Archives of Business Research – Vol.7, No.4
Publication Date: Apr. 25, 2019
DOI: 10.14738/abr.74.6353.
Kristian., Harahab, N., Hakim, A., & Batoro, J. (2019). Shifting Cultivation Model: An Environmental And Sustainable Agricultural Management Practice. *Archives of Business Research,* 7*(4),* 1-10.

Shifting Cultivation Model: An Environmental And Sustainable Agricultural Management Practice

Kristian
Doctoral Program of Postgraduate Study,
University of Brawijaya, Malang, Indonesia

Nuddin Harahab
Faculty of Fisheries and Marine Science,
University of Brawijaya, Malang, Indonesia

Abdul Hakim
Faculty of Administrative Sciences,
University of Brawijaya, Malang, Indonesia

Jati Batoro
Faculty of Mathematics and Natural Sciences,
University of Brawijaya, Malang, Indonesia

ABSTRACT

Shifting cultivation is a cultural wisdom of Dayak people which is considered capable of preserving environmental resources. The purpose of this study is to describe and formulate an environmental and sustainable shifting cultivation model. The data were collected through field observation and in-depth interview with the informants. Then, the analysis was performed by using Interactive analysis model. Interactive analysis is an interactive and circular method of analysis between data collection, data condensation, data display, conclusion drawing and verification. The result of the study indicates that the Shifting Cultivation System has a positive impact on the soil, agricultural production level, and socio-economic condition of the local community if it applies local wisdom values along with supervision and technical guidance from expert officers of government insitution in its practice. Shifting cultivation can be implemented to achieve environmental and sustainable agriculture system if there is a policy support and local wisdom consideration.

Keywords: Shifting cultivation, local wisdom, Dayak people, sustainable agriculture.

INTRODUCTION

Indonesia is an agrarian country in which most of its population (60%) lives in rural areas working as farmers (Population Census Data in 2016). Based on those data, it shows that the agricultural sector is still a driving force for rural economies. Shifting cultivation is an agricultural system that is built based on people's experience in processing land and soil from generation to generation. There is a negative and positive side to the practice of shifting cultivation. Negatively, shifting cultivation is considered to cause deforestation and soil erosion, forest fire, and low productivity. In contrast, shifting cultivation system is more familiar with natural system which is certainly more adaptive in maintaining natural structures; it means that shifting cultivation supports conservation and sustainability.

Shifting cultivation is a multisectoral farming method both in terms of causes and effects because it relates to a process in a space or ecosystem. In the ecosystem, there are three environmental elements, namely: abiotic, biotic and socio-cultural which are interrelated and

inseparable. If one of the three elements is disturbed, it will affect other elements and in turn will cause environmental problems. The shifting cultivation practitioners have really understood about it, therfore they preserve the nature for that purpose and for the sustainability of their lives.

In its development, shifting cultivation is often argued by environmental and economic experts. However not all environmental damage and low productivity issues are truly proven. The shift in the extensive shifting pattern of subsistence towards intensive and market oriented has begun to be implemented since the introduction of the Critical Land Rehabilitation Program (ProRLK) in 1992 and road opening that connects the village to Trans Sumatra road which is around 40 km in 1993 (Yonariza, 1996). They evolved from being rubber farmers into paddy farmers and commercialized horticultural plants such as chili, corn, peanut and patchouli plants, herbs and others.

One of the positive aspects of shifting cultivation system that needs to be understood is that it works through local wisdom. The local wisdom cannot be separated from the culture of the people who support it. Local wisdom is all elements of human culture including religious system, language, economics, technology, education, social organization, and art.

Dayak people are very identical with their inherent traditional rituals. Every activity must involve traditional rituals. In their farming activities, clearing land, cutting down trees and planting plants must be started with a ritual called *hancak* or prayer ritual. That ritual is performed to ask for God's blessing so that the crops can be successfully planted.

