

Sustaining Traditional Irrigation System through Ecotourism Development: Case of Subak of Sembung, Denpasar, Bali, Indonesia

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Abstract

Subak constitutes a traditional irrigation system in Bali which has a nature of socio-agrarian-religious based on the culture and Hindu religion in Bali. Farming culture in the *subak* system is one of the cultures supporting the development of cultural tourism in Bali. Since 2012, UNESCO has recognized the existence of *subak* as the world cultural heritage. The economic growth of development often results in impacts that are less favorable for agricultural development, such as conversion of rice fields. The government of Denpasar city has introduced ecotourism within *subak*. The objectives of this study are to: (i) find out the problems encountered by *subak* related to ecotourism; and (ii) describe the extension techniques that are carried out for the development of ecotourism within *Subak* of Sembung. This *subak* was selected by purposive sampling. is in *Subak* of Sembung, Peguyangan Village. Key respondents were selected to get data needed. Data collected by using interview, survey, observation and documentation. Descriptive method was employed to analyzed data. The study pointed out that there are some problems encountered by *subak* in the development of ecotourism, such as the aspects of production, tourism education, and business management. Therefore, it is needed the empowerment of *subak* to overcome the problems faced. The increase of crop production (corn, chili, eggplant, long beans, vegetables, cucumbers and also papaya) is carried out through direct extension and training activities in their rice fields. Improvement of tourism education is also done through the extension activities for the *subak* members and management board of traditional village and the ecotourism managers, especially those concerning *sapta pesona* (seven of charm). Strengthening of farmers' capacity on business management is conducted through the extension training about post-harvest, such as processing, packaging, and marketing. It could be suggested to the *subak* and managers of ecotourism and traditional villages to have better synergy of their activities to ensure the sustainability of the development of ecotourism of *Subak* of Sembung. Government should support ecotourism activities through the promotion of the existence ecotourism within *subak*.

Keywords

Subak, ecotourism, production, extension, training

Introduction

Subak is a traditional irrigation system in Bali and is often identified with water users' organization in the fields on irrigation and agriculture. This has a nature of socio-agrarian-religious based on the culture and Hindu religion in Bali [1; 2; 3]. Farming culture in the *subak* system is one of the cultures supporting the development of cultural tourism in Bali. Since 2012, UNESCO has recognized the existence of *subak* as the world cultural heritage.

The development of the agricultural sector in Denpasar City, Bali Province still has a significant role in various aspects, such as economy, culture and environment. This condition is in line with the role of the agricultural sector, especially in rice fields in developing countries [4]. Some important roles of the agricultural sector are providing food, providing opportunities for business opportunities, producing raw materials needed by industry, consuming industrial products, and contributing foreign exchange to the State.

The fast growth of economic development in the urban areas often results in impacts that are less favorable for agricultural development. One of the impacts is the conversion of rice fields intended for infrastructure

development, such as roads, housing and settlements, industry [5; 6]. The conversion of rice fields has also occurred in Denpasar City since three decades ago. Government of Denpasar City has made the green belt area or green open space in some areas in order to control the land conversion. In addition, the government has also introduced ecotourism program within *subak* area to provide attractive view and activities and to protect the conversion of rice fields. This ecotourism is also intended to preserve the *subak*s culture and increase farmers' income. One of the subaks which is used as an ecotourism area is Subak of Sembung located in Peguyangan Village, North Denpasar District, Denpasar City.

Considering the relative new formation of ecotourism within Subak of Sembung (about 4 years ago), the efforts are needed to improve the quality of ecotourism services from various aspects, such as production, behavior of farmers toward *Sapta Pesona* (seven of charm), business management, and ecotourism management sustainability. This study aims to: (i) find out the problems encountered by subak related to ecotourism; and (ii) describe the extension techniques that are carried out for the development of ecotourism within *Subak* of Sembung.

Methodology

The selection of location for this study was done by purposive sampling (intentionally), that is in *Subak* of Sembung, Peguyangan Village, North Denpasar Sub-district, Denpasar City, Bali Province. The location of this study can be seen in Figure 1. Some considerations regarding the selection of the *Subak* of Sembung are: (i) the *subak* area is located in Denpasar City which has the high potential for land conversion; (ii) the *subak* has been initiated to develop an ecotourism area by the government since 2014; (iii) the *subak* has good agro-climate conditions for agricultural development both food crops and horticulture.



