



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 10, Issue, 06, pp.70418-70423, June, 2018

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

RESEARCH ARTICLE

INSTITUTIONAL ADJUSTMENT OF SUBAK (TRADITIONAL IRRIGATION SYSTEM) ORIENTING BUSINESS: CASE OF COOPERATIVE OF SUBAK GUAMA, BALI PROVINCE, INDONESIA

^{1,*}Gede Sedana and ²I Nengah Dasi Astawa

¹Faculty of Agriculture, Dwijendra University, Indonesia

²Undiknas University, Indonesia

ARTICLE INFO

Article History:

Received 08th March, 2018

Received in revised form

22nd April, 2018

Accepted 29th May, 2018

Published online 30th June, 2018

Key words:

Subak, Adjustment,
Business, Cooperative,
and Benefit.

ABSTRACT

The existence of *subak* as a traditional irrigation system in Bali has *tri hita karana* as its philosophy and focus on social and cultural activities. The more complex of its members' needs and problems, government has endeavored to develop *subak* orienting business. One of the business is run by the farmers' cooperative. The objectives of this study are to describe the potential economic activities of *subak*, and to portrait the institutional adjustment of *subak* toward the business orientation. The collected data was analyzed by employing descriptive method. The study pointed out that the *subak* of Guama has great potential to establish and develop cooperative due to the previous economic activities, such as being a channel on the agri-inputs distribution, and making deposit and money lending to members. The institutional adjustment of *subak* is done through the set-up of organizational structure of cooperative under the *subak* system. The head of *subak* is a controller of the management of cooperative established. The regulations of *subak* is very effective to support the good performance of cooperative. Members of *subak* who are also members of cooperative could get economic benefits from the cooperative.

Copyright © 2018, Gede Sedana and I Nengah Dasi Astawa. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Gede Sedana and I Nengah Dasi Astawa. 2018. "Institutional adjustment of subak (traditional irrigation system) orienting business: case of cooperative of subak guama, bali province, Indonesia", *International Journal of Current Research*, 10, (06), 70418-70423.

INTRODUCTION

Agricultural sector has great role in the economic development within the developing countries, including Indonesia. Rice farming is one of the most important in the country due to the need of food (rice) has become increased. The improvement of rice farming could be supported by the irrigation development and the management of irrigation system. In Bali province, Indonesia, the existence of *subak* system is very crucial due to all of the rice farming cultivated on the rice fields are managed under the *subak*. *Subak* is a traditional rice farmers' organization which has *tri hita karana* (three causes for happiness) as the philosophy (Roth and Sedana, 2015). *Tri hita karana* has three elements, namely *parhyangan* (the harmonious relationship between farmers and the God); *pawongan* (the harmonious relationship among the farmers and the outsiders) and *palemahan* (the harmonious relationship between the farmers and the environment). *Subak* firstly has simple activities based on its nature, that is social, cultural and religious aspects.

*Corresponding author: Gede Sedana,
Faculty of Agriculture, Dwijendra University, Indonesia

This condition makes *subak* might not have business orientation, thus the income of farmers is relatively low. The government has introduced the program on developing water users association, including *subak* through the economic orientated activities. One of the activities is cooperative establishment and development. The existence of cooperatives in the developing countries could make the members (farmers) to have easier access to agri-inputs, credit, and markets information (Gebremichael, 2014). Besides, the cooperative also has a significant role to promote technical, economic and social aspects for the members other than increase the productivity. In several studies pointed out that the farmers' cooperative could significantly influence the improvement of social interaction, capacities of farmers, physical, financial aspects, and become more effective to achieve the goals of members (Ortmann, G.F. and King, 2007; Shahrudi *et al.* 2009; Mohammadi, 2012; Borda-Rodriguez, *et al.* 2016). In the relation to cooperative development, one of the *subaks* in Bali which has conducted business activity is *Subak* of Guama. This *subak* is located in the regency of Tabanan, Bali province, Indonesia. Objectives of the study are to describe the potential economic activities of *subak*, and to portrait the institutional adjustment of *subak* toward the business orientation.

