# Chapter 26
# Developing Agricultural Production of Ethnic Minority Households in the Context of Climate Change (Lak District, Dak Lak Province, Central Highland of Vietnam)

**Thi Ai Nhi Duong and Van Thao Truong**

**Abstract** Climate change has made agricultural production of ethnic minority households in Lak District, Dak Lak province facing many difficulties and challenges. Qualitative and quantitative research methods were used for analysis. The results of the research showed that developing agricultural production of ethnic minority households is affected by natural conditions, infrastructure economy, socioculture, and customs and government policies, as well as internal resource factors. The article also proposed some solutions for developing agricultural production of ethnic minority households in the study site focusing on strengthening linkages in production and consumption, and changing crop structure in accordance with the climate change context on the basis of promoting local availability.

**Keywords** Agricultural production · Climate change · Ethnic minority · Lak District · Dak Lak province

## 1 Introduction

Lak District is located in the Southeast of Dak Lak province, with a natural area of 125,604 ha, and a population of 64,644 people (General Statistical Office of Lak District [GSOL], 2018), with 16 ethnic groups, in which ethnic minorities account for 65%, and there are ethnic groups such as M'Nong, Tay, Thai, Ede, Muong, and Nung. For ethnic minorities, agricultural production is mainly self-sufficient,

T. A. N. Duong (✉) · V. T. Truong
Tay Nguyen University, Dak Lak, Vietnam
e-mail: ainhi@ttn.edu.vn



A. T. Nguyen, L. Hens (eds.), *Global Changes and Sustainable Development in Asian Emerging Market Economies Vol. 2*, https://doi.org/10.1007/978-3-030-81443-4_26

fragmented, small, and attached to mountains and forests based on exploiting elements of natural potential. The agricultural production of this group has difficulties due to the weak economic potential, low education level, and low self-esteem. Developing agricultural production of ethnic minorities contributes to making a part of ethnic minority household richer, creating jobs and increasing household incomes, and contributing to poverty reduction. However, due to major obstacles both in awareness and in customs, their residential areas are often in mountainous, highland, and remote areas, limited in terms of investment resources, market access of inputs and outputs, and supportive policies, which have made the life of ethnic minority households difficult. In addition, climate change in recent years has led to more frequent droughts, natural disasters, and epidemics, which has made the development of agricultural production inefficient and unsustainable. Therefore, based on the analysis of the current situation, the factors affecting the agricultural production development of ethnic minority households are identified; from that, some solutions are proposed to develop agricultural production of ethnic minority households in Lak District in the context of climate change.

Agricultural development, especially in developing countries in the context of climate change, has been a major topic and has received much attention from international scholars in recent decades. For most countries, especially developing countries with majority of rural population, it is important to develop agriculture so that poverty alleviation and ensuring sustainable livelihoods are achieved. Only on this basis, we can overcome self-sufficiency, promote the exchange of goods and social division of labor, form, expand, and perfect various types of markets, and improve living standards and quality of life of the population. However, choosing and prioritizing the type of development is a matter of much wider controversy due to its dependence on the natural and socioeconomic characteristics of the country or the region as well as from time to time.

1 Overview of research on status and factors affecting agricultural economic development in the context of the climate change

Agricultural development in developing countries faces a lot of constraints, and this is part of the cause of poverty if not overcome.

First of all, most agricultural households lack resources, especially the lack of land, and the capital needed to expand production, change production structures, and change jobs (World Bank, 2007). In addition, in rural areas, the quality of labor is also poor due to the lack of health and education (Hall & Harry, 2006; World Bank, 2003a). Demographic conditions, such as high population density and fertility rates, in many cases exacerbate these difficulties (World Bank, 2003). These have resulted in low labor productivity and low income (World Bank, 2007). In addition, agricultural production activities also face many risks in terms of natural disasters due to the climate change and markets. It takes a long time for businesses to recover from shocks (World Bank, 2003).

Market deficiencies in developing countries, especially in rural areas, are also often severe. This results in high transaction costs, asymmetric information, imperfect competition, and many other negative externalities. However, over-

coming these defects—the role of the state—is often not well implemented. This can be considered as a failure of the state in regulating markets and providing public services (World Bank, 2007).

Inequality in resource ownership of farm households, especially ethnic minorities in developing countries, is common. They often do not have access to land or the amount of land that is too small to cultivate (Vollrath, 2007; Zezza et al., 2007). Inequalities in access to public services such as health care and training (Jayne, Villarreal, Prabhu, & Guenter, 2006) or insurance and credit services are also important factors that cause poverty and backwardness. In addition, local social institutions such as norms of behavior, beliefs, gender equality, social caste, or the lack of social networks often curb household production (Fafchamps & Bart, 2002; World Bank, 2007).