In terms of culture, the Lundayeh Dayak people always involve custom or traditional ritual as an opening and closing event in all big or small scale activities carried out by the community. They believe that a custom is an ancestral inheritance that must be maintained and preserved. However, it is undeniable that changes in behaviors, patterns and traditional culture towards more modern and complex direction happen today. The examples of those changes are: (1) settle housings and new livelihoods (2) education awareness, (3) mass media awareness and (4) facilities and infrastructure development.

The shifting cultivation pattern, from extensive subsistence system towards intensive and market-oriented towards commercialization and from nomadic into settlers, becomes a new opportunity in meeting today's modern food needs. Current fulfillment of modern food demands a healthy food source and clear traceability, which is then known as organic food. The production result of the shifting cultivation system is a product that clearly meets organic food standards. Therefore, the existence of a shifting cultivation system with its local wisdom should be managed in such a way; it has to be presented as a regulation in order to sustain healthy modern food needs. Based on this background, the purpose of this study is to describe and formulate an environmental and sustainable shifting cultivation model.

RESEARCH METHODS

The research was conducted in June and July 2018 in the West Malinau Sub-district, Malinau Regency, North Kalimantan. The precise area was in the shifting cultivation system performed by Dayak Lundayeh people. Qualitative approach was employed in this study in order to understand the phenomenon of shifting cultivation system as a local wisdom. As explained by Sugiyono (2012) and Moleong (2008), a research with a qualitative approach is conducted holistically by describing the result in the form of words and languages, and it is analyzed inductively by comparing with relevant theories.

The data source of this study consisted of informants, events and documents. Following the concept of Miles et al. (2014), the informants chosen in this study were those who specifically had the knowledge and information on the data needed. The initial informant of this study was selected purposively (purposive sampling), the informant was determined by the researchers themselves in accordance with the research objectives. Purposive sampling was used in determining the key informant, and then the other informants were determined by using snowball sampling based on instructions from the key informant and the detailed information.

Analysis is the process of compiling data so that they can be interpreted; compiling data means classifying them in pattern, theme or category. The data analysis of this research was performed by using the Data Analysis Model from Miles, et al. (2014), which is called the Interactive Model Data Analysis. It includes: data condensation, data display, and conclusion drawing or verification. The interactive model in data analysis is shown in Figure 1.

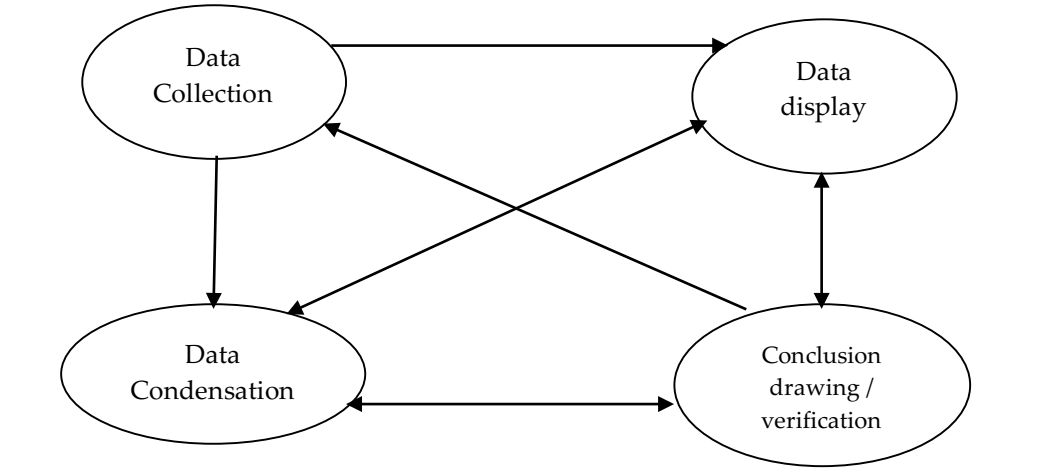

Figure 1. Components of Data Analysis: Interactive Model

Reference: Matthew B. Miles, *et al*., *Qualitative Data Analysis: A Methods Sourcebook*. Singapore: SAGE Publications Inc., 2014:33.

