Social capital in agricultural irrigation management of "*RBUMDES Mursapa"*

Modal sosial dalam pengelolaan irigasi pertanian "RBUMDES Mursapa"

Rustinsyah
Department of Anthropology, Faculty of Social and Political Sciences, Universitas Airlangga
Address: Jalan Dharmawangsa Dalam, Surabaya, East Java 60286
E-mail: rustinsyah@fisip.unair.ac.id

Abstract

Peasants in Plandirejo Village who live along the Bengawan Solo River use river water for agriculture. To distribute river water to agricultural land use the pump. It needs to be managed together so that it can be used properly. *RBUMDES Mursapa* as an institution that has succeeded in managing agriculture in Plandirejo Village. The role of social capital as one of the factors causing success in managing agriculture. Social capital is a network of elements of stakeholders involved in achieving the same goals. Therefore, qualitative research was conducted from June 2016 to July 2017 by collecting data through observation, interviews and FGD (Focus Discussion Group) with stakeholders managing agriculture. The purpose of the study is to describe social capital in irrigation management and its consideration of the sustainability of agricultural activities in the village. The results of this study are: a) social capital has an important role to succeed in managing agriculture; and b) agricultural development planning between the sustainability of agriculture and the development of communities in the village such as agricultural production which is quite high, in the agricultural and non-agricultural sectors, and provides support for national agricultural improvement programs. The impacts of the success of *RBUMDES Mursapa* include: a) contributes to rural development and accommodates the activities of village government; b) to mobilize rural farming activities; c) open up employment for male and female.

Keywords: agricultural irrigation; management; community development; river bank

Abstrak

Petani di Desa Plandirejo yang tinggal di sepanjang sungai Bengawan Solo menggunakan air sungai untuk irigasi pertanian. Untuk mendistribusikan air sungai ke lahan pertanian dengan menggunakan pompa. Untuk itu air perlu dikelola bersama agar dapat didistribusikan dengan baik. RBUMDES Mursapa sebagai lembaga telah berhasil mengelola irigasi pertanian di Desa Plandirejo. Peran modal sosial sebagai salah satu faktor penyebab keberhasilan dalam mengelola irigasi pertanian. Modal social merupakan jaringan elemen stakeholder yang terlibat kerjasama untuk mencapai tujuan yang sama. Keberhasilan tersebut membawa dampak terhadap keberlanjutan kegiatan di pedesaan. Oleh karena itu, dilakukan penelitian kualitatif pada bulan Juni 2016 hingga Juli 2017 dengan pengumpulan data melalui obeservasi, wawancara dan FGD (Focus Discussion Group) terhadap stakeholder yang mengelola irigasi pertanian. Tujuan penelitian adalah mendeskripsikan modal sosial dalam pengelolaan irigasi dan dampaknya terhadap keberlanjutan kegiatan pertanian di desa. Hasil penelitian ini adalah: a) modal sosial mempunyai peran penting untuk keberhasilan mengelola irigasi pertanian; dan b) dampak pengelolaan irigasi antara lain keberlanjutan pertanian dan pembangunan masyarakat desa seperti produksi pertanian yang cukup tinggi, membuka peluang kerja di sektor pertanian dan non-pertanian, dan memberikan dukungan terhadap program ketahanan pangan nasional.

Kata kunci: *irigasi pertanian; pengelolaan; pengembangan masyarakat; pinggiran sungai; social capital*

Introduction

Water is a key element in paddy agricultural system. Problems related to water become crucial issues in economic, political, and social debates (El Chami et al. 2011). Generally, the problems are related to water scarcity (Yang et al. 2013), population and economic growth (Alcamo et al. 2007), trade and food production (Kasaai 2014), competition in obtaining water and water management systems (De Fraiture & Wichelns 2010).

As Indonesia experiences two seasons, which are dry and wet (rainy) seasons, rainfall in Indonesia fluctuates throughout the year. Floods happen in some areas during the rainy season and droughts

happen during the dry season. According to Wu et al. (2013), because of climate change, hydrology variations such as rainfall, evaporation, runoff, and soil moisture will change in terms of time, distribution, and duration. Furthermore, as Brownlee et al. (2014) describe, climate change has increased the pressure on water resources. This becomes a challenge in the distribution of water to users or consumers living along the river basin.

