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## Dynamics of Sweden Agriculture and Extension of the Indigenous People Communities in Borneo Kalimantan, Indonesia

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### **Abstract:**

*Kenyah Dayak is one of 18 Dayak groups of East Kalimantan Indonesia and has the biggest population among them. Since the 1950s, most Kenyah migrated from their native land, Apau Kayan to downstream in different areas into which the monetary economy had infiltrated to different degrees. Infiltration of the monetary economy leads to changes in the importance and practices of Swidden agriculture, so called ladang in Indonesia. The objectives of this study are to assess the dynamics of ladang practices and the agricultural extension among the indigenous Dayak people. Results show the changes in ladang practices including traditional knowledge and the farming calendar, labor allocation for mutual aid systems and reciprocal work, land productivity, livelihood diversity and income sources, and the gender perspective of ladang. Despite influence by the monetary economy, the Kenyah maintain cohesiveness among themselves through traditional forms of ladang work organization. The extent of such cohesiveness has somewhat declined in the new settlement in sub-urban area. Kenyah people in general are quite responsive to changes in livelihoods diversification, but rather late in adopting agricultural technology or extension due to limitation of Agricultural Agents, cultural constraints and old values.*

**Keywords:** *Kenyah- Dayak, ladang, Apau Kayan, communal-reciprocal work*

### **1. Introduction**

The indigenous Dayak people consisted of 18 ethnic groups with an accumulated population of more than 500,000 or 21% of East Kalimantan's population. Among the groups is Kenyah Dayak, simply called "Kenyah," which has the biggest population of the 18 groups at around 60,000 people or 12% of the Dayak in East Kalimantan (Imang and Kueng, 2005; Lahang et al., 2000; Liman, 1993; Lawai 2003. "Apau Kayan" is described by Soriente (2003) as "highland area in the interior plateau at the headwaters of Kayan River," and covers an area of 10,000 km<sup>2</sup>.

Since the 1950s to the mid of 1970s, some Kenyah people have moved downstream from Apau Kayan plateau to different places in basin areas, including Mahak Baru, Batu Majang, and Pampang. The motivating factors were the difficulty of getting salt, clothes, gasoline, tobacco, sugar, and other items (Lahjie, 1990; Inoue, 1998).

During the last 20 years, conditions have changed rapidly due to external pressures such as logging, forest fires, and increased migration of the Kenyah people to basin areas, which led them into the monetary economy. The objectives of this study are to assess the dynamics of ladang practices and the agricultural extension among the indigenous Dayak people.

### **2. Method**

Research was conducted from 2012-2014 in three villages that inhabited by the indigenous Kenyah Dayak of East Kalimantan. The villages were selected by considering different accesses to economic center: Mahak Baru, representing low access to the monetary economy, it takes 60 minutes by small plane to economic center; Batu Majang, representing medium access, and Pampang representing urbanized Kenyah people with full access to the monetary economy.

Data were collected by interviewing 35 respondents in Mahak Baru, 20 respondents in Batu Majang, and 38 in Pampang. Some key informants such as village chiefs (*Petinggi*), customary chiefs (*Kepala Adat*) and elders were also interviewed through in-depth interview. This research used descriptive qualitative method for data analysis.

### **3. Results and Discussion**

#### *3.1. Livelihoods and Income*

The differences in access to economic center may influence their economic-point of view to new livelihoods and *ladang*. The main livelihood of 84% of households in Mahak Baru is shifting cultivation (*ladang*), followed by civil servant and other at 16%. The economic life of Batu Majang is similar to Mahak Baru in terms of agricultural activities, but has

better market access. The main livelihood of 83% of households is swidden agriculture, while 15% are private employees and 6% are civil servants.

In Pampang are living near town, the main livelihood of 77% of the respondents remains swidden agriculture. Around 85% of the respondents explain that rice from swidden agriculture is primarily for household consumption.

As the observed villages differ in access to market and natural resources, income sources also vary. We found that the average yield of unhulled rice grown by each respondent was 267 tin in Mahak Baru, 125 tins in Batu Majang, and 127 tins in Pampang. Provided all the rice was sold at the local price of Rp 25,000/tin, each respondent earns Rp 6,675,000 in Mahak Baru, Rp 3,125,000 in Batu Majang, and Rp 3,175,000 in Pampang. Therefore, Mahak Baru has the largest nominal total income as well as the largest contribution of rice total income (60%), followed by Pampang (35%) and Batu Majang 32%.

