

ANALYSIS OF THE LEVEL OF LIVELIHOOD ASSETS OWNERSHIP OF FARMERS IN CONVENTIONAL AND ORGANIC PADDY FARMING IN TWO ADJOINING VILLAGES

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Abstract: Indonesian farmers can achieve sustainable livelihoods through organic farming. However, conventional farming is still the major agricultural application in Indonesia. Currently, there is little knowledge about the level of livelihood assets ownership by farmers between organic and conventional paddy farming to achieve sustainable livelihoods. This study is an initial comparison of the level of livelihood assets owned by organic and conventional paddy farmers. 34 conventional farmers from the Mulyo 2 farmer group and 32 organic farmers from Sumber Makmur 1 farmer group in East Java province were recruited as respondents. By using Sustainability Livelihood Analysis, it was found that human capital was at the same level between both farmer groups. The level of natural capital owned by respondents in the Mulyo 2 farmer group is higher than in Sumber Makmur 1. The level of financial, physical, and social capital for respondents in the Mulyo 2 farmer group was lower than in the Sumber Makmur 1 farmer group. It concludes that natural capital is the determinant to achieve sustainable livelihood by respondents in the Sumber Makmur 1 farmer group. Meanwhile, financial, physical, and social capital are the determinants to achieve sustainable livelihoods in the Mulyo 2 farmer group.

Keywords: Sustainable livelihoods, organic farming, conventional farming, livelihood assets.

Introduction

Several studies of sustainable livelihood have been conducted to investigate the ability of organic farming to fulfil farmers' livelihoods. Sherief and Aravindakshan (2010) stated that organic farming provided a mechanism of sustainable livelihood. In addition, it was able to increase the livelihoods of peasants (Altenbuchner *et al.*, 2014) and according to Udin (2014), the application of organic farming could support the sustainable livelihoods of smallholder farmers. Moreover, Sihombing and Lingga (2017) found that the improvement of sustainable livelihood can be successfully achieved through organic farming. However, the implementation and development of organic farming in Indonesia is still limited even though the Indonesian Ministry of Agriculture undertook programs to promote and aid organic farming development. Two projects, named "Go organic" and "Development of 1,000 organic farming villages" were launched in 2010 and

2015, respectively. However, there were only 251,619 hectares of organic agricultural land in Indonesia, which was only 0.4% of the total agricultural land in 2019 (Willer *et al.*, 2021). This indicated that conventional agriculture was the major agricultural application in Indonesia.

The implementation of conventional farming in Indonesia is in accordance with Indonesian government policy: Law of the Republic of Indonesia Number 18 of 2012 regarding food security. This policy states that the Indonesian government has the responsibility to provide sufficient food availability, locally, and nationally, which is accessible to every individual equally in the entire territory of the Republic of Indonesia. In this regard, according to Sardiana (2017), the aim of conventional farming is to obtain maximum agricultural production by utilising modern technologies such as high-dose synthetic chemical fertilisers and pesticides

with no or little input of organic fertilisers. Furthermore, the Ministry of Agriculture implemented a plan to enhance food production called *Upaya Khusus Padi, Jagung, dan Kedelai* (UPSUS PAJALE) in 2015. The objective of this plan was to enhance the production of rice, corn, and soybeans by providing chemical fertilisers and pesticides to farmers. Through this program, Indonesia became a self-sufficient country with a surplus in rice production for five consecutive years as presented in Table 1 (Kementerian Pertanian Republik Indonesia, 2022; Rusmad, 2022). East Java province was the largest rice producer, producing 9,944,538 tonnes of rice in 2020 (Badan Pusat Statistik, 2022).

Table 1: Surplus in rice production

Year	Rice Production in Million Tonnes
2017	13.81
2018	4.37
2019	2.38
2020	1.97
2021	1.30

Despite the ability to generate maximum agricultural production, conventional farming has negative effects on the environment. A study by Liambo *et al.* (2020) confirmed the negative effects of the overuse of chemical fertilisers and pesticides in conventional agricultural methods. Over time, chemical fertiliser usage decreases soil productivity while pesticides are harmful to the balance of the ecosystem. This issue was brought up by Salim (2020) who highlighted the relation between conventional agriculture and declining environmental biodiversity. Moreover, it also affected the genetic diversity of flora and fauna which are the main capitals for sustainable agriculture. In order to successfully implement the government policy that ensures food security, most Indonesian paddy farmers employ conventional farming. Nevertheless, the sustainable livelihoods of farmers are still an issue until today despite the importance of organic and conventional farmers.