DOI: <https://doi.org/10.24941/ijcr.31160.06.2018>

MATERIALS AND METHODS

Location of this study was in the *Subak* of Guama, Tabanan regency, Bali Province, Indonesia. This site was selected by employing purposive sampling with the main consideration that the *subak* has established cooperative. Members of this *subak* who are also being members of cooperative are 344 farmers. In this study, it was taken 50 farmers as samples by using simple random sampling. Data collected by using survey, interview, observation and documentation techniques. The measurement of categories of farmers' knowledge and attitude is based on the Likert scale. This is done by giving value 1, 2, 3, 4, and 5 to each answer of farmers. There are five categories of knowledge and attitude. Each category of knowledge and attitude have an interval of 16 which is got from the formulation as cited below.

$$i = \frac{\text{Score maximum} - \text{score minimum}}{5} = \frac{100\% - 20\%}{5} = 16$$

Based on the above interval, it can be seen the categories of attitude and knowledge of farmers (see the Table 1). Data collected was analyzed by using descriptive methods to give interpretation regarding the objectives of this study.

RESULTS AND DISCUSSION

Subak system: The location of *subak* of Guama is scattered within three villages, namely Selanbawak, Peken Batannyuh and Belayu. The main source of irrigation water of *subak* is from Cangi weir on the river Yeh Sungai. The other *subaks* which also get water from this weir are: (i) *Subak* of Pacung Babakan; (ii); *Subak* of Cangi Selatan; (iii) *Subak* of Apit Jurang; (iv) *Subak* of Uma Dalem; (v) *Subak* of Bulan, (vi) *Subak* of Selanbawak and (vii) *Subak* of Lepud. The area of Guama *subak* is 179 ha where its rice fields have relatively flat topography. Availability of water in the *subak* for planting along the year is sufficient with the cropping pattern of rice-rice-secondary crops. Physical infrastructure such as roads either for four-wheel and two wheels in the *subak* and the surrounding area is relatively good, so be a contributing factor in the development of agribusiness. In addition, network communication, electricity and drinking water to rural communities including farmers as *subak*' members are very good.

Since the beginning of *subak* formation, this institution has a simple function, that is only the management of agriculture and irrigation. The nature of *subak* is social-agrarian and religious due to the activities of *subak* consists of agriculture, irrigation, social activities and ritual ceremonies. As cited above, *subak* has a philosophy of *tri hita karana* functioning to make harmony in the activities of agriculture and irrigation which are followed by the ritual ceremonies (Sedana and Dasi, 2017; Dik and Sedana, 2015; Sedana, *et al.*, 2013; Windia, *et al.*, 2017; Windia, *et al.*, 2015). Taking into account the nature of the *subak*, it is seen that the social and cultural activities of agriculture become a very dominant aspect in the management of *subak* irrigation system. A mutual help system based on an atmosphere of togetherness among farmers is also an important foundation for the organization of agricultural activities. Economic activity was not clearly visible in *subak* institutions in the five decades ago. But individually, the economic activities were actually done by every farmer, such as the

management of farm by planting several kinds of crops for their family life, even though the profit was not relative high. Currently, the needs of farmers both individually and in farmers' groups are increasing and more complex. Therefore, there is a need for efforts to develop *subak* institutions that are economically oriented. In the agricultural context is known as agribusiness in order to increase the value added and income of farmers and farmers' group and increase economic of rural development (Verhofstadt and Maertens, 2014; Johnson and Shaw, 2014). One of the activities undertaken by *subak* is the formation of *subak* cooperative, in which its members are the entire of *subak* members. Some of the strengths possessed by *subak* in the formation of *subak* cooperatives are as follows: (i) they have had neighborhood for a long time; (ii) they already have written rules in the management of agriculture and irrigation; (iii) they have mutual trust in the management of agriculture and irrigation; and (iv) they have very strong non-physical ties on the ritual or religious activities. In case of *subak*, ritual ceremonies constitutes as the most affiliating factors in the activities of farming.

