuk pertanian padi:
    a. ………………………… Rp. …………………
    b. ………………………… Rp. …………………
    c. ………………………… Rp. …………………

G. Hasil padi dari lahan pertanian:

31. Total produksi padi: ………………… Kg

32. Total padi yang dijual sebagai gabah:
    …………… Kg dan Rp. ……………

33. Total beras yang diperoleh dari penggilingan: ………………… Kg

34. Total beras yang dijual:
    …………… Kg dan Rp. ……………….

H. Tanaman lain yang ditanam oleh responden:

35. Apakah ada menanam tanaman lain selain padi:

    ☐ Ada
    ☐ Tidak ada

36. Kalau ada menanam tanaman apa saja:

    ………………… (……… Kg panennya) (Rp. ……… harga jualnya)
    ………………… (……… Kg panennya) (Rp. ……… harga jualnya)
    ………………… (……… Kg panennya) (Rp. ……… harga jualnya)

37. Dijual kemana:

    ☐ Ke pasar
    ☐ Di beli pengumpul
    ☐ Lainnya …………………

I. Kerentanan mata pencaharian:

38. Total produksi padi pada musim panen saat ini dibanding musim panen sebelumnya:

    ☐ Meningkat dari ………………… kg ke ………………… kg
    ☐ Tetap/stabil
    ☐ Menurun dari ………………… kg ke ………………… kg

39. Harga jual gabah padi pada musim panen saat ini dibanding musim panen sebelumnya:

☐ Meningkat dari Rp. ………………… ke Rp. …………………

☐ Tetap/stabil

☐ Menurun dari Rp. ………………… ke Rp. …………………

40. Harga jual beras pada musim panen saat ini dibanding musim panen sebelumnya:

☐ Meningkat dari Rp. ………………… ke Rp. …………………

☐ Tetap/stabil

☐ Menurun dari Rp. ………………… ke Rp. …………………

J. Aset mata pencaharian:

41. Modal manusia

   a. Bagaimana kesehatan bapak untuk bekerja di sawah?
      ☐ Selalu sakit
      ☐ Sering sakit
      ☐ Kadang-kadang sakit
      ☐ Sekali-sekali sakit
      ☐ Selalu sehat

   b. <u>Untuk petani organik</u>: Pak, kalau bapak menanam padi pakai pupuk dan obat-obatan organik apakah:
      <u>Untuk petani non-organik</u>: Pak, kalau bapak menanam padi pakai pupuk dan obat-obatan kimia apakah:
      ☐ Mengikuti cara yang dilakukan petani lainnya
      ☐ Memakai cara sendiri

   c. Apakah untuk menanam bibit padi, memupuk, menyemprot, matun, dan mindoni bapak:
      ☐ Tidak pernah membayar orang
      ☐ Jarang membayar orang
      ☐ Kadang-kadang membayar orang
      ☐ Sering membayar orang
      ☐ Selalu membayar orang

42. Modal alam

    a. Bagaimana tanah bapak itu waktu dicangkul; dibajak pakai sapi; atau ditraktor, apakah:
- ☐ Sangat sulit atau keras
- ☐ Sulit (keras)
- ☐ Tidak mudah tidak sulit
- ☐ Mudah
- ☐ Sangat mudah (dicangkul; dibajak pakai sapi; ditraktor)

    b. Kalau air untuk sawah bapak bagaimana pak? Apakah:
- ☐ Tidak tersedia
- ☐ Kurang tersedia
- ☐ Cukup tersedia
- ☐ Tersedia
- ☐ Berlimpah

43. Modal finansial (keuangan)

    a. Pak, biaya untuk:
(a) beli benih padi,
(b) beli pupuk,
(c) mengupah orang menanam padi,
(d) biaya matun,
(e) biaya mindoni,
(f) biaya menyemprot,
(g) biaya panen……
itu uangnya dari mana pak? Apakah dari:

