LAND USE AND FACTORS INFLUENCING HOUSEHOLDS INCOME IN M'NONG ETHNIC MINORITY IN THO SON COMMUNE, BU DANG DISTRICT, BINH PHUOC PROVINCE

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Abstract

The M'nong ethnic minority is an indigenous group who has been settled in the area for long time and practicing shifting cultivation until the late 1980s. Since then they were gradually sedentarized under the government sedentarization program. This study aims at understanding what changes have been occurred in their land use systems in the last few decades and what factors have been contributing to this land use change. In addition, this study analyses the effects of household landholdings as well as other selected socio-economic factors on M'nong household income. The results show that the M'nong land use systems have been changes over time. The M'nong farmers have shifted from swidden agriculture to sedentary agriculture (with cash crops such as cashew, rubber trees, coffee). Their traditional indigenous culture associated with swidden agriculture have been transformed as they are in more contacts with the Kinh culture. The key message of the study is that land resouce plays an significant role in generating income for the M'nong, therefore, future studies should focus more on how to use this important resource effectively and sustainably, not only for the M'nong but also for all other upland indigenous communities in Vietnam.

Keywords

Land use, upland, M'nong, income, cashew, shifting cultivation, and sedentary agriculture.

1. Introduction

In the recent decades, there is a shift in the outlook of the Vietnam government as regards upland agriculture, recognizing the upland system as an important part of the national economy. The government has made additional investments in building rural infrastructure in the upland. Moreover, it has instituted policy and institutional reforms to improve the welfare of the people therein. For instance, new kinds of property rights institutions, such as stewardship contracts, are being promoted to encourage more sustainable use of land at forest margins. Policies discouraging swidden farming and forest clearing for upland rice cultivation are being enforced. These efforts, according to the Ministry of Agriculture and Rural Development, have improved market access in the uplands, diversification of upland production systems and increasing commercialization of upland agriculture.

The process of commercialization and diversification of the upland systems has also been facilitated by rapid increases in the productivity of lowland areas (Chime 1999). In the late 1980s, Vietnam began a process of de-collectivization, market reform, and trade liberalization, together with water control and the promotion of short-duration high-yielding rice varieties. These reforms stimulated rapid expansion of rice production during the period 1986-1989 so much so that Vietnam has now become the second largest rice-exporting country in the world. Improvements in food grain productivity in the lowlands have encouraged the expansion of commercial crops, such as cashew, coffee, tea…, in the uplands as food needs are now increasingly being met through the production of lowland food crops. This has allowed a more profitable utilization of the uplands, especially those areas with better marketing facilities (Khiem, 1999).

Such changes in the lowland rice economy and the impact of new policies and institutional initiatives geared toward developing upland areas may increase or reduce the pressure to intensify the use of upland systems. Some studies have indicated that policy changes (e.g., land allocation and more stable land tenure in the northern mountain region) have increased crop yields and encouraged reforestation of formerly barren hills (Dovonan and others 1997; Tachibana, Truong, and Otsuka 1998).

Increasing lowland productivity, meanwhile, is expected to reduce the pressure on upland food production (Coxhead and Jayasuriya 1994; Tachibana, Truong, and Otsuka 1998), although this may lead to further exploitation of marginal lands by increasing land use, i.e., promotion of cash-crop production (Barbier and Bergeron 1998; Hardaker, Fleming, and Tin 1993). There is evidence that farmers in Vietnam have substituted high-yielding maize for upland rice in more suitable upland areas (Sikor and Truong 1998), pushing upland local rice

production to more remote and marginal lands. In addition, the shift to the cultivation of nonfood or commercial crops in the upland increases the vulnerability of farmers to food shortage, especially in areas where marketing institutions are undeveloped and the price of cash crops is uncertain (Dewey 1981). Nonetheless, commercial-crop production, with the adoption of improved technologies, can increase the total household income and trigger multiplier effects (von Braun and Kennedy 1994).

The indigenous M'nong community in Tho Son Commune, Bu Dang District, Binh Phuoc Province provides a case for studying and understanding the change in land use systems owing to the strong state interventions and market forces. It would be interesting to find out what has happened to this shifting cultivation community since its integration into commercial agriculture; and to assess the effect of current land holdings and other socio-economic factors on M'nong household income.

This study generally aims to understand what changes have occurred in the land use system of a swidden farming community as a result of the implementation of recent state policies on forestland management in upland Vietnam.

It specifically intends:

(1) To understand history of Mnong people at Tho Son commune;

(2) To describe the changes of land use over time;

(3) To identify current livelihood activities and income sources of Mnong;

(4) To analyse the affects of household landholdings as well as other selected socio-economic factors on M'nong household income.

2. Literature Review

Culture change and adaptation: Anthropologists commonly believe that customary behaviors are generally adaptive, or at least not maladaptive, depending on the physical and social environment (see Ember and Ember 1999:183). What may be adaptive in one environment may not be adaptive in another. According to Ember and Ember (1999), a custom is adaptive if it increases the likelihood that the people practicing it will survive and reproduce. The authors note examples of how people adapt to changes in their social environment: migrating to new places for work; population increase owing to improved medical care and, consequently, reduced land space, and forcing people whose to survive with less land.

Individuals prefer adopting behaviors that are more suited to their present conditions when circumstances change. In order to find out which behaviors is more suited to their environment, people experiment by trying new behavior or by evaluating the behavior of others. When they discover such behavior as adaptive, they maintain this. One may choose to

do what most people in a new situation will decide to do (Boyd and Richerson 1980 cited in Ember and Ember 1999).

People usually look at the cost or the risk of an innovation when deciding what behavior to adopt. A "risky innovation" (Ember and Ember 1999) is one that involves adopting a completely new strategy, such as in farming which people have never practiced. People may try it but they face the risk of not having any food at all if they fail. It is thus those people who can afford the risk that are likely to try the innovation. Others would rather evaluate the strategy first and then decide whether to adopt it.

It is expected that individuals will choose adaptive behaviors over the maladaptive ones. Even if people are correct in their short-term judgment of benefit, they may be wrong in their judgment of the long-term benefit. For instance, a new crop may yield more than the old crop for five consecutive years; but the new crop may fail miserably in the sixth year because of lower than normal rainfall or depleted soil nutrients. Other case, people may be forced by the more powerful to change their practices and behavior.

The theory of natural selection suggests that a new behavior is not likely to become cultural or remain cultural over generations (Ember and Ember 1999). Nonetheless, many examples of culture change seem maladaptive. In recent centuries, the major stimulus to culture change, whether adaptive or maladaptive, has been a new social environment that came with the arrival of people from western societies (Ember and Ember 1999).

Acculturation and cultural adaptation: Ember and Ember (1999:461) describe acculturation as “a process of changes that occurs when different cultural groups come into intensive contact.” While in diffusion, the less powerful societies voluntarily borrow new cultural items from other societies; in acculturation, the process of extensive cultural borrowing occurs in the context of “super ordinate-subordinate”. (Ember and Ember 1999) relations between societies wherein the less powerful society borrows the most cultural items from another society under external pressure. The authors claim that these external pressures for cultural change can be direct, such as when the Spanish conquerors forced the native groups to accept Catholicism. Acculturation, however, can also be indirect. For instance, the United States Federal Government made indirect attempts to spread American culture by driving many native groups out of their lands. In the process, the natives were obliged to give up many aspects of their traditional ways of life and adopt many of the dominant society‘s traits to survive. The acculturation process was accelerated when Native American children were required to go to schools that taught the dominant society's values.

A “subordinate” society may acculturate to a dominant society even in the absence of direct or indirect forces by adopting the cultural elements of the dominant society. This enables the

subordinate society to share some of the benefits received by the dominant society and, therefore, survive. An example is the case of many Inuit and Lapp groups in Arctic areas who seemed eager to replace their dogsleds with snowmobiles without any coercion (Pertti Pelto 1987 cited in Ember and Ember 1999).

Commercialization as cultural change: When people cultivating the soil produce surplus, commercialization occurs. In many cases, cash income is used to pay rent or taxes. Commercialization is then said to be associated with the formation of peasantry (Ember and Ember 1999:469). Peasants, according to Ember and Ember (1999), are rural people who produce food for their own subsistence and also contribute or sell their surplus to other towns and cities that do not produce their own food.

Commercialization occurs upon the introduction of commercial agriculture. In commercial agriculture, all cultivated commodities are produced for sale rather than for personal consumption. The system of agriculture is industrialized, with some of the production processes (plowing, weeding, irrigation, and harvesting) being performed by machines. Commercial agriculture is, in fact, often as mechanized as any manufacturing industry. Land is worked for its maximum returns, and labor is hired and dismissed just as impersonally as it is in other industries (Ember and Ember 1990).

The transition to commercial agriculture can result in an improved standard of living in the short and long term. However, the standard of living may decline if the market price of commercial crop drops. Gross and Underwood (1971 cited in Ember and Ember 1999) cited the case of the farmer-herders in the arid sertao region of northern Brazil who, by the early 1940s, had been engaged in producing sisal (a plant whose fibers could be made into twine and rope) which provided them with a more secure living in their arid environment. When the world price of sisal dropped and the wages of sisal workers declined, many families were forced to limit the food intake of their children in order to give more to the income-earners.

Ember and Ember (1999:470) explain that commercialization can start in various ways and its effects on traditional economics are predictable. Property rights become individualized rather than collectively shared. In addition, even in societies that were previously egalitarian, commercialization usually brings about greater inequality in access to resources and, hence, a greater degree of social stratification.

Land use: Clawson and Stewart (1965) define land use as “man‘s activities on land which are directly related to the land.” The term “land cover” is sometimes used instead of “land use.” According to Barley (cited in Rind and Hudson 1986), in rural areas, land use has been understood as “the vegetation and artificial constructions covering the land surface.”

However, to simplify the word, Rind and Hudson (1986) use the general term "land use" to express either man's activity or land cover, or both.

Shifting cultivation: According to Conklin (1957), shifting cultivation is any agricultural system in which fields are cleared by fire and cropped discontinuously. It is a system wherein fallow periods are longer than the cropping periods. In the Philippines, the term "kaingin" is used to refer to the clearings made in upland agriculture. Olofson (1981:4) discourages the use of this term because it emphasizes the point of view of an observer-speaker rather than that of the indigenous farmers. He prefers the more ethno linguistically neutral, and now more anthropologically accepted, term "swidden" or alternatively, the term/s used by the respective ethnic groups. Olofson defines "swiddening" or "swidden making" as a "type of horticulture wherein a majority of the land area is kept in fallow to allow regeneration of bush or forest, while cropped clearings are rotated or shifted within this area."