The development of farmer cooperatives in several developing countries has also begun to show good performance. For example, the government of Ethiopian has endeavored to promote co-operatives establishment in order to increase the productivity and achieve the food security and rural poverty eradication programs (Tefera, *et al.*, 2017). Farmers' cooperatives in Flores (Indonesia) also show their activities that provides benefits for members. Prominent activity of the cooperative is to market the processed coffee beans jointly to the exporter (Sedana and Dasi, 2016). In *Subak* of Guama, the formation of cooperative was firstly initiated by the government, namely Agricultural Technology Assessment Institute, Bali Province in 2002. The program developed to strengthen *subak* institutions through the implementation of agribusiness activities.

Potentials of subak relating to business activity: As cited above, *subak* commonly had activities on rice farming and secondary crops farming. Prior to intervention of the governments (The Agency for Agricultural Research of Bali province, called BPTP and the Food Crops Service, Bali province and Tabanan regency), *Subak* of Guama initially has conducted economic activities on a relatively small scale business. The main source of capital was from the internal *subak* (members). Several economic activities held in *Subak* of Guama are savings and loans. Besides, *subak* also run a business on provision of agricultural inputs (seeds, fertilizers, pesticides, and others) which was managed by the Village Unit Cooperative located in another district, that is sub-district of Mengwi (Badung regency). In this business, *subak* was only as a channel between the cooperative and members of *subak*. Its consequence, the *subak* could not gain big profit due to it went to the cooperative. *Subak* was only got the share profit from the cooperative. The mechanism of agricultural inputs provision from cooperative was defined by the management board of cooperative and based on the government regulations. The management board of cooperative conducted a meeting with members of *subak* to give information about the process of getting agricultural inputs. In this meeting, management board of cooperative also invited the government staff (agricultural extension officers) from the Agriculture Service (at the Tabanan regency) to assist in informing about the needs of agricultural inputs for the rice farming.

Table 1. Categories of knowledge and attitude of farmers about cooperative establishment and development

No	Category of attitude	Score (%)	Category of knowledge
1	Strongly agreed	> 84 - 100	Very high
2	Agreed	> 68 - 84	High
3	Hesitate	> 52 - 68	Enough
4	Disagreed	> 36 - 52	Low
5	Strongly disagreed	20 - 36	Very low

Table 2. Distribution of samples relating to knowledge about cooperative development

No	Category	Frequency (person)	Percentage (%)
1	Very high	8	16.00
2	High	40	80.00
3	Enough	2	4.00
4	Low	0	0.00
5	Very low	0	0.00
	Total	50	100

Source: Analysis of primary data, 2018

Table 3. Distribution of samples based on the attitude toward cooperative development

No	Category	Frequency (person)	Percentage (%)
1	Strongly agreed	11	22.00
2	Agreed	38	76.00
3	Hesitate	1	2.00
4	Disagreed	0	0.00
5	Strongly disagreed	0	0.00
	Total	50	100

