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Submission date: 11-Jul-2024 09:36PM (UTC+0700)

Submission ID: 2415226979

File name: e_Establishment_of_Sustainable_Agriculture_in_South_Sumatera.pdf (388.18K)

Word count: 4471

Character count: 24184

The Meaning Of Traditional Irrigation Management In Supporting The Establishment Of Sustainable Agriculture In South Sumatera

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Article history

Received	Received in revised form	Accepted	Available online
07 August 2021	07 February 2022	15 Maret 2022	18 Maret 2022

Abstract: One of the efforts made in realizing sustainable agriculture is to maximize efficient water use techniques through the use of traditional irrigation networks. The existence of irrigation is one of the assets as well as a manifestation of the original agricultural culture of the village community and the environment. The discussion of irrigation is closely related to the socio-cultural environment of the village community. The socio-cultural values of the rural area are closely related to the traditional irrigation management process that has been going on so far. This research was conducted in South Sumatera by sampling at two different locations, namely the first location in the city of Pagaralam City and the second location in Lahat District. The location was determined purposively using a sample 120 farmers. This study uses historical research methods compiled and described descriptively. The collected data show the existence of traditional rural irrigation persists to this day, despite the modernization of the agricultural world that is being promoted worldwide. This is evident in the discovery of social and environmental cultural values among rural communities which currently still use traditional irrigation networks. The community still preserves the cultural values in the village in managing their traditional irrigation network. As well as the principle of cooperation and deliberation which is the basis to manage village irrigation networks. Thus traditional irrigation becomes one of the unifying elements for rural communities, especially farmers.

Keywords: Irrigation, Eksistensi, Management, Traditional.

1. Introduction

In the last two decades, the concept of sustainable agriculture has evolved and embraces many aspects of resources. Broadly speaking, the concept of sustainable agricultural development aims to increase the income and welfare of all farming communities by increasing agricultural production which is carried out in a sustainable manner, taking into account the burden of the ecosystem, so that production sustainability can be maintained in the long term. Various studies on sustainable agriculture have been conducted, including showing evidence that sustainable agriculture can increase productivity more than conventional agriculture. Siagian, (2019) mentions that a study of 286 sustainable agriculture projects in 57 developing countries in Africa, Asia and North and South America between 1999 and 2000 showed an average yield increase of 79%. One of the successes of this project is the use of more efficient water use techniques through the use of irrigation networks on agricultural land. Water will play a very important role in cultivation activities to optimize

the results of technology applications in cultivation activities. Siagian (2019) indicates that the new paradigm in the utilization of water resources in principle is how to use these resources wisely by prioritizing the principles of natural resource conservation, democracy, and efficiency in such a way that the prosperity and justice created can be enjoyed by all generations.

Indonesia has a quite rich experience in the development of water resource management or irrigation. Based on nation history, irrigation management systems are estimated that existed on the island of Java circa 1600 BC. However, with the progress and modernization of existing irrigation networks, a great potential of irrigation networks has been forgotten. This irrigation network is usually called village irrigation network or traditional irrigation network or small irrigation network. According to Purwantini & Suhaeti, (2017), a small irrigation system is an irrigation network with an area of less than 500 ha whose management is still very simple and based on the

principle of deliberation from farmers or local communities.

At the presence, the concept of traditional irrigation management still falls within the scope of community management which is based on the principle of deliberation and customary law. Therefore, many argue that irrigation is one of the local wisdoms in agriculture which emerged an initiative of the community and the government to manage the distribution of water for their farms. Where the expansion of irrigation networks built by the government, both the colonial government and the government of the Republic of Indonesia, can be found in the dichotomy of the irrigation management framework, namely the management framework based on farming community and government. Zaini et al., (2020) showed that the rural agricultural landscape is traditionally irrigated so one of the keys to the success of village agriculture is irrigation management. The discussion of irrigation is closely related to the socio-cultural and environmental aspects of the village community. The socio-cultural values of the rural areas are closely related to the traditional irrigation management that has been practised.