2 Overview of the situation of researching an agricultural development solution in the context of the climate change

A group of solutions on agricultural development policies in the context of the climate change are discussed here. There are many effective policies and systems that can be implemented; here, we summarize a few key groups:

- The first group of policies can be mentioned as subsidies, subsidies, by product, by household group, or by developments of natural conditions in the context of the climate change and markets (Brooks, 2010; Jones & Andrzej, 2010). Tax and fee reductions also apply to similar conditions (OECD, 2009; World Bank, 2007). In addition, for many types of agricultural products, it is possible to control prices, and apply output floor prices or ceiling prices for input services to ensure the interests of producers. These measures in developing countries today, for many reasons, are generally applied at a low level (OECD, 2009).
- Providing credit with various forms and interest rates for agricultural development especially in the climate change context is also a remarkable measure. Credit provision that is properly applied in parallel with the development of the capital market can create many positive effects.
- Investing in human capital through education, training, and technical assistance to improve productivity in the climate change context and facilitate non-agricultural employment is a long-term policy group (Haggblade, Peter, & Thomas, 2010; Sherraden, Trina, Amanda, & Fred, 2004; World Bank, 2007).

## 2 Methodology

The communes selected as the research sites are the communes with the highest number of ethnic minority households engaged in agricultural production, including Yang Tao, Dak Lieng, and Krong No Communes.

Both the secondary and primary data are collected for solving the research purposes. Primary data were collected through interviews with 99 ethnic minority households (60 local ethnic minority households and 39 other ethnic minority

households) participating in agricultural production in 3 chosen communes by the random stratification method.

The study uses descriptive and comparative statistical methods to analyze the status of the agricultural production development of ethnic minority groups including indigenous ethnic minorities and other ethnic minorities.

# 3 Results

## *3.1 The Situation of Agricultural Production of Ethnic Minority Households*

### 3.1.1 Area of some Major Crops of Ethnic Minority Households

The area of annual crops is larger than that of perennial trees, and the average area of annual and perennial crops of the two groups of households is 0.86 ha per household and 0.15 ha per household, respectively (Table 26.1). Due to the climate, weather, and soil conditions suitable for annual crops, annual agricultural production is the strength of the district in general and of ethnic minorities in particular. The main production area is wet rice with the two average groups of households being 0.7 ha per household, and due to the narrowing of the land area, the ethnic minority people have the custom of dividing the land to their descendants after making it. As a result, the family production area that each household has got is getting smaller, and other ethnic minority people are immigrants, so they have to rent and buy land for production. Therefore, the area of agricultural land is zero. In addition, due to climate change, natural disasters, floods, and droughts, a part of agricultural land has been lost and poor-quality land cannot be used for agricultural production.

**Table 26.1** Area of some major crops of ethnic minority groups in Lak District

| Criteria | Average (Ha/Household) | The indigenous ethnic minority households | | The rest ethnic minority households | |
|---|---|---|---|---|---|
| | | Area (ha/ household ) | % | Area (ha/ household ) | % |
| **1. Annual crops** | **0.86** | 0.867 | **100** | **0.857** | **100** |
| **– Rice** | **0.70** | 0.700 | 80.74 | 0.700 | 81.68 |
| **– Maize** | **0.08** | 0.070 | 8.07 | 0.100 | 11.67 |
| **– Sweet potato** | **0.02** | 0.017 | **1.96** | **0.017** | **1.98** |
| **– Cassava** | **0.07** | 0.080 | 9.23 | 0.040 | 4.67 |
| **2. Perennial plants** | **0.15** | 0.142 | **100** | **0.174** | **100** |
| **– The coffee** | **0.13** | 0.11 | **77.45** | **0.16** | **91.95** |
| **– Cashew** | **0.03** | 0.032 | **22.54** | **0.014** | **8.05** |