Source: Analysis of primary data, 2018

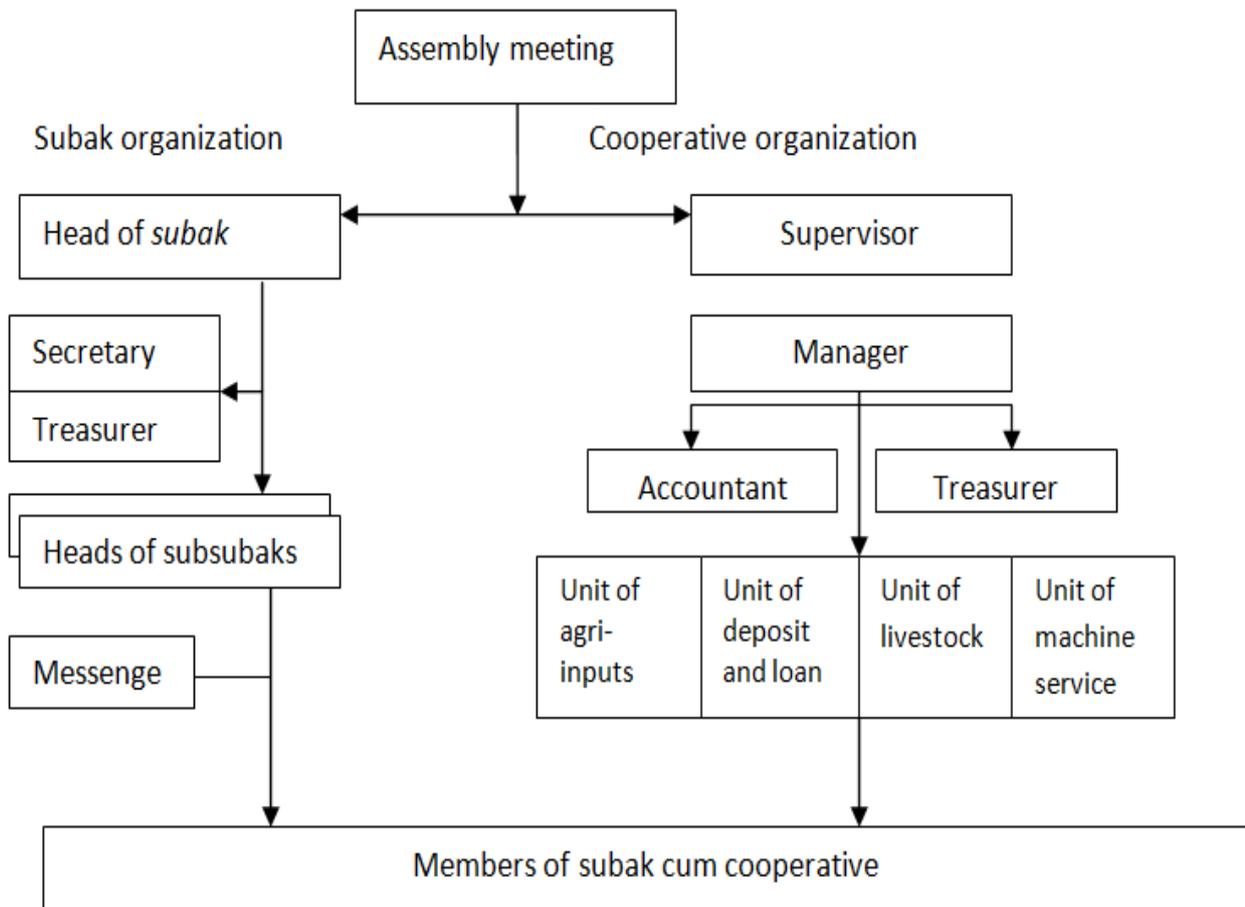


Figure 1. Institutional adjustment of subak toward agribusiness activities

Firstly, the management board of cooperative distribute the forms that would be filled in by the management board of *subak*. It is about the name of members, their land size, amount of seeds, fertilizers, pesticides needed. This forms are called Definitive Work Plan for Farmers Group. The completed forms should be signed by the head of *subak* and acknowledged by the agricultural extension officer. This means that the role of *subak* is to channel the information from the cooperative to members of *subak*. Cooperative is also assisted by the *subak* due to it has defined the kind of rice variety which would be planted and time of distribution for fertilizers. Besides, *subak* also defines the planting schedule for rice that must be strictly implemented by farmers. The savings and loan activities are entirely based on trust among members and management board of *subak*. Loan to *subak* members was agreed through *subak* meetings in the relation to the maximum limit of loan amount, loan duration and interest rate of loan, including the mechanism of loan return. There was no formal bureaucracy in the process of loan provision at the *subak* level. Money lending activities to members is a routine activity conducted every month by the *subak*. Every monthly meeting (35 days), the members who are borrowing money must return the interest of loan to *subak*, including fines, if any. In this meeting, the other members could propose to get loan from *subak*. The collaborative work between *subak* and cooperative in another regency as cited above in the process of provision and distribution of agri-inputs, and the saving and loan activities for the members of *subak* are being a great potentials to establish and manage cooperative for making more profit. These constitute as an embryo of economic business that would be managed under the cooperative of *subak*.