Based on data from BPS South Sumatera in 2017, South Sumatera has two districts that use traditional irrigation channels as a source of irrigation in running lowland rice farming, namely Lahat District and Pagaralam City. Pagaralam City has 2,440,29 ha of paddy fields that use traditional irrigation channels in their farming. Meanwhile, in Lahat District, there are 318.00 ha using traditional irrigation canals. The presence of irrigation is an assets as well as a manifestation of the original agricultural culture of the village community and the environment.

For traditional irrigation to work and be sustainable, development must reduce external investment as much as possible, consistence with the community's economic capacity and farmer driven ownership. Irrigation will work well if the community participation and cooperation with stakeholders goes well and in harmony. In line with the above efforts, the role of social capital is very decisive in the management of traditional irrigation, therefore the role of social capital needs to be increased. Purwantini and Suhaeti, 2017 revealed that the function of social capital as a social glue holds together the unity of community members from the smallest level or household to the national or state level together. Supriadi & Rivai (2018) added that the failure of traditional irrigation management is due to the dependence of rural communities on government assistance,

especially for operation and maintenance of irrigation networks.

Seeing the enormous challenges for the management of traditional irrigation systems in the future, it is interesting to see how traditional irrigation management still takes place amidst of the people of South Sumatera today and to see the incomes of rice farmers who use traditional irrigation in running their farms. According to Nelvi, (2019) efforts to trace the existence of irrigation networks aim to determine the existence of irrigation networks and the sustainability of the management of these irrigation networks.

Based on the above description, the authors are interested in discussing "the existence of traditional irrigation in supporting the achievement of sustainable agriculture in South Sumatera".

2. Material and Methods

2.1 Materials

This investigation is conducted in South Sumatera by taking samples from two different locations, first location in Pagaralam city and the second location in Lahat district. From each location, two villages are taken as research samples. For the Pagaralam city area, the sites are Lubuk Buntak village and Pelang Kenidai village, and for Lahat district, they are Pagaruyung village and Jenti'an village. The location determination was carried out purposively with the consideration that both locations have the largest traditional irrigation network in South Sumatera.

2.2. Method

2.1.2. Sample collection and preparation

Data collection was carried out in September 2019. The sample in this study consisted of 120 people who came from two research locations with a proportion of 60 people for each research location.

2.2. Experimental variabel and analytical procedures

The technique for determining the data source in this study was non-probability sampling, specifically purposive sampling and snowball sampling. The researcher determined the village head from the research location as the key informant in this study based on the purposive sampling technique.

2.4. Data Analysis

The village head is used as a key informant because he is the first person in charge of managing village assets, including information on village irrigation management in his area. Snowball sampling is used to explore other data sources that have the same characteristics as those desired in this study. The data collection methods used in this study are as follows: observation techniques, in-depth interviews or unstructured interviews, documentation techniques, and FGD (Focus Group Discussion) techniques.

3. Result and Discussion

3.1. Traditional Irrigation in South Sumatra

Irrigation is the totality activities to obtain water for agricultural purposes. The effort may include: planning, production, management and maintenance of facilities, withdrawal water from springs and regular distribution when water is excessive, discharge through drainage canals. In general the purpose of irrigation can be divided into two areas. The immediate purpose is to moisten the soil bound to the water and air capacity of the soil so that conditions are favorable for plant growth in this soil. Other goals include regulating soil temperature, washing soil that contains toxins, transporting fertilizer materials through existing water flows, raising groundwater levels, increasing site elevation by draining water

and storing water-soluble mud and so on (Zulkamain, 2018).

Based on Government Regulation No. 20 of 2006 on irrigation and Regulation No. 30/PRT/M/2007 of the Minister of Public Works Regulation, the development and management of irrigation systems aims to utilize the benefits of water in agriculture. The development and management of the irrigation system is carried out in a participatory, integrated, environmentally friendly, transparent, accountable and just manner and shall be implemented in all irrigation areas. The area of irrigated paddy fields in South Sumatra is 113,341.5 ha. (Pasandaran, 2007).