Since the 1990s, non-timber forest products (NTFPS) such as *gaharu* (*Aquilarria beccariana*), hunting catches, fish, pan-mined gold, and *bezor*, locally called *guliga*, have contributed significantly to cash income in Mahak Baru. NTFPs contribute 18% of total income, followed by income from services and salaries (civil servant jobs and running stores or other services), which account for 15%. All villagers may freely harvest such NTFPs without strict enforcement of customary law, even when practicing unselective harvesting, which led to drastic declines in the last two years. Inoue (1998) describes this situation as “loose local commons.”

In Batu Majang, cash crops are important and account for 32% of income, followed by timber-related activities at 28%, and services and salaries at 5%. Rice contributes only 9% to the total. Cash crops, particularly vegetables, have been sold to the logging company PT. Sumalindo under a partnership scheme (*kemitraan*) with Batu Majang since 1993.

In Pampang, the salaries of professionals, and employment at coal mining and other private companies are the most important sources of income, contributing 44% of total income, followed by cash crops such as vegetables, cacao, coffee, fruit, bananas, and candlenuts (20%).

### 3.2. The Dynamic Practices of *Ladang*

#### 3.2.1. *Ladang* Calendar

The most upper village Mahak Baru commences *ladang* activity in early June, followed by Batu Majang at the end of June. Pampang is the latest at the end of July. As this shows, the farther downstream a village is, the later *ladang* activities are commenced. What factors cause the differences? Respondents gave a variety of responses, which are summarized as follows: (1) the most upstream farmers clear primary and old secondary forests for *ladang*, which takes more time for land selection, land clearing, felling, and also drying before burning, (2) *ladang* sizes in Mahak Baru are larger than those of Batu Majang and Pampang, which also requires more time to clear the *ladang*, and (3) to adjust the *ladang* calendar with drought and the best sowing dates. Figure 2 indicates that sowing dates in Batu Majang and Pampang are, respectively, one and three weeks behind those of Mahak Baru.

In term of sowing time, Mahak Baru people are the earliest in sowing of *ladang*, on 15–18 August every year. The Iban in Sarawak and West Kalimantan, which are located in the same region, also sow in mid-August (Kendawang *et al.*, 2005). Meanwhile, Batu Majang sow at the end of August and those of Pampang in second to third week of September.

A key informant made this statement about sowing on different dates: “The reason we sow on different dates is to obtain the best yield. Seasonal and geographical differences require different sowing dates. We have tried a couple of times to sow on the same date as we did in our origin villages in Apau Kayan and Mahak Baru, but failed”.

#### 3.2.2. Land Selection

Through decades of experience, respondents learned that productivity depends highly on natural factors such as rainfall, soil fertility, pests, diseases, and maintenance. Therefore, land selection plays crucial role for the best *ladang* yield because it is linked closely to other factors which influence *ladang* yields. Sindju (2003) also observes that land selection guarantees successful swidden farming.

The most important consideration in land selection is “fallow period base vegetation” is the most important consideration in land selection for *ladang* in Mahak Baru and Batu Majang, and even in Pampang. Categories of vegetation among villages and sub-ethnic groups vary even though basically similar. In the field observation, fallow periods have four categories as commonly used by the Indigenous Kenyah Dayak at field sites: *bekan* (0–2 years), *jekau bu'et* (5–8 years), *jekau dado'* (more than 9 years), and *mpak* (primary forest).

Of course, the longer that land is fallowed the more fertile the land because of the accumulation of nutrients (Upadhyay, 1995). For the *citemene* slash and burn in Zambia, Oyama (2005) observes that the above-ground woody mass is the way to select fertile land. When farmers describe land as *jekau bu'et* or *jekau dado'*, they are implicitly describing the state of vegetation succession. Inoue and Lahjie (1990) also reveal that the range of age is not fixed because the recovery rate of vegetation depends on soil fertility. The second and third criteria for land selection are accessibility to *ladang* and clustered of *ladang* because it is linked closely to pest control.