Institutional Adjustment of *subak* relating to agribusiness development:

Based on irrigation management and the realization of the provisions of regulations and regulations such as the previous Law no. 7/2004 about Water Resources, and the previous Government Regulation No. 26/2006 about Irrigation, it is clearly stated that strengthening of irrigation institutions (water users association, including *subak*) is very important to undertake. *Subak* is directed to improve its ability in the management of physical aspect of irrigation, institutional as well as economic capability. This means that institutional adjustment in *subak* is required to be able to develop economic activities, such as agribusiness. This is related to the efforts of water users association empowerment based on the Decree of the Minister of Home Affairs Number 50/2001 about the Guidelines for Empowering Water User Association. It has been stated in the article 21, as follows:

- Empowerment of the water users association and the coordination body of water users associations is addressed to to develop them to have capability and capacity in the proper irrigation management, the profitable economic activities related to the farming of its members and cooperation with other parties based on their potentials;
- Empowerment in the field of economic business related to farming includes the cultivation of high value economic crops, fisheries, livestock, the provision of agricultural inputs, agricultural machinery equipment, irrigation network construction services, product processing, and product marketing;
- The Water users association and the coordination body of water users associations may establish an

economic or agribusiness enterprise, while maintaining irrigation management.

Following the innovation introduced by BPTP, *Subak* of Guama was interested in the agribusiness development. The main principles of this development are to get more profits for the *subak* through the cooperative of *subak*, and to assist members in getting agricultural inputs for rice farming and other economic activities. Information about the benefits of cooperative establishment and intensive guidance from the BPTP had ensured the management board of *subak* and members to understand and encourage to immediately form a cooperative of *subak*. In this study, it is pointed out that the average of farmers' knowledge about the cooperative establishment is relatively very high. Its score is 88.20 % out of the maximum score with the interval from 66.40 % to 90.50 %. This indicates that the members of *Subak* of Guama have very high knowledge, and also have a potential to establish the cooperative. The sample distribution relating to knowledge of cooperative development is shown in the Table 2.

Referring data shown in Table 2, it can be seen that there is none who has low and very low knowledge about the cooperative development. It is 16.00 % of farmers has very high knowledge, while 80.00 % of farmers has high knowledge. The items measured in the knowledge variables are benefits of cooperative, ways to establish cooperative, cooperative organization and management, financial management and administration. The high knowledge of farmers has great contribution to the achievement of program (Dawoe, *et.al.*, 2012; Karunamoorthi, *et al.*, 2012; Segnon, *et al.*, 2015). In the relation to cooperative development, this condition should be followed up by the government to encourage *subak* for establishing cooperative. Another variable learned in this study is attitude of farmers toward cooperative establishment and development. Similar to knowledge variable, the items measured are benefits of cooperative, ways to establish cooperative, cooperative organization and management, financial management and administration. Based on the survey on 50 samples, it is known that the average of farmers' attitude toward cooperative establishment and development is agreed (its average 78.50% out of the maximum score). Most of samples (76.00 %) has agreed attitude and the rest (24.00 %) has strongly agreed toward cooperative establishment and development. The distribution of samples based on the attitude toward cooperative development is shown in the Table 3.