Figure 1 Location of Denpasar City

In this study, key respondents were determined, such as the management board of Subak of Sembung, ecotourism managers, the management board of traditional village of Peguyangan, the head Peguyangan Administrative Village, the Agriculture Service, the Tourism Service in Denpasar city, and several farmers who were actively involved in community partnership activities. Data collected in this study was primary data and secondary data. Data collection was done by using several techniques, namely interview, survey, observation and documentation. The collected data was then tabulated according to the variables proposed in this study. Data were analyzed using descriptive methods, which provide interpretation or describe all the symptoms found in this study.

Results And Discussion

Administratively, the Subak of Sembung is located in the Administrative Village of Peguyangan, North Denpasar Sub-district, Denpasar City. The total area of *subak* is 115 ha. Subak of Sembung consists of six sub-*subaks* (called *munduk*), namely:

1. Munduk of Umawani covering 20 hectares with 34 farmers
2. Munduk of Sapian covering 20 hectares with 45 farmers,
3. Munduk of Sembung covering 13 hectares with 21 farmers,
4. Munduk of Umapuan covering an area of 35 hectares with 59 farmers,
5. Munduk of Jaba Kuta covering 14 hectares with 36 farmers; and
6. Munduk of Umapalak covering 13 hectares with 29 farmers

Physically the boundaries of the Subak Sembung area (see Figure 2) are as follows:

1. North: Peguyangan Kaja Village
2. East: Peguyangan Kangin Village
3. South Side: Peguyangan Village
4. West Side: Peguyangan Village