Category of vegetation	Mahak Baru	Batu Majang	Pampang
Shrub ( <i>Bekan</i> )	Mpung ( <i>Blumea balsamifera</i> ), ulem (NI), siit (NI), baling (NI), lebem (NI), sawan (NI)	Mpung, lebem	Mpung, ulem, udu mawen, udu kere
Young secondary forest ( <i>Jekau bu'et</i> )	Karun (NI), lebem (NI), bine ( <i>Macassaranga</i> sp), belebu (NI), sawan (NI), noh (NI), udu penganen (NI), titeq ( <i>Zingiberaceae</i> )	Kayu uwa (NI), belebu, sawan, lebem	Benuaq ( <i>Macassaranga</i> ),,, lendum kapan, aka kelapat
Old secondary forest ( <i>jekau dado</i> )	Benuaq ( <i>Macassaranga</i> ), karun, pela (NI), sanam pidek (NI), kayu sanam (NI), aka kelese ( <i>Spatholobus ferugineus</i> ), udip ampang, lengidan (NI), sep busan (NI),	Benuaq ( <i>Macassaranga</i> ), adeu (NI), kideu (NI), lebem,	Benuaq ( <i>Macassaranga</i> ), kidau, kayu suang, aka kedating, aka kelese
Primary forest ( <i>mpak</i> )	Tenak ( <i>Shorea</i> spp), ampang ( <i>Shorea</i> spp)	Tenak ( <i>Shorea</i> sp), ampang	Tenak, ampang

Table 1: Indicator Species by Category of Fallow Period

Note: NI (Scientific Name Not Identified)

Source: Field Observation (2012)

Table 1 shows that indicator species in field sites are almost similar. Species of *mpung* and *sawan* are the best indicator species of fertile soil in shrub (*bekan*) vegetation, while *karun*, *lebem*, *kayu uwa*, and *benuaq* are important indicator species in young and old secondary forests. When the species are dominant and grow well in a certain area, it means that the soil is fertile enough for *ladang*.

### 3.2.3. Labor Organizations

Basically, farmers work individually on their own *ladang*, but they also organize themselves working together with other famers as a manifestation of "unity-sense and cohesiveness among people." We observed that Kenyah farmers mobilize manpower in *ladang* through the arrangements called *senguyun*, *pulun*, *mepo*, and *metau*. Inoue and Lahjie (1990) observed that *senguyun* is characterized by direct parity and reciprocity of manpower, while *pulun* is a cooperative work system characterized by indirect reciprocity in which the amount of labor supplied is not taken into consideration. We observed that by working in *pulun*, it is possible to sow any one field in one day. Compensation to indirect reciprocity is achieved by the concerned family serving big meals to those who participated in the sowing. One respondent said, "*Pulun* is an important moment for me. If we no longer practice *ladang*, we could not sustain *pulun* anymore". Sindju (2003) defines *mepo* as a purely social work group that emerges spontaneously to assist a person or family thought to be in need of help in completing his or her farm work without expecting compensation in any form.

As Kenyah people migrated down to areas with different degrees of monetary infiltration, the questions that arise are: what is the importance of *ladang* and do farmers still practice such types of work organization, or have they become more individualistic? Table 2 shows allocated person days for *ladang* and for each labor organization.

	Mahak Baru		Batu Majang		Pampang	
	n	%	n	%	n	%
Total labor allocation for <i>ladang</i>	212	100	122	100	130	100
Family labor	179	84	113	93	122	94
Exchange labor ( <i>senguyun</i> )	13	6	3	2	3	2
<i>Pulun</i>	9	5	2	2	3	2
Hired Labor ( <i>metau</i> )	11	5	4	3	2	2
<i>Mabe</i>		+		-		-
<i>Mepo</i>		+		+		+

Table 2: Labor Allocation In

Note: N = Average Person Days; + = Practiced; - = Not Practiced

Source: Field Survey (2011/2012)

Table above indicates that the practices of *senguyun* and *pulun* also declined because farmers spend much time on their own activities. Time allocated to *senguyun* in Mahak Baru, Batu Majang, and Pampang are respectively 6%, 2%, and 2%, while time allocated to *pulun* in these villages is 5%, 2% and 2%.