Source: Calculated from household survey, 2018

**Table 26.2** Productivity and output of some main crops of ethnic minority groups in Lak District

| Type of tree | Criteria | The indigenous ethnic minority households | The rest ethnic minority households | Average |
|---|---|---|---|---|
| Paddy | Productivity (ton/ha) | 3.45 | 3.5 | 3.5 |
| | Output (ton/household) | 2.15 | 2.29 | 2.19 |
| Maize | Productivity (ton/ha) | 3.05 | 3.3 | 3.13 |
| | Output (ton/household) | 0.21 | 0.34 | 0.25 |
| Sweet potato | Productivity (ton/ha) | 11.75 | 11.2 | 11.58 |
| | Output (ton/household) | 0.03 | 0.03 | 0.03 |
| Cassava | Productivity (ton/ha) | 19.65 | 17.9 | 19.12 |
| | Output (ton/household) | 0.66 | 0.17 | 0.51 |
| Coffee | Productivity (ton/ha) | 2.8 | 2.9 | 2.8 |
| | Output (ton/household) | 0.165 | 0.352 | 0.22 |
| Cashew | Productivity (ton/ha) | 1.2 | 1.2 | 1.2 |
| | Output (ton/household) | 0.04 | 0.02 | 0.03 |

Source: Calculated from household survey, 2018

### 3.1.2 Productivity and Output of some Main Crops of Ethnic Minority Households

There is a difference in productivity and yield of some main crops of ethnic minority in Lak District. However, the difference between the two groups of households is not large. Other ethnic minority households have greater productivity and output than the ethnic minority. The yield and yield of rice of other ethnic minority households and other ethnic minorities are, respectively, 3.45 ton/ha, 2.15 ton/household, and 3.5 ton/ha, 2.29 ton/household. The cause of this discrepancy is due to the tradition that ethnic minority households produce using improper fertilizer and pesticide content, poor soil, and lack of knowledge and capital. The production process is not focused, so the productivity and output are quite low (Table 26.2).

### 3.1.3 Quantity and Productivity of some Main Animals of Ethnic Minority Households

Poultry is the livestock with the largest number of animals raised in each household, 22 heads/household and 33 heads/household for ethnic minority and other ethnic minorities, respectively. For the ethnic minority, since they are mainly very easy to raise, many farmers also raised. The number of livestock at least is the buffalo and also the animal with the heaviest weight with 0.42 quintals/head (Table 26.3).

**Table 26.3** Quantity and productivity of some main livestock of ethnic minority households

| Type of pets | Criteria | Average | The indigenous ethnic minority households | The rest ethnic minority households |
|---|---|---|---|---|
| Buffalo | Quantity (head/household) | 1 | 1 | – |
| | Productivity (ton/head) | 0.42 | 0.42 | – |
| Cow | Quantity (head/household) | 5 | 6 | 3 |
| | Productivity (ton/head) | 0.32 | 0.30 | 0.35 |
| Pig | Quantity (head/household) | 3 | 3 | 4 |
| | Productivity (ton/head) | 0.05 | 0.04 | 0.06 |
| Poultry | Quantity (head/household) | 25 | 22 | 33 |
| | Productivity (ton/head) | 0.0009 | 0.001 | 0.0009 |

Source: Calculated from household survey, 2018

### 3.1.4 Agricultural Production Results of Ethnic Minority Households

The total value of land use efficiency for the group of households has 21.13 million VND / ha, and for other ethnic minorities is 21.68 million VND/ha. The production efficiency per labor of the indigenous ethnic minority households is 3.90 million VND, which is greater than that of the other ethnic minorities. The average added value gained per unit of labor reached 2.25 million VND/labor, and the group of ethnic minority households reached 2.51 million VND/labor higher than the other ethnic minorities, which is only 1.65 million VND/labor. The average mixed income earned per employee reached 1.92 million VND/labor. The capital use efficiency of indigenous ethnic minority groups is higher than that of the other ethnic minority groups. The increase in the cost index indicates that, when investing an additional cost, the value added of the ethnic minority group is 1.85 times, and that of the other ethnic group is 1.65 times. The mixed income on cost ratio shows that, when investing an additional expense, the mixed income of indigenous ethnic minority households is 1.57 times and that of the other ethnic households is 1.35 times (Table 26.4).

### 3.1.5 Situation of Linkage in Agricultural Production

Linkage in production is considered an indispensable trend of modern agriculture. With the form of linking production households—production households are the form of organizing production between households. Therefore, due to the lack of orientation in production, farmers often look at each other and imitate the same production, which inadvertently forms a form of horizontal linkage between production households. They often use the situation of the previous crop as a basis for the next crop, if the previous crop is high in prices and high in profits, then the number of households participating in the crop will greatly increase. The direction of production in the district cannot guide them on how to produce.

