



Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author: Gede Sedana
Assignment title: Article and Proceeding
Submission title: ALTERNATIVE POLICIES TO STRENGTHEN THE TRADITIONAL I...
File name: journal,alternative,_2020.pdf
File size: 529.26K
Page count: 12
Word count: 6,603
Character count: 36,144
Submission date: 04-Oct-2022 08:09PM (UTC+0700)
Submission ID: 1916378306

International Journal of Advanced Science and Technology
Vol. 29, No. 7s, (2020), pp. 973-984

**ALTERNATIVE POLICIES TO STRENGTHEN THE TRADITIONAL IRRIGATION SYSTEM
FOR SUPPORTING THE FOOD SECURITY PROGRAM:
Case of the Subaks' System in Bali, Indonesia**

Gede Sedana, Dwiendra University, Indonesia , Abdul Rahmat., Gorontalo State University,
Indonesia

Abstract

Irrigation water is very important for the agricultural sector, especially rice farming. Scarcity of water could influence the production of rice and land conversion which give an impact to the achievement of food security program. Rice farming activities in Bali province are fully managed under the subak system. The objectives of this study are to describe the roles of subak system as a traditional irrigation system in supporting the food security program, and to give recommendations to government in strengthening subak system to sustain its roles. There are 48 subaks scattered within 4 regencies selected as samples. Data were analysed by using descriptive method. The results of study pointed out that subaks have philosophy of tri hita karana which is used as a guide for the water management. In term of food security program, subaks have played specific roles for the water distribution and allocation; the mobilization of resources for operation and maintenance; the fund raising, the conflict management; and the ritual performances. It is very important to recommend for the government in order subaks could strengthen their roles for the food security program. These recommendations consist of (i) the provision of subsidy for agricultural inputs and equipment; (ii) strengthening capacities of subaks in terms of agricultural technology and management and organization; (iii) the price control of rice produced by farmers; (iv) the provision of subsidy for irrigated land tax or tax exemption; (v) the guarantee of irrigation water availability; and (vi) the control of irrigated land conversion.

Keywords: Subak, food security, water management, rice farming, government

Introduction

Water is one of the very important resources for the agricultural (irrigation) and non-agricultural sectors (Dabsut, 2002; Angehok and Premlata, 2006). Agricultural sector has still played great role in the economic within the developing countries (Oguzor, 2012; Omorogiuwa *et al.*, 2014). Since 1990, the availability of water has been a problem for fulfilling the needs of people due to its scarcity and competition. In Indonesia, these have frequently made conflicts among the users, such as subak (subak is a traditional irrigation system in Bali, Indonesia), private sectors (for tourism and industry), and government (for domestic water). Subak as an irrigators' organization manages and regulates the distribution and allocation of irrigation water for the rice farming (Sedana and Udayana, 2018; Sedana and Astawa, 2017). It is one of the Bali's cultures that have recognized worldwide as a world cultural heritage (Yamashita, 2013; Aryawan, *et al.*, 2013).

Subak has been known since more than thousands ago and developed over the centuries in the specific socio-cultural, agro-ecological and political environment in Bali, Indonesia (Roth, 2011; Loveman, 2011; Roth and Sedana, 2015). The entire rice fields within Bali province are fully managed under the subak system. There are about 1,500 subaks scattered within Bali Island with different size of areas and number of members. Rice fields are not only for production function but also have multi-functions, such as: (i) environmental function; (ii) social function; (iii) food security function; (iv) economic function; and (v) cultural function (Conception, *et al.*, 2006).

In Bali, however, the fast growth of economic development, particularly the tourism development, has brought about the negative impacts on agricultural development, particularly on the food security program. Bali is one of the most international tourism destinations in Indonesia, even in the

ISSN: 2005-4238 IJAST
Copyright © 2020 SEFSC

973

ALTERNATIVE POLICIES TO
STRENGTHEN THE
TRADITIONAL IRRIGATION
SYSTEM FOR SUPPORTING THE
FOOD SECURITY PROGRAM:
Case of the Subaks' System in
Bali, Indonesia

by Gede Sedana

Submission date: 04-Oct-2022 08:09PM (UTC+0700)

Submission ID: 1916378306

File name: journal,alternative,_2020.pdf (529.26K)

Word count: 6603

Character count: 36144

3
**ALTERNATIVE POLICIES TO STRENGTHEN THE TRADITIONAL IRRIGATION SYSTEM
FOR SUPPORTING THE FOOD SECURITY PROGRAM:
Case of the *Subaks*' System in Bali, Indonesia**

Gede Sedana, *Dwijendra University, Indonesia* , Abdul Rahmat., *Gorontalo State University, Indonesia*

Abstract

Irrigation water is very important for the agricultural sector, especially rice farming. Scarcity of water could influence the production of rice and land conversion which give an impact to the achievement of food security program. Rice farming activities in Bali province are fully managed under the subak system. The objectives of this study are to describe the roles of subak system as a traditional irrigation system in supporting the food security program, and to give recommendations to government in strengthening subak system to sustain its roles. There are 48 subaks scattered within 4 regencies selected as samples. Data were analysed by using descriptive method. The results of study pointed out that subaks have philosophy of *tri hita karana* which is used as a guide for the water management. In term of food security program, subaks have played specific roles for the water distribution and allocation; the mobilization of resources for operation and maintenance; the fund raising, the conflict management; and the ritual performances. It is very important to recommend for the government in order subaks could strengthen their roles for the food security program. These recommendations consist of (i) the provision of subsidy for agricultural inputs and equipment; (ii) strengthening capacities of subaks in terms of agricultural technology and management and organization; (iii) the price control of rice produced by farmers; (iv) the provision of subsidy for irrigated land tax or tax exemption; (v) the guarantee of irrigation water availability; and (vi) the control of irrigated land conversion.