☐ Uang tabungan sendiri	5
☐ Jual perhiasan atau ternak atau motor	4
☐ Kiriman uang dari anak	3
☐ Ngutang dari tengkulak	2
☐ Ngutang dari Bank	1

    b. <u>Untuk petani organik</u>: Uang untuk menanam padi organik apakah:
<u>Untuk petani non-organik</u>: Uang untuk menanam padi convensional apakah:
- ☐ Pasti ada
- ☐ Sering ada
- ☐ Kadang-kadang ada kadang-kadang tidak ada
- ☐ Jarang
- ☐ Tidak ada

c. Apakah bapak memiliki ternak?
- ☐ Tidak punya ternak
- ☐ Punya ternak

44. Modal fisik

a. Bagaimana kondisi jalan-jalan di desa ini?
- ☐ Sangat jelek
- ☐ Jelek
- ☐ Tidak bagus tidak jelek (biasa saja)
- ☐ Bagus
- ☐ Sangat bagus

b. Kalau dari lahan atau rumah bapak mau ke jalan-jalan di desa ini gimana pak? Apakah:
- ☐ Sangat susah/sulit
- ☐ Susah/sulit
- ☐ Tidak mudah dan tidak sulit (biasa saja)
- ☐ Mudah
- ☐ Sangat mudah

c. <u>Untuk petani organik</u>: Kalau pupuk organik (kotoran sapi, kotoran kambing atau kotoran ayam) dan pestisida alami untuk sawah bapak bagaimana pak? Apakah:
<u>Untuk petani non-organik</u>: Kalau benih padi, pupuk kimia (Urea, ZA, NPK Phonska dan TSP) dan pestisida kimia (Decis, Furadan dan Ally) untuk sawah bapak bagaimana pak? Apakah:
- ☐ Tidak tersedia
- ☐ Kurang tersedia
- ☐ Kadang-kadang tersedia kadang-kadang tidak tersedia
- ☐ Tersedia
- ☐ Berlimpah

d. Pak, kalau bapak mau menanam padi di sawah bapak, tanah di sawah bapak itu apakah:
- ☐ Dicangkul
- ☐ Dibajak pakai sapi
   Atau
- ☐ Ditraktor

e. Kalau bapak sakit apakah pergi ke:
☐ Puskesmas
☐ Rumah sakit

f. Pak, alat komunikasi apa yang bapak pakai sekarang? Apakah:
☐ HP (Handphone)
☐ Telepon rumah
☐ Radio amatir
☐ Mesin Fax(imili)
☐ Surat

45. Modal sosial

a. Pak, kalau bapak mau berhubungan dengan petani lain di desa ini apakah:
☐ Sangat sulit
☐ Sulit
☐ Tidak mudah dan tidak sulit (biasa saja)
☐ Mudah
☐ Sangat mudah

b. Apakah bapak mengikuti arisan di kelompok tani?
☐ Ikut
☐ Tidak ikut

c. Kalau bapak mau mengurus sesuatu di kantor kelurahan (balai desa) apakah:
☐ Sangat sulit
☐ Sulit
☐ Tidak sulit dan tidak mudah (biasa saja)
☐ Mudah
☐ Sangat mudah

K. Transformasi Struktur dan Proses:

46. Struktur

    a. Untuk petani organik: Pak, selama ini praktek langsung tentang pertanian organik yang harus sesuai aturan sertifikasi dari pemerintah apakah:

       Untuk petani non-organik: Pak, selama ini peraturan dari pemerintah (misalnya: peraturan tentang bibit, pupuk, obat-obatan, pendidikan, kesehatan, dll) apakah:

       ☐ Selalu memberatkan(bapak)

       ☐ Sering memberatkan

       ☐ Kadang-kadang memberatkan

       ☐ Jarang memberatkan

       ☐ Tidak pernah memberatkan

    b. Untuk petani organik: Selama ini peraturan berdasarkan sertifikasi dari pemerintah itu apakah:

       Untuk petani non-organik: Selama ini peraturan penggunaan dosis pupuk kimia, obat-obatan kimia dari pemerintah itu apakah:

       ☐ Tidak pernah bermanfaat (bagi bapak)

       ☐ Jarang bermanfaat

       ☐ Kadang-kadang bermanfaat kadang-kadang tidak bermanfaat

       ☐ Sering bermanfaat

       ☐ Selalu bermanfaat

    c. Untuk petani organik: Selama ini program-program dari pemerintah (misalnya: program yang mendorong tentang penggunaan bibit organik, pupuk organik, obat-obatan organik, kesehatan) apakah:

       Untuk petani non-organik: Selama ini program-program dari pemerintah (misalnya: program tentang pengadaan bibit, pupuk kimia, obat-obatan kimia, kesehatan) apakah:

       ☐ Tidak pernah bermanfaat

       ☐ Jarang bermanfaat

       ☐ Kadang-kadang bermanfaat kadang-kadang tidak bermanfaat

       ☐ Sering bermanfaat

       ☐ Selalu bermanfaat

d. <u>Untuk petani organik</u>: Apakah pemerintah ada memberi bantuan kepada bapak (seperti: peralatan pertanian, fasilitas kesehatan)?
<u>Untuk petani non-organik</u>: Apakah pemerintah ada memberi bantuan kepada bapak (seperti: bantuan bibit, pupuk, obat-obatan, kredit, kesehatan, dll)?