These whole steps were aimed at developing a theory based on data (Grounded Theory); a theory obtained through a study of the phenomena that represented it. Based on the above explanation, the steps of this study were started with collecting data before developing a theory or comparing patterns with the theories that credited before. The result of this study was then refined by designing proposition as a part of the final result of this research activity. The proposition was created based on the data and data analysis results as well as discussion.

RESULTS AND DISCUSSION

Shifting Cultivation System: A Local Wisdom

Shifting cultivation practice including the determination of the area, land clearing process, equipment, burning time, cultivation time and rituals in the cultivation system is carried out with agreed rules and procedures as the local wisdom of Lundayeh Dayak people.

According to Asysyifa, (2009), indigenous people have certain local wisdom in farming. Basically, they depend on nature for their daily lives. Therefore, indigenous people will always maintain the balance of the nature. In the cultivation pattern of agriculture, indigenous peoples apply *gilir balik* system, field rotation plantation system which utilizes nature and follows natural cycle. Generally, they have divided the land use zones. The zones consist of the settlement zone, shrubland zone, fallow land (*reuma)* zone, field zone, plantation zone, sacred

zone and protected zone. The seven zones are properly guarded by Dayak peope. Therefore, it is not possible for Dayak people to farm or settle in sacred forest or protected forest.

Shifting cultivation system practice in the local indigenous Lundayeh Dayak tribe is a traditional view and knowledge that influences people's behavior and it has been practiced for generations to meet the needs and challenges of a community's life. According to Asaad (2011), local wisdom has a function meaning in society both in the preservation of natural and human resources, maintaining custom and culture, and beneficial for life. As explained by Mumfangati, et al. (2004), this local wisdom unites and blends with the cultural customs or ethnics who live in the area. Local wisdom is a knowledge that is typical of a particular society or culture that has developed long ago as a result of the process of reciprocal relations between the community and its environment. This is also in accordance with the explanation of Fox, et al., (2000).

This shifting cultivation is also an integrated and sustainable farming system in space and time. The cultivation system is carried out as the main feature of ecological wisdom; moving from one field to the next field in order to let the land fallow after being cultivated for several times. Fallow time greatly influences the soil fertility and production level. Lahajir (2001) classified secondary forest based on fallow periods as follows, (1) old secondary forest with fallow period of 10 -15 years, (2) young secondary forest with fallow period of 10 - 5 years, and (3) the youngest secondary forest with fallow period of less than 5 years.

Shifting Cultivation System towards Environmental and Sustainable Agriculture

Shifting cultivation system practice towards environmental and sustainable agriculture includes physical soil condition such as the level of fertility, erosion, and others. In this case, shifting cultivation applies fallow method as the key in order to maintain fertility and productivity. A study by Notohadiprawiro (2000) explained that the cultivation system was carried out for only 1-2 years in planting, which was then followed by a long fallow period.

Land conservation through fallow method can rapidly increase carbon storage in the soil. The global increase in soil organic matter over a long period of time will be able to provide a beneficial effect on decreasing the average increase in atmospheric CO_2 and increasing soil productivity, especially in many degraded land areas (Hardjowigeno, 1987).

Erosion has long been recognized as a major problem in shifting cultivation, but very few quantitative studies discuss about the erosion of shifting cultivation, thus the references are still limited. A study conducted by Hardjowigeno (1987) revealed that traditionally land clearing in shifting cultivation has lower erosion and loss of sediment compared to other systems.

The shifting cultivation of the Lundayeh Dayak people is a form of land cultivation from the oldest culture in agriculture and it is still needed in modern agriculture. According to Arsjad (2000), tillage is defined as any mechanical manipulation of the soil to create a proper soil condition for plant growth. The purpose of tillage is to prepare nurseries and plant sites, create excellent root areas, immerse the remaining plants, and remove weeds.