This definition associates swiddening with the clearing of bush or forest, and the forest-clearing-swiddening-bush fallow- forest regeneration cycle. It differentiates this type of system from sedentary agriculture, wherein cultivation areas are shifted within permanent areas. In addition, where spatially oriented rotation periods are short, in sedentary agriculture, grass rather than bush or forest fallows are often cleared.

Sedentary agriculture: According to Kottak (1991:177), sedentary means "remaining in one place." He describes a sedentary village as "one in which people remain together year-round or several years." Applied to agriculture, this means a type of cultivation in which the plots are permanently cultivated and planted to cultigens without allowing the soil to fallow. This type of cultivation is perceived to be different from the practice of shifting cultivation or swidden farming, which is still employed by many upland indigenous people such as the M'nong. Lowlanders who cultivate vast open fields connected to markets by roads and modern transportation usually practices sedentary agriculture. Cultivation of these open fields involves the employment of higher technology and intensive use of land, usually to produce cash crops for the market. Hence, this type of farming is considered as more advanced than swiddening.

Land use changes. These changes have had great impact on the environment as well as the ways of life of local inhabitants. Usually, these are caused by the "intensification of traditional land use owing to population increase and changes in methods in land use in the rural economy in general" (Ibrahim 1987). As observed by Ibrahim (1987), the intensification of traditional land use in Sudan, which stemmed from the local people's need to extract more produce from the land to feed an increasing population, had occasioned very short fallow periods in between cropping seasons. As a result, the land degenerated after five to six years

that it could not give the same amount of yield afterwards. The farmers had to give up cultivating the plot and, consequently, had to clear and open up new farmlands to secure their own subsistence. The plots, which they had abandoned, turned into desert fields as soil eroded and production decreased. Moreover, as they maintained the intensify of their cultivation, desertification of degenerated, exhausted, and abandoned plots continued.

Market, agricultural commercialization, and land tenure. According to Crocombe (1971 cited in Yonariza 1996), the shift from subsistence agriculture to cash-crop farming affects land tenure as it creates in every person the need for more land to cultivate. This is supported by the fact that most people today aspire to possess more land than merely to attain subsistence. Yengoyan (1971 cited in Yonariza 1996) studied the influence of market on the land tenure system of a swidden community in Mindanao, Philippines, called Mandaya. In the traditional Mandaya tenure system, land was regarded as a free good, and tenure over the land was established and maintained by the application of labor, meaning, the families made claims not on the land under cultivation but on the cultigens they had planted. In response to the market, this group adopted abaca as a cash crop. This adoption, however, had changed the group's notion of land from free good into economic good because abaca was a market commodity that required capital investment. As a result, land was measured on a monetary basis, and the values of the land varied according to terrain, location, and forest cover. All farmers also came to recognize that rights to land, both cultivated and fallow, must be maintained to ensure cash flow.

Sellers (in Fortmann and Bruce 1988) investigated the relationship between land tenure and agricultural production in Tucurrique, Costa Rica. He found that the value of agricultural products tended to increase with the security of land tenure. He described the value of agricultural products as varying based on whether the product was household-consumed, marketed, or a combination of both. For example, yucca, beans, and some tubers were grown only for household consumption. Other crops like chayote, squash, and maize were planted for household consumption and for the market. The status of tenure over particular crops followed specific principles: "no normal land rights," for most subsistence crops; "legal rights to crops," for mixed crops; and "legal rights to land," for most cash crops. Sellers concludes that the relationship between land tenure and agricultural production stems from the fact that cash crops tend to be perennial and require greater investment of capital and time.

The Mandaya and Tucurrique cases are contrasting. Among the Mandaya, agricultural commercialization determined the land tenure systems. In Tucurrique, land tenure systems determined the farmers' involvement in the market economy. It was noted that among the Mandaya, agricultural commercialization came before various land tenure systems were

established. The two cases show a strong relationship between land tenure system and agricultural commercialization. It is precisely this link that this study seeks to understand among the shifting cultivators in Central Highland of Vietnam.

3. Research Method

This research focuses on land use changes of M'nong people, with transformation land system from self-consumption production to cultivation for trade. It is thanks market pressure and government intervention in natural resource management in recent years. As the argument of literature review part, land use changes are results from these market pressure and intervention in relation to promotion farmers produce agricultural products for trade.

+ Data collection

Semi-structure interview: Using an open questionnaire is ready to interview key informants at study site. The interviewees are investigated including village patriarch and land management staffs to understand on land ownership and land use through many periods.

Household interview: a random sample of 89 households at Tho Son commune is selected with the ready questionnaire.

Secondary data collection: Secondary data was collected from annual reports of Tho Son commune people committee, Bu Dang district people committee and other formal statistics.

Observation method: It is used to describe current situation of land use of M'nong people at Tho Son. In other hand, this method is used to provide more illustrated picture to make a stronger evidence for this research.

+ Data Analysis: Based on the qualitative data from household survey, this research describes some characteristics and current situation of land use of M'nong people at study site.

Descriptive statistic**:** Software as Microsoft Excel, Eview, and SPSS are used to summary some criterion involving to land use and household income. From that point, this research can illustrate land use changes of M'nong people at Tho Son commune.

Regression Analysis: It is an analysis by statistic-mathematics model to show the relation between dependent variable and independent variables. In this research, income per capita of surveyed households is considered as dependent variable, meanwhile, land holding, a number of land plots, family labours, education of head of household and others are independent variables. In facts, there are many factors influencing to household income with emphasize to land use system. Therefore, the research identifies some independent variables affecting to dependent variable as following:

Table 1: Sign Expectation of Regression Coefficients

Variables	Variable Explanation	Unit	Expected Sign
1. Land holding	Land holding per capita of surveyed households	Ha/person	+
2. Land Plots	A number of land plots	Plot	-
3. Labours/household size	Family labour-household size ratio	Person	+
4. Education	Education of head of household	Schooling levels	+
5. Technology	Agriculture technology	times/year	+
6. Gender	Gender of head of household	1:male; 0:female	(+/-)
7. Credit		1:yes; 0:no	+

Source: Tran Duc Luan and Nguyen Ngoc Thuy, 2009

To identify factors influecing to income per capita, this research gives out the expected sign of coefficient as follows:

Land holding: *Land holding is a factor as expected as strongly contribute to household income for users. The larger land holding is, the more income user has. Therefore, it is expected as positive sign (+).*

Land Plots: *With the same land area, the higher land plots are, the lower income household has (because of difficult in management). Therefore, it is expected as negative sign (+).*

Labour/household size: *Household has more family labours will has more opportunities to get higher income. Therefore, it is expected as positive sign (+).*

Education Level: *The higher education of head of household is, the more income has. Therefore, it is expected as positive sign (+)*

Technology Training: *Household participates agricultural training courses will know technology and apply better in their production. Therefore, it is expected as positive sign (+).*

Gender: *Agricultural production relies on labour force and natural factors. In general, male has higher power than female, so male can earn more income than female do. Howerver, M'nong people has a matriarchy, a*

sign of coefficient will be unclear, therefore, it is expected both positive and negative sign (+/-).

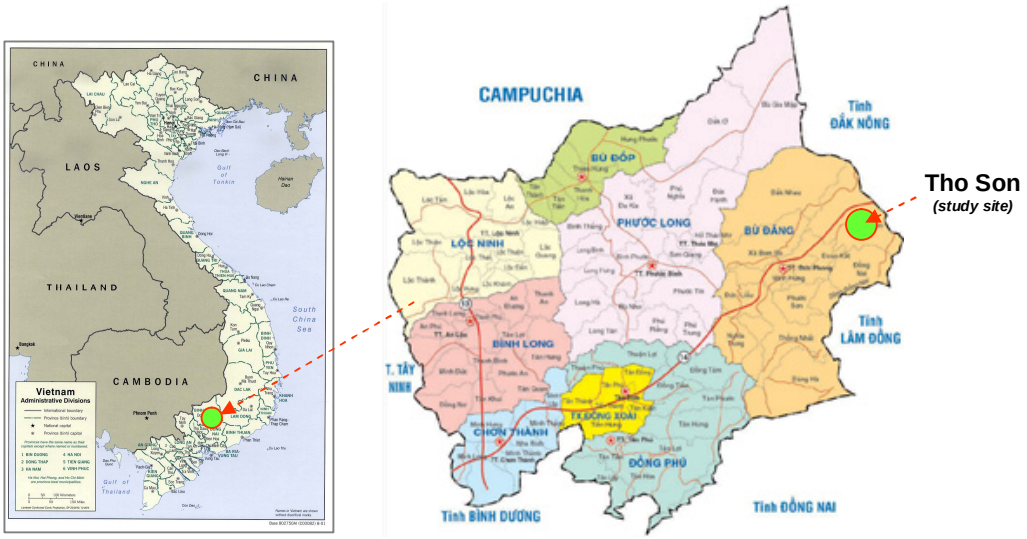
Credit: *Households got credit will cover and invest better for their livelihoods, so it is expected as positive sign (+).*

4. Overview on study site and M'nong People

4.1. Study site

Located in the intersection between the Central Highlands and the Southeastern region of Vietnam, Tho Son Commune belongs to Bu Dang District, Binh Phuoc Province. The commune is about 9 km southeast of Duc Phong town of Bu Dang District, which is crossed by the National Highway 14. Tho Son shares the border with Phu Son commune in the South, Dong Nai Commune in the East, Dak Nhau Commune in the West and Doan Ket in the South. The natural total area of Tho Son Commune is about 7,766.38 ha, with the total population of 6.599 capita. The commune consists of seven hamlets and is the home of nine different ethnic minorities, which is occupying 43% of the total population. There are 590 M'nong households with 2,812 capita comprising of 42.61% commune total population.