The area of irrigated rice fields in South Sumatra is (113,341.5 ha). Increasing land productivity as well as increasing productivity and rice production, among others, in irrigated agro-ecosystems will continue to be implemented, especially in an effort to support the establishment of self-sufficiency and food security (Amirullah, 2021). Data from BPS South Sumatra in 2017, show that there are two urban districts that use traditional irrigation canals as a source of irrigation in lowland rice farming, namely Lahat district and Pagaralam city. Lahat district has 318.00 ha using traditional irrigation canals. Pagaralam city has 2,440,29 ha of paddy fields using traditional irrigation canals for cultivation.

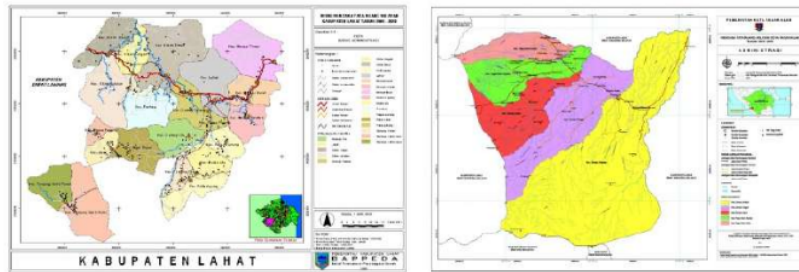


Figure 1. administration Map of Lahat Regency and Pagaralam City.
(Source : base map of BIG.2021)

Traditional irrigation, i.e. surface irrigation, is the drainage of water above the surface with a water level of about 10-15 cm above ground level. Surface irrigation is an irrigation system in which water discharge into

rivers through weirs or free inlet structures. Then irrigation water is flowed by gravity through canals to agricultural land. Here are known primary, secondary, and tertiary channels. This water regulation is carried out with a sluice gate.

The process is by utilizing the force of gravity, namely by flowing water from high plains or land to lower lands. Thus, the water automatically flows following the gravitational force through the crevice or waterway which is intentionally built as a channel for water flow.

Traditional irrigation in South Sumatera has played an important role in providing livelihoods for farmers, especially in central areas of food cultivation in hilly land typologies or highland areas. At the research site, traditional irrigation is also useful to (a) facilitate tillage, (b) regulate soil temperature and microclimate, (c) clean or wash the soil from soluble salts or high acids, (d) remove dirt or garbage in the waterways; and (e) flood the soil to eradicate pests (weeds) and pests. Traditional irrigation networks have been an alternative for many farmers to meet the water needs of their farms. This is related to efforts to use, distribute and manage water for

various productive activities in the agricultural, especially food crops. Traditional irrigation is a cultural asset of agriculture in South Sumatera that needs to be preserved. Similar to subak irrigation in Bali, traditional irrigation in South Sumatera has many community cultural values that have existed since ancient times. The cultural values contained are reflected in the technical management which has the strong culture of mutual assistance in the village community in the technical maintenance of irrigation facilities and several terms in the activities of use irrigation facilities that take place in the community. The operation and maintenance activities (OP) of irrigation networks in traditional irrigation systems and with the terms used in several traditional irrigations at the research site are described in table 2 and explained as follows.

Table 1. Terms used in Traditional Irrigation Management Systems in South Sumatera.

No	General Terms	Regional Terms	Description
1.	Dam	<i>Papakan/Babat ayek</i>	A dam is a traditional pool of water whose construction is not permanent and does not have a measuring device.
2.	Water Sources	<i>Mate Ayek</i>	Is a source of water (usually from rivers or from mountainous areas).
3.	Sluice	<i>Tagam</i>	It is a place for water to enter and exit from the main channel to the rice fields.
4.	Traditional Leader	<i>Jurai Tue</i>	Is a person who is given the trust to regulate and decide all matters relating to irrigation management in the village.
5.	Waterways	<i>Siring</i>	Channel through which water (including primary secondary and tertiary channels)
6.	Irrigation Network	<i>Ngului Ayek</i>	It is an effort to trace water upstream of the river so that the flow of water becomes smooth.
7.	Shower	<i>Pancugh</i>	A channel where water comes out or a place to channel water through bamboo media.