The way of processing the soil greatly influences the good natural soil structure that is formed due to root penetration; if the tillage is too intensive, the soil structure will be damaged. The farmer who cultivates land excessively by totally processing the soil up to its surface is one example of improper processing. That condition causes soil grains to be dispersed by

raindrops, clogging up the soil pores. To overcome the adverse effects of tillage, there are several reccomended methods of processing conservation land to minimize erosion, namely: (a) Zero Tillage (*Tanpa Olah Tanah*): The land to be planted is not processed and the remnants of the previous plant are left scattered on the surface; it will protect the soil from the threat of erosion during the initial growth of plants period. (b) Minimum Tillage: Not all soil surfaces are processed, only rows of plants are processed and some of the remnants of plants are left on the surface (c) Countur-based Tillage: Tillage process is carried out by cutting slopes to form pile paths or by laying out unburned trees (logs) and grooves according to contours or transverse. According to Ariwibawa (2004), Contour-based tillage will be more effective if it is followed by planting according to the contour that allows water absorption and avoids the transposition of land from the shifting cultivation system. If the tillage method has been applied, it can be utilized according to the needs and capabilities. It is this adaptation to the local ecology that makes shifting cultivation system a conservation farming system. This system does need to be improved with thorough knowledge.

The shifting cultivation of the Lundayeh Dayak people has fulfilled the characteristics and indicators of sustainable agricultural system. The following are the characteristic of sustainable agriculture system according to Ministry of Agriculture (2010; 2014):

1. Maintaining ecological functions means not to damage the ecology of agriculture itself;
2. Continuing economically means being able to provide a decent value for the implementer of the agriculture and no party is exploited. Each party gets the right according to its participation;
3. Fair means that every agricultural executor gets his rights without being restricted and waited for and does not violate other things;
4. Humane means to uphold human values, in which human dignity is upheld, including the existing culture;
5. Flexibility means being able to adjust to current situations and conditions, thus sustainable agriculture is not static but can dynamically accommodate the interests of consumers and producers.

Sustainable development has a broader meaning and purpose than sustainable economic growth. Therefore, the shifting cultivation of the Lundayeh Dayak people is seen from the concept of Sustainable development. Thus it needs awareness of the economic, social and environmental dimensions. The economic dimension is related to the concept of maximizing income flows that can be obtained by at least maintaining productive assets as the basis for obtaining these revenues. The main indicator of economic dimension is efficiency and competitiveness level, scale and growth of value added and economic stability. Economic dimension emphasizes aspect of fulfilling human economic needs both for today's and future generations. However it will be better if economic dimension has market regulations related to commodity prices.

Then, social dimension is people's orientation related to the need for social welfare reflected by a harmonious social life (including the prevention of social conflict), preservation of cultural diversity and socio-cultural capital, including protection of ethnic minorities. For this reason, poverty alleviation, equal distribution of business opportunities and income, social political participation and socio-cultural stability are important indicators that need to be considered in the implementation of Dayak people development.

Next, natural environment dimension emphasizes the need for the stability of natural ecosystem including biological living system and natural matter. Included in this case are biodiversity and biogical texture preservation, soil resource, water and agro-climate, as well as

environmental health and comfort. The emphasis is placed on preservation of the flexural power and dynamics of ecosystem to adapt to change rather than conservation, a static ideal condition that is impossible to realize.

These three dimensions affect each other so each dimension must be considered equally. The stable and healthy social systems as well as natural and environmental resources are the basis for economic activities, while economic welfare is a prerequisite for maintaining social and cultural stability and preserving natural resources and environment.

Economic, social and economic objectives at a certain level can work together. However, these dimensions can against and oppose each other. If it happens, the concept of sustainability will lead to the need for the right balance between these 3 dimensions. Policy choices need to be carefully determined by considering each of the interrelated dimensions.

Sustainable Agriculture is an agricultural practice that is ecologically feasible, economically profitable, and socially accountable (Michael, et al., 2013). Sustainable Agriculture is a farming system that is able to maintain productivity and its benefits for the community in an unlimited time. Such system must be able to conserve resources, be socially supported, compete economically, and be environmentally accountable.