Ibrahim *et al.* (2018) revealed that the achievement of sustainable livelihood is influenced by the ownership of livelihood assets. Jaka and Shava (2018) defined livelihood assets as the means of production for a society to produce material resources for survival. DFID (1999) stated that livelihood assets consist of human capital, namely skills, knowledge, and capability to work as well as good health to enable people to create secure livelihoods; natural capital, namely natural resources useful for livelihoods; financial capital, namely the financial resources (the availability of cash or equivalent) to achieve livelihood goals; physical capital, namely the basic infrastructure and producer goods that are needed by people to support livelihoods; and social capital, namely the social resources that are utilised by people to achieve their livelihood goals (Table 2). In this regard, the assets play an important role in generating and preserving desired livelihood outcomes (Munanura *et al.*, 2021) that increase well-being (Tang *et al.*, 2013). It is clear that the ownership of livelihood assets by farmers in organic and conventional farming and its utilisation to generate and preserve livelihood outcomes will not only increase their well-being, but also lead them to achieve sustainable livelihoods. Therefore, livelihood asset ownership by farmers in organic and conventional farming is a determinant of achieving sustainable livelihoods.

However, little is known about the relationship between the level of livelihood asset ownership with the achievement of sustainable livelihood, especially livelihood assets owned by conventional and organic paddy farmers. Additionally, there are few studies that compared the ability of conventional and organic farmers to obtain sustainable livelihoods based on the level of their owned and accessed livelihood assets. This study aims to investigate the level of livelihood assets ownership of conventional and organic farmers and its effect on achieving a sustainable livelihood. Thus, the knowledge obtained from this study can be used as a reference to enhance paddy farmers' livelihoods.

Materials and Methods

Figure 1 shows the flow chart of the research methodology.

This study was conducted in East Java province, Indonesia. Two villages, Mulyoarjo and Sumber Ngepoh, which have the highest population of paddy farmers among villages in East Java were selected as research areas. These villages are adjoining hamlets in Malang district, East Java province, Indonesia (Figure 2). Two farmer groups in Mulyoarjo village, Mulyo 1 and Mulyo 2 cultivate paddy using conventional techniques. They utilise chemical fertilisers

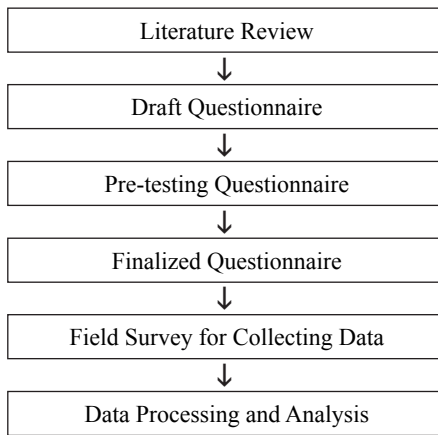


Figure 1: Flow chart of research methodology

and pesticides to maintain their paddy plants and gain maximum harvest. Meanwhile, most farmers in Sumber Ngepoh village, Sumber Makmur 1 and Sumber Makmur 2 plant paddy organically. They use organic fertilisers such as animal manure or compost, and apply organic pesticides to repel or eliminate pests. Several members of the Sumber Makmur 2 farmer group cultivate their paddy fields conventionally and semi-organically. Semi-organic farming still utilises chemical pesticides for pest control and uses a smaller amount of chemical fertilisers in addition to organic fertilisers.

Respondents in this study were 38 farmers from Mulyo 2 and 35 farmers from Sumber Makmur 1. To determine the sample size from a known (finite) population, this study utilised the formula from Krejcie and Morgan (1970) as presented in Equation 1.