According to the result of the household survey, the proportion of household groups is not high, and the average rate is 38.39%, of which the ethnic minority group is 44.95% and the other ethnic minority group is 23.33% of the rate associated

**Table 26.4** Agricultural production results of the ethnic minority groups in Lak District.

| Unit: Million VND | | | |
|---|---|---|---|
| Criteria | The indigenous ethnic minority households | The rest ethnic minority households | Average |
| 1. Efficiency of land use | | | |
| GO (million VND/ha) | 21.13 | 21.68 | 21.3 |
| VA (million VND /ha) | 13.61 | 13.50 | 13.58 |
| MI (million VND /ha) | 11.82 | 11.03 | 11.58 |
| 2. Efficiency of labor | | | |
| GO (million VND /ha) | 3.90 | 2.66 | 3.52 |
| VA (million VND /ha) | 2.51 | 1.65 | 2.25 |
| MI (million VND /ha) | 2.18 | 1.35 | 1.92 |
| 3. Efficiency of capital | | | |
| GO/IC | 2.81 | 2.65 | 2.76 |
| VA/IC | 1.81 | 1.65 | 1.76 |
| MI/IC | 1.57 | 1.35 | 1.50 |

Source: Calculated from household survey, 2018

with people in the same commune. For those outside the commune, this rate is lower than the average rate of 8.08%, and all groups of households have links with the same lineage for agricultural production. Through this, it was found that the surveyed households were still not aware of the effectiveness of the association, so the participation rate was not high, and not focused, still in the form of self-production, and independence was mainly passive in the consumption of products. Households link with each other in many stages in which the exchange and use of labor make up the highest proportion, with the ethnic minority group reaching 97.10% and the other ethnic minority group reaching 93.33%. In addition, difficulties in the process of linking between still encounter many problems of capacity, lack of information about partners, prices account for a high proportion in the process of linking.

## *3.2 Factors Affecting the Development of the Agricultural Production of Ethnic Minority Households*

### 3.2.1 Biophysical Conditions

The groups of ethnic minority households in Lak District live in steep slopes and remote areas, which are very far from centers of communes, towns, and districts. Land is fragmented. At the same time, the soil quality is bad due to leaching and other physical and chemical properties.

The climate is characterized by the humid tropical highland climate of the valley, with two distinct seasons each year, the rainy and dry seasons. The average rainfall ranges from 1800 to 1900 mm, which is suitable for planting a variety of agricultural crops. Climate change in recent years caused droughts, water shortages in the

dry season and floods, and inundation in the rainy season often taking place in some localities in Lak District, especially the ethnic minorities having a significant impact on the agricultural production results of households.

### 3.2.2 Resource factors for Agricultural Production

1. Labor.

The average number of employees/household is 5 people, in which the indigenous ethnic minority household groups are with 5 laborers/household and other ethnic minority groups are with 4 labors/household, lower than the average (household interview results, 2018). This indicates that the labor force of the households in the district is quite plentiful. In agricultural production, labor and demographics greatly impact the production and business situation of households. Farmers can take advantage of local labor resources in tending, managing, and harvesting. Therefore, it contributes to reducing production costs and raising incomes.

2. Land

Lak District is a purely agricultural district with advantages of soil and climate for agricultural development but still faces many difficulties in the agricultural production process. Because of the lack of the capital as well as fragmented and small land, production costs are still high.

Agricultural production not only meets difficulties in the size of production land, but also the quality of land is increasingly reduced, leading to inefficient agricultural products and low productivity. The main reason is that farmers are increasingly abusing the use of chemical fertilizers and pesticides in the production process. Therefore, soil quality is increasingly degraded and it affects crop yields.

3. Financial Capital

The district has introduced many policies on capital combining banks to support people to borrow money in the production process with low interest rates. But, since the people's intellectual level is not high, the policy access is still not high and not widely available. Therefore, people still produce with traditional means of production, the varieties are not effective, and the productivity is not high.

Capital is one of the important factors to help maintain and expand agricultural production. Especially in the field of agricultural production, a large amount of investment is required. Farmers use their capital to invest in seed sources, expand and take care of plants during growth and development. In addition to their own capital, farmers can mobilize additional capital from other sources such as banks, mass organizations, and associations.

Demand for loans of households for production is relatively high in 2018, with an average of 82.83% of households borrowing with an average loan amount of nearly 11.84 million VND / household. While the amount of loans in ethnic minority households is VND 10.85 million / household, the other group of ethnic minority

households is VND 14.11 million/household higher than that of ethnic minority households (interview results from households survey, 2018).