Sustainable Agriculture prioritizes the management of agricultural ecosystem which has high diversity or biodiversity. According to FAO (1999), Agricultural Biodiversity includes the variation and variability of plants, animals and microorganisms needed to support the key functions of agricultural ecosystem, structure and process to strengthen and provide support for food production and food security. Rathore et al., (2010) stated that high diversity ecosystem is more stable and resistant to loss; it has lower risk of financial losses and can reduce the impact of droughts and floods as well as protecting plants from pests, diseases and other natural constraints. Diversification can also reduce economic stress due to increased prices of fertilizers, pesticides and other production inputs. Food Security is one of the main objectives of Sustainable Agriculture.

Recommendation for an Environmental and Sustainable Shifting Cultvation System

Shifting cultivation is a traditional farming system commonly used by indigenous peoples. It has existed since 10,000 BC. Shifting cultivation technique is carried out by clearing land in a certain area, cutting down and burning forest, then planting various food crops such as rice, corn, or cassava. Shifting cultivation technique is very dependent on climate since it greatly affects the burning time and planting time. During the dry season, people cut down trees and then burn the land. Meanwhile people plant seeds on that land during the rainy season. The land used for shifting cultivation continues to be used for a considerable time.

Land used as a field will be abandoned within about 2 years because it becomes unproductive. When the first land that has been left is fertile again, the land is re-opened into field; and the second land will be abandoned. The process occurs continuously, so that indirectly, the land used for farming has been mapped. Mapping areas for traditional communities can reduce the risk of clearing new land from primary forests.

Furthermore, shifting cultivation activity is able to maintain the cycle of forest rejuvenation. The succession process after abandoning the field helps maintain the biodiversity of land animals, birds, and various reptiles in the forest. Animals live on young tree branches, lay eggs and feed various types of insects in the forest. The similar explanation was stated by

Bhagawati, et al. (2015), shifting cultivation is an appropriate activity for developing agro ecosystem.

In some other areas in Kalimantan, shifting cultivation is only carried out in several forest areas that have been mapped as fields. Usually, fields can only be used for 2 to 3 times then left behind. The abandoned field is left for around 2 years. After a large number of trees grow again on that land, then it is ready to be reopened as a field. Indirectly, shifting cultivation technique is a traditional conservation effort performed by indigenous people that is inherited from their ancestors. By employing this technique, people do not need to open new land other than those that have been mapped for cultivation. Thus the primary land and virgin forest are preserved. Shifting cultivation only has annual harvest limit, therefore seasonal factors greatly affect the cultivation process. During the dry season, the cleared fields are dried and then burned. When the rainy season comes, the paddy that has been planted is allowed to flourish in order to be harvested. Although shifting cultivation has a very long harvest time, people do not need to use fertilizers or pesticides.

Modern agriculture is characterized by agricultural technique that is based on the maximum yield obtained. This system is usually conventional since most farmers still use chemical fertilizers and pesticides to control pests. In shifting cultivation system, lands for farming are divided into certain areas based on the number of families in the community. Shifting cultivation technique is carried out in the forest. Therefore, shifting cultivation technique also utilizes forests as a balance. The existence of diversity in the landscape preserves the diversity of insects so that the animal population can be controlled, and it does not become a pest to the rice fields.

Modern agriculture has a significant role related to environmental problems due to the impact of environmental damage produced by modern agricultural systems that is happening throughout the world. The problem of environmental pollution and eutrophication of the lake is caused by the high supply of nutrients in the soil and water. In shifting cultivation system, rice field productivity and planting only last once in a year. Meanwhile, planting and harvesting in modern cultivation system are performed three times. More rice production in one year causes an increase in agricultural waste. Waste production in modern agriculture is three times greater than shifting cultivation technique.

Today, numerous environmental problems arise from the conventional modern farming system. Therefore farmers are starting to use an environmentally friendly paddy field management system. The system is known as the organic paddy field system. Organic field system does not use pesticides to reduce pest populations. Instead, it uses biological species-based control. The principle is to release specific pest predators to control pest populations.