Keywords: *Subak, food security, water management, rice farming, government*

Introduction

10
Water is one of the very important resources for the agricultural (irrigation) and non-agricultural sectors (Dabour, 2002; Angchok and Premlata, 2006). Agricultural sector has still played great role in the economic within the developing countries (Oguzor, 2012; Omorogiuwa *et al.*, 2014). Since 1990, the availability of water has been a problem for fulfilling the needs of people due to its scarcity and competition. In Indonesia, these have frequently made conflicts among the users, such as subak (subak is a traditional irrigation system in Bali, Indonesia), private sectors (for tourism and industry), and government (for domestic water). Subak as an irrigators' organization manages and regulates the distribution and allocation of irrigation water for the rice farming (Sedana and Udayana, 2018; Sedana and Astawa, 2017). It is one of the Bali's cultures that have recognized worldwide as a world cultural heritage (Yamaquita, 2013; Aryawan, *et al.*, 2013).

7
Subak has been known since more than thousands ago and developed over the centuries in the specific socio-cultural, agro-ecological and political environment in Bali, Indonesia (Roth, 2011; Lorenzen, 2011; Roth and Sedana, 2015). The entire rice fields within Bali provinve are fully managed under the subak system. There are about 1,500 subaks scattered within Bali Island with different size of areas and number of members. Rice fields are not only for production function but also have multi-functions, such as: (i) environmental function; (ii) social function; (iii) food security function; (iv) economic function; and (v) cultural function (Conception, *et al.*, 2006).

6
In Bali, however, the fast growth of economic development, particularly the tourism development, has brought about the negative impacts on agricultural development, particularly on the food security program. Bali is one the most international tourism destinations in Indonesia, even in the

world. The production of rice has been decreased due to the increase of land conversion (rice field) due to tourism development. Based on the records of the Agriculture, Horticulture and Plantations Office at the Bali Province, the average area of rice fields conversion within the last 5 (five) years is 370 ha/year. The rapid urbanization in the developing countries has contributed to accelerate the agricultural land conversion (Pham, *et al* 2017). Land and irrigation water are being major problems, challenges and threat to the *subak* sustainability in Bali. Subak must be strengthened and revitalized in anticipating the challenges. In another side, *subaks* are fully expected to support and run the food security program from the government. Concerning to these situations, this study has objectives to describe the roles of *subak* system as a traditional irrigation system in supporting the food security program, and to give recommendations to government in strengthening *subak* system to sustain its roles.

Methods

The study was purposively conducted in 4 regencies (Tabanan, Badung, Gianyar and Buleleng regencies) out of nine regencies in Bali province, Indonesia due to within the four have a big amount of subaks. The sites location is presented in the Figure 1. There were 12 subaks were also purposively selected as samples, in which four subak per each regency. The total sample is 48 *subaks*. The management boards of each *subak* were interviewed as key respondents by using interview guide. Kind of data collected are primary and secondary data, such as profile of *subaks*, activities and roles, problems encountered by *subaks*. In this study, data were fully analyzed by using descriptive method.

Figure 1: Sites location of study





Bali Province

3. Results and discussion

3.1 Subaks' characteristics

Subaks are regarded as the very important organizations for the government in producing rice and the other food crops (maize, soybean, sweet potato, and the likes). Nowadays, all agricultural programs of government have been accepted, adopted and applied by farmers through the *subaks*. In term of social and cultural aspects, *subaks* have had specific activity, namely intensive ritual ceremonies performed within the period of rice farming activity. The ritual ceremonies are based on the growth of rice crop and phases of rice planting started from gaining irrigation water from the weir, land preparation, making seedling and transplanting of rice till the post harvesting. The ritual activities make *subak* as a unique organization which is different with the other irrigation systems in Indonesia.

Based on the survey conducted within the research sites, it is found that all *subaks* have semi-technical irrigation system. The main systems of irrigation (dam/weir, primary and secondary canals, water division structures) within the *subaks* have been permanently constructed dan rehabilitated by the government (The Public Works Service at the provincial and national levels). Other characteristics of *subaks* within the research sites are presented in the Table 1.

Table 1
 Characteristics of subaks

No	Items	Regencies			
		Tabanan	Badung	Gianyar	Buleleng
1	Dam/weir	Permanent	Permanent	Permanent	Permanent
2	Condition of main system (canal and water division structure)	Good	Good	Good	Good
3	Condition of tertiary system (canal and water division)	Enough	Good	Enough	Enough

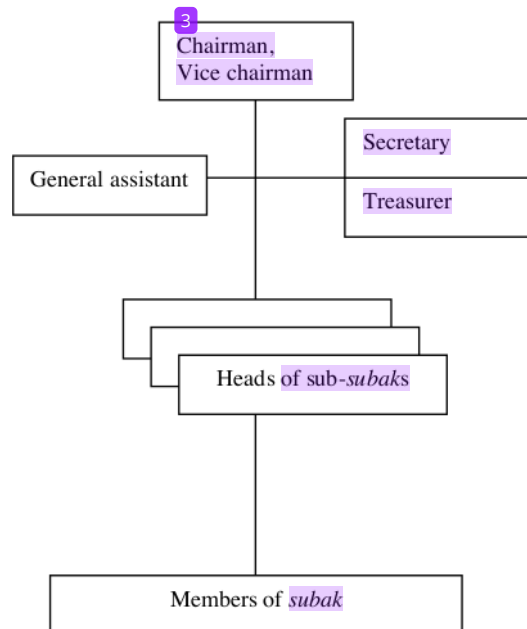
	structure)				
4	Organization of <i>subak</i>	Well organized	Well organized	Well organized	Well organized
5	Water availability (dry season)	Limited	Enough	Enough	Limited

