

**STUDY OF PROPOSALS FOR ADDITIONAL SOLUTIONS  
TO MECHANISMS AND POLICIES FOR HIGH TECH  
APPLIED AGRICULTURE IN DIRECTION  
OF COMMERCIAL GOODS IN VIETNAM**

**Ass. Prof. Dr. Le Tat Khuong**

**M.Sc. Tran Anh Tuan**

**M.Sc. Ta Quang Tuong**

Institute of Regional Research and Development, MOST

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**Abstract:**

*High techs are the most important tools to enhance added values of commercial agricultural goods when other driving forces for development such as lands, labors and others and part of issued policies already have exhausted almost all the power effects. Under optics of this awareness, within a short time period, many policies were issued to promote breakthrough moves in agricultural production such as Law on High Techs, Project for development of high tech based agriculture up to 2020, National program of high tech development. According to actual assessments, however, there is a delayed issue of indications to guide local government administrations, enterprises, organizations and individuals to implement the Project for development of high tech based agriculture up to 2020. There is no many high techs to be applied in agricultural field and there is no applicable models of development of high tech based agricultural production. There is also no proper investments at local scale for planning and building high tech based agricultural regions/areas. Searching for the answers to this question, the authors of this paper have conducted a global assessment of situation and then defined scientific backgrounds and practical conditions which govern impacts to development of models of high tech based agricultural production. On this basis, some feasible solutions are proposed for development of high tech based agricultural production in direction of commercial goods in Vietnam.*

**Keywords:** *High tech based agriculture; Policy.*

**Code:** 14082502

Practice shows well that high tech based agriculture appeared to mark a new development stage of Vietnam agriculture which is expressed as “quantity transferred to quality”. The reasons for that were the needs to transfer from low effective agriculture (high scaled production and export activities can produce agricultural products with low quality, limited assortments, high costs and low added values) to new models of higher productive agricultural production (production of commercial agricultural goods of low costs to meet tough demands of domestic and export markets). The transfer process

shows well the most important roles of application of high techs in agricultural production. Some models of high tech based agricultural production appeared as backgrounds to develop of regions/areas of commercial agricultural production. And being connected to that, other related services have chances to be more reasonably re-organized including agricultural product processing industries, input material supply system (new materials production, fertilizer production, animal food production and etc.) and investment chains (storing and conserving facilities, transport system and etc.). Thanks to these moves, the value chains of agricultural goods get shortened and the benefits generated from production and distribution of agricultural goods get shared reasonably. In short, the agricultural production based on high techs are the necessary pre-condition for more sustainable development of Vietnam agriculture.

### **1. Survey outcomes of application of some high tech based agriculture models in Vietnam**

There exist actually controversial views to the concept of high tech based agriculture. The construction of high tech based agriculture models, however, needs to be oriented to some main indicators such as big superficies (enough for implementation), suitable infrastructure (for high techs application and integrated mechanization). In this process, the priorities are given to cultivation of plants and animals of high economic value, applicability of centralized production scale and properly shared involvement of enterprises and farmers (the latter would secure the harmonic interests of sides).

The analysis was conducted for selection of the models for surveys of high tech based agriculture. We had selected some models of high tech based agriculture in direction of production of agricultural goods, namely: Vegetable-flower production model of Tropical Flower JS. Co. (Moc Chau, Son La Province), Tay Tuu Flower Production Cooperative (Tu Liem District, Hanoi), LiangBiang Farm Ltd. Co. (Da Lat City, Lam Dong Province), DalatGap Ltd. Co. (Da Lat City, Lam Dong Province), Agrivina-Dalat Hasfarm Ltd. Co. (Da Lat City, Lam Dong Province), joint production model between farmers and Moc Chau Milk Cow Studs JS. Co. (Moc Chau, Son La Province), joint production model between farmers and fish products export enterprises of NTACO JS. Co. (An Giang Province). Survey outcomes were analyzed to study the effectiveness and remaining problems in the high tech based agriculture models for production of agricultural goods. On this basis, certain solutions are proposed to improve the mechanisms and policies for development of high tech based agriculture in Vietnam.

### ***1.1. Models of high tech based agriculture for vegetable-flower production***

*Aspect of cultivation lands:* Almost all the enterprises in the surveyed models have large superficies of cultivation lands (6 hectare up), namely Agrivina Ltd. Co. has the biggest superficies of green houses and grid houses (about 280 hectare). All the surveyed models are operated as enterprises, except Tay Tuu Flower Production Cooperative which operates on cooperative rules between households of farmers.

*Aspects of labor forces:* The high rate of highly skilled labors is observed in the enterprise-mode operated models. Typically, Agrivina Ltd. Co. has a very high rate of technically skilled labors (90-95%) while the rate is very low (25-40%) in Tay Tuu Flower Production Cooperative.

*Aspect of productivity:* The higher rate of productivity is observed in enterprise-mode operated models. For examples, the productivity of tomato production of Tropical Flower JS. Co. and Agrivina Ltd. Co, is 200 ton per hectare which is 3 times higher than the average standard of traditional production methods. The production volume increases by 13.7 kg/m<sup>2</sup> in comparison to the standard cultivation rate of individual farmers.