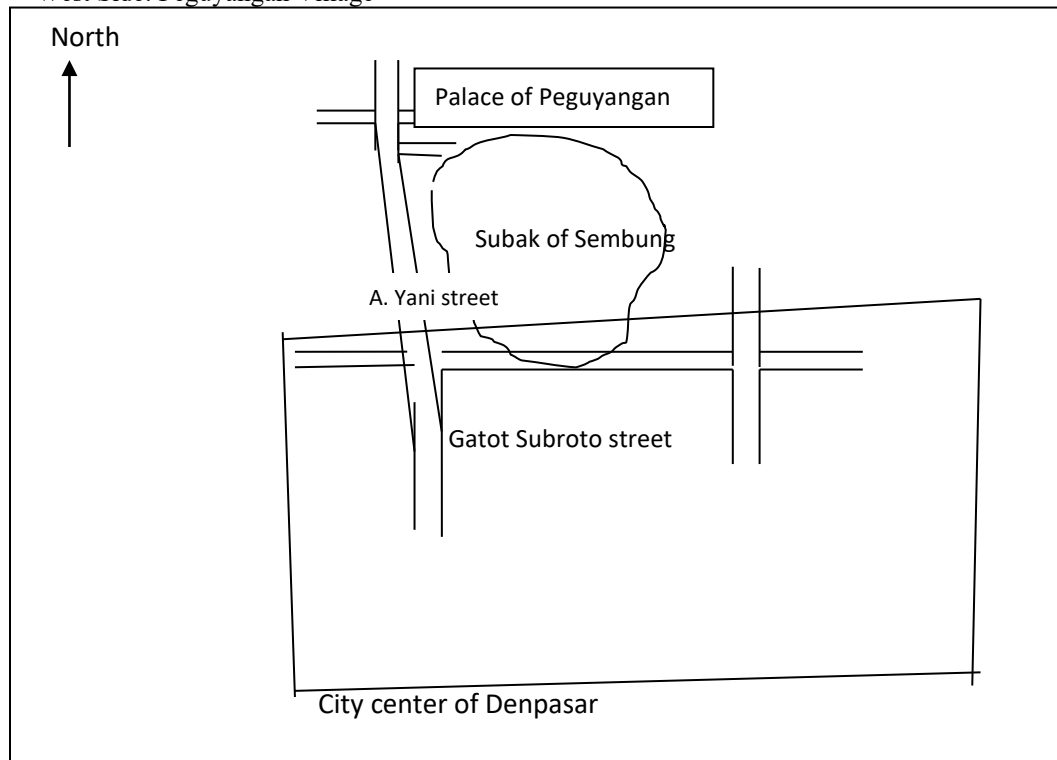


Figure 2 Layout of the Subak of Sembung
Source: Chairman of *Subak* of Sembung

The *Subak* of Sembung still maintains its traditional agricultural cultural system in the activities of irrigation and agriculture. The traditional agricultural culture deals with the water distribution system, planting based on proper days according to the Hindu Bali Calendar (1 month equals to 35 days), mutual cooperation and *subak* ritual ceremonies that are adjusted to the stages of rice growing, started from the land preparation till the harvest period. *Subak* of Sembung has a water source coming from Dam of constructed by government on the Ayung River.

Economic development and population growth in the City of Denpasar have a negative impact on the demand for land used for settlements housing, offices, industry, roads and so on. This condition can affect the conversion of productive rice fields. Anticipatory efforts were carried out by the government in 2014 through the introduction to ecotourism within *Subak* of Sembung. This ecotourism looks identical to the agricultural culture with agrotourism [7]. However, until the beginning of 2017, its development has not shown significant progress. This is indicated by the small number of visitors coming to the ecotourism area. Every Saturday and Sunday, it is usually more visitors come to the area of *Subak* of Sembung. At present, most tourists do sports activities and then buy local products produced by farmers in the *Subak* of Sembung.

Organizationally, the activities of *Subak* of Sembung are coordinated by a chairman called *pekaseh*. He has vice-chairman called *pangliman*, secretary (*penyarikan*), and treasurer (*petengen*). In addition, each of the sub-subak is coordinated by the chairperson, who is called a *kelihan munduk* (see Figure 3).

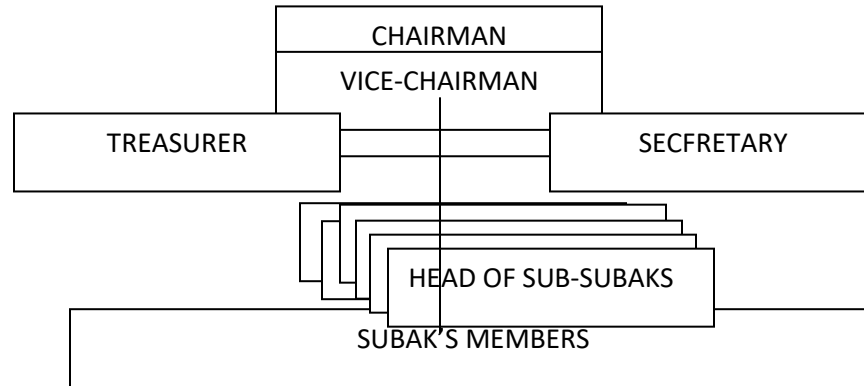


Figure 3 Organizational structure of subak

In carrying out daily activities, *Subak* of Sembung is based on the philosophy of *tri hita karana* (three causes of happiness) which includes three components, namely *parhyangan* (harmonious relationship between farmers and God); *pawongan* (harmonious relationship with the other farmers); and *palemahan* (harmonious relationship with the environment). This philosophy is the basis for *subaks* in Bali in realizing harmony to achieve the objectives of *subak* organizations based on the farming culture [8; 9; 10; 11; 12].

The government of Denpasar City has provided physical assistance in the form of a small gate, tracking which can be used for visitors to take a walk enjoying rice fields with a system of distribution and allocation of traditional irrigation water, as well as various types of crops on rice fields. The tracking actually functions to a farming road that is used to facilitate transportation of agricultural production facilities, agricultural equipment and machinery, and agricultural products.

Problems faced by subaks, Based on the interview, survey and observation within the site, it was found that there are still some problems in the ecotourism development within *Subak* of Sembung. These problems include the following (i) production; (ii) tourism education; and (iii) business management.

Production Aspect, Limited farming cultivation techniques, especially for vegetables and fruits cultivated on their rice fields, such as chili, eggplant, long beans, cucumber, papaya and so on. This condition causes its production to be low and the quality is not sufficient for consumers, including visitors. The average production of chili for example produced by farmers is still low (30 kg / 2 acres) caused by fusarium attacks. Other production is also still low due to limited use of superior seeds and proper technology for production (good agricultural practices), such as spacing, land preparation, irrigating, plant maintenance (fertilization, weeding and pest and disease control).