Source: Primary data, 2019

The condition of irrigation system, especially in the main system is in good condition due to the government’s intervention. Government under the Public Works Service has program to rehabilitate and upgrade the main system of *subaks* based on the Law of Water Resources. Besides, operation and maintenance of the main system is being responsibility of the government at the regency, province as well as national levels. Meanwhile, the responsibility of tertiary system is taken by the *subaks*. In some *subaks* within Tabanan, Gianyar and Buleleng regencies, the conditions of tertiary systems are good enough since most of the canals have not been permanently constructed by *subaks*. Under the interviews with the key respondents, the condition of canals within tertiary system is related to the wealth of *subaks* to finance the canal rehabilitation and upgrading. Seeing the data shown in Table 1, the conditions of *subaks*’ tertiary system in Badung regency are better than the other three regencies. The government in Badung regency has intensively provided programs to help *subaks* through the irrigation project for rehabilitation and upgrading on the tertiary system.

Subak is not only an institution for the rice farming activities, but also as a part of Bali’s local wisdom about human society and its relationship with the environment. The local wisdom of irrigators association have supported the sustainable irrigation management (Adams, *et al.*, 1994; Solomon and Kitamura, 2006) The philosophy of the *subak* system is *tri hita karana* (three causes of happiness) based on the harmonious relationships among the three (The God, the human being, and the environment). *Tri Hita Karana* is a universal concept of harmony and togetherness (Lansing, 2005; Windia, 2006; Sedana and Astawa, 2018). The daily activities within *subak* are coordinated by the chairman of *subak*, locally called *pekaseh*. In the case of *subak* is big number or big size of area, it should be divided into sub-*subaks* (called *tempek*) which are coordinated by the the heads of sub-*subaks*. The common organizational structure of *subaks* in the research sites are presented in the Figure 2.

Figure 2 The common organizational structure of *subaks*



3.1 Roles of *Subak* System on Irrigation Water Management

The availability of irrigation water is fluctuative along the year due to the uncertainty of rain fall as a result of climate change. In case of dry season, farmers as member of *subak* have a main problem on the irrigation water since the water at the source level (river) becomes decreased. Based on the survey and interviews with the key respondents within the research sites, the main problems encountered by *subaks* in Bali are scarcity of water availability, pest and disease attack, and others (see Table 2).

Table 2
Problems encountered by *subaks*

No	Problems	Number of <i>subaks</i> (unit)	Percentage (%)
1	Scarcity of water availability (dry season)	44	91.67
2	Pest and disease attack	36	75.00
3	Low price of rice	40	83.33
4	Limited labour	30	62.50
5	Uncertain climate (heavy rain and drought)	26	54.17
6	Expensive price of inputs (seed, fertilizers and pesticides)	36	83.33
7	Expensive land tax	28	58.33

Source: Primary data, 2019

Note: Percentage calculated by dividing the number of *subak* and the total samples (48 *subaks*)

Concerning the data presented in the Table 1, the highest percentage is seen on the scarcity of water availability, which is about 91.67 %. In fact, *subak* as an organization has still been able to overcome the rice farming management even though there is a water problem through the water management system, such as rotation and staggering. Water management in *subak* system has been run under the internal rules or regulations and consensus among the members.

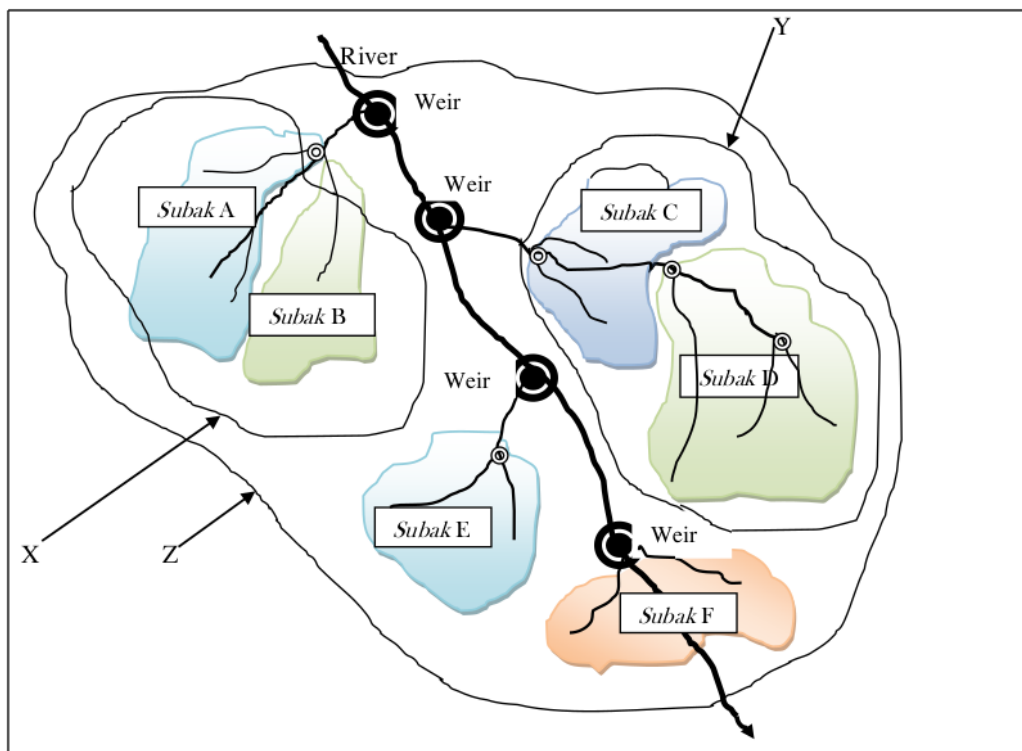
Based on interviews with the key respondents within the *subaks* as samples, it is pointed out that there are some roles undertaken by *subaks* in order to achieve the goals of *subak* members and support the food (rice) security program of government. These are: (i) distribution and allocation of irrigation water; (ii) mobilization of resources for operation and maintenance of irrigation facilities; (iii) fund raising; (iv) conflict management; and (v) ritual ceremony performance.