Agricultural irrigation in villages on the river basin of Bengawan Solo relies on river water taken and distributed by using pumps. Some of the problems faced are related to the distribution of water, procurement of water pumps, and the operational costs. Even in areas close to the river, the water overflows, resulting in floods. In the dry season, the volume of water in the river decreases. Therefore, the river water should be managed to fulfil the water needs. To overcome the issue of water demand for irrigation, it is necessary to develop irrigation management system by involving the local community, which is called the Development of Participatory Irrigation Management System (*Pengelolaan Sistem Irigasi Partisipatif* or *PPSIP*). Thus, the Empowerment of Water User Farmers (*Pemberdayaan Perkumpulan Petani Pemakai Air* or *P3A*), also known as Water User Association (*Himpunan Petani Pemakai Air* or *HIPPA*).

HIPPA-WUAs is an irrigation management organization at village level. The legal basis of the organization has been set in law. Example: Provincial Government Regulation of East Java Province No.3 Year 2009 on irrigation. Further, the regulation is used as a reference in the implementation and management of irrigation networks in the villages. In Plandirejo Village, irrigation management system is run by *RBUMDES (Rencana Badan Usaha Milik Desa) Mursapa*. *RBUMMDES* is a plan village-owned enterprise that manage agricultural irrigation in the Village.The management system is regulated in Regulation of Plandirejo Village No.01 Year 2016 and No.2 Year 2016. Therefore, this article discusses how agricultural water management system is implemented by *RBUMDES Mursapa* to support the sustainability of agricultural business. It also explores factors which can support or hamper the sustainability of the irrigation management, and the impact of the agricultural irrigation management toward the sustainability of agricultural activities and development of rural community.

The use of water for agricultural irrigation in villages on Bengawan Solo river basin is considered beneficial for sustainable agriculture development. According to Edquist (1985), in order for the development to be productive, farmers must be involved in the implementation of the technology. Further, that elements linking technology and the social position of farmers are: a) farmers' interest toward the products of the technology; b) technology suitable with the capacity of the farmers organization; c) technology compatible with farmers' financial ability; d) technology compatible with farmers' access to land, input, and technical supports; and e) technology in accordance with farmers' knowledge of management (how to operate, maintain, and improve).The farmers have various methods for meeting their water need. In order to consider the elements, Association of Water User Farmers or *HIPPA* was established. The names of organizations or institutions which manage agricultural irrigation vary, for example the Association of Water User Farmers Subak in Bali. *HIPPA* is an organization of water user farmers that is social, economic, and cultural oriented; it is based on the principle of *gotong royong* (reciprocity or mutual aid). *HIPPA* can be categorized into 4 types: a) association of water user farmers; b) groups of associations of water user farmers; c) parents of associations of water user farmers; and d) *HIPPA* federation.

HIPPA as a water management institution is responsible for distributing water for farming in its areas. Farmers as members of the institution provide economic and social supports for the sustainability of the organization. According to World Bank, there are five principles for establishing *HIPPA* or Water User Association (WUAs), namely: 1) sufficient and reliable water supply; 2) WUAs managed hydraulically; 3) leaders selected by WUAs management and decision making should be made by farmers; 4) water which is filled up volumetrically (not in accordance with the land area); and 5) WUAs having a right to collect water fee (Wang et al. 2010)

RBUMDES Mursapa as an action institution established by the village government for managing water irrigation (Regulation of Village Government No.1 and 2 Year 2016) has a function similar to

Water Users Association. Irrigation water management requires operational funds and involves both internal and external stakeholders. The funds are required for the procurement of pump technology, operational cost, fuel, and fee for the management. Stakeholders in a network can participate, working together so that water distribution can run smoothly. Participation, cooperation of stakeholders to achieve the main goal, is called social capital.