Figure 1: The study site



Vietnam Binh Phuoc Province

Ecologically, Tho Son belongs to the Southeastern region. It is, however, still a relative isolated area. In term of climate condition, Tho Son has weather characteristics of the Southeastern region. The average annual rainfall is about 2,702.9 – 3,231.9mm with two seasons: the rainy season is from May to November and dry season from December to April

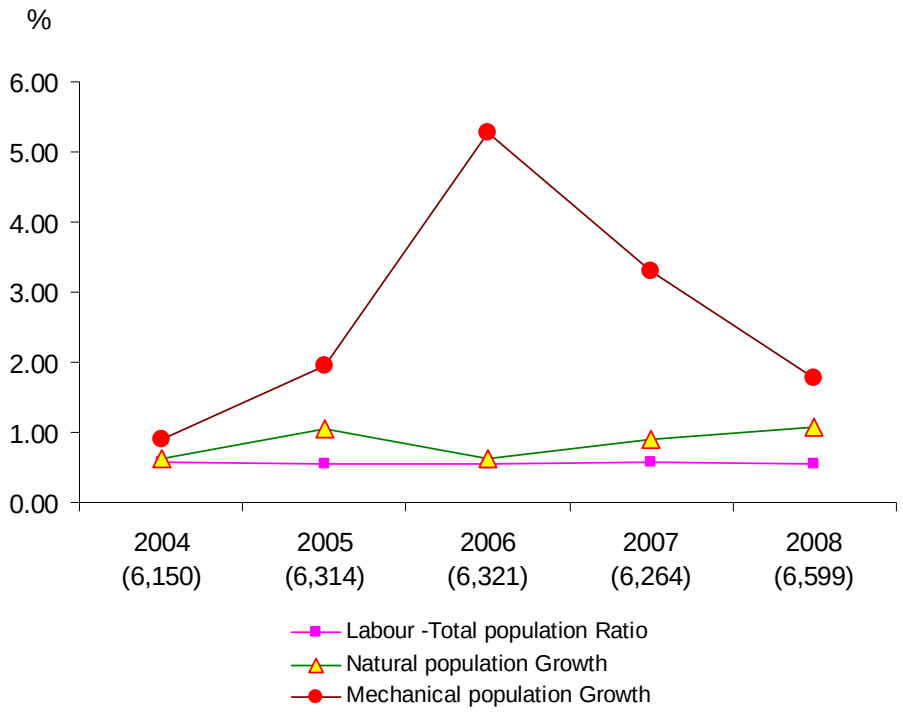
of the consequence year. The average temperature is about 24.5 – 26.2^{o}C that is favored to cultivate some industrial crops, especially for cashew nut.

The Lap River supplies water for Thac Mo hydroelectric plant and is connected with other streams, providing water for agricultural production and for household uses. Generally speaking, the streams systems in Bu Dang District, particularly in Tho Son Commune is abundant in the rainy season - sometime causing flood in the area - but scarce in the dry season. The underground water is considered as the main source of water for household consumption and irrigation. It is observed that almost every household in the study site has its own well.

The current land use is mainly for crop cultivation and forestry. The total agricultural land is about 7,476.01ha, occupied 96.26% of the natural area. Most of lands have been used with varieties purposes. Eighty percent of the total natural land is classified as basalt soil, which are about 5,389.07 ha. This kind of land is appropriate for growing beans of different kinds, maize and industrial crops such as cashew nut.

The population density of Tho Son Commune is about 85 people per square kilometer. The average size of household is about 4.58 people/household. This number tends to reduce thanks family planning.

Figure 2: Population growth, 2004-2008



Source: Tho Son Commune People Committee, 2009

Figure 2 shows that population of Tho Son in 2004 (6,150 persons) is lower than that of 2008 (6,599 persons). Nevertheless, the rate of total labour and total population is seemingly unchanged. It is noticed that the mechanical population growth rate increases sharply in 2006 due to the fact that after Tho Son was spitted into two communes (namely Tho Son and Phu Son); there was an influx of new immigrants to Tho Son. As mentioned earlier, thanks to family planning in the recent years, the natural population growth is about 1% in average. The majority of the M'nong people follow Protestant and Catholic. Some are Buddhist. Protestantism as well as other religions has provided with them a certain degree of what Emile Durkheim calls solidarity. Nonetheless, some traditional customary laws are still observed which governed the relationship between and among families, lineages, and community.

Local mass organizations, like the Women's Union, Farmers' Union, Youth League, exist in the commune. They are considered as implementing tools for accomplishing objectives and targets set by the local government. However, at the grass-root level, these organizations, particularly the Women's Union, are very active and regarded as effective local partners in many development projects. Every month, the village headman organizes meetings with the leaders of these organizations to inform them of government decisions and plans. The leaders, in turn, are expected to disseminate the information to the villagers.

Agriculture: Agriculture production in Tho Son is mainly based on the cultivation of some industrial crops such as cashew, fruit trees, black pepper and rubber. Other annual crops such as cassava, beans, and other food crops were also planted. According to statistic data on animal husbandry, the buffaloes herd of Tho Son commune is 395 heads, cattle: 846 head, pigs: 1,772, goat: 200, poultry: 6,230.

Market access: There is a local market in Tho Son commune, which mainly sell fertilizers, pesticides, and buy agricultural products. Each hamlet has about 6-9 groceries where people in the village can buy their daily necessities. There are some eateries in the center area of the commune.

Education: In the commune, there are two preliminary schools and one secondary school, which can accommodate 2.554 children. There is no high school found in Tho Son, therefore, students who are admitted to high school have to travel to nearby town of Duc Phong for their schooling.

Healthcare: There exists one medical station located in the central of the commune. Its responsities include giving first aids and vaccinating for children, to educate local people about the environmental protection, hygiene and food safety. Family planning is one of important aspects of their works.

Characteristics of the M'nong

The M'nong people (also known as Bu-dâng, Preh, Gẻ, Nong ,Prâng, Kuyênh, Chil Bu Nor) is one of 54 ethnic minorities in Vietnam with the total population of 92.451 persons. They speak the language of Mon-Khmer, two of the dominant language groups in the Central Highland (the other is Malayo-Polynesian).

The M'nong people is mainly inhabit in the Southwest of Daklak province, Lam Dong province and some mountainous districts of Binh Phuoc provinces. They can also be found in the east territory of Cambodia, near the border provinces of Vietnam such as Daklak, Daknong, Lam Dong and Quang Nam provinces.

Because there are many M'nong groups, they have many dialects. The main dialects include Eastern M'nong and Western M'nong. However, it is not very different between two dialects. They are easy to hear and understand. In livelihood traditional activities, deforest for cultivation (*mir*) plays an important work. Main food of M'nong people is non - glutinous rice. Meanwhile, glutinous rice is not popular. Other agricultural products as corn, sweet potato, and cassava are cultivated for people'consumption, and food for animal husbandry.

M'nong community organisation

Village patriarch plays an important role in the village. People keep a traditional custom to transfer for future generations. All of M'nong male, female, young or old like wine drunk out of a jar through pipes and tobacco. However, nowadays, people enter Protestant religion so they limited to use wine and tobacco. M'nong community follows matriarchy. Surname of children is the same to surname of their mother. An M'nong female has an important role in family but no differentiate between wife and husband. They live happily together.

Following a traditional custom, when a M'nong child becomes adult, has to sharpen his teeth if he wants to get married. Wedding custom includes three steps: propose marriage, promise of marriage, and wedding ceremony. However, it somewhere depends on arrangement of two families. M'nong people like a great number of children, especially child female. A child will be formal named after one year from his birthday. A dead rate of M'nong children after birth is very high (8.2%/year)

Funeral custom

In funeral, M'nong people has a custom of singing, gong and drum beating round coffin over day and night time. After interring, they use branch of trees and leaves to cover mouth of grave, and then use soil to full cover. During 7 days and 1 month, family of dead person will leave off mourning.

5. Finding and Discussion

5.1.Historical issues of M'nong community at Tho Son commune

Interesting history of M'nong people at Tho Son commune is descriptive by qualitative information from tells of village patriarch. He says that M'nong people have been living in Tho Son commune for long time, from 16-17th century. However, their houses are not stable due to shifting cultivation of wandering hill tribes. At beginning time, it was not much households. Then, M'nong community develops because of settled down to married life, living with wife's family, high natural birth rate, etc…, and gradually becomes a dense community as nowadays.

In the past, M'nong people moved to everywhere. Up to period of 1945-1954, they lived in Bom Funl Ber and Bom Funl Ry villages which are far from Tho Son commune about 2 km of distance. From 1954 to 1960, they moved to Quang Truc commune for living (located in Dak Nong province now). From 1960 to 1975, they came back to Bom Funl Ber and Bom Funl Ry villages. Replying on the settled agriculture and resident program of government in 1975, M'nong people has been staying at Son Hoa village, Tho Son commune up to now.

Figure 3. Traditional and Modern Tools for Agricultural Production of the Mnong

Traditional Tools

Công cụ làm cỏ
(Hoe)

Xà gạt
(Knife)

Gậy chọc lỗ
(Dibble)

Modern Tools

Chemical Sprayer

Power-Saw

Truck-trailer

Source: Tran Duc Luan and Nguyen Ngoc Thuy, 2009

In the past, M'nong people tilled mainly in the fields on the mountainous slope, wet crop cultivation only existed in area around streams, rivers, lakes, and lagoons. Animal husbandry included buffaloes, cows, pigs, goats, and even dogs. In addition, they hunted wild animals in forest, but in recent years, forest area has been reducing and gradually rare wild animals. Relating to livelihood activities, before 1975, M'nong people just knew to till in the mountainous fields, cultivated corn as one kind of sub-products for their food. Agricultural production mainly served for household consumption, and outputs were not for market.

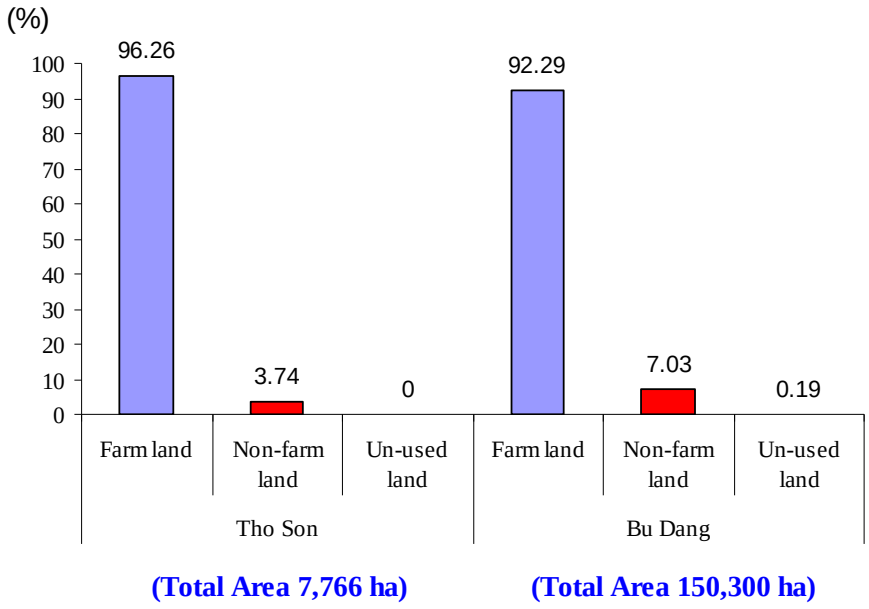
From 1975, Kinh people migrated from the north and central of Vietnam to Tho Son for living, and M'nong people leant from Kinh people for wet rice production. They took advantage of swamps to cultivate rice. Besides, M'nong people had a brocade-weaving job from cotton yard replacing for forest tree covers. The brocade-weaving job was undertaken by M'nong woman, specially a trade village established by supports of Binh Phuoc provincial government. Meanwhile, a productive mean weaving job likes papoose, basket, and others was implement by M'nong man. At that time, products could trade in the form of "*exchange of goods*", for example, buffalo exchange to rice (this activity happened among people in villages of Tho Son). The village patriarch tells that, only several M'nong people used money from 1960 by selling animal husbandry to buy salt in Thu Dau Mot (Binh Duong province).