Noting data shown in Table 3, it is pointed out that the attitude of farmers toward the cooperative establishment and development are positive. This situation could be a starting point for the government to invite *subak* to establish cooperative in order that the members might gain benefits and share profit from the cooperative. Positive attitude of farmers contribute better perception on the innovation and support to adopt it (Adrian, *et al.*, 2005; Azman, *et al.* 2013). None of sample has disagreed and strongly disagreed attitude toward the establishment and development of cooperative. Having good understanding (knowledge and attitude) of farmers, BPTP undertook intensive guidance to *subak* to establish a cooperative. *Subak* was very welcomed to the initiation for the *subak* establishment. Through several coordination meetings among *subak*'s members, BPTP staff, staff of the Agriculture Services (at the province and regency levels), the cooperative had completely established in 2003 with the common

cooperative structure (See Figure 1). There are supervisor, manager, accountant and treasurer and other unit managers. It is called KUAT Guama. KUAT is a Cooperative on Integrated Agribusiness. A legal status of cooperative has been provided by the government. BPTP staff had still supervised the management of the new cooperative. The structure shown in the Figure 1 gives an information that there are two structures consisting of *subak* organization structure and cooperative organization structure. The head of *subak* is being a supervisor of cooperative. While, the manager of cooperative is a professional person hired by cooperative, including the accountant, treasurer and manager of units under the cooperative. Through this structure, the activities of cooperative is still under control of *subak* (the head of *subak*). Besides, some regulations prevailed in the cooperative are being the regulations of *subak*. For instance, the farmer or member of cooperative who might not return the loan of cooperative would be also fined by *subak* (temporary stop of irrigation water until returning the loan). This means that the internal regulations of *subak* contribute to the effectiveness of the cooperative performance. In other words, the existence of *subak* is being an umbrella of the cooperative management. Therefore, the cooperative has been obliged to contribute (in the form of cash money) to the *subak* activities, particularly in the ritual ceremonies at the *subak* level. In this study, it is found that the selection of cooperative manager including managers of the units are conducted by deliberation in meetings of *subak* and cooperatives. The selected manager is given mandatory task to appoint the accountant, treasurer and managers of the units under the cooperative. All of the appointed board should be consulted by the head of *subak*. This indicates that the *subak* and cooperative is being one body, in which the cooperative is run as a part of *subak*. Like other cooperatives in Indonesia, the duties of a manager in KUAT of Guama are as follows: (i) to coordinate the business at *subak* level; (ii) to have periodical evaluation on the performance of its employees with respect to the main tasks; (iii) to report business progress to cooperative management and *subak* in accordance with the evaluation results and follow up and resolve various problems that arise; (iv) to create and develop new ideas for the improvement of agribusiness activities under the cooperatives; (v) to make cooperation or partnership with other parties like the government and the private sector; (vi) to make a business plan and evaluate it every year; (vii) to take preventive measures in case of adverse business and always consider the conditions in each business unit; (viii) to provide motivation to employees to improve work productivity; (ix) to propose the improvement of employee welfare to the cooperative management; and (x) to take account the business activities to the management board and *subak* every year through the annual assembly meeting.

The accountant has a very important task in business activities under the cooperative regarding the cash flow. The main tasks of accountant are as follows: (i) to keep recording each credit and cash transactions and receivables from certain parties including members; (ii) to conduct ensure and make verification of the completeness of payment documents; (iii) to post the input code into the accounting system; (iv) to Provides approximate code as input data on a computer system; (v) to bring the documents for getting approval from the manager; and (vi) to prepare periodic financial reports to managers and relevant agencies as a progress report. Meanwhile, the treasurer of cooperative has a role in financial management and have closed relation to the accounting department.

As a financial manager, the main tasks of treasurer are as follows: (i) to make a proof of payment from and to customers or members; (ii) to make accounting input codes together with accounting sections; (iii) to deposit the payment or sale proceeds to the bank; (iv) to make a daily or weekly financial position report; (v) to keep proof of payment and payment receipt; (vi) to assist manager in the needs of operational funding ; and (vii) to keep all transactions into an accounting system. In order to encourage management board of new cooperative, BPTP firstly provided incentive to cooperative, in the form of grant. This should be used for the main business activities consisting of ICM (Integrated Crop Management); CLS (Crop Livestock System); and (iii) MBC (Micro Business Credit). The three main business are expected to bring about the economic benefits for the cooperative and *subak*. The activities covered by ICM are provision of loan for rice seed, fertilizer and pesticides for the members of cooperative which are also members of *subak*. The members who got loan from cooperative must return it within 4 months (a period of rice farming, starting from land preparation until the harvest). Based on the cooperative meeting, it was defined that the interest of loan in the ICM program is 1 percent per month. The CLS program implemented by cooperative of *subak* was providing loan for selected farmers in order that they grow cattle.