The reasons for using social capital approach in relation to communitarian benefits generally focus on structural approaches, such as network connections and group size (Ballet et al. 2007). According to Bourdieu (1986), social capital is a set of resources and potentials in a social network that are recognized together to achieve a goal. Meanwhile, according to Putnam et al. (1997) say that social capital has several elements, namely trust, norms that regulate elements in the network in order to increase efficiency and collective initiative in social organizations. Social capital has several dimensions: civic participation, social networks and social support, social participation, reciprocity and trust, and local area views (Foxton & Jones 2011). While, Granovetter (1973) has identified that social capital comprises social relationships in a network; some natures of the relationships are weak and some others are strong in terms of the function.

Fukuyama (1995) asserts that social capital is necessary for successful development, but a strong rule of law and basic political institutions are necessary to build social capital. Another term, called a hybrid social capital is the integration of bonding, bridging, and linking social capital which has a role in the management of subsidized fertilizer in Pelem Village, Pare Sub-district, Kediri Regency, East Java Province, Indonesia (Rustinsyah 2015). In Michellini's (2013) research, social capital is regarded as substance device for providing services and investigation of local social economic developments. Social capital is a network of social relations which has the function of a coordinated social organization to enhance collective initiatives. The function and role of elements in a network are in the form of actions in participating, supporting, and mutual exchange cooperation followed by norms and trust between one another to achieve certain goals.

There are two aspects of how social capital functions for development projects: first, substantial interdependence of the network elements in the region (Flora 1998, Moulaert & Nussbaumer 2005); second, sometimes, the facts form a vicious circle that can only be resolved through proper diagnosis in local situations. In irrigation water management, social capital is important for the maintenance of irrigation networks, coping with natural disasters (floods, droughts) that are not easy to predict and other issues related to water demand for irrigation. The government has a responsibility to maintain the procurement of irrigation networks as stipulated in the Government Regulation No.23 Year 1982 on irrigation, particularly in Chapter 2, articles 2 and 3. Article 2 states that Irrigation water, irrigation networks, and the complementary structures in tertiary plots, village irrigation or Subak are managed by water user farmers or village or Subak under the guidance of the Regional Government in view of the provisions of this Government Regulation. Further, article three explains that irrigation water, irrigation networks, and their complementary structures constructed by legal entities, social bodies, or individuals for the purposes of business are managed by legal entities, social bodies, or individuals by considering the provisions of this Government Regulation.

Damages of irrigation networks, floods, and damages of pumps can occur any time, and should be overcome immediately so as not to disrupt the distribution of water. The local managing institutions are expected to solve the problems. Putnam (1997) coined the concept that civic engagement and social interconnection are practical prerequisites for school construction, safer roads, faster economic growth, more effective government, and even healthier lives. Some empirical studies (cf. Bhuiyan 2005, Fukuyama 2000, Krishna 2002, Philips 2002, Putnam 1993) prove the tendency of the role of social capital for collective actions and mutual benefits, derived from the quality of relationships between individuals in a particular group or community.

The important role of social capital in a community tends to give maximum results in a collective action; government will be more efficient, democracy will flourish, and citizens will become healthier (Roßteutscher 2010). Several other studies have highlighted the importance of social capital in

development, such as the importance of social capital in economic development (Fukuyama 1995, Sabatini 2007); community peace (Bhuiyan 2005); social entrepreneurship (Hasan 2005); class mobilization (Heller 1996); environmental management (Bhuiyan 2005, Carpenter et al. 2004); management of natural resources (Nath et al. 2010); civil activity (Deshi 2000); democratic participation (Krishna 2002); and implementation of subsidized fertilizer in one village in Java (Rustinsyah 2015).

Research Method

This study was conducted at *RBUMDES Mursapa*, an agricultural irrigation institution in Plandirejo Village, Plumpang District, Tuban Regency, East Java, Indonesia, from June 2016 to July 2017 using the qualitative approach. The study focuses on the water management of *RBUMDES Mursapa* and its implications for agriculturalsustainability and community development in Plandirejo village.The village is located on the bank of Bengawan Solo River that passes through from Central Java to East Java. The Bengawan Solo drainage basin is a sub-basin of Begawan Solo upstream. Sub-basin of Madiun River and sub-basin of Bengawan Solo downstream are the sub-basin of Bengawan Solo upstream. The Sub-basin of Madiun River is 6,072 km^2 and the sub-basin of Bengawan Solo downstream is 3,755 km^2. Administratively, Bengawan Solo River covers 17 districts and three cities; the seventeen cities include Boyolali, Sukohardjo, Wonogiri, Blora, Rembang, Ponorogo, Madiun, Magetan, Ngawi, Bojonegoro, Tuban, Lamongan, Gresik, and Pacitan.