In general, most of the loan sources are assessed to have relatively quick and simple loan procedures. However, the amount of loans is limited, making households not really brave to invest in production. Capital needs for production activities vary depending on the time and type of production and business households, and the loan term of banks is different. Therefore, the rate of payment from time to time also varies.

4. Technical, scientific and technological factors

Agricultural production is inseparable from scientific and technical advances because it has created high-quality and good-quality animal crops. Currently, science and technology are getting more and more attention. Implementing S&T tasks with the topic "Building a model of raising the Central Highlands hybrid sows with wild boars and F1 hybrid breeding techniques in Lak District, Dak Lak province" by the Department of Agriculture and Rural Development presides over the implementation, and the implementation period is from December 2017 to November 2018. Currently, 02 models have 05 Central Highlands sow pigs that have reproduced 30 crosses. In general, the model of raising the Central Highlands hybrid sows with wild boars and the F1 hybrid breeding technique in the district has initially achieved certain results, and the F1 hybrid is adaptable to the environment and growth and development.

5. Equipment and means of production

The equipment and facilities in the households are not adequate, and the level of equipment is still low. The percentage of households equipped with facilities for agricultural production is not much different between the two groups of households. As for other equipment, the percentage of households with special equipment is lower than that of other ethnic minorities, because other ethnic minority groups come from other places, so they are not familiar with or have many relatives, so all means must be purchased by themselves, while the indigenous ethnic minority households have links with people in their lineages, and they have a tradition of solidarity and mutual assistance, so they can borrow from each other for agricultural production. From this, it can be seen that other ethnic minority groups will have higher production costs than ethnic minority households, leading to reduced economic efficiency.

### 3.2.3 Market of Inputs and Outputs

In the agricultural production process, market price factors play an important role in affecting people's income and life. On the same unit of high price, output will increase the income of the people, but in the case of low market prices, except for those families with capital capabilities, agricultural products are retained. When prices are high, they will consume, and families who are in difficulties at some time

need capital for investment and life, they have to accept consumption even at low prices. In addition, the characteristics of the agricultural products are quite bulky and difficult to preserve, so waiting for a reasonable price to consume is quite difficult for people. Therefore, people are often passive in the fluctuations of market prices, which greatly affect the income and life of agricultural production people. In addition, agricultural production in the district has small-scale household economy, lack of linkage, and is limited in productivity, quality, and product competitiveness; the number of establishments purchasing agricultural products is still limited and small in scale so they do not stand out to provide sufficient input materials for people; and the number of outside facilities supplying input materials is still low, not diverse, and rich in products. Therefore, it has not fully met the needs of the people here. Therefore, for farmers, in production, they need to explore the market through mass media, via the Internet. They need to practice the habit of analyzing, judging, and forecasting the market of agricultural products in order to make a rational production plan according to market demands; at the same time, it is necessary to link production in cooperatives in order to proactively coordinate production and actively look for markets for product consumption.

### 3.2.4 Rural Infrastructure

Rural infrastructure also has an impact on the development of agricultural production. In ethnic minority people areas, rural transport systems, irrigation systems, electricity systems, markets, trading centers, and information systems have not been completed and are not capable to meet the demand, due to this, the development of commodity production and agricultural production of ethnic minority people have not really been promoted. The weakness of rural infrastructure hampers the development of agricultural production as supply of inputs is limited and product consumption becomes more difficult.

Currently, in Lak District, there are 39 irrigation works including 7 pumping stations, 18 spillways, and 15 reservoirs that can serve irrigation for agricultural production. However, at present, many works have been damaged, degraded, and unable to water according to the designed capacity. Particularly for the reservoir system with 15 works, 5 projects are Khe Mon Reservoir (Buon Triet Commune), Nam Kar Lake (Nam Ka Commune), Lieng Krak Lake (Krong No Commune), Hoc Mon Lake (Lien Son Town), and Lien Son Reservoir (Lien Son Town), which has been degraded, damaged, or deposited, and only 60–90% of its capacity is irrigated (People's Committee of Lak district [PCL], 2018).

### 3.2.5 Public Policy

Policy factors play a very important role in promoting or limiting market economy development in the district. Therefore, the role of the State and localities is very important in timely promulgating of policies and guiding documents for timely

guidance of development. In recent years, the State has issued guidelines and policies to encourage the development of agricultural production and agricultural production for ethnic minority households, including policies to encourage agricultural economic development; policies to encourage enterprises to invest in agriculture and rural areas; credit policies for agricultural and rural development; and specific policies to support socioeconomic development in ethnic minority and mountainous areas in the period of 2017–2020.