Tourism education aspect, Low understanding of *sapta pesona* or seven charm (safe, orderly, clean, cool, beautiful, friendly and memorable) as one of the basis for the ecotourism developing within *Subak* of Sembung. For example, in the clean aspect, there is still garbage in the irrigation canal of *subak*. Another case is farmer still burn rice straw on their land, in which its smoke upset the visitors. Cleanness culture among farmers as subak members is still relatively low, especially for the environment (irrigation canal) and also the cleanness of products to be sold.

Farmers still use water on the irrigation canal to clean the products they pick, such as eggplants, before being packaged in plastic bags that will be sold to consumers. Due to agricultural product produced by farmers is one of the visitors' goals to buy, the products should be hygiene and clean. Farmer's education on the meaning of cleanliness is still low in order to support his business efforts through the development of *subak* ecotourism.

Management Aspects, Business management skills in groups are still low so there is no agreement on the price of products marketed at ecotourism locations. There is no added value to the products produced from the farm. As a result farmers' income and income have not increased significantly. Products that are sold are still in primary form not yet processed, and the packaging is still very simple. Farmers still manage individual product sales, for example in pricing their products. This condition causes the prices of the products offered vary from one farmer to another within the *subak* area. The way of packaging agricultural products also has not shown a good manner, since the farmers use plastic bags only without any treatment. This makes not so good package and does not have attractive looking for the potential buyers.

Ecotourism development through extension and training, Agricultural extension is an educational activity outside of school or non-formal education aimed at petrani and their families regarding agricultural aspects to change their behavior to realize better farming, better business, and better living [13;14;15]. There are various types of agricultural extension techniques carried out by the Dwijendra University Team and PPL to farmers in order to achieve their goals and objectives (Ban and Hawkins, 2011). In the case of ecotourism development in Subak of

Sembung, the Dwijendra University team and PPL applied several agricultural extension techniques to farmers and community leaders in the ecotourism in *Subak* of Sembung area. Some of the extension techniques are mass extension, group extension and individual extension.

Mass extension, In the development of ecotourism within *Subak* of Sembung, the extension agent utilizes mass media both online and printed news. The use of this media is directed to provide general knowledge to the community in the *Subak* of Sembung area. It is aimed to announce the existence of ecotourism of *Subak* of Sembung. The area has been acknowledged as tourism area by the community in Denpasar City and outside the city. In essence, the purpose of using this mass media is to change the cognitive aspects of the target people. Similarly, the use of mass media in the development of ecotourism in *Subak* of Sembung is intended to raise the awareness of farmers toward their ecotourism. However, this information regarding ecotourism development cannot be fully received by the community because they do not have an access to the mass media.

The results of study showed that the information was only accessed by the head of administrative village, the head of traditional village and the manager of ecotourism. While other community members know after being given information by those who access it. This means that the use of mass media has not provided effective results for the delivery of information to community as a whole. One of the factors that led to this situation was limited news or information relating to the ecotourism within *Subak* of Sembung. In addition, they also still tend to look for other information which at that time provides a stronger attraction compared to information about the economic development and political aspects. This condition is in line with the results of research conducted in several regions both in Indonesia and outside Indonesia which shows that the information conveyed through the mass media has not been effective to disseminate to all people. Therefore, the farmers were given information about ecotourism published in the mass media and online media including social media.

Group extension, One form of the extension techniques that is beneficial for farmer is group extension or focus group discussions [16]. This extension technique is more directed to build or shape the positive attitudes of the target of extension (farmers). In this study, the development of ecotourism within in *Subak* of Sembung also applied group extension techniques attended by farmers and management board of *subak*, as well as other parties coming from outside the *subak*, such as the management board of traditional village, staff of the Agriculture Service and the Tourism Service Offices at the Denpasar city level.