3.1.1. *Papakan/ Babat Ayek*

According to (Pasandaran, 2005), a dam is a building across a river that is used to raise the water level of the river so that it can be tapped. This hydraulic structure and its equipment are built transversely and are designed to raise the water level with a fixed threshold so that river water can be tapped and flowed by gravity to the irrigation network. The dam construction is usually permanent and equipped with complementary parts. On the other hand, the dam

is a traditional weir, characterized by its non-permanent construction and no flow meter.

The dam or better known as *Papapan ayek* is a traditional water basin whose construction is not permanent and does not have a measuring device. This basin is intentionally constructed as a water reservoir to facilitate the distribution of water downstream.

Papakan is generally located in the upstream area because it immediately becomes the first reservoir of water from water sources

either from rivers or natural springs in the surrounding mountains. All research sites have their own dams, only the conditions and locations

are slightly different from other locations. The following is a documentation of a dam or slab found at one of the research sites.



Figure 2. A Dam in Pagaruyung Village, Lahat Regency.

This irrigation is called Umar Sakti irrigation whose main source of water from Mount Dempo through the Lematang Hulu river. At the research location in Pagaruyung village, Lahat district, rice cultivation depends on the distribution of water from Umar Sakti's irrigation. This irrigation system has a large dam that although still simple, can hold up to millions of cubic meters of water per day. The existence of this dam is very helpful in distributing water to villages, especially those located around the area of Agung city, Lahat district. This traditional irrigation is not only focus on farming activities but is also used by the community for other purposes such as fishing and at the same time for household purposes such as washing, bathing and toilet.

3.1.2. *Mate Ayek*

Water is a natural resource that is needed by humans, animals and plants in this life. In

agricultural activities, water is an important component after soil. Almost all activities in farming will generally require water to run. From farming to harvesting, the existence and availability of water must be prioritized to meet the needs of plants, that's why in farming activities the existence of springs needs to be considered so that the need for water can continue to be met.

According to Santosa, (2016), springs are the source from which water comes from, the topography of the mountainous area allows the presence of many naturally formed springs. A spring is a place on Earth's land that can emit a jet of water that comes from inside the earth or from the ground or from the mountains. The water that comes out or gushes out of course leads to the earth's surface, and the discharge of the water from the aquifer. The aquifer itself is a layer under the ground that contains water and has the ability to drain water, so that the water that is in the ground can be raised to the surface to be used later by living things that live on the earth's surface.



Figure 3. The Water Sources In Pagaruyung Village Lahat Regency.

At the research location, the springs generally come from rainwater that is stored naturally in protected forests in the highlands of Bukit Barisan and Mount Dempo. When it rains, the roots of trees in the forest absorb the water that falls to the ground. This water is stored as a reserve in plant roots and flows through the gaps in the soil pores, following gravity, into the topography of the forest.

3.1.3. *Tagam*

The floodgate, commonly called *Tagam* by the people of South Sumatera is one of regulating the inflow and outflow of water from tertiary watercourses to the level of farmers' fields. In the village community of the research location, the distribution of water is regulated through a permit for making tags per rice field. The number of *Tagam* allowed in each rice field is only one. The *Tagam* are used to divert water from the tertiary canals to the rice fields. This limitation on the number of *Tagam* is intended to achieve an equal distribution of water use among all farmers who own paddy fields.

Farmers are allowed to establish only one *Tagam* in their fields and open or close it as needed during farming activities. The principle of deliberation and the role of *Jurai Tue* as well as supervision by other farmers will greatly determine justice in the distribution of water. Basically, the principle of trust and supervision by other farmers has become a separate control in the use of traditional irrigation water, except just that recently the values of togetherness and mutual cooperation in the maintenance of land irrigation facilities have faded so that many canals and some irrigation facilities are not maintained until they are badly damaged. Of course, this is detrimental

to the farmers themselves, because water resources in traditional irrigation farming have a direct effect on the farming activities undertaken by farmers.