Thus the shifting cultivation technique of indigenous peoples is more conservative compared to modern agricultural system that is developing at this time. The development model of sustainable modern agriculture emphasizes the polyculture farming system. The higher diversity of predators in polyculture is able to control pest populations. Biological control of pests can reduce the level of pesticides use that is not environmentally friendly. The employment of shifting cultivation concept in modern farming system can be a solution to food problems in Indonesia.

Reality does show that shifting cultivation is not flawless. Shifting cultivation has a relationship with damage to forest ecosystem, especially on small island, for example flooding during the rainy season and drought during the dry season. Other environemtal damage is a decrease in

soil fertility, climate change occurence especially microclimate condition, animal habita disruption, biodiversity decline. If the cultivation is done by clearing and burning, many rare or endemic species are also extinct.

Addressing various issues of negative shifting cultivation requires the willingness of both central and regional governments to deal with the problems of shifting cultivation rate. So, an appropriate and targeted planning can be drawn up to overcome the problems. Regional regulations which can control the increasing implementation and rate of agriculture practice are significantly needed. Rules and regulations are very crucial to educate the cultivators about the limits and practices of cultivation procedures that ensure the ecosystem sustainability. Furthermore, sanctions will also be set for violations that may occur; those are the consequence of the existence of regional regulations. It is expected that cultivation practice can be carried out in a controlled manner. In this case, strong synergy between the bearer of custom or customary law, village regulations and local wisdom is significantly needed. Local wisdom is the main basis for an environmental and sustainable shifting cultivation as expressed by (Akbar, 2011; Fahrianoor et al., 2013; Putra, 2013; Subiakto and Bakri, 2015)

Shifting cultivation is more than a subsistence business; it must have a commercial approach. Education and supervision from the Ministry of Agriculture is very important. The presence of a market that accommodates organic products is significantly needed, for this reason it is necessary to develop a brand image and brand awareness of organic products from shifting cultivation. The role of the market (central market for organic commodities) is an esential factor since it can overcome the low productivity; the production result per hectare may be low but its production value must be high. Therefore, it should be the role of all parties including the government, policy makers, and business community to mutually support the practice of shifting cultivation as illustrated in Figure 2.

Shifting cultivation practice as a local wisdom of Lundayeh Dayak indigenous people is in harmony with environmental and sustainable agriculture. The sustainability of development is the continuation of the quality and welfare improvement of people lives including their homes and availability of various types of excellent food. Food security must be seen from the context of improving people's quality of life and environment in the countryside.