From the gender perspective, we found that the main *ladang* workers in Mahak Baru and Batu Majang are wives, respectively 54% and 45%. On the other hand, wives and husbands in Pampang play similar role in *ladang*. Husbands also support their wives, who work by growing cash crops and making handicrafts. This indicates that man in the first two villages considered that hunting and gathering still an important livelihood for cash and self- consumption.

### 3.2.4. Productivity of *Ladang*

The most common way to weigh the yield of *ladang* by the Dayak and particularly the Kenyah Dayak is the “tin,” locally called *kaleng*. One *kaleng* is equivalent to 12 kg of un-hulled rice (*padei*). Based on calculation, *ladang* productivity in Mahak Baru is 1,270 kg/ha, Batu Majang 800 kg/ha, and Pampang 890 kg/ha of un-husked rice. By comparison, Colfer et al. (1997) observed that *ladang* productivity of Kenyah Apau Kayan was 1,170–1,370 kg/ha, Inoue et al. (1991) found that *ladang* productivity of Punan Dayak of Kelay in the late 1980s was 1,489 kg/ha, while Inoue (2000) found the *ladang* productivity of Kenyah in the late 1980s was more than 2,000 kg/ha in Apau Kayan and 1,900 kg/ha in upper Mahakam. Another comparison with Dayak Bahau ethnic, Imang, etc (2018) mentioned that swidden agriculture productivity of Bahau in Matalibaq was 1,475 kg/ha.

### 3.2.5. Perception of Sedentary and Intensive Agriculture

Because of transportation and market constraints, it makes sense for farmers in the isolated villages like Mahak Baru to depend heavily on forest products and swidden agriculture instead of practicing sedentary farming (wetland rice) and cash crops. Suwarno and Campbell (2003) observed that the livelihoods of people in rural Malinau have been dominated by agriculture and non-timber forest products. It is different however with the Kenyah in Batu Majang, which has regular market access.

In 1993 the logging company PT. Sumalindo established a check dam to create a wetland, but farmers prefer to practice *ladang*. Annual cash crops such as cacao, coffee, and rubber were introduced 10 years ago, but farmers began planting them only very recently. By comparison, Inoue and Lahjie (1990) found that other Dayak groups such as the Tunjung and Benuaq have been successfully harvesting rubber.

The question is why the Kenyah are less interested in wetland rice and intensive agriculture. Farmers admitted that they feel “something is missing” and there is a “missing link” to the past if they no longer practicing *ladang*. By maintaining *ladang* they can remember the valuable past and can preserve ways of working together through the *senguyun*, *pulun*, *mepo*, or *mabe* systems, which are not appropriate to practice with wetland rice. They also do not feel comfortable working in wet places (wetland rice) or hoeing for soil preparation.

### 3.2.6. Adoption to Agricultural Extension

The main reason why farmers not apply fertilizer particularly for annual crops is because they are not sure of a return on their long-term investment. It is apparent that “extractive habits and instant harvesting culture” remain ingrained in the Kenyah people. Therefore, for further agricultural development, their inherent culture and habits should be seriously taken into consideration.

Adoption process is a mentally process by individuals to learn an innovation from the beginning until he/she decided to be a user or implementor of certain product. In order to know the adoption level of the respondents to agricultural technology especially related to rice cultivation, we interviewed them using some question-lists as follows: (1) *not aware*, respondent do not know the new technology; (2) *Aware*, the farmer knew the new technology but less updated information; (3) *Interest*, the respondent looking for updated information about the new technology; (4) *Evaluation*, respondent considered the advantages and disadvantages of the new technology; (5) *Trial*, the respondent implemented the new technology in small scale; (6) *Adoption*, respondent decided to practice the new technology in a broader scale and continuously.

Village	Not aware	Aware	Interest	Evaluation	Trial	Adoption
Mahak Baru	52	29	9	7	3	0
Baju Majang	45	27	12	9	7	0
Pampang	40	28	13	10	7	1

Table 3: Adoption Level to Agricultural Extension by Village (%)

Source: Field Survey (2012/2013)

Data on table above shows that in average of 46% of the respondents in all research sites are at “not aware”-level to adoption level. The reasons are various: (1) they used to practice the existing mean of agricultural way and they feeling comfortable with the existing agricultural system, (2) there is no reliable information for the new agricultural technology. The following level of the respondents is at “aware” level, means that they knew the new agricultural technology but not followed up with updated information. Various answers of respondents are shown on table below.