Downstream or estuary areas of Bengawan Solo become densely populated settlements, forming delta cities on Java, namely the city of Bojonegoro, Tuban, Lamongan and Gresik as the estuary of the river. Today, the estuary areas of Bengawan Solo often experience flood because of overflow, especially Bojonegoro, Tuban, and Lamongan. Similarly, villages on the edge of Plumpang Sub district, Turban, experience flood during the rainy season. The flood season usually starts from December to April. In May 2017, farmland in Plandirejo village close to the river was still flooded. Thus, pumps were operated to flow water from rice fields to the river.

Data for the research were collected through: a) observations; b) in-depth interviews with stakeholders in the board of *RBUMDES Mursapa* and other stakeholders outside the board, especially those related to water and farming issues such as the Water Resource Section of Public Works Department, farmer groups, village governments, and members of *RBUMDES Mursapa* as water user farmers; and c) Focus Group Discussion (FGD) involving members and administrators to obtain information on issues related to water distribution, stewardship, farming and other issues The data collection focuses on qualitative aspects related to the tasks, obligations, cooperation, and participation of stakeholders within the organization as well as outside the organization, especially those related to water and farming issues. *RBUMDES Mursapa* is one of implementing institutions of water management which develops well. Until March, it had collected cash balance of IDR 543,433,357which was deposited in Bank Rakyat Indonesia on behalf of the organization, *RBUMDES Mursapa*.

In the rainy season, Plandirejo Village, especially in moor (*tegalan*) which are agricultural areas near Bengawan Solo River, is flooded. Thus, water pumps are operated to flow water from the land to the river. In May 2017, agricultural land in the area was still flooded. However, rice was planted on agricultural areas far from the river in June, which was the first planting phase. The data analysis is intended to understand ethnographic data comprising transcripts of interviews with stakeholders, results of focus group discussion, research notes, annual reports, and observations. Data analysis was done through two stages: the first step is classifying data in the form of transcripts of interviews, research notes, and annual reports of *HIPPA* (*Himpunan Petani Pemakai Air* or Water Users Organization board). The second stage is interpreting the data, further developed as narratives in order to obtain information regarding the role of social capital.

Result and Discussion

Agricultural irrigation system of *"RBUMDES Mursapa"*

The agricultural irrigation system in this village uses water from Bengawan Solo River. For managing agricultural water, *RBUMDES Mursapa* was established. *RBUMDES Mursapa* has a board which is

regulated in the articles of the institution (*RBUMDES Mursapa*). The boardof *RBUMDES Mursapa* consists of Supervisory Board, Management Team, Field Technical Section, Technical Machine, Operator, Driver and Working Group. Village Head becomes the advisor of the institution. In addition, the board of *RBUMDES MURSAPA* also works together with farmer groups, Department of Agriculture, Water Resource Section of Public Works Department, and Bengawan Solo Watershed Officials (DAS-*Daerah Aliran Sungai*). The cooperation is to support the success of farming, which includes pest control/eradication, maintenance of irrigation networks, pumps and so on. *RBUMDES Mursapa* consists of 1138 water user farmers. To distribute water effectively, nine working groups were established.

The distribution of water is divided into two, namely: areas close to Bengawan Solo, which are *tlatah* or *tegalan* (dry-farming area) of approximately 70 hectares and distant areas of rice fields, approximately 150 hectares. To facilitate the distribution of water to agricultural land, it is divided into several blocks: a) *tlatah* or *tegalan* (moor) areas are divided into three blocks (blocks 14, 15, and 17) supervised by 3 persons; b) paddy field areas are divided into 6 blocks (blocks 1,2,3,4,5, and 6) supervised by 4 people. Supervisors are in charge of monitoring the needs of water service in the areas. The following table 1presents the types of blocks, supervisors, number of farmers, and farmland areas.