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

where:

s = Required sample size

X² = The table value of chi-square for 1 degree of freedom at the desired confidence level (1.960 x 1.960 = 3.841)

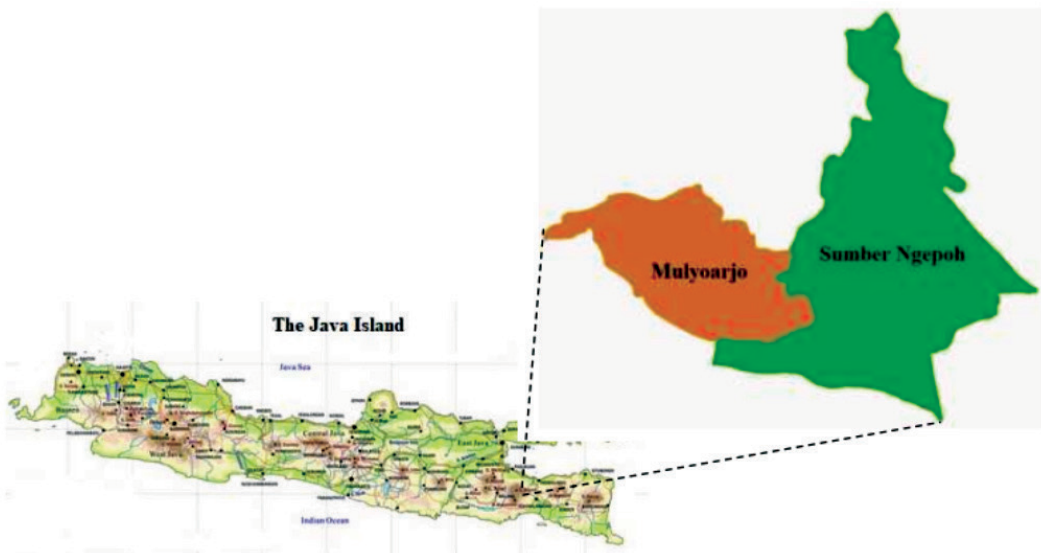


Figure 2: Map of the adjoining villages, i.e., Mulyoarjo and Sumber Ngepoh villages

- 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)

The biggest farmer group were 34 conventional paddy farmers from Mulyo 2, Mulyoarjo village. Meanwhile, 32 members from the Sumber Makmur 1 group were selected as respondents for organic farming. Data were collected by direct interviews using structured questionnaires.

The category of data from each livelihood asset indicator was normalised to generate an index value by using the index-value formula (Fernando, 2011) as shown below:

$$IV_x = \frac{(AV_x - MinV_x)}{(MaxV_x - MinV_x)} \tag{2}$$

where:

- x = Score value given by each respondent to the livelihood asset 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

The index value of each livelihood asset was used to calculate its composite index value by using the formula:

$$CIV_x = \frac{\sum_{x=1}^n IV_x}{N} \tag{3}$$

where:

- CIV_x = Composite index of IV_x
- IV_x = Index value of x
- N = Total number of respondents

Then, each composite index value was calculated into asset value by using the equation:

$$AV = \frac{\sum_{x=1}^n CIV_x}{R} \tag{4}$$

where:

- AV = Asset Value_x
- CIV_x = Composite index of IV_x
- R = Total number of CIV_x

The asset values were presented as decimals with a range of 0 to 1, which were then plotted into the radar chart, which then generated a pentagon shape. There are two plots of asset value that are put on one pentagon. One plot represents conventional livelihood capital assets and another represents organic livelihood capital assets. The position of each value asset in each pentagon presents visually the information

Table 2: Livelihood assets and its indicators

Livelihood Assets	Indicators	References
Human capital	a. Education level	Ndeilenga (2013)
	b. Health status	UNDP (2017)
	c. Labour resources	Rakodi (2002)
Natural capital	a. Preparing land for planting	DFID (1999)
	b. Water availability	Nicol (2000)
Financial capital	a. Savings	DFID (1999)
	b. Cash at hand	Goodwin (2007)
	c. Liquid assets, namely livestock	FAO (2006)
Physical capital	a. Road in the village	DFID (1999)
	b. Fertilisers	Serrat (2017)
	c. Medical clinics and hospital	Thái (2018)
Social capital	a. Social relationship	Krantz (2001)
	b. Participation in collective activities	Abenakyo <i>et al.</i> (2007)
	c. Procedures	Krishna (2000)

about the ownership (owned and accessed) of livelihood assets by farmers in conventional and organic 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 centre point of the pentagon, where the lines meet, represents zero access to assets while the outer perimeter represents maximum access to assets.