3.1.4. *Jurai Tue*

Jurai tue is a term used to describe an important figure in the community, especially in the Pagaralam city and Lahat district. The *Jurai Tue* has more authority than the village or village head. The community at the research site acknowledged that the existence of *Jurai Tue* would more or less act as a political leader, traditional, social, and cultural leader to establish relationships with the surrounding villages.

One of the functions of the *Jurai Tue* is related to management and distribution of irrigation water. This function is considered because at first there was no Water User Farmers Association or P3A. This role has been implemented from generation to generation by *Jurai tue* who are elected by the village community. *Jurai tue* is considered to have an important role in regulating traditional irrigation water management of rural communities life.

The management and activities of irrigation management generally involved participation and decisions from *Jurai Tue* who has been trusted by the village community. During his duties, *Jurai Tue* participate in monitoring of traditional irrigation network management activities by the village community. The role of decision-making in water distribution and conflict resolution to drive the rehabilitation of village irrigation networks is carried out directly by "*Jurai Tue*". The principles of justice and deliberation are main basis for *Jurai Tue* in acting as an elder in community life in the village, including in supervising the distribution of water

from the traditional irrigation network owned by the village.

3.1.5. *Siring*

The irrigation system in the traditional irrigation network is known as "*siring*". *Siring* is a local term that widely used by South Sumatera people to called existing traditional irrigation canals. In Indonesian, *siring* is defined as a channel where water flows from a high area to a lower area. *Siring* in terms of traditional irrigation used by South Sumatera people is divided into two types, namely *Siring Belande* (the people) and *siring PU* (Government). *Siring Hollande* is a natural water channel that existed since the Dutch colonial era, and was rebuilt by the Dutch colonists at that time. However, there are people who say people's *siring* is a *siring* that existed since the time of the ancient ancestors which is formed naturally by the flow of large amounts of water that erodes the soil layer forming a natural water column. On the other hand, *siring PU* (Government) is termed of *siring* or water channel that was deliberately built by the government for general public and widely

used, not only for farming activities, but for household consumption activities. Basically, the water is channeled through the sluice gate to the primary channel, here the water is regulated according to the capacity of use. From the primary channel, connected to the secondary channel, continued to tertiary channel then to the farm level channel and finally to the rice fields.

3.1.6. *Ngului ayek*

Ngului ayek is one of the efforts in the operational maintenance of irrigation networks. Efforts to control and monitor irrigation networks are especially to maintain smooth flow of water in irrigation canals. *Ngului ayek* is generally carried out directly by farmers independently or in groups. Before the planting season comes, farmers usually take advantage of this momentum to carry out mutual cooperation to clean irrigation canals together. However, outside the planting season, there are farmers who carry out "*ngului ayek*" independently around their own fields. After the works are done and water channel clean then the water flow will enter the rice field smoothly.



Figure 4. *Ngului Ayek* are Activities by Farmers

3.1.7. *Pancugh*

The water channel that commonly found in traditional irrigated rice fields is "*Pancugh*". *Pancugh* is a manual shower made of bamboo sticks to drain other places. The bamboo is usually

large which resembles a pipe that being able to accommodate during the drainage process. Initially, *Pancugh* was widely used to drain water from its source directly, either from tree root infiltration on forest cliffs or to channel water from one rice field plot to another.

The irrigation network consists of canal structures and their supporting structures needed to regulate irrigation water. It has purpose to provide, distribute, give, use, and dispose of the rest of the use of irrigation water (Komarudin, 2010). The construction of irrigation networks is important because Indonesia in the tropical monsoon zone which has abundance of water due to high rainfall. This abundance of water can be accommodated by the irrigation network to prevent floods. The existence of an irrigation network also helps farmers, especially during dry season because stored water during heavy rains can be allocated during the dry season.

4. Conclusion

This study shows that the existence of traditional rural irrigation still persists to this day, although the modernization of agricultural is being promoted throughout the world. The maintenance socio-cultural values in village community and encourage the principles of mutual cooperation and deliberation, it becomes basis to manage traditional irrigation networks in the village. Traditional irrigation becomes a unifier for rural communities, especially for farmers.

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