Table 1.
Block (Work Area), Supervisors,Agricultural Area of Plandirejo Village

Types of agricultural area	Number of supervisors	Number of farmers as members	Areas (hectare)
Moor (blocks 14, 15, & 17)	3	491	70
Paddy field (blocks 1,2,3,4,5, & 6)	4	847	150
Total	**7**	**1138**	**220**

Source: Data of *RBUMDES Mursapa* (2016)

Water from Bengawan Solo River is pumped to Plandirejo River. It takes 6 to 7 days to fill the river. From Plandirejo River, the water is distributed to secondary network, tertiary network, up to rice field andmoor (*tegalan*). Water distribution starts from the upstream area. After the rice field in the upstream is irrigated, the water gate is opened so that the water flows to the lowland. The opening and closing of the water gate are done by *Pokja* (*Kelompok Kerja*– Working Group). It takes 7 to 8 days to irrigate the whole rice field and *tlatah* or *tegalan* in Plandirejo Village.

For water irrigation, *RBUMDES Mursapa* has 21 diesel engines and 15 pumps: weight 20pk diesel engines, two D15 diesel engines, one D14 diesel engine, three *etek* diesel engines, and four FM D16 diesel engines. The *RBUMDES* also has two 6D pumps, six 8D pumps, five 10D pumps, one 12D pump, and one 14D pump. Figure1 shows the main water pumps in Bengawan Solo. The following is picture 1, about one of the pump used by the *RBUMDES Mursapa.*

Diesel and pump are maintained and managed by four operators. The main responsibility of the operators is to activate the suction and disposal pump. Maintenance of the machines and pumps is done when the planting season begins; pump checking is done every month, and engine repairs are done when there is damage or failure. At the time of planting preparation, *RBUMDES Mursapa* provides budget for machine and pump maintenance of IDR 15,000,000-20,000,000.

RBUMDES Mursapa has two types of main pumps, suction pump and disposal pump. The suction pump sucks water from Bengawan Solo which is then flowed to Plandirejo River, which is then channelled into farmers' fields. The disposal pump sucks water from the fields to be discharged into Plandirejo River during floods.

History of *RBUMDES Mursapa*

The local community of Plandirejo Village is familiar with irrigation system. The water source of the irrigation is Bengawan Solo River. The need for agricultural irrigation is increasing, which becomes

an opportunity for investors. From 1980 to 2000, irrigation in Plandirejo Village was managed by a businessman, Naman Haji (NH) from Bojonegoro Regency. Naman Haji provided facilities (pumps and other facilities) to support the agricultural irrigation. NH obtained 25% of the harvest. NH also got 10% of the income of the water user farmers. The collected fund was then used to repair roads and irrigation networks in Plandirejo. In 2000, NH granted the facilities (pumps and others) and management to the village government of Plandirejo.

Figure 1.
Water pumps from *HIPPA Mursapa* in Bengawan Solo River

From then on, the village government of Plandirejo has been managing the agricultural irrigation by using water from Bengawan Solo River. For managing the irrigation system, an institution was established, named *RBUMDES Mursapa*. It is located in the area of the paddy field of Plandirejo Village. Besides being used as a place for gathering, the office of *RBUMDES Mursapa* is also used for storing rice. The location of the office facilitates the transportation of yields to the *RBUMDES* office. Since 2010, agricultural irrigation in the village has been managed by *RBUMDES* Plandirejo. From 2000 to 2010 Plandirejo Village obtained 40% of the harvest. After the budget change in 2014, the percentage decreased. Plandirejo Village only received 30% of the harvest. The total area of agricultural land in Plandirejo Village is approximately 220 hectares. Farmland in Plandirejo Village consists of fertile soil (black soil) area of 150 Ha and swamp land (red soil) area of 70 Ha. In the fertile soil area (black soil), the cropping pattern is twice paddy and once crops. On the other hand, in the moor land area (red soil), the cropping pattern is only for paddy, twice a year. The farming business gets water supply from *RBUMDES Mursapa*, especially for paddy. The following table 2 indicates the planting and harvesting patterns of Plandirejo farmers.