Results

The results of the study compared each indicator of capital as a part of livelihood assets owned and accessed by respondents in the Mulyo 2 and Sumber Makmur 1 farmer groups (Table 3). The educational level, as an indicator of human capital, of respondents in the Mulyo 2 farmer group is higher than in the Sumber Makmur 1 farmer group. This is because some respondents in the Mulyo 2 farmer group graduated from high school or completed three years diploma and bachelor's degree programmes. Some respondents in the Sumber Makmur 1 farmer group never went to school or graduated from elementary or junior high school. In terms of health, respondents in the Mulyo 2 farmer group have better health than respondents in the Sumber Makmur 1 farmer group. More respondents in

the Mulyo 2 farmer group reported being rarely sick compared with respondents in the Sumber Makmur 1 farmer group. For the last indicator of human capital, respondents in the Mulyo 2 farmer group employed more labour outside of their families than in the Sumber Makmur 1 farmer group.

The soil in the paddy fields owned by respondents in the Mulyo 2 farmer group was more difficult to cultivate than the fields owned by respondents in the Sumber Makmur 1 farmer group. On the other hand, respondents in the Mulyo 2 farmer group had more water available to them to water their fields compared with respondents in the Sumber Makmur 1 farmer group.

For financial indicators, some respondents in the Mulyo 2 farmer group were not independent and reliant on outside financing for their farms. Some of them were in debt to the middleman to finance their paddy farming. However, all respondents in the Sumber Makmur 1 farmer group are financially independent. It is found that many used their savings to fund their paddy farming. Therefore, respondents in the Mulyo 2 farmer group faced uncertainty in financial capital, both in availability and amount to finance their paddy farming as compared to

Table 3: Indicators of livelihood assets and values

Livelihood Assets	Indicators	Mulyo 2	Sumber Makmur 1
Human capital	(a) Education levels:		
	• Low educational level	82.36	100.00
	• High educational level	17.64	0.00
	(b) Respondents' health:		
	• Getting sick often	2.94	0.00
	• Getting sometimes sick	14.70	43.75
	• Rarely sick	70.59	37.50
	• Healthy	11.77	18.75
	(c) Employing labour outside of respondent family:		
	• Not employ	0.00	0.00
• Sometimes employ	5.88	12.50	
• Employing	94.12	87.50	
Natural capital	(a) Processing of farm soil:		
	• Hard	2.94	0.00
	• Moderately	32.35	28.13
	• Easy	64.71	71.87

	(b) Availability of water to water paddy field:		
	• Not available	0.00	0.00
	• Available enough	14.70	37.50
	• Abundant	85.30	62.50
Financial capital	(a) Source of financial:		
	• Own savings	70.59	100.00
	• Be in debt to <i>tengkulak</i> (middleman)	29.41	0.00
	(b) Financial availability:		
	• Not available	0.00	0.00
	• Sometimes available	14.71	3.13
	• Available	85.29	96.87
	(c) Ownership of livestock:		
	• Having	55.88	100.00
	• Do not have	44.12	0.00
Physical capital	(a) Road condition in village:		
	• Bad	8.82	3.12
	• Average	61.77	34.38
	• Good	29.41	62.50
	(b) Access from paddy field to main road:		
	• Difficult	26.47	6.25
	• Moderately	32.35	37.50
	• Easy	41.18	56.25
	(c) Fertilisers availability:		
	• Not available	0.00	0.00
	• Sometimes available	23.53	21.88
	• Abundant	76.47	78.12
	(d) The availability and use of medical care facilities:		
• Community health centre	61.77	78.12	
• Hospital	38.23	21.88	
Social capital	(a) Having a relationship with other respondents:		
	• Difficult	0.00	0.00
	• Moderate	11.76	37.50
	• Easy	88.24	62.50
	(b) Following activity in the farmer group:		
	• Following	0.00	100.00
	• Do not follow	100.00	0.00
	(c) Procedures of administrative services in the head village office:		
	• Difficult	0.00	0.00
	• Moderate	32.35	37.50
• Easy	67.65	62.50	

respondents in the Sumber Makmur 1 farmer group. Besides that, only half of the respondents in the Mulyo 2 farmer group own livestock.