Each farmers got loan as much as the price of two cattle. It was about IDR 6,000,000. Based on the consensus of cooperative and *subak*, it was agreed that the interest of this loan is also 1 percent per month. The period of return is 1 year. Meanwhile, the MVC program was addressed to the women (family members of farmers) for making productive business under the home industry. The management of these businesses was managed by the manager of cooperative assisted by the accountant and treasurer and other unit manager. In the first five year, BPTP staff had still guided and supervised the management of cooperative. Aside from guiding management board, BPTP staff also provided agricultural extension for the farmers, through the implementation of demonstration plot and training. In this study, the institutional adjustment of *subak* has been felt positively in term of economic benefits. Besides, the cooperative establishment and development also is being the effort to develop business activities and still under the auspices of *subak* institutions. According to members of *subak*, there are several advantages obtained by establishing new institutions (cooperative) within *subak*. Among other things are as follows: (i) members can easily obtain agri-inputs either individually or in groups; (ii) members could get credit without any complicated mechanism; (iii) members could get economic benefit from the profit gained by cooperative; (iv) members of *subak* could decrease their burden to the contribution for *subak* activities, especially in ritual ceremonies activities due to there is allocation cash money from the cooperative; (v) member could get easier access information and technologies from the outsiders since cooperative has partnership with government and private sectors related to agricultural development. Many research also showed that the existence of cooperative could bring benefits for the members (Adebayo, *et al.*, 2010; Allahdadi, 2011; Golmohammadi, *et al.*, 2013)

Conclusion

Subak constitutes a traditional rice farmers' organization in Bali which has philosophy called *tri hita karana* (three causes for happiness).

It firstly has simple activities based on the social, cultural and religious aspects. The collaborative work between *subak* and village cooperative in another regency on the process of agri-inputs distribution, and the saving and loan activities for the members of *subak* become great potentials to establish and develop *subak* cooperative for making more profit. These activities could be an embryo of economic business that would be managed under the cooperative of *subak*. The institutional adjustment of *subak* should be done to have business activities through the establishment of cooperative. This adjustment shows that there are two structures consisting of *subak* organization and cooperative organization. The specific management is the head of *subak* is being a supervisor of cooperative which is run the manager. Besides, the activities of cooperative is still under control of *subak*.