From 1986, some households planted a cashew experiment with supported by Go Cong farm. After experiment period, M'nong people realised cashew can contribute a possitive result for household economy. In addition, local government encourage people cultivated cashew to help them escape poverty. From 1988 to now, cashew has been popularly planting at Tho Son. About productive means, in the past, M'nong people used primitive instruments that were made by them. Nowadays, M'nong people use modern productive means for agriculture. They have to buy these means from machine-industrial sector.

5.2.Current Situation of land use at Tho Son commune

Total area of Bu Dang district is about 150,300 ha, of those Tho Son commune's accounts for 5.2%. In terms of land use structure, there is no significant difference between Tho Son commune and Bu Dang district. Specifically, over 96% of natural land is for agricultural cultivation with the main crops of cashew, pepper and rubber. Fruit trees and cassavas account for little land area.

Figure 4: Proportion of land used at Tho Son Commune and Bu Dang District



Source: Reports by Bu Dang District's people committee, 2008

Perennial industrial plants are the main crop at Tho Son commune. Rubber area has increased in the past years, of which rubber area at Tho Son farm is about 916 ha. Besides, rubber area of small landowners has strongly risen with 125 ha. Current rubber groves develop fairly well and bring high yield. Total rubber area of the commune is 1,041 ha and 60% of them are being harvested with average productivity of 1,100 kg dry-sap per ha. Rubber sap yield is over 719 tons. Rubber benefits agricultural sector, social economy and creates a large number of jobs for most of labors at the commune. Cashew area at the commune is 2,365 ha including new planting area of 65 ha, and harvested area is 2,315 ha with productivity is 1,613 tons/year. In recent years, due to propitious weather and the increase in cashew price, income from cashew production is very high to ensure households' living. Coffee area of the commune is about 275 ha with harvested area of 247 ha, coffee yield is 13.6 quintals/ha, and average productivity in 2008 was 335.92 tons. Before, pepper is the favour crop because of high profit, accounts less land area than other crops like rubber or cashew do. In the past years, due to low pepper price and high costs of petrol and electricity for watering, high other costs and epidemic diseases, pepper area has been reduced. In 2008, total pepper area is only 30 ha with pepper yield of 27.4 quintals/ha.

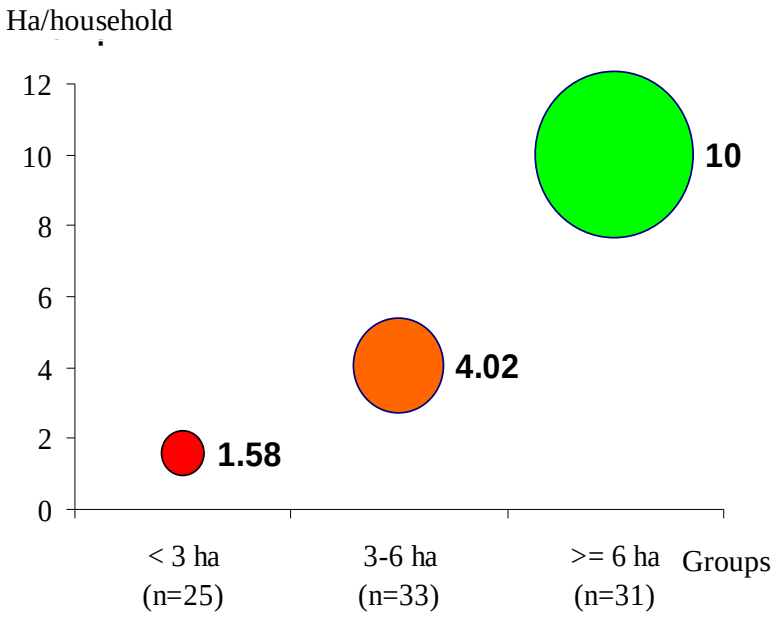
Beside perennial crops, many kinds of fruit trees have been grown producing desired effect for the last years. However, fruit tree area is only about 48.2 ha because households get familiar with intercropping fruit trees with other perennial crops and the area is only

accounted for the perennial crops. In facts, fruit tree area of Tho Son commune is 80 ha including mango, durian, rambutan, mangosteen, jackfruit. Of those kinds of fruit tree, durian, rambutan, jackfruit are core crops. In general, fruit trees in the area grow and develop well, producing high yield and good quality. Finally, cassava at Tho Son commune also develops well with total area of 92 ha, yield of 230 quintals/ha, productivity of 2,116 tons.

5.3 Information from surveyed households

To analyze data of surveyed households, 89 observations were categorized into three groups based on the difference in their cultivated land area. Households holding land area of less than 3 ha were arranged at group I, those holding land area of ranging from 3 ha to 6 ha were in Group 2, and Group 3 includes those holding land area of over 6 ha. The purpose of the division originates from the hypothesis that there will be difference in income among households if their land areas are different.

Figure 5: Average land area of household groups



Source: Calculated by the author based on data surveyed, 2009

When testing differences in the average land area held by 3 household groups, we can find that p-values of F values are less than α = 1%, which means that the difference in average land area possessed by households is statistically significant at confidence level of 90%.

Table 2: Difference in the average land area by groups

Group (I)	Group (J)	Mean Difference (I-J)	Standard Error	Sig.
< 3 ha	3 - 6 ha	-2.43 (*)	0.51	0.00
	>= 6 ha	-8.41 (*)	0.51	0.00
3 – 6 ha	< 3 ha	2.43 (*)	0.50	0.00
	>= 6 ha	-5.98 (*)	0.48	0.00
>= 6 ha	< 3 ha	8.41 (*)	0.51	0.00
	3 - 6 ha	5.98 (*)	0.48	0.00

* *Mean difference at α = 1%*

Source: Calculated by the author based on data surveyed, 2009

General characteristics of surveyed households

Average land area of household in the sample is 5.42 ha and that of 1.58 ha for group I, 4.02 ha for group II and 10 ha for group III. A special thing is that the larger household's land area is, the more of plot numbers the household has. Specifically, the average number of plots of group I is 1.36 in comparison to 3.03 plots for group II. In terms of education, there is statistically insignificant difference in surveyed household leaders' education by groups. However, there is clear difference in the household leaders' age. The average household leaders' age in-group I is 7 years old less than those in group 2 and 7 years old less than in group 3.

Table 3: General information of surveyed households

Items	Unit	Groups			Sample (n=89)
		< 3 ha (n=25)	3-6 ha (n=33)	>= 6 ha (n=31)	
1. Land area (land holdings)	Ha/household	1.58 *(0.78)*	4.02 *(0.88)*	10.00 *(3.02)*	5.42 *(3.98)*
2. Plot numbers	Plot/household	1.36 *(0.49)*	1.88 *(0.60)*	3.03 *(0.60)*	2.13 *(0.89)*
3. Education of head of household	Year level	4.16 *(3.17)*	4.79 *(3.65)*	4.65 *(3.91)*	4.56 *(3.59)*
4. Age of head of household	Age	44.68 *(14.50)*	49.55 *(14.73)*	51.65 *(14.97)*	48.91 *(14.85)*

Numbers in parentheses in italic are standard errors

Source: Calculated by the author based on data surveyed, 2009

In terms of other members' education in a household, more than 50% people attend at primary level and approximately 40% people attend junior high school level. A prominent thing is that although the percentage of illiterate people of group II and group III is higher than that of

group I, percentage of people whose educational levels are above senior high school of group I is less than those of the other groups.

Table 4: Educational level of other members of surveyed households

Unit: percent (%)

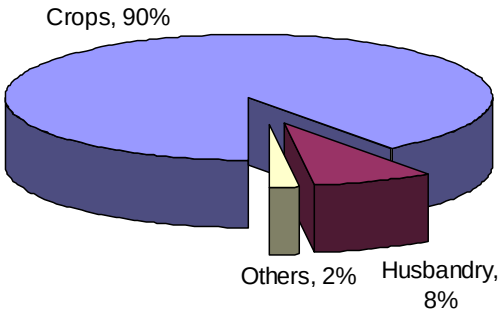
Educational levels	Groups			Total sample (n=89)
	< 3 ha (n=25)	3-6 ha (n=33)	>= 6 ha (n=31)	
1. Illiteracy	4.17	5.00	4.76	4.73
2. Primary school	54.17	48.57	52.38	51.10
3. High school	41.67	42.86	40.00	41.64
4. Higher levels	0.00	3.57	2.86	2.52
Total	100.00	100.00	100.00	100.00

Source: Calculated by the author based on data surveyed, 2009

5.4 Livelihood of surveyed households

M'nong community at Tho Son commune mostly live on cultivating cashews, rubbers, coffees and peppers. Breeding and non-agricultural activities have not been developed yet. Household's income structure from their livelihoods consists of cultivation accounting for 90%, breeding capturing at 2% and other livelihood accounting for 8%.

Figure 6: Income Structure of surveyed households



Source: Calculated by the author based on data surveyed, 2009

In terms of income from cultivation, the income of households in-group I is approximately equivalent to a half of that of household's in-group II and equivalent to a quarter of that of household's in-group III. However, the income from breeding and other sources of livelihood of household in-group I is higher than that of household in group II and group III. The reason

for this issue is households in group I with small land area breed or work in non-agricultural sectors more frequently than those in group II, and even group III has.

