SCIENCE-TECHNOLOGY SOLUTION
FOR FORESTRY-AGRICULTURAL DEVELOPMENT IN
DIFFICULT AREAS OF NORTH MOUNTAINOUS REGIONS

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Abstract:

In the trends of development and integration of the country, in addition to opportunities, the forestry sector in North Mountainous Region (NMR) has to face many challenges, namely increasing competition and productivity and product value of forestry-agricultural production lower than development potentials. The region has the country highest rate of poor households with many communes listed in 135-II Program. Therefore, the problem is to mobilize the role of science-technology (S&T) activities as key driving factor for sustainable development of forestry-agricultural production in the region

Objective of the study is to identify suitable S&T solutions to mobilize the potentials of forestry-agricultural production in difficult areas for a higher living level of local population. Therefore, the approaches need to be considered carefully in social and economical platforms. The selected solutions should have strategic nature, in conformity to market trends and rules and on basis of value chains. More particularly, when studying the scope of problems in difficult areas, we pay attention to: (1) elements which permit farmers to access and to apply in production practice; and (2) creation of added values and enhancement of competitive advantages of local factors.

Keywords*: Science-technology solution; Forestry-agricultural production; Agriculture of mountainous regions; North mountainous regions.*

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1. Introduction

In the process of economic integration of the country, the NMR faces many challenges and farmers in remote areas get the most impacts. They have also risks to be low developed in increasing poor-rich gaps. In context of outdated agricultural production, the deforestation under demographic pressures and food production leads to large impacts to eco-environment and continuing low living level of local population.

The solutions for the above problems are based on S&T activities which would create driving forces for development of forestry-agricultural

production. Also, the study of solutions for development of the NMR need to pay attention to factors which provide favorable conditions for the population to access and apply of S&T measures in production practice. They would have possibilities to extend and to provide sustainable development of exploitation of comparative potentials and advantages of forestry production.

Research project *"Study of actual status and solutions to promote economic-agricultural structure shift of North-West Region up to 2020"* would give certain contributions to find out the solutions for the above problems. First of all, the immediate targets would be to raise the living level of population for gradual enhancement of their capacities of production organization. Then, on this basis, technical advances could be introduced to production activities and sustainable development of the mountainous region.

2. Study methodology

Statistic data and methods: On basis of primary and secondary collections of data related to the study scopes in 14 provinces in the NMR from central and local statistic agencies and information from experts, the necessary information for study works was collected.

Typical study method: Deep analysis works were conducted for main findings on basis of field surveys and works in 6 communes with typical difficulties as noted in 135-II Program (in three provinces Son La, Tuyen Quang and Bac Kan). Detail survey works were conducted with 360 questions sent directly to farmer households randomly selected... Field works were conducted with directed monitoring and records by measuring-counting tools, photos and collection of samples from producers, markets places and good selling-purchasing locations in the areas. This method permits to have a global vision on study subjects.

Expert method: Various approaches and discussions were conducted during scientific workshops between experts, leaders and staffs in charge of forestry-agricultural production of local administration.

Pilot method: On basis of study targets, on-field production models were implemented with participation of local communities. The involvement of producers was encouraged since work designing stage up to outcome monitoring stage. Models were not repeated according to experiment methods but largely applied according to regulations by Ministry of Agriculture and Rural Development (MARD).

3. Outcomes and discussions

3.1. Actual status of forestry-agricultural production in the NMR

3.1.1. Cultivation

Rice and corn are the main cultivated plants in the areas. The cultivating superficies are hold stable for almost all the surveyed spots.
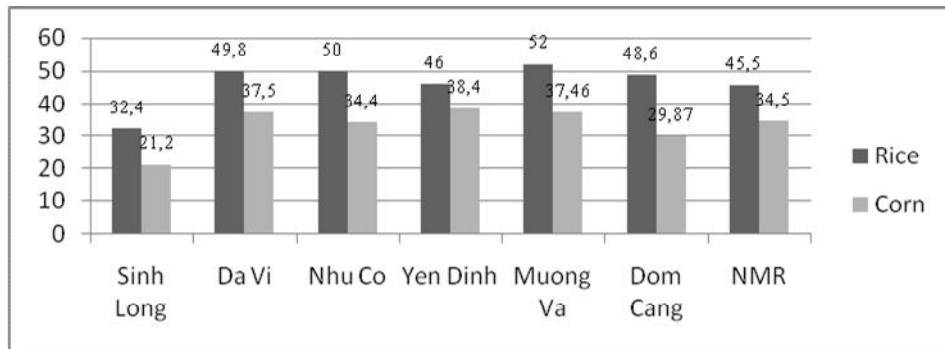
Source: Survey outcomes of Research Project "Study of actual status and solutions to promote economic-agricultural structure shift of North-West Region up to 2020"