Lak District has had a number of programs and plans on agricultural production processes such as Plan No. expressed in the agricultural restructuring project toward increasing value added and sustainable development associated with building new rural areas. Thus, these guidelines and policies have created more solid beliefs for production entities in general, ethnic minorities in particular, promoting production in the fields of cultivation, husbandry, and production associated with processing and consuming agricultural products. All things contributed to improve the product quality, develop agriculture sustainably, create jobs for workers, increase incomes, decrease to eliminate hunger, and reduce poverty, step by step renewing the face of the commune in the rural association.

These factors have greatly influenced the development of agricultural production in the district, including the development of agricultural production of ethnic minorities in recent years. The biggest difficulty that constrains the development of agricultural production of this group is the limitation of resource factors including land, capital, capacity of production entities, and labor. Due to a low starting point, and limited resources of the production entity, ability to access policies was limited.

## *3.3 Some Solutions to Develop the Agricultural Production of Ethnic Minority Households*

### 3.3.1 Promoting the Available Potentials of Natural Conditions

At the same time, there are specific plans to limit the impact of climate change on agricultural production. Continuing to rely on available advantages of natural conditions such as topography and weather to produce agriculture, making the most of the water and soil sources, finding suitable animals and plant crops in the area to diversify the crop, more quality agricultural products can be created to improve the living standards for farmers. There are specific plans to prevent the effects of natural conditions on agricultural production.

### 3.3.2 Enhancing Resource Factors for Agricultural Production to Limit the Impact of Climate Change

1. Linking expansion of agricultural land area and strengthening measures to improve the quality of land for agricultural production.

- Propagating, mobilizing, and supporting ethnic minority farmers in their villages and in the same lineages to consolidate, exchange plots, convert, transfer, or lease land to accumulate land in accordance with the Land Law, create favorable conditions in production, and increase investment efficiency to develop agricultural production. At the same time, it is easier to deal with the effects of climate change.
- Paying attention to the protection and improvement of land to improve the quality of land, thereby contributing to increasing the productivity of plants and animals.
- Encouraging links between ethnic minority households in the same villages and clans to expand the area of land for agricultural production development.

2. Training and improving the quality of labor.

- Enhancing the training and opening of training courses to improve the intensive level of production in the people, especially the classes in the garden for people to see and practice hands-on to provide full knowledge, planting, and tending skills. Encourage all strata to actively learn to raise awareness to create a foundation for applying scientific and technical advances to the production process.
- There are policies to encourage agricultural officials to work locally to serve production for people.
- Diversify agricultural extension types in training courses, providing useful forms to attract people's participation.

3. Expand rural forms of credit, and increase the amount of loans and the loan term.

Arousing people's capital and attracting investment from outside to build infrastructure to create favorable conditions for agricultural production development can be done. It is necessary to implement preferential policies on investment capital for production households as this is a form of production and business, including

- Based on the planning on the development of agriculture, forestry, and fishery production, there will be a policy to invest in transport infrastructure, electricity, daily-life water, irrigation, information, and processing facilities. Encourage households and individuals to develop agricultural, forestry, and fishery production in the form of production.
- Increase loan size and loan term for production households that need a large capital, a long payback period, especially forestry and for a period of 3 years or more (medium and long-term loans), to have enough time to recover capital and pay principal and interest and continue to invest in reproduction and expanding production.
- Risks in agriculture are quite high, especially droughts, pests, diseases, instability in the market, and price fluctuations that are beyond the control of farmers. In order to help production households limit and overcome risks, soon stabilize production after damage, it is necessary to have policies and solutions on insurance for plants and animals. This is a voluntary means of self-protection that has been popularized in developed countries.

4. Enhancing the applicability of science and technology in agricultural production to reduce the impact of the climate change.

In order for agricultural products to be consumed and highly competitive, there is a need for more active and satisfactory support from the State in high investment in science and technology and effective measures to encourage the maximum mobilization of the participation of all economic sectors, organizations, and scientists in the research, transfer, and application of rural agricultural science and technology.