☐ Tidak pernah

☐ Jarang

☐ Kadang-kadang

☐ Sering

☐ Selalu

e. Apakah petugas PPL (Petugas Penyuluh Lapangan) selalu datang mengunjungi bapak?

☐ Selalu

☐ Sering

☐ Kadang-kadang

☐ Jarang

☐ Tidak pernah

f. Kapan waktunya petugas PPL datang mengunjungi bapak?

☐ Seminggu sekali

☐ Dua minggu sekali

☐ Tiga minggu sekali

☐ Sebulan sekali

☐ Tidak pernah

g. Selama ini dosen atau mahasiswa dari perguruan tinggi (universitas) apakah:

☐ Tidak pernah (berkunjung)

☐ Jarang

☐ Kadang-kadang

☐ Sering

☐ Selalu

h. Selama ini lembaga atau organisasi kemasyarakatan (LSM = Lembaga Swadaya Masyarakat) apakah selalu?

☐ Tidak pernah datang mengunjungi bapak

☐ Jarang

☐ Kadang-kadang datang kadang-kadang tidak datang

☐ Sering datang

☐ Selalu

i. Selama ini pihak swasta (perusahaan swasta) apakah:

☐ Tidak pernah memberi bantuan kepada bapak

☐ Jarang

☐ Kadang-kadang

☐ Sering

☐ Selalu

47. Proses

a. Untuk petani organik: Pak, apakah selama ini kalau pemerintah memberi bantuan alat pertanian, apakah:
Untuk petani non-organik: Pak, apakah selama ini kalau pemerintah memberi bantuan bibit, pupuk, atau alat pertanian apakah:

☐ Tidak pernah menguntungkan (bapak)

☐ Jarang menguntungkan

☐ Kadang-kadang menguntungkan

☐ Sering menguntungkan

☐ Selalu menguntungkan

b. Pak, selama ini kalau bapak membayar pajak (seperti: pajak tanah, bangunan, dll) apakah:

☐ Selalu memberatkan atau merugikan

☐ Sering memberatkan atau merugikan

☐ Kadang-kadang

☐ Jarang memberatkan atau merugikan

☐ Tidak pernah memberatkan atau merugikan

c. <u>Untuk petani organik</u>: Selama ini kalau Bapak menjalankan kegiatan bertani padi organik apakah:
<u>Untuk petani non-organik</u>: Selama ini kalau Bapak menjalankan kegiatan bertani padi conventsional apakah:

☐ Selalu dibatasi oleh pihak lain

☐ Sering dibatasi oleh pihak lain

☐ Kadang-kadang dibatasi kadang-kadang tidak dibatasi

☐ Sering bebas oleh pihak lain

☐ Selalu bebas oleh pihak lain

d. <u>Untuk petani organik</u>: Selama ini cara-cara untuk menanam padi secara organik apakah:
<u>Untuk petani non-organik</u>: Selama ini cara-cara untuk menanam padi secara conventsional apakah:

☐ Selalu memberatkan (bapak)

☐ Sering memberatkan

☐ Kadang-kadang

☐ Jarang memberatkan

☐ Tidak pernah memberatkan

e. <u>Untuk petani organik</u>: Menurut bapak menanam padi secara organik apakah bertentangan dengan budaya menanam padi di desa ini?
<u>Untuk petani non-organik</u>: Menurut bapak menanam padi secara convensional apakah bertentangan dengan budaya menanam padi di desa ini?