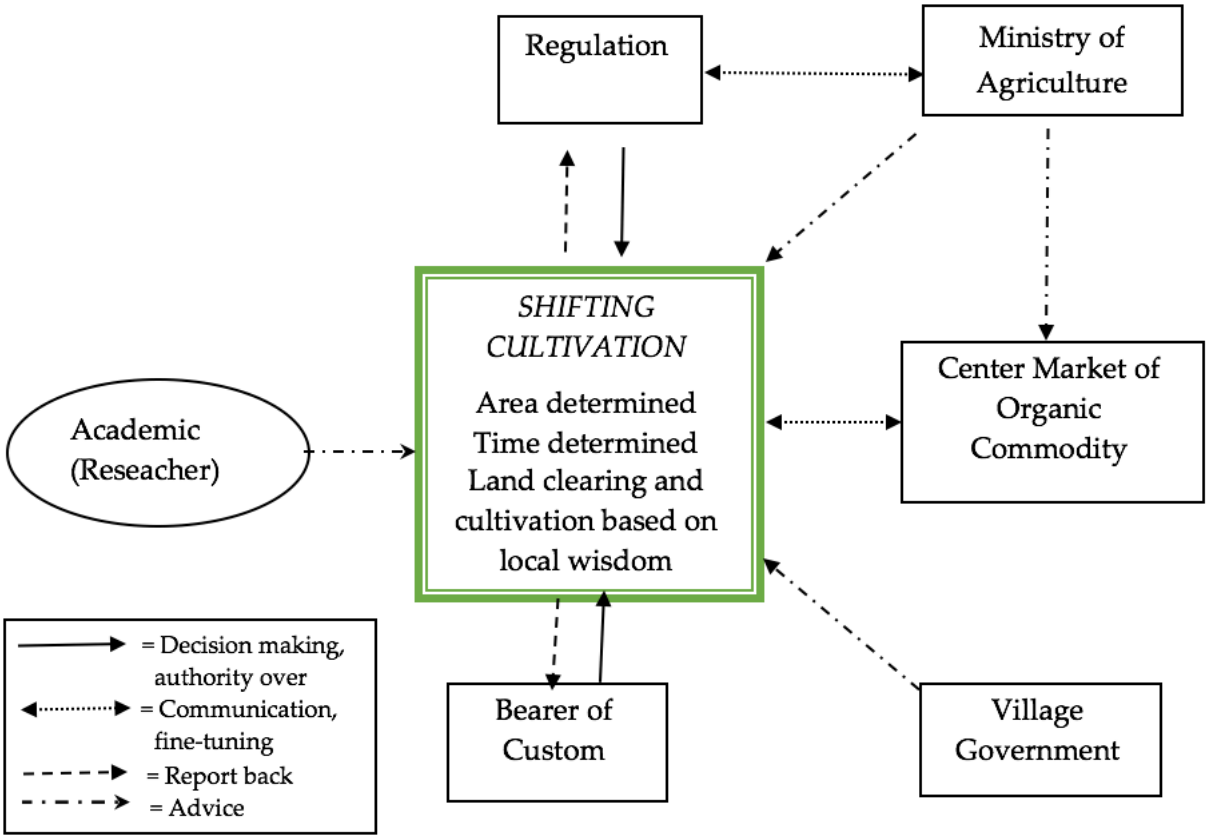

Figure 2. Ideal Management Model in the Shifting Cultivation.

CONCLUSION

Based on the field and theoretical studies related to shifting cultivation, it can be concluded that Shifting Cultivation System has a positive impact on the physical soil, agricultural production level, and socio-economic condition of the local community if local wisdom values, supervision and technical guidance from expert government officers are involved. Shifting Cultivation System can be implemented to create an environmental and sustainable agriculture. However, it must be reinforced with policy support and local wisdom awareness.

References

Akbar, Acep, 2011. "Studi Kearifan Lokal Penggunaan Api Persiapan Lahan: Studi Kasus di Hutan Mawas, Kalimantan Tengah". Dalam *Jurnal Penelitian Sosial dan Ekonomi Kehutanan*, Vol. 8 No. 3 September 2011, Hal. 211 – 230.

Arsyad, Sitanala, 2000. *Konservasi Tanah dan Air*. IPB-Bogor: UPT Produksi Media Informasi. Lembaga Sumberdaya Informasi.

Ariwibawa, Nugraha, 2004. *Erodibilitas Tanah di Kecamatan Jogorogo Kabupaten Ngawi Propinsi Jawa Timur*. Surakarta: Fakultas Geografi UMS.

Asaad, Ilyas, 2011. *Pengetahuan Tradisional Sebagai Bagian Kearifan Lokal dari Masyarakat Hukum Adat Yang Terkait Dengan Sumber Daya Genetik (Sdg) dalam Protokol Nagoya.* Deputi Komunikasi Lingkungan dan Pemberdayaan Masyarakat/KLH. Jakarta.

Asysyifa, 2009. Karakteristik Sistem Perladangan Suku Dayak Meratus Kecamatan Loksado Kalimantan Selatan. Dalam *Jurnal Hutan Tropis Borneo,* No. 25, Maret 2009.