Today, science and technology have become a direct force to improve efficiency and productivity, science, and technology here are understood both in production and in supply of production materials (livestock breeds, crop) and after harvest. If the producer does not have good plant and animal breeds, the productivity and quality of the product will be poor, and the product will be difficult to consume or even not be consumed. In order for the production and business activities of the production entity to achieve higher economic efficiency, there are a number of solutions to be applied in science and technology:

– Enhancing the import of foreign advanced technologies, especially plant varieties, domestic animals, and machinery and equipment of high technology, suitable to the conditions of each region and each locality.
– Focusing on renovating plant and animal breeds, processing technology, strengthening the care and protection of plants and animals, applying postharvest technology, protection measures and increasing fertility of soil, and protecting water resources.
– Implementing the planning and construction of irrigation works to create water sources for production, and production subjects shall invest by themselves or borrow from credit capital to build water supply systems for production and daily life.
– Planning investment and development of nurseries for industrial plants, forest trees, and seed production establishments or supporting them with conditions for seed production in order to ensure good and high-quality seeds to be supplied to production subject.
– Encouraging production entities to contribute capital to the scientific and technical development support fund to apply it to production and provide technical services to farmers in the region.
– Organizing technical services such as seed services, plant protection services, veterinary services in various forms, contracting for protection, and contracting for service stages.
– Strengthening the system of agriculture and forestry extension on the basis of socialization, and helping farms and farmers improve farming methods and techniques. The agricultural extension system has an active role in disseminating, training, and applying into practice scientific advances such as bringing quality seedlings with high productivity, and training for farmers.
– Planning to change the plant structure conversion is more adaptable to climate change conditions taking place in the study area.

5. Investing in modernizing and strengthening equipment and means of production in service of agricultural production.

Means of production are tools to support agricultural production. However, there are still insufficient facilities for production in households in Lak District, mainly only sprayers and water pumps, poorly constructed barns, and substandard agricultural facilities. As for rice mills, most households rent them. The transportation of products after harvesting is also contracted by households so very few households are equipped with cars, plows, and agricultural machines to transport this, resulting in high production costs. Due to high investment costs and low knowledge of the people, many households are still hesitant to invest in buying or renting machines. This makes losses and postharvest costs still high. In order to equip households with adequate and modern means of production, they need to boldly invest and borrow capital from financial and credit institutions to equip machines for production. In addition, local budgets should only focus on supporting part of the investment in the purchase of machinery and equipment for mechanization development, training support, training, and technical training. Enterprises should be encouraged to research and invest in the development of the mechanical engineering industry to produce agricultural machines with high economic and technical efficiency suitable to the district's socioeconomic situation and soil characteristics. A network of distribution, supply, warranty, and repair facilities in localities should be consolidated and established. Enterprises manufacturing and trading agricultural machines in the district should be encouraged to provide incentives for buyers of agricultural machinery such as deferred payment, maintenance, warranty, repair, replacement, and damaged equipment.

### 3.3.3 Strengthening the Construction of Rural Infrastructure

- Continue to direct relevant units, People's Committees of communes and towns to conduct monitoring and monitoring of irrigated areas of irrigation works; make plans for natural disaster prevention and control.
- Build and expand the system of canals to ensure irrigation water, and field transport routes.
- Carry out remodeling of degraded works.
- Urge contractors to speed up the construction of irrigation works, ensuring that works are constructed in time; actively store water for production.
- Expand trading markets, rural electricity systems, and information transaction systems to help people have more favorable conditions in agricultural production.

### 3.3.4 Expanding and Consolidating the System of Supply of Input Materials and Purchasing of Output Agricultural Products

- Establishing purchasing organizations and systems, and forming linkages between production households and companies purchasing enterprises so that after-production products are covered, people do not have to worry much about

output for products, people can sell agricultural products to the purchasing company or enterprise or the company will send people to buy at home at market prices or at higher prices than the market from time to time and product quality. Encourage and create a healthy competition between forces engaged in commercial service activities, providing materials and machinery for the production and consumption of products.

– Forming the market forecast organization system. Through extension stations, authorities, mass media, timely, complete, and accurate provision of domestic and foreign markets to farmers in a public and widely manner in order to ensure that farmers have the opportunity to choose the appropriate items and services provided to the market. In addition to making forecasts about the demand for agricultural materials, farmers need to be proactive in updating market information so that the consumption of agricultural products is timely and most effective.
– Through organizations such as the Farmers' Union, the Chamber of Agriculture has formed a service network, providing market information to farmers in a complete, accurate, and timely manner. Avoid the disadvantaged people while consuming agricultural products.