Water distribution and allocation are the primary role of *subak* as an irrigators' association due to water is one of the affiliating factors to bind and unite the farmers in farming activities. At the weir level, for example, the water is proportionally divided to a *subak* and other *subaks* located at the downstream area. Before government's intervention, the *subaks* along the river had a consensus to divide allocation of water among themselves. Informally, they had good coordination for water distribution, allocation including water control. After the government's intervention (the construction of permanent weir) distribution and allocation of water at the river have been jointly managed by the *subaks* and government. Government sets water meter control device and put water gate control to manage water flowing to the canals. It means that although the water management at the river level is run by the government, the distribution and allocation of water has still been operated based on the agreement and consensus among the *subaks*. They still have kept those agreements and consensus for making harmonious relationship among the *subaks* especially in the term of water management. Consensus of *subaks* is defined through the meeting of *subaks* as members of the federation of *subaks*. In Tabanan regency, the *subaks* federation has been established along the River of Ho since more 15 years ago. Similar to Tabanan regency, the federation of *subaks* has also been established along the River of Buleleng since 1974. However, there is no yet the federation of *subaks* within Badung and Gianyar regency. Management of water along the river within the two regencies has been run under the coordination government official. The federations of *subaks* in Tabanan and Buleleng regencies are based on the interrelation of irrigation water along the river as shown in the Figure 2.

Concerning the figure above, in case of the plural *subaks* (some *subaks* get water from one weir), water distribution among the *subaks* is divided in the division structure on the primary canal. There is coordination between or among *subaks* for water distribution and allocation, which is under the federation of *subaks* as coordinating body. It means that the coordinating body of *subaks* is addressed to have good water distribution and allocation. In some irrigation networks under the Public Works, government officer is the one who operates the water gate constructed on the weir and division structure.

The federation of *subaks* at the level of river could also manage the distribution and allocation of water among the *subaks* in the wider area from the upstream area to the downstream area. The federation of *subaks* is chaired by the chairman and assisted by the vice-chairman and other officers coming from each *subak* as a representative.

Figure 2
Federation of *subaks* along the river



Remarks:
X and Y : Federation of subaks between *subaks* getting water from one weir
Z : Federation of subak among *subaks* getting water from one river

The main functions of this federation are: (i) to coordinate the water distribution and allocation among the *subaks*; (ii) to make coordination among the *subaks* relating to cropping patterns, planting schedule of rice within each *subak*; (iii) to have coordination on the resources mobilization for the operation and management of irrigation facilities; (iv) to coordinate the activities for ritual ceremonies at the higher level, such as at the regency level; (v) to liason *subaks* with the outsiders; (vi) to communicate the information from the government to *subaks* and from the *subaks* to government and other relevant

institutions. Therefore, *subaks* could be resilient in supporting food security program of government through the proper management of irrigation water under the federation. Besides, *subaks* and the federation of *subaks* have significant roles in assisting governments' programs, especially in supporting the dissemination agricultural innovation, agricultural regulations, and other policies relating to irrigation, agriculture, and cooperative and land tax. Through these roles, each *subak* getting water from the one river could define the cropping patterns and planting schedule along the year based on the water distribution and allocation. *Subaks* usually have three times to plant the crops during the year in which this is defined as cropping patterns. The common cropping patterns of *subaks* are rice-rice-secondary crops, or rice-secondary crops-rice, or rice-secondary crops-rice. The secondary crops planted within the research sites are maize, soybean, ground nut, mung bean, flowers and vegetables.

If the availability of water is scarced during dry season, *subak* could change the cropping patterns and delay of planting schedule. In *subak* system, water distribution is conducted by two methods, namely rotation and staggering. In the rotation method, *subak* manages the members to use irrigation water by giving some members or some sub-*subaks* to have opportunity for planting rice crop in the present year, but they should plant another crop for the next year. In this case, *subak* has significant role in distributing water in order that the members could get water proportionally. It means that the rotation method is addressed to ensure the cropping patterns for the members.

Staggering method is applied to distribute irrigation water by using the need of water for land preparation for rice planting. *Subak* should firstly give a turn to the certain number of members or one sub-*subak* to have the land preparation for a several days. After finishing it, the water should be distributed to the other members or other sub-*subaks* for having land preparation, too. It is worthy to note that the methods of water distribution might be change at the time dependent on the water availability.

In *subak* system, the mobilization of resources is very important role, particularly for the operation and maintenance and rehabilitation of irrigation facilities, such as canals and temples. This mobilization is conducted in the forms of physical and non-physical contributions. If there is damage on the canal or other irrigation facilities, *subak* would have a meeting to discuss for the rehabilitation. The meeting would talk about the budget, labor mobilization, and water diversion during the rehabilitation, and others. If the saving of *subak* is limited, the members of *subak* could also usually contribute cash money for buying materials and consumption. The physical form of members in this mobilization is the labour devoted in the mutually work, called *gotong royong*. While non-physical form is the ideas contributed by farmers shared within a monthly meeting of *subak*.