In terms of supporting infrastructure, the roads in Mulyoarjo village are not in good condition as compared to those in Sumber

Ngepoh village. Moreover, accessing the paddy field from the main road was more difficult in Mulyoarjo as compared to Sumber Ngepoh village. The availability of fertilisers in both villages is abundant. Most respondents in both villages have access to a community health centre.

Compared with respondents in the Sumber Makmur 1 farmer group, respondents in the Mulyo 2 farmer group have closer relationships among themselves, which facilitates discussions on farming problems such as pest and disease attacks on paddy plants, rate of paddy production, and fluctuations in paddy prices. Respondents in the Sumber Makmur 1 farmer group held regular activities that offered economic advantages to them. All respondents in both villages had easy access to basic social services provided by the office of the village head.

The livelihood asset values of respondents in the Mulyo 2 farmer group and Sumber Makmur 1 farmer group from the composite calculation of capital indicators are presented in Table 4.

The value assets were plotted onto a radar chart in the form of a pentagon as presented in Figure 3. The position of each plotted value asset in the chart visually presents information about the ownership and the ability to access the livelihood assets by respondents in each farmer group.

As plotted in Figure 3, respondents in the Mulyo 2 and Sumber Makmur 1 farmer groups owned the same level of human capital at a value of 0.34. Respondents in the Mulyo 2 farmer group owned natural capital at a value of 0.70 which is higher than the Sumber Makmur 1 farmer group ownership level at 0.68. For financial, physical, and social capital, the Mulyo 2 farmer group ownership values were 0.75, 0.48, and 0.46, respectively, which are lower than Sumber Makmur 1 farmer group’s values of 0.97, 0.56, and 0.79, respectively.

Discussion

Based on the results above, the following discussions are made based on the livelihood asset:

Human Capital

Mazibuko (2014) stated that the achievement of sustainable livelihoods can be realised through human capital. The human capital of a high level of formal education was not a major concern for

Table 4: Livelihood assets values of respondents

	Human Capital	Natural Capital	Financial Capital	Physical Capital	Social Capital
Sumber Makmur 1	0.34	0.68	0.97	0.56	0.79
Mulyo 2	0.34	0.70	0.75	0.48	0.46

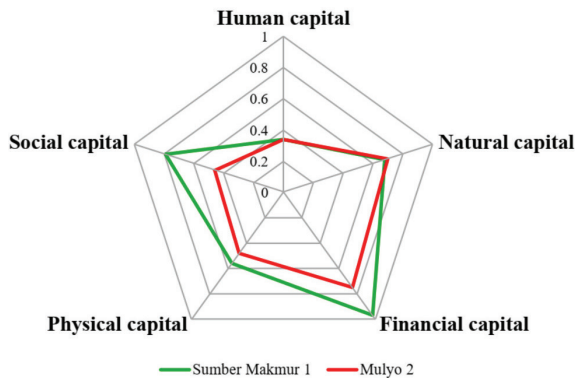


Figure 3: Livelihood asset values

most respondents, both in the Mulyo 2 farmer group and the Sumber Makmur 1 farmer group (Table 5). This can be attributed to their age (37 to 76 years old) and the need to meet family responsibilities. However, Olaye and Onajite (2015) argued that education is a way to achieve sustainable livelihood. Lawrence and Tate (1997) stated that informal learning is a suitable approach to attaining a sustainable livelihood and this can be a way for Mulyo 2 and Sumber Makmur 1 farmers to improve their knowledge and skills in order to achieve sustainable livelihoods. Ramjattan *et al.* (2020) found that farmers can get informal education through agricultural programs to solve their problems and improve their livelihoods. Therefore, visits by agricultural education officers to both farmer groups play an important role in helping the

respondents get informal education in achieving sustainable livelihoods. This is in agreement with the findings by Shah *et al.* (2013) who stated that education officers have a significant role in adding to farmers' knowledge, skills, and attitudes.