REFERENCES

- Adebayo, S. T. Chinedum, O. H. Dabo, . C. S. P. Pascal, H. 2010. Cooperative association as a tool for rural development and poverty reduction in Rwanda: A study of Abahuzamugambi ba Kawa in Maraba Sector. *Educational Research, 1(11)*: 600-608.
- Adrian, A.M., S.H. Norwood and P.L. Mask, 2005. Producers' perceptions and attitudes toward precision agriculture technologies. *Comput. Electron. Agric.*, 48: 256-271.
- Allahdadi, F. 2011. The Contribution of Agricultural Cooperatives on Poverty Reduction: A Case Study of Marvdasht, Iran. *Journal of American Science*, 7(4): 22-25
- Azman, A., J.L. D'Silva, B.A. Samah, N. Man and H.A.M. Shaffril, 2013. Relationship between attitude, knowledge and support towards the acceptance of sustainable agriculture among contract farmers in Malaysia. *Asian Soc. Sci.*, 9: 99-105.
- Borda-Rodriguez A, Johnson H, Shaw L, Vicari S. 2016. What makes rural co-operatives resilient in developing countries? *Journal of International Development* 28 (1): 89-111.
- Dawoe, E.K., J. Quashie-Sam, M.E. Isaac and S.K. Oppong, 2012. Exploring farmers' local knowledge and perceptions of soil fertility and management in the Ashanti Region of Ghana. *Geoderma*, 179-180: 96-103.
- Gebremichael, B.A. 2014. The Role of Agricultural Cooperatives in Promoting Food Security and Rural Women's Empowerment in Eastern Tigray Region, Ethiopia. *Developing Country Studies Vol.4, No.11*: 96-109.
- Golmohammadi, F., A.Kahromi, H.K. Nezhad, Yalda Honari, E. Isfahani and M.Kazemi.2013. Role of agricultural cooperatives in accessing to sustainable productivity and creating job opportunities in rural regions (Case study: South-Khorasan Province- east of Iran). *Journal of Engineering and Applied Sciences (3)*: 859-876.
- Jia, X., J. Huang, C. Xiang, L. Hou, F. Zhang, X. Chen, Z. Cui and B. Holger, 2013. Farmer's adoption of improved nitrogen management strategies in maize production in China: an experimental knowledge training. *Journal of Intergr. Agriculture*, 12: 364-373.
- Johnson, H, and Shaw L. 2014. Rethinking rural co-operatives in development: introduction to the policy arena. *Journal of International Development* 26: 668-682.
- Karunamoorthi,K., M. Mohammed, and F. Wassie. 2012. Knowledge and Practices of Farmers with Reference to Pesticide Management: Implications on Human Health. *Archives of Environmental and Occupational Health*, 67 (2):109-116.
- Mohammadi, H., M. Sabouhi, S., B.A. Siasar, and B. Mir. 2012. Study on the Role of Agricultural Production Cooperative in Improving Farmers' Technical Knowledge: A case Study on ugar Beet Growers in Fars Province, Iran. *Journal of Sugar Beet*, 27(2): 59-67.
- Ortmann, G.F. and King, R.P. 2007. Agricultural Cooperatives II: Can They Facilitate Access of Small-Scale Farmers in South Africa to Input and Product Markets? *Agrekon*, Vol 46, No 2.
- Roth, D. and Sedana, G. 2015. Reframing Tri Hita Karana: From 'Balinese Culture' to Politics. *The Asia Pacific Journal of Anthropology*, 16(2): 157 - 175
- Sedana, G. I G.A.A.Ambarawati, and W. Windia. Strengthening 2014. Social Capital for Agricultural Development: Lessons from Guama, Bali, Indonesia. *Asian Journal of Agriculture and Development*. Vol.11 No.2:39-50.
- 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.
- Sedana, G. and I 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.
- Shahroudi AA, Chizari M, and Pezeshkirad. 2009. The influence of water users' cooperative on farmers' attitudes toward agricultural water management: a case study in Khorasan-Razavi province, Iran. *Journal of Economics and Agriculture Development* 2009; 22(2):71-85.
- Segnon, A.C., E.G. Achigan-Dako, O.G. Gaoue, and A.Ahanchédé. 2015. Farmer's Knowledge and Perception of Diversified Farming Systems in Sub-Humid and Semi-Arid Areas in Benin. *Sustainability*, 7: 6573-6592.
- Tefera, D.A., J. Bijman, and M.A. Slingerland. 2017. Agricultural Co-operatives in Ethiopia: Evolution, Functions and Impact. *Journal of International Development*, (29) :431-453.
- Verhofstadt E, Maertens M. 2014. Smallholder cooperatives and agricultural performance in Rwanda: Do organizational differences matter? *Agricultural Economics* 45(1): 39-52.
- Windia, W., Sumiyati, and G. Sedana. 2015. Aspek Ritual pada Sistem Irigasi Subak sebagai Warisan Budaya Dunia. *Jurnal Kajian Bali*, Vol.5, No.: 23-38.
- "Ritual Aspect in the Subak System as the World Cultural Heritage.
- Windia, W. G. Sedana, T. de Vet, J.S. Lansing. 2017. The Local Wisdom of Balinese Subaks, in the *Indigenous Knowledge: Enhancing its Contribution to Natural Resources Management*, edited by Paul Sillitoe. Boston, USA: CAB International.