Chart 1. Average yield of rice and corn cultivation

Chart 1 shows the large difference in yields among localities. The reasons of low production were identified through interviews: rats (56%), delayed sowing works because of water lacks (76.5%), pests (45.6%), use of local seeds (37.5%), low cares (25.8%).

In addition to rice and corn, there are some cultivations for industrial production and export purpose such as cassava, soya, tea, coffee, rubber and others but they are segmented and low scaled.

3.1.2. Husbandry

Husbandry is the main income source of households in difficult areas. They are mainly buffalos, pigs and poultry. The production volume by household is very low (see Table 1).

The survey shows the low productivity of husbandry activities by households. The scale remains too small in comparison to potentials and advantages of the region (including both natural conditions and market demands). Technical advances are not applied for husbandry, stud animals remain local with low quality and productivity. There is a very limited shift from free ranging husbandry to intensive husbandry.

Though statistic figures show the biggest contribution in the global income sources for households in the region, they get only about 5,400,000 VND/year/household. With deducted production costs the benefits from husbandry are only 1,800,000 VND/year/household.

Table 1. Average volume of husbandry by household

Unit: Individual

	Main animals	Sinh Long	Da Vi	Nhu Co	Yen Dinh	Muong Va	Dom Cang	Global
1	Buffalo	2.5	1.9	0.3	1.1	0.9	2.4	1.5
2	Cow	1.0	-	-	-	0.5	0.2	0.6
3	Pig	3.2	5.8	2.2	7.2	1.0	0.8	3.3
4	Sow	0.3	0.2	0.2	0.3	0.3	0.0	0.2
5	Poultry	12.9	8.8	12.1	27.5	24.6	48.3	22.4

Source: Survey outcomes of Research Project "Study of actual status and solutions to promote economic-agricultural structure shift of North-West Region up to 2020"

3.1.3. Forestry production

The main forestry production of households in the surveyed areas is forest plantation, management and exploitation. Majority of households get lands for long lasting forest cultivation. Averagely the forest land assigned to households is very limited, only 1.33 hectare/household (see Table 2)

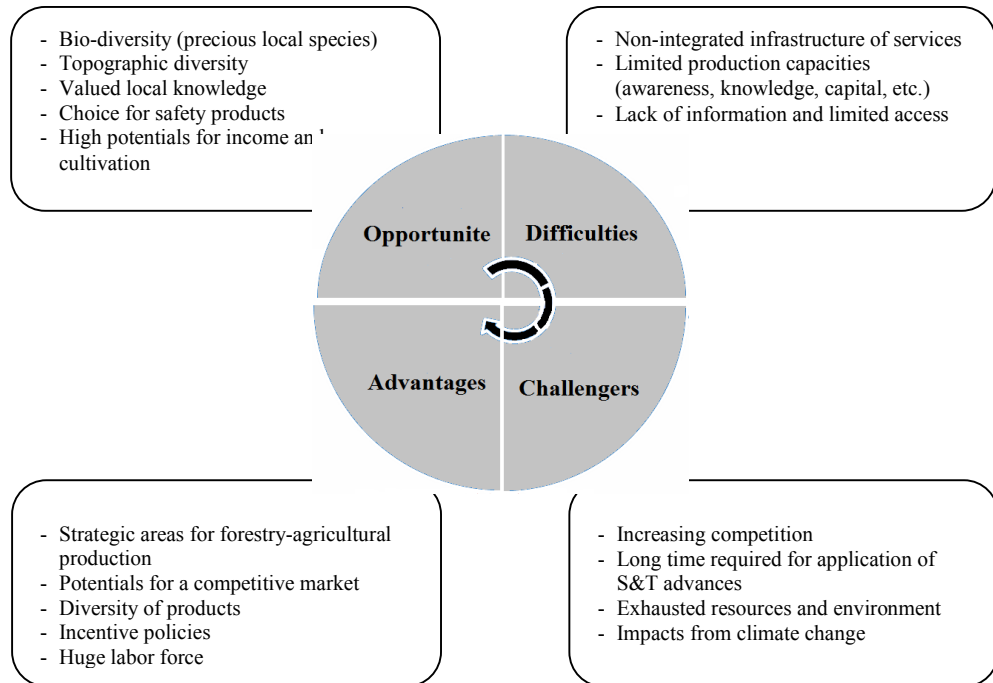**Table 2.** Average forest superficies per household