Health is part of human capital (DFID, 1999) and good health enables people to realise livelihood goals (Islam & Ryan, 2016). It is found that respondents in the Mulyo 2 farmer group are at higher risk of health problems due to their heavy use of chemical fertilisers and pesticides in their paddy fields. This is in agreement with studies by Mahyuni *et al.* (2017), Sharma *et al.* (2019) and Kombusadee and Kurukodt (2021) that found that heavy use of chemical fertilisers and pesticides exposes farmers to poisoning. Therefore, agriculture education officers need to

Table 5: Demographic data of respondents

Variables	Paddy Farming	
	Organic Respondents	Conventional Respondents
Age (years)		
30-39	-	1
40-49	5	4
50-59	15	11
60-69	10	13
70-79	2	-
Education level		
Dropout of elementary school	2	5
Graduate from elementary school	26	15
Graduate from junior secondary school	4	8
Graduate from senior secondary school	-	4
Diploma graduate	-	1
Undergraduate degree holder	-	1
Marital status		
Unmarried	-	1
Married	31	31
Widower	1	2
Size of family		
1	-	1
2	10	8
3	12	10
4	8	9
5	2	4
6	-	2

teach the respondents how to safely use chemical fertilisers and pesticides so that exposure to agrochemicals can be minimised.

Both farmer groups employ seasonal farm workers, which increases the cost of paddy production. To overcome this issue, Prayuginingsih *et al.* (2021) states that mechanisation can reduce farming costs. In this regard, the government can support mechanisation by assisting in the procurement of agricultural tools and machinery to respondents.

Natural Capital

Mumuni and Oladele (2016) stress that access to natural capital can help achieve sustainable livelihood goals, and Rota and Sidahmed (2010) asserted that livestock is one such natural capital. However, livestock owned by some respondents in the Mulyo 2 farmer group was not intended as a natural capital. They did not apply livestock manure as organic fertiliser in their paddy fields and instead used chemical fertilisers. Not using livestock manure as a natural capital in their paddy fields hindered their sustainable livelihood goals. Moreover, long-term application of chemical fertilisers will cause the soil to harden (Hartati *et al.*, 2014; Yulianingsih, 2014; Asriadi & Firmansyah, 2021) resulting in the need for more labour from outside the family to be hired to till the soil. As a consequence of their heavy use of chemical fertilisers, it is found that the Mulyo 2 farmer group hired more labourers to till the hardened soil compared with respondents in the Sumber Makmur 1 farmer group. The Sumber Makmur 1 respondents used their livestock towards their sustainable livelihood goals by applying the manure as organic fertiliser to their paddy fields. Dahlan and Darmansyah (2011) stated that organic fertilisers increase soil fertility and porosity, thus, making fields easier to till. As a consequence, there is less need for labourers from outside the family.

Paddy requires a lot of water (Sari, 2019). Water also regulates the temperature and humidity of paddy plants for optimum growth and yield (Fitriani, 2020). Respondents in the

Mulyo 2 farmer group used wastewater from the city of Lawang sub district such as from households, restaurants, or factories (tofu factories) to irrigate their fields. The large quantity of water used by Mulyo 2 farmers has the potential to leach chemicals from the fertilisers that are applied to the paddy fields. Chatzistathis *et al.* (2021) found that heavy irrigation can leach the nutrients (such as Nitrogen (N), Phosphorus (P), and Potassium (K) (Jaja & Barber, 2017) supplied by chemical fertilisers. Consequently, the leaching decreases harvests (Kuo *et al.*, 2012). To solve the issue, Ramadhan and Oktavyanti (2022) recommend that excess water in the paddy fields be drained to the sea.