Group extension conducted within *Subak* of Sembung was related to the information about the technology of crop cultivation implemented on rice fields, packaging and product marketing techniques and aspect of ecotourism. In the development of ecotourism within *Subak* of Sembung, several forms of group extension were carried out formally through the existing *subak* organization, ecotourism managers and traditional village institution. In term of informal one, the extension was done with the farmers met at the same time in the site. In the aspect of plant cultivation technology, farmers were invited to discuss the good crops maintenance ways in order to increase the productivity and quality of products. The agricultural extension approach in a group carried out on the ecotourism development in *Subak* of Sembung is participatory which involves the direct farmers into the planning, implementation and monitoring and evaluation of programs.

Through group extension, farmers actively carry out activities related to increasing productivity, which starts from the provision of seeds and seeds, tillage, planting, fertilizing, pest and disease control until harvesting. Farmers are willing to provide the land used for demonstration plots as a place to plant recommended crops. The participatory approach in the extension of this group and involving farmers directly has a positive effect on the implementation of farming management in rice fields in accordance with good cultivation technology. The types of plants cultivated by farmers are corn, cucumber, green vegetables, eggplant, chilies, long beans, *paya*, and papaya. Maintenance of plants cultivated directly by farmers. The extension subjects were in line with the problems or real condition found in the site or at the farm level. Discussions were carried out directly and at the same time delivered a solution of the problems happened on the farmers' land regarding the crops planted by farmers.

The Focus Discussion Group involved the Department of Agriculture, the Tourism Office, the chairman of Peguyangan administrative village, the ecotourism management board and the Traditional village of Peguyangan , management boar of *subak* and several members of *subak*. This group discussion activity focused on the issues related to ecotourism development and production technology and business management. In this FGD, some of the problems presented were: (i) crop diversification; (ii) pest and disease control; (iii) government assistance and subsidies for agriculture; (iv) government assistance and subsidies for ecotourism; (v) sustainable ecotourism management.

The results of the Focus Group Discussion carried out later served as a guide for the management board of *Subak* of Sembung and ecotourism managers to develop sustainable ecotourism within *subak*. It is hoped that each party will coordinate with each other to address the problems being faced at the *subak* level. The Agriculture Service, and

Tourism Service should develop an integrated and synergized program to be able to develop ecotourism in *Subak* of Sembung.

Individual extension, Individual extension is carried out directly to farmers to provide a more complete understanding of agricultural cultivation technologies, such as the benefits of seeds, seeds, fertilizers and pest and disease control, post-harvest and *sapta pesona* (seven charms). Individual extension to farmers is directly carried out on farmer's land in order that he could understand and employ the innovation provided. This individual extension was more emphasis on the purpose of adoption and implementation of innovation directly to solve the problem and develop the capacity of farmers. This approach is often known as learning by doing, where farmers implement technology while learning together with extension workers. In this study, the cultivation technique that was disseminated was land tillage, spacing, pest and disease control, fertilization for several types of plants, such as corn, cucumber, long bean, chili, eggplant, and post harvest.

Conclusions

Tourism development in Bali is very much based on agricultural culture of *subak* system. The agricultural sector in Denpasar City has a significant role in economic, cultural and environmental development. Rapid development in the city area led to the conversion of rice fields. One of the efforts made to control the conversion of rice fields is the development of ecotourism in *Subak* of Sembung.

In the development of ecotourism within *Subak* of Sembung, there are still problems encountered by *subak*, such as the aspects of production, tourism education, and business management. Therefore, it is needed the empowerment of *subak* to overcome the problems faced. Increasing the production of non-rice crops is an important factor to be offered to visitors in the ecotourism area within *Subak* of Sembung. The kinds of crops planted by farmers are corn, chili, eggplant, long beans, vegetables, cucumbers and also papaya. The increase of crop production is carried out through direct extension and training activities for farmers in their rice fields. Tourism education is also conducted through the extension activities for the *subak* members together with the management board of traditional village and the ecotourism managers, especially those concerning *sapta pesona* (seven of charm). Capacity building of farmers in business management is done through the extension training about post-harvest, such as processing, packaging, and marketing of plant products to visitors and other communities.

It could be suggested to the *subak* and managers of ecotourism and traditional villages to further enhance the synergy of their activities to ensure the sustainability of the development of ecotourism of *Subak* of Sembung. The role of the government as a facilitator and regulator is also needed to support ecotourism activities and at the same time to promote the existence ecotourism of *Subak* of Sembung.

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