Fund is one of the important components in organizing the activities of an organization including *subak*. A fund in each *subak* is used to finance the operation and maintenance of irrigation facilities and other activities such as ritual ceremonies. In the financial aspect, *subak* manages several things that must be well known by all members. In some *subaks*, there are some sources of *subak*'s revenue, such as:

1. Sarin tahun, the dues charged to all members after the rice harvest within the wet season;
2. pengampel, the fees charged to the *subaks*' members who are not active;
3. Gegadon, the dues charged to members of the *subak* after harvesting rice planted during dry season;
4. The auction of rice fields through the activities of rearing duck on the rice field or planting tobacco after harvesting;
5. Fines, which is a payments made to members who violate the rules or other agreements of *subak*.

Presently, some *subaks* as samples (in Tabanan, Badung and Gianyar regencies) also get a source of revenue from the economic activities related to agricultural development, such as cooperative unit established under *subak* system. Besides, the governments at the provincial and regency levels also provide a grant to *subaks* every year. Based on the survey, fund collected by each *subak* could be used for buying agricultural inputs (fertilizers and pesticides) from the agricultural inputs distributor in the city. Another economic activity in *subaks* is also in the term of loan (credit) provision for the members.

Conflict among members of *subak* is managed by *subak* itself through the *subak* meeting. Kind of conflicts are water stealing, planting of rice beyond the defined schedule, absence in the certain activities

of *subak*, and others. Conflict is also found in water distribution among *subaks* which have water from one source. The existence of coordination body inter-*subaks* (subaks' federation) is very important to solve the problem of water distribution. All of the conflict resolutions are defined into the internal regulations or the rules of *subak*. The rules of *subak* contain the activities of members and management board relating to the agriculture and irrigation aspects. Recently, the conflict of water is also found between *subak* and other sectors, such as industry. The increased use of water by industry could decrease the water supply for *subaks*. For this problem, *subaks* should send a complaint to the government for having the solution. At the river level, the existence of *subaks* federation is useful to take an action for making negotiation with the industry in term of water allocation. The government (the Drinking Water Enterprise) sometime also has conflict with *subaks* due to the use of water from the same source (on the river) with *subaks* as happened in the regencies of Tabanan and Buleleng. Facilitation and mediation are always done to solve this conflict.

Ritual activity is one of the principal activities of the *subaks* in Bali. Performing of ritual ceremonies within the *subaks* are fully based on the social and cultural aspects of the community where the *subaks* located. There are many sequent ritual activities performed by *subak* started from fetching water in the weir, preparing the land until harvesting. Ritual ceremonies are performed in the temples at the individual, *subak* and inter-*subaks* levels. At the level of individual farmers, the farmer conducts ritual ceremonies at his own small temple constructed on his rice field. The collective ritual ceremonies are performed at the temple of *subak* (*bedugul* temple, temple of *ulun suwi*, *ulun empelan* temple, and the others, and the level of inter-*subak*, such as in the temple constructed near the lakes (the name of temple is *ulun danu*). There is one *ulun danu* temple within each lake in Bali. The farmers have a belief that the performances of ritual ceremonies might bring about the good production on rice farming activity.

Based on the interviews with the respondents, it is found that the *subaks* have variety of functions (multi-functions), which is not merely to produce food. The respondents said that, there are several functions of *subak* on the irrigated land, as follows: production and economic functions; environmental functions including flood control and erosion control, groundwater recharge, purification of air and water, and giving fresh and healthy air; ecological function (as an habitus for various species that provides a source of protein for farmers and preservation of biological diversity); social and cultural functions, namely as buffer of rural tradition and social-cultural values. *Subaks* also have functions to the rural development, which could support the livestock farming, provide employment opportunities for the villagers; and become ecotourism and agrotourism activities because of the attractiveness of scenic beauty in the form of rice terraces and natural rural and agricultural life of the rural population including agricultural production (Sedana *et al*, 2018; Mizutani, 2002; Shah and Shah, 1994).

3 Recommendations to government to strengthen *subaks* for supporting the food security program

As cited above, the *subaks* in Bali have great role in supporting rural development and agricultural development (food security program). In Indonesia, the policies which have been implemented are addressed to increase food production through the provision of production input subsidy, and to increase in the income of farmers. The increased food production is achieved by the agricultural technology practices. Besides, the policy for irrigated land conversion control is also important to take by the government.

In case of Bali province, government has disseminated and implemented the food security program through the *subaks*. In order to maintain the role of *subaks* in supporting the food security program, it is recommended to government to have some programs directed to encourage and strengthen *subaks*. These include: (i) providing subsidy for agricultural inputs and equipment; (ii) strengthening capacities of *subaks*; (iii) controlling the price of rice produced by farmers; (iv) providing agricultural insurance; (v) providing subsidy for irrigated land tax or tax exemption; and (vi) controlling the conversion of irrigated land.