### 3.3.5 Continuing to Implement policies on Developing Agricultural Production in the Context of Climate Change

– Promoting the propagation and mobilization of economic organizations, professional social organizations, union members, members, and the masses to grasp the party's guidelines and policies and mechanisms, policies of the State, the province, and the district on agricultural and rural development, and consumption of agricultural products. Besides, directing communes to step up the land consolidation and exchange to form a large sample field, which is the basis for developing agricultural production with higher yields and productivity, saving production costs.
– Balancing the budget and having policies to ensure adequate capital for support policies issued from the central to local levels. In other words, adjustments in the Budget Law are needed, or short-term solutions are needed so that adequate resources can be devoted to rural development in general and the agricultural sector in ethnic minority households in particular. In fact, many supporting policies, in recent years, after being formulated and promulgated by the central government, have assigned all implementation responsibilities to the local authorities, but it was not feasible because the district could not allocate resources to perform. This is a fairly common practice for many State policies—when it was first promulgated, it was warmly welcomed by public opinion and localities throughout the country, but after putting it into practice, it does not work.

## 4 Conclusions

Agricultural production of ethnic minority households in Lak District is mainly short-term crops, in which wet rice is the largest crop with an average area of 0,7 ha/household. Productivity and yield of crops are not high due to many reasons such as lack of resources to invest in production, and the deterioration of soil quality makes crop productivity low. Livestock of great values contributes to the increase in income of each household group. The production value of the ethnic minority group is higher than that of other ethnic minority groups because of the lower expense and higher economic efficiency. Agricultural production development of ethnic minority households is influenced by factors of natural conditions, infrastructure, socio-culture, and customs and policies, and groups of factors, in which the group of policy elements plays the most important role affecting the formation and development of agricultural production. In addition, internal factors are also important, affecting the development of agricultural production both in quantity and in quality. In order to develop agricultural production for ethnic minority people in the area of Dak Lak province in the coming time, some proposed solutions include (i) promoting the available potentials of natural conditions; (ii) strengthening resource factors; (iii) strengthening the construction of rural infrastructure; (iv) expanding and strengthening the system of input supply and purchase of output agricultural products; and (v) continuing to implement policies on agricultural economic development.

## References

Brooks, J. R. (2010). *Agricultural policy choices in developing countries* (pp. 132–139). OECD.

Fafchamps, M., & Bart, M. (2002). Returns to social network capital among traders. *Oxford Economic Papers, 54*(2), 173–206.

General Statistical Office of Lak District [GSOL]. (2018). *Year Book of Lak District*. pages 1–8 (in Vietnamese).

Haggblade, S., Peter, H., & Thomas, R. (2010). The rural non-farm economy: Prospects for growth and poverty reduction. *World Development, 38*(10), 1429–1441.

Hall, G., & Harry, P. (Eds.). (2006). *Indigenous peoples, poverty, and human development in Latin America* (pp. 112–120). Palgrave Macmillan. Retrieved from http://www.oecd.org/dataoecd/50/31/46340461.pdf

Jayne, T. S., Villarreal, M., Prabhu, P., & Guenter, H. (2006). HIV/AIDS and the Agricultural Sector in Eastern and Southern Africa: Anticipating the Consequences. In S. Gillespie (Ed.), *AIDS, Poverty, and Hunger: Challenges and Responses* (pp. 203–212). International Food Policy Research Institute (IFPRI).

Jones, D., & Andrzej, K. (2010). Policy responses in emerging economies to international agricultural commodity Price surges. *OECD Food, Agriculture and Fisheries Working Papers., 34*, 23–31.

OECD (2009). Agricultural policies in emerging economies: Monitoring and evaluation (pp. 226-230). Retrieved from http://www.oecd.org/dataoecd/54/30/42347206.pdf

People's Committee of Lak district [PCL]. (2018). Report on socio-economic development situation of Lak district, pages 5–7 (in Vietnamese).

Sherraden, M., Trina W., Amanda M., Fred S. (2004). Overcoming Poverty: Supported Saving as a Household Development Strategy. Working Paper No. 04–13, Center for Social Development, George Warren Brown School of Social Work Washington University, pages 119–128.

Vollrath, D. (2007). Land distribution and international agricultural productivity. *American Journal of Agricultural Economics, 89*(1), 202–216.

World Bank. (2003). Reaching the rural poor - a renew strategy for rural development. *World Bank Publications*, 89–85.

World Bank. (2007). *World development report 2004: Agricultural for development* (pp. 115–121). Oxford University Press.

Zezza, A., Paul, W., Benjamin, D., Gero, C., Katia, C., Esteban, Q., Kostas, S., Panayotis, K., Luca, T., Stefania, D., & Genny, B. (2007). Rural household access to assets and agrarian institutions: A cross country comparison. *Background paper for the WDR, 2008*, 145–158.