Table 5: Income by sources of livelihood of surveyed households

Unit: VND million/year

Items	Groups			Sample (n=89)
	< 3 ha (n=25)	3-6 ha (n=33)	>= 6 ha (n=31)	
1. Cultivation	27.08 *(12.59)*	51.59 *(12.48)*	107.58 *(27.57)*	64.21 *(38.38)*
2. Breeding	2.33 *(4.01)*	0.46 *(0.83)*	1.73 *(3.47)*	1.43 *(3.06)*
3. Other	8.34 *(8.38)*	4.85 *(10.44)*	4.50 *(7.70)*	5.71 *(9.04)*
Total	37.75 *(16.03)*	56.90 *(15.58)*	113.80 *(29.72)*	71.34 *(38.64)*

Numbers in parentheses in italic are standard errors

Source: Results from surveyed data in March 2009

Land use of interviewed households

Table 6. Land use of the M'nong in Tho Son Commune

Timeline	Land use	Observation of changes
Before 1975	- Shifting cultivation	- Subsistence. There are many rituals associated with cultivation such as harvesting festivities, offering buffaloes sarcrifces to god. - Land owned by lineage under customary laws.
1975-1984	- Wetland rice cultivation - Sedentarization	- Still owned by lineage for swidden fields. - Owned by households for homesteads, croplands and wetland allocated by government. - There were still some traditional festivities such as buffaloes sacrifice, harvesting festivals - The M'nong learn wetland rice cultivation practice from the Kinh immigrants. - Exploitation of the lands along the streams for wetland paddy fields.
1986	- Some began to plant cashew.	- Commercialization of local economy - Some household were conversed to Protestant religion
1988	- Most of household planted with cashew, intercropping food crops if possible	- Traditional festivities associated with shifting cultivation have been reduced. - Land owned by household (including swidden fields)
1999- 2000	- All swidden fields were shifed to cashew, rubber, fruit trees..	- Traditional festivities almost disappeared. -There was very little land used for cultivating upland rice.

2007- now	- Upland rice completely erased	- Associated festivities and ceremonies had completely disappeared.

Source: Key-informant interviews, 2009

Key informants interviews found that there has been a transformation in land use systems of the M'nong. Gradually, they shifted from the shifting cultivation practices to sedentarization, from upland rice production to wetland rice and commercial crops such as cashew, rubber and fruit trees. The market pressure and Kinh culture have influenced the cultivation practices as well as their perceptions on agricultural production. This findings are the same with Crocombe (1971, cited in Yonariza, 1996). Harvesting festivities as well as other ceremonies asssociated with shifting cultivation were eroded. The subsistence farming economy is now integrated into the commercial economy resulting in changes in their local culture. This result is also similar to Ember and Ember (1999:461) in their study in the United States.

Difference in income by statistically significant level by households' land area

Considering average income between group I and group II, we can find income of household in group I is 19 million VND/household/year lower than that of household in group II and is 76 million VND/household/year lower than that of household in group III. The difference is statistically significant at $\alpha = 1\%$.

Table 7: Difference in average by statistically significant level by households' land area

Variables	Group (I)	Group (J)	Difference (I-J)	Standard error	Sig.
1. Household Income	< 3 ha	3 – 6 ha	-19.1447(*)	5.74923	.001
	< 3 ha	>= 6 ha	-76.0518(*)	5.82862	.000
(million/household/year)	3 – 6 ha	>= 6 ha	-56.9071(*)	5.42344	.000
2. Household size	< 3 ha	3 – 6 ha	-.1394	.58546	.812
(person/household)	< 3 ha	>= 6 ha	-1.9742(*)	.59355	.001
	3 – 6 ha	>= 6 ha	-1.8348(*)	.55229	.001
3. Family Labours	< 3 ha	3 – 6 ha	-.2218	.47065	.639
(person/household)	< 3 ha	>= 6 ha	-1.3948(*)	.47715	.004
	3 – 6 ha	>= 6 ha	-1.1730(*)	.44398	.010
4. Education of	< 3 ha	3 – 6 ha	-.6279	.95940	.515
household leader	< 3 ha	>= 6 ha	-.4852	.97265	.619
(Year)	3 – 6 ha	>= 6 ha	.1427	.90504	.875

** Mean difference at $\alpha = 1\%$*

Source: Results from surveyed data in March 2009

There is statistically significant difference in average of household's person numbers, average of household's labour numbers among group I, group II, and group III at households at α = 1%. However, there is no statistically significant difference in educational level among households group.

Difference by statistically significant levels by the year of settlement

Household's time of settlement at the area has an effect on their income, the number of household members, labor numbers, and land area held. At the confidence level of 99% , the income of the households who settled in the area by 1960 is 25.73 million VND/household/year higher than that of households who settled in the period of 1961-1975 and 35.36 million VND higher than that of households who settled after 1975 as well. However, there is no statistically significant difference between income of households settling there in the period of 1961-1975 and that of households who settling there after 1975 at α = 5%.

Table 8: Difference by statistically significant level by the year of settlement

Variables	Group (I)	Group (J)	Difference (I-J)	Standard error	Sig.
1. Household Income *(million/household/year)*	Before1960	1961-1975	25.73 (*)	8.76	0.00
	Before 1960	After 1975	35.56 (*)	10.08	0.00
	1961-1975	After 1975	9.83	9.97	0.33
2. Household size *(person/household)*	Before 1960	1961-1975	1.05 (***)	0.56	0.06
	Before 1960	After 1975	1.62 (**)	0.64	0.01
	1961-1975	After 1975	9.57	0.63	0.37
3. Family Labours *(person/household)*	Before 1960	1961-1975	1.32 (*)	0.39	0.00
	Before 1960	After 1975	2.49 (*)	0.45	0.00
	1961-1975	After 1975	1.17 (*)	0.44	0.01
4. Land area *(ha/household)*	Before 1960	1961-1975	1.97 (**)	0.94	0.04
	Before 1960	After 1975	2.62 (**)	1.08	0.02
	1961-1975	After 1975	0.65	1.07	0.54

, **, * equivalent to difference at α = 1%, 5% , and 10%*

Source: Results from surveyed data in March 2009

As can be seen from the table 7, there is a downward trend in average member numbers and land areas of each household by time. The cause of this issue is the separating from home. When children get married and separately, number of members in the household will decrease. Besides, the more population increases, the more household numbers there are and the less land area each household hold.

5.5 The linear regression model

Land holdings (land area) and method of using land resource have an influence on income of the household. Cross-section data from the survey of 89 households were used in the case study to analyze factors affecting household income. Results of the model estimated by ordinary least square method (OLS) give us interesting assessments when other factors in the model are assumed to be fixed. The linear regression model is set up based on the hypotheses: there is no linear relationship among explanatory variables; There is no heteroscedasticity and autocorrelation in the model (Gujarati Damodar N. 1995; Ramanathan R. 1998).

The model estimated based on cross-section data from 89 observations, so autocorrelation could be ignored. Although R-squared is high, the multicollinearity is not seen in the model. However, there is signal of heteroscedasticity in the model and this problem was solved by using the weighted least square method to run the model (Gujarati Damodar N. 1995; Ramanathan R. 1998).

Table 9: Factors affecting to income per capital of surveyed households

Variables	Variable description	Coefficient	t-stat	P-value
1. Constant		1.80	2.07	0.04
2. Land holdings	Ha/person	8.97	18.48	0.00
3. Number of plots	Plot	-1.40	-7.32	0.00
4. Labours	Person	6.98	4.71	0.00
5. Education of head of household	Year level	0.13	1.52	0.13
6. Extension training attendance	Time/year	-0.12	-0.53	0.60
7. Gender of head of household	1:male; 0:female	0.72	1.89	0.06
8. Credit	1:yes; 0:no	-0.65	-1.43	0.16

R^2 = 0.8 Prob(F-Statistic) = 0.00

Source: Estimated by the author based on data surveyed, 2009

Land holding variable has positive coefficient and statistically significant, which means that a 1ha increase in land holdings/person leading to a number of 8.97 million VND/year raise in income/person. The increase in income is not high because, at the area, cashew is the main crop harvested once a year and income from cultivating cashew depends on market prices of inputs and outputs in the year.

Variable of plot number is statistically significant and has negative sign. If number of plots per households increases one, income per capita will decrease by 1.4 million VND/year. Causes of the issue are that the more plot numbers household holds, the more difficulty the household copes with managing, looking after, and protecting the crops.

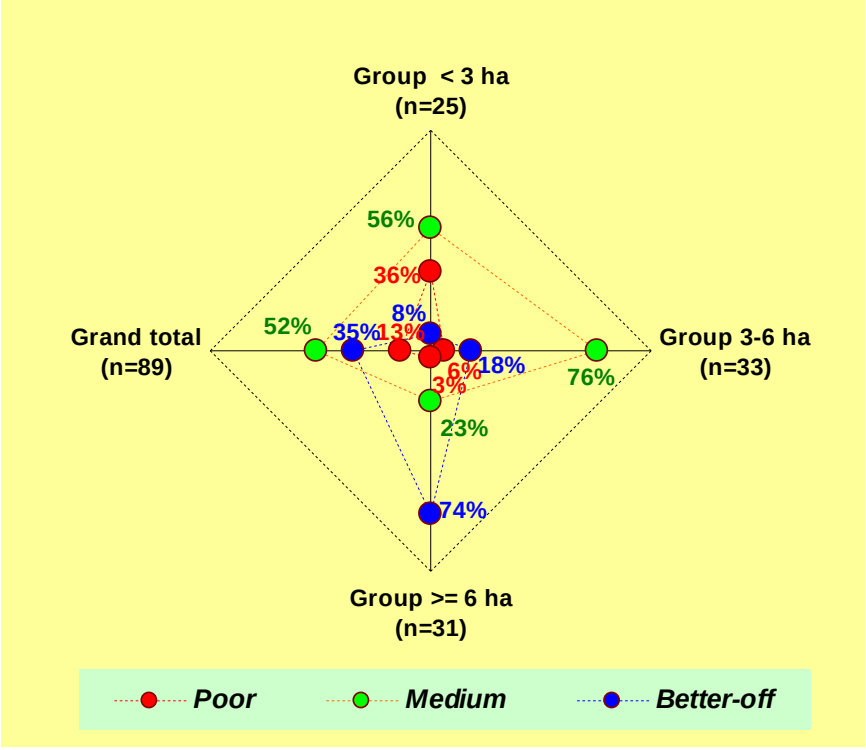
Variable of labor: its coefficient is positive and statistically significant at α=1%. This means that for a 0.1 increase in household's labor ratio, income/person will increase by 0.698 million VND/year.

Gender of head of household is significant at α = 10%, income per capita with the male head is higher than that of household whose the head is female with the difference of 0.72 million VND/year. A prominent thing is that factors such as household head education, extension training attendance and credit are insignificant in explaining change in household. The households' cashew cultivation mainly bases on their experiences, natural conditions more than technology factors. Credit has not used in production yet, so its effects has not been seen.