	Commune	Forest land (hectare)	Including	
			Long lasting industrial trees	Forestation
1	Sinh Long	2.42	2.08	0.34
2	Da Vi	0.38	0.02	0.36
3	Nhu Co	1.51	0.06	1.45
4	Yen Dinh	2.35	0.22	2.13
5	Muong Va	0.82	0.00	0.82
6	Dom Cang	0.47	0.00	0.47
	Globally	*1.33*	*0.40*	*0.93*

Source: Survey outcomes of Research Project "Study of actual status and solutions to promote economic-agricultural structure shift of North-West Region up to 2020"

The lands assigned to households for forestation is usually are bare lands or heavily eroded. Almost all the households have low chances of access to

promotional supports for forest plantation in these lands. Interviewed people say that, since they receive certificate for land use, they almost never think of investments for these lands because of lack of capitals and they do not earn any money from products on planted forests.

3.1.4. SWOT analysis for actual status of forestry-agricultural production in difficult areas

- Bio-diversity (precious local species)
- Topographic diversity
- Valued local knowledge
- Choice for safety products
- High potentials for income an '
  cultivation

- Non-integrated infrastructure of services
- Limited production capacities
  (awareness, knowledge, capital, etc.)
- Lack of information and limited access

Opportunite   Difficulties

Advantages   Challengers

- Strategic areas for forestry-agricultural production
- Potentials for a competitive market
- Diversity of products
- Incentive policies
- Huge labor force

- Increasing competition
- Long time required for application of S&T advances
- Exhausted resources and environment
- Impacts from climate change

3.2. Proposal of groups of S&T solutions for development forestry-agricultural production in the NMR

3.2.1. Directions and requirements

- Pushing strongly the application of technical advances to increase productivity and local product quality on basis of market demands and trends.

- Exploiting effectively potential of advantageous areas; selecting specific products (local plants, trees and animals) which are high valued and suitable for local production. They would contribute to raise the living level of local population.

- Developing agricultural production models with technical advances applicable for population in remote areas.

- Identifying measures for protection and improvement of soil quality suitable for joint forestry-agricultural production.

With these directions, the following groups of solutions are proposed for difficult areas, namely the group of S&T solutions and the group of policy solutions.
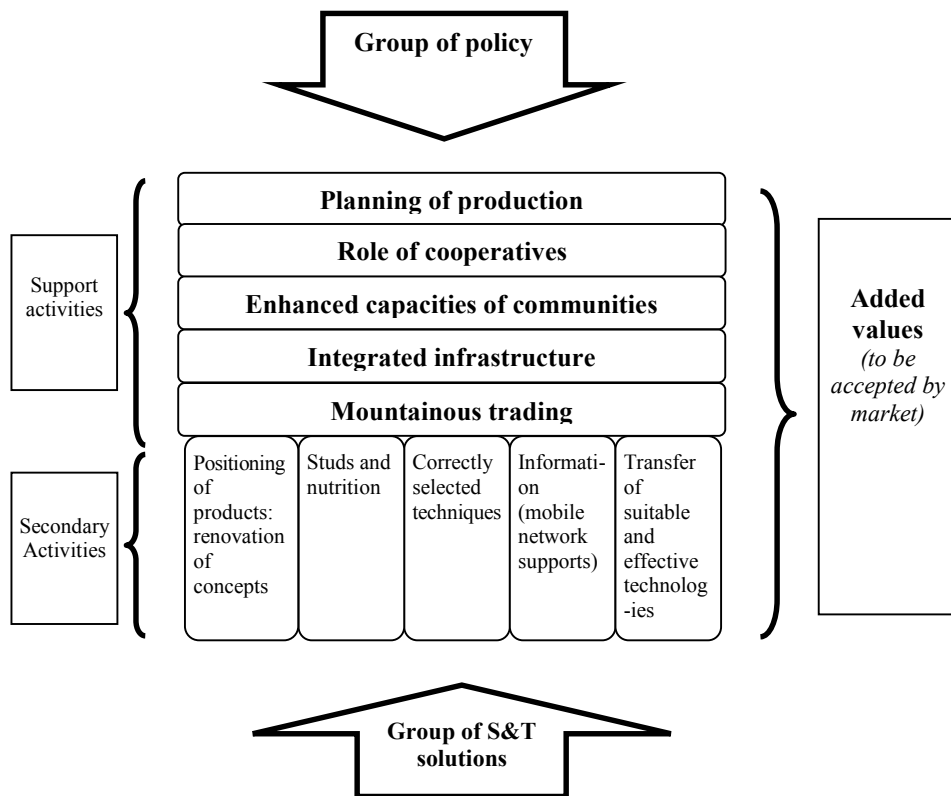
3.2.2. Group of S&T solutions