Village	The technology not Really Appropriate with Local Condition	Limited Mass Media for Receiving Information	Extension Officer (PPL) Less Interaction with Farmers	No Real Success-Story for Farmer, No Demonstration-Plot	No Market Guarantee to Sell Products
Mahak Baru	7	9	36	33	15
Baju Majang	4	16	35	32	12
Pampang	2	14	39	34	11

Table 4: Problem in Adopting Agricultural New-Technology (%)

Source: Field Survey (2012/2013)

Table above shows that the main problem for farmer to implementing new technology of agriculture were the Extension Officers/Agents are less interaction with farmers. Farmers complained that the Agents just coming to village sometimes and no follow up. This statement is in-line with Batoa and Hertina (2019) that the reasons why farmer very late to adopt agricultural extension were because the agricultural agents less interaction with farmers.

### 3.2.7. Socio-Cultural Problem in Adopting Agricultural Extension

Sociocultural factors are customs, lifestyles and values that characterize the Kenyah Dayak community especially in agricultural activities. In terms of agricultural development, the Kenyah Dayak people are considered left behind other ethnics in implementing intensive and more productive agriculture. For example, when other neighborhood ethnics already practiced sedentary agriculture such as irrigated wet rice and vegetable gardens, the Kenyah people still more interested to swidden agriculture. Therefore, it is important to explore their problem to improve agriculture system for a better economic life. During the field observation using in-depth interview with key-persons, we found that the problem in three villages were almost similar as follows: (1) In Mahak Baru, the isolated village: the farmers already very familiar to practices swidden agriculture; land availability for a long circle of swidden is more than enough so that they no need of irrigation for wet rice; *ladang* plays important role in sustaining the Kenyah culture; (2) In Batu Majang, the middle access to economic center: earlier they had irrigation facility provided by a logging company but we not comfortable to work at wet place; rice of *ladang* is more tasteful other than wet land rice, only by practicing *ladang* they could sustain their cultures; no need intensive work so that men and women have enough time to enjoy hunting, fishing, gathering and other non-agricultural activities; (3) In Pampang, the urbanized villages with good access to town: no irrigation facility, only by practicing *ladang* they can enjoy to work together for example *senguyun*, especially when they sowing and harvesting; the hunting-gathering habit is still practiced even though not as intensive as those in remote villages; they need a visual economical proof that sedentary farming is more successful than swidden agriculture. This finding also similar with Imang, et al (2018) who found that other Dayak group especially the Bahau people in Matalibaq also need real proof of *ladang daleh* to practice the *daleh* system.

## 4. Conclusion

It has been shown that since the Kenyah people migrated downstream, the monetary economy has influenced them in many aspects of life such as agricultural activities including *ladang*, livelihood, and lifestyle. The importance of *ladang* in terms of both allocated time and yield has decreased significantly as the Kenyah migrated downriver. Differences of geography and market access have changed some aspects of *ladang* practice including traditional knowledge and the farming calendar, labor allocation, land productivity, livelihood diversity and income sources, and the roles of wives and husbands. Even though the Kenyah have been influenced by the monetary economy, they still maintain cohesiveness among people through the forms of work organization in *ladang*, i.e., *senguyun*, *pulun* and *mepo*.

Due to low access to the monetary economy as in Mahak Baru, non-timber forest products are an important source of cash, and considering transportation constraints, rice security is very important for people who foresee a famine season. They argued that *ladang* is not merely an agricultural activity, but also an important part of culture. Respondents in Pampang also practice *ladang* for subsistence. They are quite responsive to economic change by growing cash crops such as vegetables, cacao, rubber, and coffee. In term of agricultural extension, the indigenous Kenyah people are late to adopt agricultural extension because of the limitation of the Agents to demonstrate the advantage of the new agricultural technology as well as cultural constraints. Therefore, a socio-cultural approach is needed to take into account accelerated agricultural development.

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