One of the most important factors influencing the higher productivity of land and rice crop is agricultural inputs (seed, fertilizer, and pesticides). In the research sites, the prices of these inputs are relatively expensive. Government's subsidy is still very important for the smallholder farmers in Bali

which is also found in the other developing countries (Dorward and Chirwa, 2011; Wijetunga and Saito, 2017). This subsidy is fully aimed to support farmers toward the high price of agricultural inputs. This program is needed due to the present condition of rice farmers are still poor. Distribution of agricultural inputs should be done collectively by *subaks* coordination. The main purpose of this program is to make more efficient cost of production at the farmer level. Efficient production cost and higher productivity for rice farming could also be done by introducing the improved agricultural technologies. Introduction to these technologies should be transferred by the agricultural extension agents through extension and training programs. The subsidy would be an incentive for farmers in order to improve their income gained from the rice farming (Sedana and Dasi, 2016). The increase of economic incentive at the *subak* level could be supported by providing the farm production equipment which is simply operated (Ikejiofor and Ali, 2014; Loksha and Mahesha, 2016).

The capacities of *subaks* should be strengthened in the relation to technical aspects (agriculture and irrigation) and non-technical aspects (management, administration, organization, financial and business). The strong *subaks* are expected to manage their members to have good agricultural practices for making improved productivity of rice. Irrigation management should be technically well maintained in order to ensure and make a guarantee for farmers to get water. Aside from these, *subaks* should improve the capacities of management board concerning the administration, organization, financial and business. *Subaks* should be encouraged and supported have attractive business to provide economic benefit for them and their members. Economic benefit could be an incentive for farmers to keep their work on farming activity. Thus, they might not leave their rice fields and look for the other jobs in the city. It means that the land conversation could be prevented by making economic incentive for the farmers.

Proper price of rice at the farmers' level is also being a significant factor to increase the motivation of farmers in rice farming activities. Farmers need increased income gained from their harvested rice through the higher price. Presently, they have no strong bargaining power to sell their rice over the buyers during the peak harvest. Its consequence is their revenue might not high and would become disincentive for them. Therefore, it should be taken a basic policy by the government to increase the price of rice at the farmers'. One of the efforts which might be supported is the establishment of government enterprise unit which has function to directly buy rice produced by farmers. The prices offered by government must be higher than the market price. In other words, government should provide subsidy at the downstream or output of rice farming development. The higher price of rice could be very strong incentive for farmers to sustain their farming. The government control of price contributes to make higher income and welfare of farmers (Sedana, *et al*, 2014; Sedana and Dasi, 2018). Thus, it could be expected to sustain the rice field and protect land (rice field) conversion and support the food security program. This could motivate farmers to sustain and keep their rice farming activity and protect the rice field conversion. Moreover, the young people might also be interested in working on the rice farming.

Agricultural insurance has been developed in several countries. In Indonesia, the implementation of agricultural insurance is clear stated in the Law No 19/2013 about Protection and Empowerment of Farmers. Implementation of this insurance is regarded as an important means to achieve the objectives of agricultural sector (Reshmy, 2010; Yaghoubi, *et al*, 2011; Wang, *et al*, 2016). Rice farming conducted by farmers often encounter the threats before harvesting contributing to failure. The insurance on agriculture or rice farming is being very important part to mitigate the high risk on the crop (rice) planted by farmers. Farmers' characteristics might influence their participation in the agricultural insurance (Sherrick, *et al*, 2014; Masara and Dube, 2017). Through this effort, the farmers might not worry of the failure on their rice farming. In the site research, it is only about 30 % farmers joining in the insurance program. According to the regulation about Agricultural Insurance in Indonesia, the claim of failure on rice farming is IDR 6,000,000/ha (it equals to USD 428.57) and is regarded too small by the farmers. This amount refers to the calculation of production costs spent by farmer working on the 1.00 ha. It is suggested to government that the amount of claim should not based on the cost of production, but should be under the calculation of production value. If the production of rice 6 ton/ha, the claim should be about USD 1.714.29 as a value of failure. Therefore, the government should change the value of claim in order

that farmers would have interest to involve in the insurance program. Rice farming activity is prone to natural disaster, such as flood (rainy season), drought (dry season), pest and disease attack.

Tax of rice fields is regarded expensive by the small holder farmers in Bali due to its basis is on the location, not under the production value of land. As mentioned above, tax of rice field becomes one of the pushed factors toward the land conversion. In other side, the price of land (rice field) has been increased over the year. Therefore, it is needed to consider the subsidy of tax on rice field or land tax exemption. Government should provide subsidy for farmers relating to tax payment every year. If possible, government might take a tax exemption policy for the small holder farmers to enlighten the burden of production cost for rice farming and support the food security program.

In order to implement the Indonesian Law 41/2009 about the sustainable rice field protection issued by the central government, the local government must follow up to issue local regulations based on the cited law. In this regulation, government should make comprehensive or holistic analysis on the farmers' socio-economic and other dimensions of development. Farmers should be given an understanding about the regulation and its objectives. The objectives informed are not only for the government or environment concern, but also for the farmers' benefits. The incentives and disincentives for farmers should be clearly stated to make sure that the regulation felt fruitful for them and others. The existence of incentives and disincentives as a significant instrument might encourage and ensure farmers in implementing the sustainable rice field protection policy since they could increase their productivity. Defining the areas of rice field which might be covered should be based on the availability of supporting factors for rice farming development, such as irrigation, farm road and others.

The regulation which would be issued by local government regarding the sustainable rice field protection must be strictly implemented. Socialization of this regulation and other relevant regulations must be intensively conducted to the people (farmers and non-farmers). They should understand the essence and objectives of the regulations. Besides, the law enforcement must be also performed by the government in order to achieve the objectives of regulations. Law enforcement is one of the strongest weapons for the realization of the goals and objectives of sustainable rice field protection policy at the national, provincial and district levels. This condition is very important in the effort to control the conversion of rice field, and to preserve the existing *subak* irrigation system in Bali. Thus, the food security program could be achieved.