5.6 Self-assessment of households' living standard

Income is considered as an important criterion to assess household's living standard. Household with high income has more opportunities to afford their means of production and expenditure than low income household. In the study, information of households' self-assessment was used to recognize ratio of poor households, medium households and rich households. In terms of ratio of poor households by group, the results show that households holding land of less than 3 ha account for 36% of poor household numbers, those holding land of ranging 3-6 ha account for 6% of poor household numbers and the other accounts for 3% of poor household numbers.

Figure 7: Self-assessment of surveyed households on their living standard



Source: Calculated by the author based on data surveyed, 2009

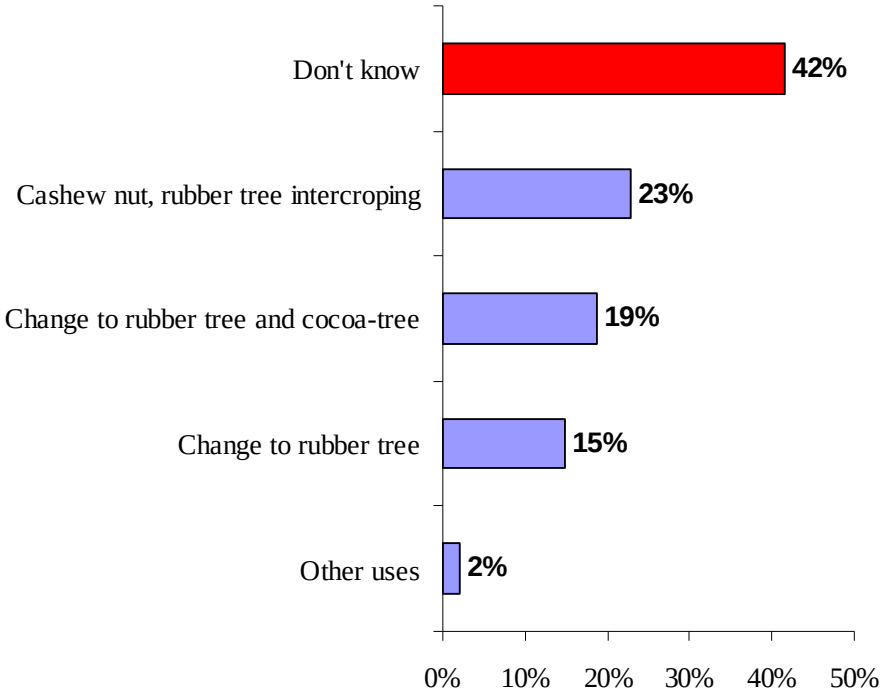
Contributing factors to poverty of household group holding little land are their land has not been used variously yet; value of products made in a unit of land is still low due to high cultivating area of cashew. Besides, pressure of having many children, many dependants and diseases are reasons for low standard of living. Of the surveyed households holding land of 3-6 ha, over 76% of them have medium standard of living. Expenses of children's schooling and part of immature or old cashew area are explained by polled households as sources of their standard of living that is not improved.

Most of households holding land of over six ha have high standard of living. Holding much land area is the main reason why their standard of living is higher than that of the other groups. Other sources of non-agricultural income, for instance, workings as workers, state-staff, business, etc contribute to the rise in household income.

5.7 Orientation and suggestion of households

When being asked for what would you do with your land area in the near future, most of respondents say that they had not known what/how to do.

Figure 8: Percentage of households' ideas about orientation of using their land holdings



Source: Calculated by the author based on data surveyed, 2009

About 23% of surveyed households said that they would alternately combine rubbers and coffees in their current cashew plots; 19% of those would cultivate other kinds of crop such as, rubber, cassava, coffee, etc; 15% of those questioned revealed that they would totally shift to

cultivate rubber and the 2% for other ideas (applying technology to improving cashew plots and clearing forest for land). When considering the collected ideas by group, 63% of households holding large land area shown intention of shifting to rubber or other crop production in comparison to 20% of those holding less land area with the same intention. A special thing is that there are 72% of those holding land area of less than 3 ha will continue to implement the old production model without knowing how to change in their land use in the next time.

The result of the regression model shows that the extension training attendance is not statistically significant in explaining household income change. However, a paradox is that farmers still ask government for transferring scientific technology to them. This is an important question needing the answer since there are 55.2% of households demanding scientific technology transfer belong to household group with large land area and this ratio gradually decline to household groups with less land area.

Table 10: Suggestions of surveyed households

Unit: percent

Suggestion	Group < 3 ha	Group 3-6 ha	Group >= 6 ha	Total sample
No suggestion	34.8	60.6	44.8	48.2
Supplying additional land	52.2	3.0	0.0	15.3
Scientific technology transfer	13.0	36.4	55.2	36.5
Total	100.0	100.0	100.0	100.0

Source: Calculated by the author based on data surveyed, 2009

About 52% of households holding small land area gave the suggestion of supplying additional land despite the scarcity of current land area in the area. To solve the problem, the local authority is implementing the 134 program of Vietnam government about providing additional land for households who are short of production land. The policy of Binh Phuoc province's people committee is to take illegal production land back to provide households lacking of production land with the priority for those who are minor ethnic people and the poor at the commune. However, up to now, the commune has not implemented the policy yet due to the difficulty in forcing of taking land back and rebellion of households holding the illegal production land.

About 48% of surveyed households do not know what to suggest or do not give any suggestion. This illustrates that, actually they have not found the orientation to do and the way to escape poverty. However, over haft of opinions of households are oriental to tranfering to commercial crops such as rubber and cocoa tree in future. This issue is considered as a sign to help a "shifting cultivation" community in land use system and cultivating changes gone with the market mobility.

6. Conclusion

Land is a very important resource to M'nong community: Holding is a life and death matter of farmers, especially M'nong community. Land is their vital means of production whatever time they live. To M'nong community in the area, land is regarded as their own flash and blood because of its extremely important role in meeting their food demand and bringing the income to ensure their family's basic needs.

The larger land area is, the more income is Land area and way to use it has impact on user's income. A one ha increase in land area/person leads to an 8.89 million VND/year rise in income/person.

With the same land area, the more plot numbers the households have, the less income they get: when there is a one-plot increase in average plot numbers of the household, income/person of that household will decrease by 1.4 million VND/year. Difficulty in managing, looking after and protecting crops are reasons for the decline if household has many plots.

Cashew is the main crop, cashew cultivation depends on physical conditions and scientific technology is rarely applied to the production: To M'nong community in the area, cashew is considered as the crop of poverty alleviation. Cashew is one of drought-resistant crops, so the cultivation relies mostly on physical conditions and technology factor has rarely been applied to cashew production. Result of the model estimated illustrate the extension training attendance is not statistically significant to explain the change in household income.

***Scientific technology of cultivation has rarely been applied but there is the demand on the scientific technology transfer*:** by studying and surveying households, a paradox can be seen is that farmers still have suggested authority transferring technology to them. This is an important question needing an answer because there are 55.2% of households demanding scientific technology transfer belong to household group with large land area and this ratio gradually decline to household groups with less land area.

7. Recommendation

The first thing is to increase resources for farming households in M'nong community. The important resource is land. Implementation of allocating forestry and agriculture land to each household according to the Land Law so that households can actively cultivate is a good way to solve land matter. Moreover, issuing certificate of land use right creates an important motivation because it is the legal acknowledgement for farmers to produce in their own land area.

The next is to support households with technology and extension training courses; help them make a plan of production which is suitable for their land condition, economic background, and household's concept of production by practical guidance instead of theoretic methods due to the limited understanding and awareness of M'nong people; and teach them how to take care of and to improve their cashew groves, how to process the old cashew groves to increase in cashew yield and household income.

On the base of household's production plan, creating a convenient credit environment for households to have enough capital for their production investment and guiding them how to use the capital effectively are necessary. When the production plan is made, studying agricultural product market and father creating the best market for the minor ethnic community who are not familiar with the market economy and often have disadvantage in unequal exchange mechanisms are essential as well. Another thing is to continue implement the government's 134 project on distributing land to onsite-minor ethnic people and poor households who are lack of land.

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APPENDIX

1. Variable Descriptive Statistics

	THUNHAP	DIENTICH	SOTHUA	NHANKHAU	LAODONG
Mean	71.33933	5.415730	2.134831	5.539326	3.528090
Median	60.60000	4.000000	2.000000	5.000000	3.000000
Maximum	171.2000	17.50000	4.000000	14.00000	10.00000
Minimum	12.60000	0.500000	1.000000	2.000000	1.000000
Std. Dev.	38.64465	3.980461	0.894313	2.364780	1.859190
Skewness	0.802350	1.013517	0.308564	0.979804	1.390595
Kurtosis	2.832751	3.360972	2.261597	4.547357	5.076188
Jarque-Bera	9.652923	15.72023	3.434238	23.11916	44.66900
Probability	0.008015	0.000386	0.179583	0.000010	0.000000
Observations	89	89	89	89	89

	GIOI	HOCVAN	KYTHUAT	VAYVON
Mean	0.887640	4.561798	0.651685	0.528090
Median	1.000000	4.000000	1.000000	1.000000
Maximum	1.000000	12.00000	2.000000	1.000000
Minimum	0.000000	0.000000	0.000000	0.000000
Std. Dev.	0.317598	3.586449	0.724586	0.502039
Skewness	-2.454910	0.557020	0.632035	-0.112537
Kurtosis	7.026582	2.158335	2.141832	1.012665
Jarque-Bera	149.5189	7.229349	8.656460	14.83393
Probability	0.000000	0.026926	0.013191	0.000601
Observations	89	89	89	89

2. Liner Regression Model Result

Dependent Variable: THUNHAP/NHANKHAU
Method: Least Squares
Date: 03/26/09 Time: 09:13
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.757773	2.308192	0.328297	0.7435
DIENTICH/NHANKHAU	8.854282	0.708917	12.48988	0.0000
SOTHUA	-1.292098	0.515166	-2.508119	0.0141
LAODONG/NHANKHAU	8.072636	2.292479	3.521356	0.0007
HOCVAN	0.260629	0.125786	2.072001	0.0414
GIOI	0.693276	1.253040	0.553275	0.5816
VAYVON	-0.752248	0.843379	-0.891945	0.3750

R-squared	0.815391	Mean dependent var	13.93171
Adjusted R-squared	0.801883	S.D. dependent var	7.804607
S.E. of regression	3.473856	Akaike info criterion	5.403794