☐ Sangat bertentangan

☐ Bertentangan

☐ Kadang-kadang

☐ Tidak bertentangan

☐ Sangat tidak bertentangan

L. Strategi mata pencaharian:

48. Bagaimana cara (strategi) Bapak meningkatkan penghasilan/pendapatan Bapak?
    - ☐ Bekerja sampingan (saya, isteri, dan anak)
    - ☐ Menanam tanaman lain selain padi
    - ☐ Beternak dan menjual ternak atau hasilnya (telur ayam)
    - ☐ Memelihara ikan dan menjual ikan tersebut
    - ☐ Menerima kredit dari pemerintah
    - ☐ Menjual perhiasan
    - ☐ Membuka usaha (toko)
    - ☐ Berhutang kepada orang lain (seperti: saudara atau teman)
    - ☐ Lainnya: ……………………………………………………………

49. Apakah setiap bulan Bapak punya penghasilan untuk membiayai keluarga bapak?
    - ☐ Tidak punya
    - ☐ Jarang punya
    - ☐ Kadang-kadang punya kadang-kadang tidak punya
    - ☐ Sering punya
    - ☐ Selalu punya (berkelanjutan)

M. Vulnerability:

50. Bagaimana produksi padi saat ini dibanding panen sebelumnya
    - ☐ Meningkat
    - ☐ Menurun

51. Bagaimana keuntungan saat ini dibanding panen sebelumnya
    - ☐ Meningkat
    - ☐ Menurun

52. Bagaimana angin kencang yang merobohkan tanaman padi di sawah bapak? Apakah:
    - ☐ Selalu terjadi
    - ☐ Sering terjadi
    - ☐ Kadang-kadang terjadi
    - ☐ Jarang terjadi
    - ☐ Sangat jarang terjadi

53. Bagaimana serangan hama tikus di sawah bapak? Apakah:
    ☐ Sangat parah
    ☐ Parah
    ☐ Agak parah
    ☐ Tidak parah
    ☐ Tidak ada serangan

54. Bagaimana serangan hama wereng di sawah bapak? Apakah:
    ☐ Sangat parah
    ☐ Parah
    ☐ Agak parah
    ☐ Tidak parah
    ☐ Tidak ada serangan

55. Bagaimana serangan penyakit di tanaman padi bapak? Apakah:
    ☐ Sangat parah
    ☐ Parah
    ☐ Agak parah
    ☐ Tidak parah
    ☐ Tidak ada serangan

K. Diskusi Fokus Grup (Focus Group Discussion)

DISKUSI FOKUS GRUP
Desa Sumber Ngepoh

Tujuan dari fokus grup ini adalah untuk <u>mendalami</u> hal-hal yang sudah saya peroleh dari wawancara dengan para petani

A. Sumber mata pencaharian utama (menanam padi)

1. Bibit
   Bapak-bapak sekalian, apakah mungkin kalau ada salah satu dari anggota kelompok tani Sumber Makmur 1 yang menjadi penyedia dan sekaligus penjual benih padi organik (dari hasil panen sebelumnya) kepada anggota kelompok tani Sumber Makmur 1 lainnya?

2. Pupuk

Bapak-bapak sekalian, apakah ada ide atau usulan mengenai pengadaan pupuk organik yang efektif untuk keseluruhan anggota kelompok tani Sumber Makmur 1?

3. Obat-obatan

Bapak-bapak sekalian, apakah ada ide atau usulan mengenai pengadaan obat-obatan organik yang efektif untuk keseluruhan anggota kelompok tani Sumber Makmur 1?

4. Serangan hama

Bapak-bapak sekalian, apakah ada ide atau usulan untuk mencegah serangan hama tikus, burung, penggerek batang, dan/atau wereng?

5. Serangan penyakit

Bapak-bapak sekalian, apakah ada ide atau usulan untuk mencegah penyakit tanaman padi organik yang bapak-bapak miliki?

6. Tenaga kerja

Bapak-bapak sekalian, apakah ada usulan mengenai kurangnya tenaga kerja laki-laki di desa Sumber Ngepoh ini?

7. Penjualan gabah

Bapak-bapak sekalian, apakah mungkin setiap kali habis penen padi organik maka anggota kelompok tani Sumber Makmur 1 menjual gabah mereka sebagian saja dan yang sebagian lagi untuk konsumsi anggota keluarga mereka sendiri? (supaya ada keseragaman)

B. Sumber mata pencaharian tambahan

Bapak-bapak sekalian, apakah mungkin kalau setiap anggota kelompok tani Sumber Makmur 1 mempunyai sumber mata pencaharian lain selain menam padi dan memelihara ternak?