Conclusion

Subaks have significant roles in water management within subak level and inter-subaks level. Philosophy of *tri hita karana* is always being a guide of *subaks* in irrigation management, especially in running their functions. The roles of *subaks* are distribution and allocation of irrigation water; mobilization of resources for operation and maintenance of irrigation facilities; fund raising, conflict management; and ritual activities. Government has been increased its development to support food safety by constructing the dams in Bali in order to ensure the water availability. *Subaks* have multi-functions in the relation to the food production, economy; environment and ecology, social and culture, rural development and ecotourism and agrotourism.

Concerning the food security program, several recommendations should be taken by the government for strengthening *subaks*. The recommendation might include (i) provision of subsidy for agricultural inputs and equipment; (ii) strengthening capacities of *subaks* in terms of agricultural technology and management and organization; (iii) price control of rice produced by farmers as members of *subaks*; (iv) provision of subsidy for irrigated land tax or tax exemption; (v) guarantee of irrigation water availability; and (vi) control of irrigated land conversion.

REFERENCES

1. Adams, W.M., Potkanski, T., Sutton, L.G., 1994. Indigenous farmer-managed irrigation in Sonjo, Tanzania. *The Geographical Journal*, 160.1: 17-32.
2. Angchok, D. and Premrata, S. 2006. Traditional Irrigation and Water Distribution System in Ladakh. *Indian Journal of Traditional Knowledge*, Vol.5 (3): 397-402.

3. Aryawan, I P.S. Windia, W. dan Wijayanti, P.U. 2013. Subak Roles in the Rice Farming Activities, A Case of Subak of Dalem, Tabanan Regency, Bali Province, Indonesia. *E-Jurnal Agribisnis dan Agrowisata*, Vol. 2, No. 1: 1-11.
4. Conception, R.N., E. Samar and M. Collado. 2006. Multifunctionality of the Ifugao Rice Terraces in the Philippines. *Prosiding Seminar Multifunctionality and Revitalization of Agriculture*. Indonesian Agency for Agricultural Research & Development, Ministry of Agriculture; Ministry of Agriculture, Forestry and Fisheries Japan.
5. Dabour, N.M. 2002. The Roles of Irrigation in Food Production and Agricultural Development in The Near East Region. *Journal of Economic Cooperation* 23, 3 (2002), pp. 31-70. Lorenzen, R.P. 2011. Changing realities: perspectives on Balinese rice cultivation. *Human Ecology*, Vol. 39, No.1: 29-42.
6. Desai, B. M., 2002. Policy Framework for Reorienting Agricultural Development. Presidential Address. *Indian Journal of Agricultural Economics*. 57 (1), 1-21.
7. Dorward, A. and E. Chirwa. 2011. The Malawi agricultural input subsidy programme: 2005/06 to 2008/09. *International Journal of Agricultural Sustainability*, Vol. 9, Issue 1: 232-247.
8. Ikejiofor, I.G. & Ali, A. 2014. The Effects of Road Transport Characteristics on the Marketing of Agricultural Produce in Nsukka LGA, Enugu State, Southeastern Nigeria. *Innovare Journal of Social Sciences*. 2(1):2–5.
9. Lansing, J.S. 2005. On Irrigation and the Balinese State. *Current Anthropology*, Vol. 46, No. 2 (April 2005), pp. 305-308.
10. Loksha M.N. and M. Mahesha. 2016. Impact of Road Infrastructure on Agricultural Development and Rural Road Infrastructure development programmes in India. *International Journal of Humanities and Social Science Invention*, Vol. 5, Issue 11: 1-7.
11. Lorenzen, R.P. 2011. Changing realities: perspectives on Balinese rice cultivation. *Human Ecology*, Vol.39, No.1: 29-42.
12. Masara, C. and L. Dube. 2017. Socio-economic factors influencing uptake of agriculture insurance by smallholder maize farmers in Goromonzi district of Zimbabwe. *Journal of Agricultural Economics and Rural Development*, Vol.3, No.1. 160-166.
13. Oguzor, N.S. 2012. Farm Organization, Ownership and Food Productivity in Nigeria. *Journal of Economics and Business Research*, No. 1, 2012: 63-72.
14. Omorogiwa, O., J. Zivkovic., and F. Ademoh. 2014. The Role of Agriculture in the Economic Development of Nigeria. *European Scientific Journal*, February 2014 edition vol.10, No.4:1857 – 7881.
15. Pham, V.C., T.T.H. Pham, T.H.A.Tong, T.T.H.Nguyen, and N.H.Pham. (2017). The Conversion of Agricultural Land in the Peri-urban Areas of Hanoi (Vietnam): patterns in space and time. *Journal of Land Use Science*, Vol.10, Issue 2: 224-242.
16. Reshmy, N. 2010. Crop insurance in India: changes and challenges. *Economic and Political Weekly*, 45(6), 19-22.
17. Roth, D. 2011. The Subak in Diaspora: Balinese Farmers and the Subak in South Sulawesi. *Hum. Ecol.* (39):55–68
18. Roth, D. and Sedana, G. 2015. Reframing Tri Hita Karana: From ‘Balinese Culture’ to Politics. *The Asia Pacific Journal of Anthropology*, Vol.16, No. 2: 157 - 175
19. Salako, M.A. and A. Lawrence. (2015). Agriculture, Economic Growth and Development Nexus: Var Variance Decomposition Evidence from Nigeria. *International Journal of Economics, Commerce and Management*, Vol. III, Issue 6: 460-473.
20. Sedana, G. 2013. Modal Sosial dalam Pengembangan Agribisnis Petani pada Sistem Subak. Kasus di Subak Guama dan Selanbawak, Tabanan, Provinsi Bali. Denpasar Disertasi Pascasarjana Universitas Udayana.
21. Sedana, G., I G.A.A.Ambarawati, and W. Windia. 2014. Strengthening Social Capital for Agricultural Developemnt: Lessons from Guama, Bali, Indonesia. *Asian Journal of Agriculture and Development*, Vol.11 No.2: 39-50.