Bhagawati, Kaushik; Bhagawati, Goutom; Das, Ranjan; Bhagawati, R.; and Ngachan, S.V.; 2015. "The Structure of *Jhum* (Traditional Shifting Cultivation System): Prospect or Threat to Climate". In *International Letters of Natural Sciences,* Vol. 46, pp 16-30, doi:10.18052/www.scipress.com/ILNS.46.16.

FAO Committee on Agriculture (COAG), 1999. *Based on Organic Agriculture*.
Rome on 25-26 January 1999.

Fahrianoor; Windari, Tri; Taharuddin, Mar'i, Rusli; and Maryono; 2013. "The Practice of Local Wisdom of Dayak People in Forest Conservation in South Kalimantan". In *Indonesian Journal of Wetlands Environmental Management*, Volume 1, Number 1, September 2013.

Fox, Jefferson; Truong, Dao Minh; Rambo, Terry; Tuyen, Nghiem Phuong; Cuc, Le Trong; and Leisz, Stephen; 2000. "Shifting Cultivation: A New Old Paradigm for Managing Tropical Forests". In Journal of *BioScience*. June 2000 / Vol. 50 No. 6.

Hardjowigeno, Sarwono, 1987. *Ilmu Tanah*. PT. Mediyatama Sarana Perkasa, Jakarta.

Kementerian Pertanian, 2010. "Sistem Pertanian Berkelanjutan". Diakses melalui http://h0404055.wordpress.com/2010/04/02/sistem-pertanian-berke-lanjutan-gambaran-kecil-untuk-indonesia/. Tanggal 1 Juni 2016.

----------, 2014. "Pertanian Berkelanjutan". http://organichcs.com/2014/01/15/ pertanian-berkelanjutan/. Diakses pada Minggu tanggal 1 Juni 2016.

Lahajir, 2001. *Etnoekologi perladangan Orang Dayak Tunjung Linggung*. Yogyakarta: Galang Printika.

Miles, Matthew B.; dan A. Michael Huberman; dan Johnny Saldana; 2014. *Qualitative Data Analysis: A Methods of Sourcebook.* Singapore: Sage Publications Inc.

Moleong, Lexy J., 2008. *Metode Penelitian Kualitatif*. PT Remaja Rosda Karya, Bandung.

Michael Epprecht., Lars Jørgensen and Thomas Breu, 2013. "Socio-Economic Perspectives on Shifting Cultivation Land scapes in Northern Laos". In *Human Ecology* (2013)41:pp. 51–62.

Mumfangati, T., *et al*., 2004. *Kearifan Lokal di Lingkungan Masyarakat Samin, Kabupaten Blora, Propinsi Jawa Tengah*. Kementerian Kebudayaan dan Pariwisata.Yogyakarta, Jarahnitra. <http://www.tembi.org/ perpus/2004_12_ perpus01. Html>.

Notohadiprawiro, Tejoyuwono, 2000. *Tanah dan Lingkungan. Pusat Studi Sumber Daya Lahan,* UGM, Yogyakarta.

Putra, R. Masri Sareb, 2013. "Berladang dan Kearifan Lokal Manusia Dayak". Dalam *Jurnal Ultima Humaniora*, Vol. I, Nomor 2, September 2013, hal 51-59.

Rathore. SS, K. Karanukaran, and B. Prakash, 2010. Alder rased farming system a traditional farming practices in negland for amelioration of jhum land. Indian Journal of Traditional Kwoledge. Vol.9 No.4 pp.677-680.

Subiatko, Wildan Deki dan Ismail Bakrie, 2015. Peranan Hukum Adat Dalam Menjaga Dan Melestarikan Hutan Di Desa Metulang Kecamatan Kayan Selatan Kabupaten Malinau Propinsi Kalimantan Utara`

Sugiyono. 2012. Metode Penelitian Kuantitatif dan Kualitatif. Bandung: Alfabeta.

Yonariza, 1996. Agricultural Transformation and Land Tenure Systems: A Study of A Shifting Cultivation Community In East Rao Pasaman District, West Sumatera, Indonesia, Thesis: Ateneo de Manila University.