C. Warna sari

1. Pelatihan apa yang diperlukan bagi anggota kelompok tani Sumber Makmur 1?
2. Bagaimana peran PPL?
3. Bagaimana dengan peran generasi muda di desa Sumber Ngepoh ini untuk ikut bertani?
4. Dipersilahkan Bapak-bapak untuk menyampaikan apabila ada hal lain yang ingin disampaikan

DISKUSI FOKUS GRUP
Desa Mulyoarjo

Tujuan dari fokus grup ini adalah untuk <u>mendalami</u> hal-hal yang sudah saya peroleh dari wawancara dengan para petani

A. Sumber mata pencaharian utama (menanam padi)

1. **Bibit**
   Bapak-bapak sekalian, bagaimana kalau anggota kelompok tani Mulyo 2 menggunakan benih padi dari hasil panen sebelumnya? Karena selama ini mereka membeli dari toko pertanian.

2. **Pupuk**
   a. Bapak-bapak sekalian, apakah ada ide atau usulan mengenai pengadaan pupuk yang efektif untuk keseluruhan anggota kelompok tani Mulyo 2?
   b. Bapak-bapak sekalian, apakah ada pendapat mengenai pengadaan pupuk organik untuk keseluruhan anggota kelompok tani Mulyo 2?

3. **Obat-obatan**
   Bapak-bapak sekalian, apakah mungkin kalau kelompok tani membeli obat-obatan dari penjual yang resmi dan menjualnya kepada anggota kelompok tani?

4. **Serangan hama**
   Bapak-bapak sekalian, apakah ada ide atau usulan yang lebih baik dan efektif untuk memberantas serangan hama tikus, burung, penggerek batang, dan/atau wereng?

5. **Serangan penyakit**
   Bapak-bapak sekalian, apakah ada ide atau usulan yang lebih baik dan efektif untuk memberantas penyakit pada tanaman padi yang bapak-bapak miliki?

6. **Tenaga kerja**
   Bapak-bapak sekalian, apakah ada usulan mengenai kurangnya tenaga kerja laki-laki di desa Mulyoarjo ini?

7. **Penjualan gabah**
   Bapak-bapak sekalian, apakah mungkin setiap kali habis penen padi maka anggota kelompok tani Mulyo 2 menjual gabah mereka sebagian saja dan yang sebagian lagi untuk konsumsi anggota keluarga mereka sendiri? (supaya ada keseragaman)

B. Sumber mata pencaharian tambahan

Bapak-bapak sekalian, apakah mungkin kalau setiap anggota kelompok tani Mulyo 2 mempunyai sumber mata pencaharian lain selain menam padi?

C. Warna sari

1. Pelatihan apa yang diperlukan bagi anggota kelompok tani Mulyo 2?
2. Bagaimana peran PPL?
3. Bagaimana dengan bantuan pemerintah untuk pengadaan:
   - Bibit
   - Pupuk
   - Obat-obatan
4. Apakah mungkin membentuk tabungan kelompok tani?
5. Bagaimana dengan peran generasi muda di desa Mulyoarjo ini untuk ikut bertani?
6. Dipersilahkan Bapak-bapak untuk menyampaikan apabila ada hal lain yang ingin disampaikan

VITAE

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Educational Attainment

Degree	Name of Institution	Year of Graduation
Master of Science	The University of Kassel, Germany	2006
Magister of Management in Agribusiness	Bogor Agricultural University, Indonesia	1996
Stratum One in agriculture	Satya Wacana Christian University, Saltiga, Indonesia	1994

Scholarship Awards during Enrolment

Thailand's Education Hub for Southern Region of ASEAN Countries (TEH-AC)

Work – Position and Address

Lecturer for Mount Hope Chritian Institute, Tawangmangu, Central Java, Indonesia

List of Publication and Proceeding

R. W. Sibarani and B. Somboonsuke; *Comparison of Organic and Conventional Paddy Farming: Study in Two Villages in Malang District, Indonesia*; Proceeding of The 4th International Conference on Green Agro-Industry; Yogyakarta; Indonesia; October 22 – 23th, 2019

R. W. Sibarani; *Farmer's Motivation Factors to Plant Rice Using Organic or Conventional Farming System*; Master Thesis; LAP Lambert Academic Publishing; Germany; 2013: https://www.amazon.com/Farmers-Motivation-Factors-Organic-Farming/dp/365942773X