Table 2.
Planting and harvesting patterns in Plandirejo Villages

Planting season	Harvesting season	Amount harvested	Area
June-July (planting season I)	September-October	10 tons per hectare	Rice field (*sawah*) Moor (*tegalan*)
October-November (planting season II)	December- January	6-7 tons per hectare	Rice field (*sawah*) Moor (*tegalan*)
February-May (planting corn, soybeans, watermelons, and melons).	February-May	-	Rice filed (*sawah*)

Source: Research Data (2017)
Note**:** Nothing was harvested in February to May because the paddy field was flooded

As Table 2 indicates, there are three farming schedules implemented by farmers in Plandirejo Village. Crops and horticulture plants grown by Plandirejo farmers are soybeans, corn, cucumbers, watermelons, cantaloupe, and many others. Planting season of crops and horticulture plants is from February to May for rice field. The crops and horticulture plants use rain water.

The pest problems faced by the farmers are rats and aphis plant. To overcome the problem of pests, the farmers work together with farmer groups and *RBUMDES Mursapa*. The methods to eliminate rats are: a) using *racumin* rat poison mixed with drops, rice, and cooking oil; all ingredients are mixed and then distributed in rice field. This is done during planting season and before harvest season. The cost of the rat exterminator is around IDR 5,000,000 for 150hectares land. The cost is paid by *RBUMDES Mursapa*; b) making an owl nest/house so that the owls hunt and eat the rats. The construction of the nest/house was done by both the farmers and *RBUMDES Mursapa*. Aphis plants are the most feared pests in Plandirejo Village. To eradicate plant hoppers, farmers use *postim* of dragon brand. One hectare of land requires two boxes, or around 20litres, which cost IDR 500,000, 00. The treatment is done twice during the planting season. The cost for eradicating the pest is paid by the farmers.

Social capital in management irrigation system

Based on the Regulation of Plandirejo Village No.01 and 02 Year 2016, *RBUMDES Mursapa* is the implementing institution of village government in agriculture for improving the welfare of the local community. *RBUMDES Mursapa* is led by the management and is under the village head. The organizational structure of *RBUMDES Mursapa* consists of: a) board of supervisor, b) management team, c) field technical section, d) mechanical Engineers, e) operators, and f) drivers and working groups. Every individual as a stakeholder who gets assignments and obligations in the organization needs cooperation in the organization and with stakeholders outside the organization related to agricultural irrigation management).

Head of village become the advisor of *RBUMDES Mursapa*. The responsibilities and duties are outlined in the village regulation. The budget/fund is collected from: a) consumer contributions in the form of percentages of crops; b) village revenue and expenditure budget; c) penalties; d) other legal businesses. The budget/fund is used for: a) operational costs of the organization; b) employees' salaries; c) other obligations; d) profit sharing. Members of *RBUMDES* are local farmers who use the irrigation water – quarters, irrigation pumps or rural irrigation. The farmers are no longer consumers of *RBUMDES Mursapa* if they do not use services of *RBUMDES Mursapa*.

Stakeholders of *RBUMDES Mursapa* work together, supporting each other in their duties, especially when serving consumers, that is distributing water and overcoming problems related to rice farming/ cultivation. Besides internal cooperation, the organization also cooperates with external stakeholders, such as farmers as consumers and other stakeholders under the government, such as farmer groups (*Kelompok Tani*), *PPL* (*Penyuluh Pertanian Lapangan* or Extension Farming Field from the Agriculture Department, and Public Works Department (*Dinas Pekerjaan Umum*) particularly the water resource section. Cooperation with villagers and water consumers are needed to accommodate the implementation of the mutual cooperation.

Usually, the supervisors and administrators of *RBUMDES Mursapa* control the irrigation network or channels once a week. The irrigation network of Plandirejo Village consists of: a) one primary network (suctioning water from Bengawan Solo to Plandirejo river), b) five secondary networks (irrigation system from primary network to rice field), and c) hundreds of tertiary networks (from secondary networks). The irrigation channels are cleaned once a month by involving farmers in the village according to the location of the networks. The work is also done even in the rainy season and when there is flood, so that the water overflow can be flown to the river.