Sum squared resid	989.5493	Schwarz criterion	5.599529
Log likelihood	-233.4688	F-statistic	60.36370
Durbin-Watson stat	1.916292	Prob(F-statistic)	0.000000

3. Multi Collinearity Test

Dependent Variable: DIENTICH/NHANKHAU
Method: Least Squares
Date: 03/26/09 Time: 09:43
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.251685	0.359430	-0.700233	0.4858
SOTHUA	0.406620	0.067047	6.064704	0.0000
LAODONG/NHANKHAU	1.271937	0.328071	3.877016	0.0002
HOCVAN	0.035556	0.019762	1.799168	0.0757
KYTHUAT	0.066582	0.090890	0.732553	0.4659
GIOI	-0.390888	0.194656	-2.008102	0.0479
VAYVON	-0.487426	0.121409	-4.014746	0.0001

R-squared	0.528384	Mean dependent var	1.046398
Adjusted R-squared	0.493875	S.D. dependent var	0.758166
S.E. of regression	0.539378	Akaike info criterion	1.678586
Sum squared resid	23.85615	Schwarz criterion	1.874321
Log likelihood	-67.69707	F-statistic	15.31169
Durbin-Watson stat	2.084411	Prob(F-statistic)	0.000000

Dependent Variable: SOTHUA
Method: Least Squares
Date: 03/26/09 Time: 09:44
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.826777	0.450223	4.057499	0.0001
DIENTICH/NHANKHAU	0.761526	0.125567	6.064704	0.0000
LAODONG/NHANKHAU	-1.280815	0.467458	-2.739959	0.0075
HOCVAN	-0.055972	0.026872	-2.082921	0.0404
KYTHUAT	0.149154	0.123699	1.205785	0.2314
GIOI	0.421638	0.268857	1.568257	0.1207
VAYVON	0.245509	0.179713	1.366118	0.1756

R-squared	0.365204	Mean dependent var	2.134831
Adjusted R-squared	0.318755	S.D. dependent var	0.894313
S.E. of regression	0.738144	Akaike info criterion	2.306031
Sum squared resid	44.67825	Schwarz criterion	2.501766
Log likelihood	-95.61837	F-statistic	7.862546
Durbin-Watson stat	1.764176	Prob(F-statistic)	0.000001

Dependent Variable: LAODONG/NHANKHAU
Method: Least Squares
Date: 03/26/09 Time: 09:44
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.746838	0.075115	9.942567	0.0000
DIENTICH/NHANKHAU	0.121792	0.031414	3.877016	0.0002
SOTHUA	-0.065485	0.023900	-2.739959	0.0075
HOCVAN	-0.028251	0.005398	-5.233496	0.0000
KYTHUAT	0.018408	0.028144	0.654089	0.5149
GIOI	0.028300	0.061618	0.459275	0.6473
VAYVON	0.016823	0.041054	0.409790	0.6830

R-squared	0.363241	Mean dependent var	0.651606
Adjusted R-squared	0.316649	S.D. dependent var	0.201905
S.E. of regression	0.166905	Akaike info criterion	-0.667397
Sum squared resid	2.284298	Schwarz criterion	-0.471662
Log likelihood	36.69919	F-statistic	7.796193
Durbin-Watson stat	1.837224	Prob(F-statistic)	0.000001

Dependent Variable: HOCVAN
Method: Least Squares
Date: 03/26/09 Time: 09:45
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.613736	1.731820	4.973805	0.0000
DIENTICH/NHANKHAU	1.068083	0.593654	1.799168	0.0757
SOTHUA	-0.897780	0.431020	-2.082921	0.0404
LAODONG/NHANKHAU	-8.862888	1.693493	-5.233496	0.0000
KYTHUAT	1.112353	0.484451	2.296111	0.0242
GIOI	2.171058	1.066170	2.036315	0.0449
VAYVON	-0.245939	0.727383	-0.338115	0.7361

R-squared	0.366884	Mean dependent var	4.561798
Adjusted R-squared	0.320559	S.D. dependent var	3.586449
S.E. of regression	2.956246	Akaike info criterion	5.081104
Sum squared resid	716.6300	Schwarz criterion	5.276839
Log likelihood	-219.1091	F-statistic	7.919699
Durbin-Watson stat	2.323202	Prob(F-statistic)	0.000001

Dependent Variable: KYTHUAT
Method: Least Squares
Date: 03/26/09 Time: 09:47
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.427675	0.434024	-0.985374	0.3273
DIENTICH/NHANKHAU	0.097651	0.133302	0.732553	0.4659
SOTHUA	0.116804	0.096870	1.205785	0.2314
LAODONG/NHANKHAU	0.281957	0.431069	0.654089	0.5149
HOCVAN	0.054308	0.023652	2.296111	0.0242
GIOI	0.478241	0.235617	2.029742	0.0456
VAYVON	-0.242675	0.158586	-1.530242	0.1298

R-squared	0.242719	Mean dependent var	0.651685
Adjusted R-squared	0.187308	S.D. dependent var	0.724586
S.E. of regression	0.653210	Akaike info criterion	2.061551
Sum squared resid	34.98808	Schwarz criterion	2.257287
Log likelihood	-84.73904	F-statistic	4.380357
Durbin-Watson stat	2.009276	Prob(F-statistic)	0.000691

Dependent Variable: GIOI
Method: Least Squares
Date: 03/26/09 Time: 09:48
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.636093	0.186905	3.403293	0.0010
DIENTICH/NHANKHAU	-0.119910	0.059713	-2.008102	0.0479
SOTHUA	0.069063	0.044038	1.568257	0.1207
LAODONG/NHANKHAU	0.090664	0.197406	0.459275	0.6473
HOCVAN	0.022171	0.010888	2.036315	0.0449
KYTHUAT	0.100030	0.049282	2.029742	0.0456
VAYVON	0.007914	0.073551	0.107595	0.9146

R-squared	0.175545	Mean dependent var	0.887640
Adjusted R-squared	0.115219	S.D. dependent var	0.317598
S.E. of regression	0.298741	Akaike info criterion	0.496908
Sum squared resid	7.318195	Schwarz criterion	0.692643
Log likelihood	-15.11239	F-statistic	2.909943
Durbin-Watson stat	2.246433	Prob(F-statistic)	0.012693

Dependent Variable: VAYVON
Method: Least Squares
Date: 03/26/09 Time: 09:48
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.692637	0.289844	2.389687	0.0192
DIENTICH/NHANKHAU	-0.337022	0.083946	-4.014746	0.0001
SOTHUA	0.090640	0.066349	1.366118	0.1756
LAODONG/NHANKHAU	0.121481	0.296447	0.409790	0.6830
HOCVAN	-0.005661	0.016742	-0.338115	0.7361
KYTHUAT	-0.114407	0.074764	-1.530242	0.1298
GIOI	0.017837	0.165781	0.107595	0.9146

R-squared	0.256309	Mean dependent var	0.528090
Adjusted R-squared	0.201893	S.D. dependent var	0.502039
S.E. of regression	0.448505	Akaike info criterion	1.309595
Sum squared resid	16.49489	Schwarz criterion	1.505330
Log likelihood	-51.27696	F-statistic	4.710153
Durbin-Watson stat	1.903382	Prob(F-statistic)	0.000363

<u>Sub-conclusion</u>: This model has no multi Collinearity because all R-squared index of auxiliary models are smaller than those of original model.

4. Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.138007	Probability	0.711241
Obs*R-squared	0.151379	Probability	0.697221

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/26/09 Time: 09:50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.018055	0.295405	-0.061119	0.9514
DIENTICH/NHANKHAU	-0.001011	0.084435	-0.011974	0.9905
SOTHUA	0.002091	0.066937	0.031237	0.9752
LAODONG/NHANKHAU	0.010904	0.299459	0.036411	0.9710
HOCVAN	0.000722	0.016943	0.042588	0.9661
KYTHUAT	0.002215	0.075396	0.029381	0.9766
GIOI	0.003344	0.166902	0.020036	0.9841
RESID(-1)	0.042440	0.114242	0.371493	0.7112

R-squared	0.001701	Mean dependent var	-2.51E-16
Adjusted R-squared	-0.084572	S.D. dependent var	0.432946
S.E. of regression	0.450882	Akaike info criterion	1.330364

Sum squared resid	16.46683	Schwarz criterion	1.554062
Log likelihood	-51.20120	F-statistic	0.019715
Durbin-Watson stat	1.976526	Prob(F-statistic)	0.999992

*Sub-conclusion: This model has no autocorrelation because Prob(Obs*R-squared) = 0.697 > α = 5%*

5. Heteroscedasticity Test

White Heteroskedasticity Test:

F-statistic	10.57761	Probability	0.000000
Obs*R-squared	71.87626	Probability	0.000002

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 03/26/09 Time: 09:18
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	83.99860	71.93021	1.167779	0.2473
DIENTICH/NHANKHAU	-111.6193	34.69656	-3.217013	0.0020
(DIENTICH/NHANKHAU)^2	-24.54917	6.763423	-3.629696	0.0006
(DIENTICH/NHANKHAU)*SOTHUA	7.473444	9.085016	0.822612	0.4138
(DIENTICH/NHANKHAU)*(LAODONG/NHANKHAU)	194.6938	35.59041	5.470401	0.0000
(DIENTICH/NHANKHAU)*HOCVAN	8.067924	1.706615	4.727443	0.0000
(DIENTICH/NHANKHAU)*GIOI	7.494528	20.08158	0.373204	0.7102
(DIENTICH/NHANKHAU)*VAYVON	-26.52404	16.16379	-1.640954	0.1058
SOTHUA	62.79318	27.20048	2.308532	0.0243
SOTHUA^2	0.546244	3.928684	0.139040	0.8899
SOTHUA*(LAODONG/NHANKHAU)	-85.33740	23.33095	-3.657690	0.0005
SOTHUA*HOCVAN	-5.499708	1.255167	-4.381654	0.0000
SOTHUA*GIOI	4.050227	13.25735	0.305508	0.7610
SOTHUA*VAYVON	-3.557848	9.551699	-0.372483	0.7108
LAODONG/NHANKHAU	-217.1016	143.3509	-1.514477	0.1349
(LAODONG/NHANKHAU)^2	93.48247	62.64438	1.492272	0.1406
(LAODONG/NHANKHAU)*HOCVAN	24.33708	4.780840	5.090545	0.0000
(LAODONG/NHANKHAU)*GIOI	-21.00919	106.7567	-0.196795	0.8446
(LAODONG/NHANKHAU)*VAYVON	65.17848	36.43097	1.789095	0.0784
HOCVAN	-16.75044	6.664802	-2.513270	0.0145
HOCVAN^2	0.630981	0.223852	2.818744	0.0064
HOCVAN*GIOI	1.534806	4.418198	0.347383	0.7295
HOCVAN*VAYVON	0.789071	1.746353	0.451840	0.6529
GIOI	-4.187460	61.89715	-0.067652	0.9463
GIOI*VAYVON	-0.787581	19.84140	-0.039694	0.9685
VAYVON	-11.95103	29.40878	-0.406376	0.6858