22. Sedana, G., and N. D. Astawa. (2016). Panca Datu Partnership in Support of Inclusive Business for Coffee Development: The Case of Ngada District, Province of Nusa Tenggara Timur, Indonesia. *Asian Journal of Agriculture and Development*, Vol. 13, No.2: 75-98.
23. Sedana, G., and N. D. Astawa. (2017). Revitalization of Farmers Organization Functions toward Agribusiness for its Sustainability: Ideas for Traditional Irrigation Organization in Bali Province, Indonesia. *International Journal of Development and Research*. Vol.7, Issue 11: 17020-17024.
24. Sedana, G. and N. D. Astawa. 2018. Institutional Adjustment of Subak (Traditional Irrigation System) Orienting Business: Case of Cooperative Of Subak Guama, Bali Proviince, Indonesia. *International Journal of Current Research*, Vol. 10, Issue, 06: 70418-70423.
25. Sedana, G. and Udayana, I G.B. 2018. Government's Efforts to Ensure the Sustainable Agricultural Lands: Case in the Traditional Irrigation System in Bali Province. *Sustainable Environment Agricultural Science* Vol. 2. No.2: 145-156
26. Shah, P. and M.K. Shah., 1994. Multifunction Irrigation Organisations: Advantage or Handicap. *Irrigation Management Network*, Network Paper No.28, April 1994. Londdon: Overseas Development Institute.
27. Sherrick, B.J., P.J. Barry, P.N. Ellinger, G.D. Schnitkey. 2004. Factors influencing farmers' crop insurance decisions. *American Journal of Agricultural Economics* 86(1): 103–114.
28. Solomon, H. and Kitamura Y. 2006. Traditional irrigation management in Betmera-Hiwane, Ethiopia: The main peculiarities for the persistence of irrigation practices. *Journal of Mountain Science* June 2006, Volume 3, Issue 2:139-146.
29. Wang, M., T. Ye, and P. Shi. 2016. Factors affecting farmers' crop insurance participation in China. *Canadian Journal of Agricultural Economics* 64(3): 479–492.
30. Wijetunga, Chatura. Saito, Katsuhiro. (2017) Evaluating the Fertilizer Subsidy Reforms in The Rice Production Sector in Sri Lanka: A Simulation Analysis. *Advances in Management & Applied Economics*, Vol. 7, No. 1: 31-51.
31. Yaghoubi, J. M. E. Shokri, and J. M. Gholiniy. 2011. Assessing Agricultural Insurance Agents Attitude towards E-learning Application in Teaching Them. *Procedia Social and Behavioral Sciences* 15: 2923–2926
32. Yamashita, S. 2013. The Balinese Subak as World Cultural Heritage: In the Context of Tourism. *Journal of Bali Studies*, Vol.3, No.2 : 39-69.

ALTERNATIVE POLICIES TO STRENGTHEN THE TRADITIONAL IRRIGATION SYSTEM FOR SUPPORTING THE FOOD SECURITY PROGRAM: Case of the Subaks' System in Bali, Indonesia

ORIGINALITY REPORT

11%

SIMILARITY INDEX

11%

INTERNET SOURCES

5%

PUBLICATIONS

5%

STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universitas Hasanuddin Student Paper	3%
2	docplayer.net Internet Source	2%
3	adri27th.stkipsingkawang.ac.id Internet Source	2%
4	Gede Sedana, Ni Nengah Yastini, Ni Made Intan Maulina. "Roles of local farmers' organization in supporting food security: case of Subak in Bali, indonesia", IOP Conference Series: Earth and Environmental Science, 2021 Publication	1%
5	journal.stkipsingkawang.ac.id Internet Source	<1%
6	repository.stiewidyagamalumajang.ac.id Internet Source	<1%
7	edepot.wur.nl Internet Source	<1%

8	www.aessweb.com Internet Source	<1 %
9	Gede Sedana. "Benefits of farmers' cooperative to rice farming activity: case of Subak's cooperative in Guama, Tabanan District, Bali province", IOP Conference Series: Earth and Environmental Science, 2020 Publication	<1 %
10	vital.seals.ac.za:8080 Internet Source	<1 %
11	ejournal.undwi.ac.id Internet Source	<1 %
12	ijaemr.com Internet Source	<1 %
13	www.journalcra.com Internet Source	<1 %
14	Aleksandar Miljatović, Dragana Tekić, Veljko Vukoje, Tihomir Novaković, Todor Marković. "Impact of different factors on the farmers' decision to insure crop production", Ekonomika poljoprivrede, 2021 Publication	<1 %
15	api.intechopen.com Internet Source	<1 %
16	www.granthaalayahpublication.org Internet Source	<1 %

17

www.iccrom.org

Internet Source

<1 %

18

Yingmei Tang, Huifang Cai, Rongmao Liu.
"Farmers' Demand for Informal Risk
Management Strategy and Weather Index
Insurance: Evidence from China",
International Journal of Disaster Risk Science,
2021

Publication

<1 %

Exclude quotes On

Exclude matches Off

Exclude bibliography On