Financial Capital

Mohammadi *et al.* (2021) concluded that financial capital has a positive impact on sustainable livelihood. Some respondents in the Mulyo 2 farmer group got into debt to finance their farms. To pay off the debt, the respondents sold conventionally grown paddy 0 at prices set by middlemen. This gives respondents in the Mulyo 2 farmer group less earnings as compared to respondents in the Sumber Makmur 1 farmer group. Respondents in the Sumber Makmur 1 farmer group sold organic paddy to the head of the Sumber Makmur 1 farming group. The price of organic paddy grain is determined under an unwritten, mutually agreed upon agreement among the respondents in their regular group meetings. The selling price of organic paddy is higher than conventional paddy. Thus, respondents in the Sumber Makmur 1 farmer group have the ability to save more money, which enables them to self-fund their farms and not use external financial sources such as debts from middlemen (Table 6). Kozera *et al.* (2016) found that savings are the base of capital accumulation for investment.

By going into debt with middlemen, the availability of financial capital for respondents in the Mulyo 2 farmer group is more uncertain as compared to respondents in the Sumber Makmur 1 farmer group, who used their savings

Table 6: Economic data of respondents

Variables	Paddy Farming	
	Organic Respondents	Conventional Respondents
Saving		
Have	32	24
Do not have	-	10
Livestock		
Have	32	19
Do not have	-	15

as financial capital. Not relying on external financial sources makes the respondents in the Sumber Makmur 1 farmer group more financially secure. Wulandari *et al.* (2017) emphasised that the availability of finance supports the production of agricultural commodities and raises income.

Livestock owned by some respondents in the Mulyo 2 farmer group and all respondents in the Sumber Makmur 1 farmer group are capital assets that can be sold if money is urgently needed. Alary *et al.* (2015) argue that livestock are a capital asset.

Physical Capital

De Satgé *et al.* (2000) state that physical capital enables people to realise livelihoods. As a part of physical capital, village roads can decrease transport costs, enabling farmers to obtain higher profits for their produce and purchase agricultural inputs and other consumer goods (Jouanjean, 2013) at lower prices. The condition of roads and footpaths that connect the respondents' paddy fields in Mulyoarjo village is relatively worse than in Sumber Ngepoh. Therefore, government assistance is needed to repair the main roads and the footpaths in Mulyoarjo village in order to support the Mulyo 2 farmer group in achieving their sustainable livelihood goals.

Serrat (2017) pointed out that fertilisers are a physical capital. Therefore, the procurement

of fertilisers by respondents in the Mulyo 2 and Sumber Makmur 1 farmer groups is critical in achieving an optimal level of paddy production. Chemical fertiliser applied by Mulyo 2 farmers in their paddy fields was subsidised by the Indonesian government that consists of urea, ZA, NPK, and TSP. Respondents purchased these chemical fertilisers at shops in Mulyoarjo village or the city of Lawang sub district. Adiraputra and Supyandi (2021) noted that scarcity of chemical fertilisers often precipitates price hikes and slow distribution of subsidised fertilisers. Buying fertiliser at inflated market prices is often not an option for cash strapped farmers and the tardiness of subsidised supply will throw off fertilisation schedules (Kautsar *et al.*, 2020). This will result in low productivity. Therefore, the local government should plan and oversee the distribution of subsidised fertilisers (Sulfikhyaminati, 2021). Respondents in the Sumber Makmur 1 farmer group do not face this issue because they use manure produced by livestock they own.

Health care facilities, as a physical capital, consist of *pusat kesehatan masyarakat* (community health centre) (Huda, 2018) and hospitals (Tansia, 2016). There is a *pusat kesehatan masyarakat* in Mulyoarjo village. This health centre is near all respondents' houses in Mulyoarjo and Sumber Ngepoh villages. Therefore, the respondents in the Mulyo 2 and Sumber Makmur 1 farmer groups chose to go to these health centres for their health problems.

Social Capital

The UNDP (2017) states that social capital allows people to reach sustainable livelihoods. Further, Thomas *et al.* (2020) found that social relations among farmers are vital to knowledge development and sharing. The ease of establishing relationships among respondents in the Mulyo 2 farmer group is built from the intense communication and sharing among respondents when faced with problems, like the scarcity of chemical fertilisers, the hard attacks of *wereng* (*Nilaparvata lugens*) and the unstable price of paddy grain. However, not all problems can be solved amongst themselves and sometimes they need an external party, namely the government to help them. Therefore, respondents in this farmer group have a high dependence on the government to achieve sustainable livelihood.