Chart 2. Group of S&T solutions based on valued chain

Solutions for positioning of products and renovation of production concepts:

The identification of products and production concepts is the crucial stage of the whole process of application of technical advances which causes great impacts to effectiveness of process activities. Therefore, the identification of groups of products for every locality which permits to meet local demands and to mobilize local comparative advantages would create a background for application of S&T advances, namely:

- Priorities for targeted groups of products which are *food plants (rice and corn)* to meet the objective of food security and then social security.

- Pushing up *groups of goods to meet market orientation* (to meet market demands).

- *Linking small-scaled producing households* to set up groups of large farms in the same ecological sub-regions; reducing the segmentation of cultivating areas. This is a background for application of technical advances for production.

- *Linking farms* into a network to create production sectors. Members will have a good cooperation and become good partners with each other. This way suggests a model of specialized commodity producing agriculture which would meet demands of materials for processing industries and markets.

Solutions for studs and nutrition for plants and animals:

- Applying aboriginal studs and pushing up the application of scientific research to develop plants and animals of high advantage.

- Enhancing the application of measures of integrated nutrition management (INM) and integrated pest management (IPM).

- Pushing up the application of organic fertilizers to secure long lasting fertility of lands.

- Pushing up the production and application of micro-biological fertilizers in agricultural production with priorities focused for mountainous areas.

Solutions of transfer of suitable and effective technologies:

The transfer of technologies in production including activities of vocational training would help to enhance added values in agricultural production. Therefore, activities of technology transfer should be based on needs of farmers and participatory principles of local communities, even since model setting stages.

3.2.3. Group of policy solutions

Enhancing the effective planning works for forestry-agricultural production for difficult areas: Building up and implementing effectively the production planning works which create pre-conditions to mobilize resources to build up agricultural infrastructure and driving forces for production investment and application of technical advances.

Mobilizing the role of forestry-agricultural cooperatives in difficult areas: Developing forms of cooperatives to promote agricultural technical supports with focus on veterinary service, plan protection, studs and seeds, information exchange and consulting service for market oriented technical procedures.

Supporting to enhance capacities of communities in application of technical advances in agricultural production: Promoting propaganda works for application of technical advances in agricultural production. Particularly in husbandry, it is necessary to pay attention to awareness of damages caused by pests and uncontrolled free ranging animals.

Developing integrated technical infrastructure to serve development of forestry-agricultural production in difficult areas: Building up integrated system of technical infrastructure for mountainous regions to create a background for socio-economic development and driving forces for application of technical advances. The attentions should be focused on transport infrastructure, power supply system, irrigation systems and social infrastructure.

Policies for development of mountainous trades: Enhancing the effective implementation of credit supports for agricultural businesses in difficult areas to promote the circulation of agricultural products.

4. Conclusions and recommendations

Based on the above notes about the actual status and production demands, this study proposes S&T solutions for agricultural development in the NMR. The most outstanding point in this study is the technical solutions selected for difficult areas on basis of reasonable and effective application of *local knowledge (aboriginal knowledge)* coupled with technical advances.

On basis of findings in this study, the team of researchers proposes to continue studies for difficult areas, namely:

- Studies for development of local products with specific advantages which may become key products of difficult areas in the NMR;

- Studies and set-up of models of IT application for agricultural production if difficult areas in the NMR.

These problems exhibit so many requirements and it is not easy to select the focused attentions. Therefore, it is the best to start from those existing factors which cause great impacts to production. These outcomes of studies will create further the scientific and practical background for the areas./.

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