Cooperation with stakeholders at the government level is intended to address issues related to farming, such as eradication of rice pests, subsidized fertilizer distribution and many others. For example, *RBUMDES Mursapa* obtained assistance for optimizing farmers' business activities. First, in 2016, *RBUMDES Mursapa* received assistance from the Agriculture Department of Tuban Regency in the form of planting machine. Secondly, in the same year, *RBUMDES Mursapa* received funding for building a 200-meter tertiary network/channel from Bengawan Solo River Basin. In 2017, *RBUMDES Mursapa* received compensation from Agriculture Office of Tuban Regency for following *HIPPA* competition in Bojonegoro.

The managers, employees who are members of the organization, receive payment after the harvest season and after they submit a report. The amount of the payment is stipulated in the AD/ART (articles of the organization). *RBUMDES Mursapa* gives salaries to the board members who are collected from the income of each harvest season. In the second harvest season, the revenue reaches IDR 442,977,065. The following table 3 indicates the payment received by the board members of *RBUMDES Mursapa* on phase II 2017.

Table 3.
Payment Received by the Board Members in Harvest Phase II 2016

Members receiving payment	Amount (IDR)
Head of supervisory board (1%)	3,567,403
Members of supervisory board (0.75) 2 people	5,351,105
Head of management team (2%)	7,134,806
Administration and finance staffs (1.85%)	6,599,696
Field staffs(1.85 %)	13,199,392
Engineers(1.4%)	4,994,364
Main Operator (1.3%)	5,351,105
Operators –(3 people)	18,550,496
Working group (1.15%) 7 people	28,717,595
Driver (0.85 %)	3,032,293
Operator of small diesel engine	1,500,000
Total	**97,998,255**

Source: Financial report phase II 2017

The amount of the payment for the board members and employees is influenced by the income of *RBUMDES Mursapa* from the harvest. Therefore, the managing stakeholders work together to provide maximum service in order to achieve high harvest/yields. In the dry season, the harvest can reach 10 tons per hectare, while in the rainy season; the yield reaches 6-7 tons. This is because in the rainy season, the water on the field is too much and more pests appear.

The membership fee of *RBUMDES Mursapa* shall be applied to farmers who grow rice. The amount of the fee is stipulated in the Articles of *RBUMDES Mursapa*. For rice fields, it is set 15% of the harvest. For *tlatah,* the fee is 17% because the land needs more water than paddy field. In the rainy season, block 1rice field is charged 12% due to frequent floods. In the second phase of harvest season of 2017, the revenue of *RBUMDES Mursapa* amounts to IDR 442,977,065 consisting of the harvest from *tlatah* of IDR 212,424,770 and the harvest yield of IDR 230,977,065.

The impact of agricultural irrigation management system

First, it contributes to rural development and accommodates the activities of village government. The following table 4 shows *HIPPA* revenue sharing. According table 4 indicates, the profit of *RBUMDES Mursapa* for managing irrigation in Phase II of 2017harvest contributes to the development of the village in the form of: a) contribution to development cost, maintenance of irrigation channel, pest control, rural governance activity etc. as much as IDR 54,080,420;b) profit to *RBUMDES Mursapa* amounting to IDR 138,111,470. So, the financial position (balance) of *RBUMDES Mursapa* becomes IDR 543,433,357. The money is deposited in Bank Rakyat Indonesia on behalf of the organization.

Second**,** successful management of agricultural water can mobilize rural farming activities because farmers in the village can plant three times a year: a) *palawija* and horticulture (February-May) forrice field ; b) paddy (June-October); and c) paddy (October - January). In the rainy season (January-April), the moor area is often hit by flood. In the dry season, from June to October, the harvest of rice

can reach 10 tons per hectare. However, during the rainy season, the harvest ranges from 6 to 7 tons per hectare, or even lower if floods occur. On the other hand, in the rainy season, there are rice pests. Table 4 indicates the harvest in season I and II in Plandirejo village.