R-squared	0.807598	Mean dependent var	11.11853
Adjusted R-squared	0.731249	S.D. dependent var	38.30154
S.E. of regression	19.85599	Akaike info criterion	9.053656

Sum squared resid	24838.40	Schwarz criterion	9.780674
Log likelihood	-376.8877	F-statistic	10.57761
Durbin-Watson stat	2.106982	Prob(F-statistic)	0.000000

*Sub-conclusion: This model has heteroskedasticity because Prob(Obs*R-squared) = 0.00 < α = 5%. Therefore, it needs to be solved by weighted least squares-WLS (by Breusch-Pagan, 1979)*

6. Heteroskedasticity Solve by Breusch – Pagan (1979)

Apply weighting series (WT=1/@SQRT(UMOI1) in the original model

Dependent Variable: THUNHAP/NHANKHAU
Method: Least Squares
Date: 03/26/09 Time: 09:29
Sample: 1 89
Included observations: 89
Weighting series: WT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.800271	0.869827	2.069688	0.0417
DIENTICH/NHANKHAU	8.968143	0.485339	18.47811	0.0000
SOTHUA	-1.395881	0.190643	-7.321946	0.0000
LAODONG/NHANKHAU	6.983937	1.482891	4.709676	0.0000
HOCVAN	0.133475	0.087566	1.524273	0.1313
KYTHUAT	-0.119157	0.225770	-0.527778	0.5991
GIOI	0.723291	0.382094	1.892967	0.0619
VAYVON	-0.652025	0.455437	-1.431648	0.1561

Weighted Statistics			
R-squared	0.991590	Mean dependent var	11.35029
Adjusted R-squared	0.990863	S.D. dependent var	16.75021
S.E. of regression	1.601134	Akaike info criterion	3.864889
Sum squared resid	207.6539	Schwarz criterion	4.088587
Log likelihood	-163.9876	F-statistic	1364.276
Durbin-Watson stat	1.999543	Prob(F-statistic)	0.000000

Unweighted Statistics			
R-squared	0.809985	Mean dependent var	13.93171
Adjusted R-squared	0.793564	S.D. dependent var	7.804607
S.E. of regression	3.546043	Sum squared resid	1018.528
Durbin-Watson stat	1.876017		

Heteroskedasticity Retest after applying WT:

White Heteroskedasticity Test:

F-statistic	0.509015	Probability	0.902763
Obs*R-squared	6.620872	Probability	0.881618

Test Equation:
Dependent Variable: STD_RESID^2
Method: Least Squares
Date: 03/26/09 Time: 09:29
Sample: 1 89
Included observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.602025	4.716388	0.339672	0.7350
DIENTICH/NHANKHAU	-0.473867	2.044471	-0.231780	0.8173
(DIENTICH/NHANKHAU)^2	0.132645	0.531147	0.249734	0.8035
SOTHUA	-0.592054	2.173214	-0.272433	0.7860
SOTHUA^2	0.051921	0.455073	0.114093	0.9095
LAODONG/NHANKHAU	8.577323	12.03769	0.712539	0.4783
(LAODONG/NHANKHAU)^2	-7.033940	8.934486	-0.787280	0.4336
HOCVAN	-0.740121	0.434283	-1.704237	0.0924
HOCVAN^2	0.051190	0.034713	1.474661	0.1444
KYTHUAT	3.566703	1.851339	1.926553	0.0578
KYTHUAT^2	-1.680280	0.967159	-1.737336	0.0864
GIOI	0.488666	1.368145	0.357175	0.7220
VAYVON	0.305655	0.925145	0.330386	0.7420

R-squared	0.074392	Mean dependent var	2.333190
Adjusted R-squared	-0.071757	S.D. dependent var	3.467858
S.E. of regression	3.590124	Akaike info criterion	5.528482
Sum squared resid	979.5633	Schwarz criterion	5.891991
Log likelihood	-233.0175	F-statistic	0.509015
Durbin-Watson stat	1.932005	Prob(F-statistic)	0.902763

*<u>Sub-conclusion</u>: This model has no heteroskedasticity because Prob(Obs*R-squared) = 0.88 > α = 5%.*

7. Mean difference Test – Applied by SPSS software

Multiple Comparisons

Dependent Variable: DIENTICH
LSD

(I) Nhóm	(J) Nhóm	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
< 3 ha	3 - 6 ha	-2.4312(*)	.50497	.000	-3.4350	-1.4273
	>= 6 ha	-8.4128(*)	.51194	.000	-9.4305	-7.3951
3 - 6 ha	< 3 ha	2.4312(*)	.50497	.000	1.4273	3.4350
	>= 6 ha	-5.9816(*)	.47635	.000	-6.9286	-5.0347
>= 6 ha	< 3 ha	8.4128(*)	.51194	.000	7.3951	9.4305
	3 - 6 ha	5.9816(*)	.47635	.000	5.0347	6.9286

* The mean difference is significant at the .05 level.

Descriptives

DIENTICH

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
< 3 ha	25	1.5840	.77765	.15553	1.2630	1.9050	.50	2.70
3 - 6 ha	33	4.0152	.87825	.15288	3.7037	4.3266	3.00	5.90
>= 6 ha	31	9.9968	3.01513	.54153	8.8908	11.1027	6.00	17.50
Total	89	5.4157	3.98046	.42193	4.5772	6.2542	.50	17.50

Multiple Comparisons

LSD

Dependent Variable	(I) NHOM	(J) NHOM	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
THUNHAP	< 3 ha	3 - 6 ha	-19.1447(*)	5.74923	.001	-30.5737	-7.7156
		>= 6 ha	-76.0518(*)	5.82862	.000	-87.6387	-64.4649
	3 - 6 ha	< 3 ha	19.1447(*)	5.74923	.001	7.7156	30.5737
		>= 6 ha	-56.9071(*)	5.42344	.000	-67.6886	-46.1257
	>= 6 ha	< 3 ha	76.0518(*)	5.82862	.000	64.4649	87.6387
		3 - 6 ha	56.9071(*)	5.42344	.000	46.1257	67.6886
NHANKHAU	< 3 ha	3 - 6 ha	-.1394	.58546	.812	-1.3033	1.0245
		>= 6 ha	-1.9742(*)	.59355	.001	-3.1541	-.7943
	3 - 6 ha	< 3 ha	.1394	.58546	.812	-1.0245	1.3033
		>= 6 ha	-1.8348(*)	.55229	.001	-2.9327	-.7369
	>= 6 ha	< 3 ha	1.9742(*)	.59355	.001	.7943	3.1541
		3 - 6 ha	1.8348(*)	.55229	.001	.7369	2.9327
LAODONG	< 3 ha	3 - 6 ha	-.2218	.47065	.639	-1.1574	.7138
		>= 6 ha	-1.3948(*)	.47715	.004	-2.3434	-.4463
	3 - 6 ha	< 3 ha	.2218	.47065	.639	-.7138	1.1574
		>= 6 ha	-1.1730(*)	.44398	.010	-2.0556	-.2904
	>= 6 ha	< 3 ha	1.3948(*)	.47715	.004	.4463	2.3434
		3 - 6 ha	1.1730(*)	.44398	.010	.2904	2.0556
HOCVAN	< 3 ha	3 - 6 ha	-.6279	.95940	.515	-2.5351	1.2794
		>= 6 ha	-.4852	.97265	.619	-2.4187	1.4484
	3 - 6 ha	< 3 ha	.6279	.95940	.515	-1.2794	2.5351
		>= 6 ha	.1427	.90504	.875	-1.6564	1.9419
	>= 6 ha	< 3 ha	.4852	.97265	.619	-1.4484	2.4187
		3 - 6 ha	-.1427	.90504	.875	-1.9419	1.6564

* The mean difference is significant at the .05 level.

Multiple Comparisons

LSD

Dependent Variable	(I) NAMDCU	(J) NAMDCU	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
THUNHAP	Truoc 1960	1961-1975	25.7314(*)	8.76348	.004	8.3102	43.1526
		Sau 1975	35.5618(*)	10.08192	.001	15.5196	55.6040
	1961-1975	Truoc 1960	-25.7314(*)	8.76348	.004	-43.1526	-8.3102
		Sau 1975	9.8304	9.96927	.327	-9.9879	29.6486
	Sau 1975	Truoc 1960	-35.5618(*)	10.08192	.001	-55.6040	-15.5196
		1961-1975	-9.8304	9.96927	.327	-29.6486	9.9879
NHANKHAU	Truoc 1960	1961-1975	1.0476	.55796	.064	-.0616	2.1568
		Sau 1975	1.6190(*)	.64191	.014	.3430	2.8951
	1961-1975	Truoc 1960	-1.0476	.55796	.064	-2.1568	.0616
		Sau 1975	.5714	.63474	.370	-.6904	1.8332
	Sau 1975	Truoc 1960	-1.6190(*)	.64191	.014	-2.8951	-.3430
		1961-1975	-.5714	.63474	.370	-1.8332	.6904
LAODONG	Truoc 1960	1961-1975	1.3221(*)	.38962	.001	.5475	2.0966
		Sau 1975	2.4935(*)	.44824	.000	1.6024	3.3846
	1961-1975	Truoc 1960	-1.3221(*)	.38962	.001	-2.0966	-.5475
		Sau 1975	1.1714(*)	.44323	.010	.2903	2.0525
	Sau 1975	Truoc 1960	-2.4935(*)	.44824	.000	-3.3846	-1.6024
		1961-1975	-1.1714(*)	.44323	.010	-2.0525	-.2903
DIENTICH	Truoc 1960	1961-1975	1.9691(*)	.93859	.039	.1032	3.8349
		Sau 1975	2.6234(*)	1.07980	.017	.4768	4.7699
	1961-1975	Truoc 1960	-1.9691(*)	.93859	.039	-3.8349	-.1032
		Sau 1975	.6543	1.06773	.542	-1.4683	2.7769
	Sau 1975	Truoc 1960	-2.6234(*)	1.07980	.017	-4.7699	-.4768
		1961-1975	-.6543	1.06773	.542	-2.7769	1.4683

* The mean difference is significant at the .05 level.