Nguyet (2002) noted that farmers helped each other gain more economic advantages. Respondents in the Mulyo 2 farmer group did not conduct activities that gave economic advantages to them. Respondents in the Sumber Makmur 1 farmer group, however, follow a practice called *arisan* (social gathering) (Table 7). The *arisan* is where money is collected and a draw is held to determine which member of the farmer group will receive the accumulated funds. The draw activity is carried out until all members have had their turn. By using the money earned from the *arisan*, each member of the farmer group can build their own house and some members can start a new business. The *arisan* not only strengthens social relationships but also helps members collect money in a disciplined manner to meet their daily needs, invest, or open a new business. Thus, respondents in this farmer group are able to achieve sustainable livelihood by themselves.

The Regulation of the Minister of Villages, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia Number 11 of 2019 and Number 6 of 2020 declare that basic social services in villages, which are carried out by the office of the village head, include transportation, health, education, and agriculture. DFID (1999) states that to enhance sustainable livelihoods of poor societies is by means of improving access to education and health, natural resources (services to those involved in agriculture), as well as infrastructure (affordable transport). Therefore, the ease for the respondents in the Mulyo 2 and Sumber Makmur 1 farmer groups in accessing the basic social services provided by the office of the village head plays an important role in helping them to achieve sustainable livelihood goals.

Based on the explanations above, there are several policies that can be published by the government of Malang regency to improve the sustainable livelihood of farmers:

1. Increase the frequency of agriculture education officers visiting Mulyoarjo village to provide direction, guidance, and counselling to the respondents in the Mulyo 2 farmer group about the safe use of chemical fertilisers and pesticides and also how to mechanise their paddy farming.
2. Repair the main roads in Mulyoarjo village and also the footpaths that connect the respondents' paddy fields to the main road.
3. The Agriculture Office in Malang district should monitor the issue of fertiliser scarcity in Mulyoarjo village.

Table 7: Social data of respondents

Variables	Paddy Farming	
	Organic Respondents	Conventional Respondents
Following <i>Arisan</i> activity		
Following	32	-
Do not have	-	34

4. Encourage each respondent in the Mulyo 2 farmer group to follow activities in their farmer group.
5. Facilitate the respondents in the Mulyo 2 farmer group who want to shift to organic paddy farming by providing livestock assistance through government grants.

Implementation of all these policies must be carried out by all stakeholders in the structure of the Malang district government, namely the regent, the head of the department of agriculture, the head of public works and housing, the head of sub district, the head of village, and also respondents in farmer groups in Sumber Ngepoh and Mulyoarjo villages. Thus, the efforts to achieve the sustainable livelihood of farmers can be carried out in a coordinated manner.

Conclusion

The level of natural capital owned by respondents in the Mulyo 2 farmer group is higher than in the Sumber Makmur 1. While, the level of financial, physical, and social capital for respondents in the Mulyo 2 farmer group was lower than in the Sumber Makmur 1 farmer group. Other studies confirmed that ownership of natural capital in organic farming and the ownership of financial, physical, and social capital in conventional farming are at a low level to be able to achieve sustainable livelihood. This comparative study is an early investigation of the level of livelihood asset possession of conventional and organic farmers. However, the length of the questionnaire used in this study caused respondents to lose interest.

The low level of ownership of natural capital by respondents in Sumber Ngepoh 1 farmer group and financial, physical, and social capital by respondents in Mulyo 2 farmer group indicates that natural capital is the determinant to achieve sustainable livelihoods for respondents in Sumber Ngepoh 1 farmer group and financial, physical, and social capitals are the determinant to achieve sustainable livelihoods for respondents in Mulyo 2 farmer group. In

this regard, respondents in Sumber Ngepoh 1 farmer group and Mulyo 2 farmer group are recommended to maximise the capitals that are at a low level of ownership and we suggest future research should look into this.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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