Table 4.
The Realization of Income-*RBUMDES* (Phase 2, 2016) in IDR

Description	Income (IDR)	Expenditure (IDR)
Moor harvest	212,424,770	
Paddy harvest	230,552,295	
Fuel cost		86,236,750
Fees: • Head of BP • Members BP (2 people) • Head of management • Field technical staffs • Engineers (staffs) • Main operator • Operator • Working group • Driver		97.998.255
Operational Costs: • Fuel purchasing cost (IDR 4,349,500) • Cost of instruments and enginemaintenance (IDR 18,148,920) • Channel maintenance cost (IDR 980,000) • Pest eradication cost (IDR 5,855,000) • Inventory (IDR 6,407,000) • Development cost (IDR 3,550,000) • Service cost, consumption, transportation, car operational (IDR 10,105,000) • Unforeseen expenses (IDR4,685,000)		54,080,420
Harvest cost, channel compensation		66,550,170
Profit		138,111,470
Total	**442,977,065**	**442,977,065**

Source: Report of Profit, *RBUMDES Mursapa* (2017)

The harvest of paddy in Plandirejo Village in two harvest seasons can reach approximately 3460 tons. In Phase II, in the moor (*tegalan*) area near the river, there is a flood so that the yield decreases. According to the Head of the village chief, in 2015 there was a flash flood that failed the harvest. In addition, this village produces *palawija* and horticulture planted in February-May in the paddy field. The yields include corn or maize, soy or glycine max, fruits (watermelon or *citrullus lanatus*, melon or *cucumi melo*, and many others). Further, the horticultural products (fruits) can be harvested up to five times.

Third, the success in serving the needs of agricultural irrigation and harvest can open up employment opportunities in agricultural sector. The types of employment that absorb labour in rural areas include: a) male and female farmers in the agricultural sector. Farming activities three times a year (twice for rice planting and one time for horticulture) require many labours. Male labour rusually cultivate the land and harvest, while female farm workers plant paddy, harvest, and clean the grass in paddy fields. The farmers are generally those who occupy narrow/small land so that they can work as labours during their spare time. According to the report of *RBUMDES Mursapa*, the number of farmers in harvest season 2017 reached 1238 people. Thus, the number of labours absorbed in agricultural sector can be higher because it involves female labourers. The wages of the farm labourers in the village are IDR 50,000 per day (from 06.00 to 11.00). If they take the package wage, a female worker gets IDR 200,000 per day (from 06.00 to 16.00). In the second harvest season of 2016, the operational cost

associated with the distribution of water reached IDR 31,581,620. The cost is equivalent to less than 60 days of a farm labour. Further, middlemen buy the rice crops. Usually, the middlemen cultivate paddy to become rice. For that, a middleman requires three workers to dry, grind rice, and many others. There are approximately ten rice middlemen in the village. The existence of rice middlemen who process paddy to rice absorbs labours in the village. The farming activities will invite food vendors and food stalls that are usually done by women.

Table 5.
Paddy Harvest in Season I and II

Types of agricultural land	Area (Hectares)	Harvest of phase I (in ton) (June-October)	Harvest of Phase II (in ton) (October-January)
Moor (Tegalan/Tlatah)	70 hectares	700	210
Rice field (*sawah)*	150 hectares	1500	1050
Total	**220**	**2200**	**1260**

Source: Potentials of village and research data (2017)

Conclusion

The role of *RBUMDES Mursapa* in managing irrigation by using pump technology for agricultural land provides benefits. Although there were some problems which are not easy to overcome, including flood in the rainy season and pests attacking paddy. *RBUMDES Mursapa* had savings of IDR 543,433,357 (report of *RBUMDES Mursapa*, March 2017) which was obtained from the income for managing the irrigation in the village.

The role of social capital is one of the factors that determine the success of *"Mursapa RBUMDES*" in managing agricultural irrigation. Social capital includes cooperation, stakeholder participation in the village, outside the village (private and government) which is in a network to realize common goals, namely the success of irrigation management and agricultural activities. The impacts of the success of *RBUMDES Mursapa* include: a) contributes to rural development and accommodates the activities of village government; b) to mobilize rural farming activities; c) open up employment for male and female .

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