**Table 1.** Production efficiency of some models of vegetable-flower production

No.	Survey indicators	Unit	Outcomes	
			Tomato	Lily
1	<b>Total turnover</b>	<b>VND thousand</b>	<b>1,554,000</b>	<b>305,900</b>
2	Average productivity	kg, flower/ha	222,000	15,295
3	Average selling price	VND/kg, flower	7,000	20,000
4	Costs of seedlings	VND thousand	25,000	128,800
5	Material costs	VND thousand	125,000	4,500
6	Mortgages of equipment, grid and green houses	VND thousand	150,000	4,000
7	Labor costs	VND thousand	94,500	7,000
8	<b>Total expenditures</b>	<b>VND thousand</b>	<b>394,500</b>	<b>144,300</b>
9	<b>Benefit (Collections - Expenditures)</b>	<b>VND thousand</b>	<b>1,159,500</b>	<b>161,600</b>
10	Benefit/selling price rate	%	74	52

*Note:* Data averagely calculated for 1 hectare/crop for tomato and for 1,000m<sup>2</sup>/crop for lily.

*Source:* Calculation outcomes from survey data.

*Aspect of efficiency:* The analysis of production rate of tomato and lily shows that the average gross benefits from tomato cultivation is VND1.16 billion per hectare and per crop (extended variety, 9 months per crop) and the one from lily cultivation is VND161 million per 1,000m<sup>2</sup>. Actual outcomes of surveys show that the production efficiency of tomato and lily production applied by the surveyed models is much higher than the traditional method of farmers. In lines with that, the selling prices of these products get higher since the new products follow higher safety standards and have better quality. From another side, the surveyed models have a common feature of close production cycles, from input material supply to product consumption, which provide enterprises with big economic benefits.

### **1.2. Models of high tech based agriculture applied for milk cow livestock**

Within the recent 10 years, the model of large scale development of milk cows applied by enterprises on basis of application of high techs in production process bring in encouraging results. The actual production practice shows the two most popular models: (i) The first one is implemented by enterprises which control the close production cycles from raising stage through processing stage to consuming stage (for example, TH Food and Milk JS. Co.); (ii) The second one is implemented through business links between enterprises and farmers (for example, Moc Chau Milk Cow Studs JS. Co.).

**Table 2.** Some specific features of the two surveyed models

Enterprises	Type of model	Number of raising households	Number of cows	Number of milk cows	Aver. milk volume (kg/cow/day)	Aver. scale (cow/house hold)	Grass superficies (ha)
Moc Chau Milk JS. Co.*	Business links of enterprise and farmers	556	11,983	6,200	21.5	21.5	1,000
TH Food-Milk JS. Co.**	Enterprise direct investment	-	29,000	15,500	27.5	-	4,000

Note: \* 2012 data provided by Business Dept., Moc Chau Milk Cow Studs JS. Co.

\*\* Data from the Report at National Conference of Evaluation of S&T activities for implementation of the Resolutions of the 7-th Conference of the Party Central Committee, X-th Session on agriculture, farmers and rural areas, Hanoi, 21<sup>st</sup> September 2013.

In order to consider the real economic effectiveness of the business link model between farmers and enterprises in production and processing of cow milk, the research team conducted in-depth interviews of households which develop production business links with Moc Chau Cow Milk Studs JS. Co... In this model, the Company covers the full consumption of the produced milk which is an important factor to make farmers sure of investment and production activities. In addition to that, farmers get other supports such as livestock-raising techniques, intensive grass cultivation techniques, cow food processing techniques, veterinary control, livestock insurances and etc.

**Table 3.** Economic efficiency rate of households participating in the business link model

Scale	Number of cows	Number of milk cows	Ave. milk production (kg/cow/day)	Milk production per day (kg)	Milk purchase price (VND thousand/kg)	Ave. income (VND mill./month)
Highest	120	65	21.5	1,397	11,500 *	434
Medium	22	11		236		73
Lowest	10	5		107		33

*Note: Fresh milk purchasing price at the survey time, October 2012.*

*Source: Calculation outcomes from survey data.*

Outcomes of survey analysis of production efficiency in households show that the average gross benefits of the households with the lowest production scale is VND3,500 per kilogram of milk. The one of the households with medium production scale is VND3,700 per kilogram of milk, and the one of the households with the highest production scale is VND4,000 per kilogram of milk. Since the costs of foods and labor are high in the total shares of costs for production of 1 kg of milk, then those households which have enough lands for grass cultivation and have no needs to hire additional labors would get higher benefit rates.

For purpose to evaluate the efficiency rate of enterprises, as discussed above, TH Milk Food JS. Co. is taken as representative example in application of high techs in production and close cycle production (from raising activities through processing to consumption of products). It is the new model of agricultural production which was introduced in 2009. The time is too short for credible evaluation of economic efficiency rate of application of high techs for enterprises. In this paper, therefore, we provided only the preliminary evaluation of the business link model between farmers and enterprises as the case of Moc Chau Milk Cow Studs JS. Co.

**Table 4.** Business efficiency rate of the households participating in the business link model*Unit: VND/kg of milk*

Items of expenditures	Production scale		
	10 cows	22 cows	120 cows
Foods	5,724	5,603	5,209
Initial investment	1,208	1,132	1,326
Labor	1,082	1,605	891
Veterinary service and control	458	429	429
<b>Total expenditures</b>	<b>8,472</b>	<b>8,230</b>	<b>7,856</b>
Income from milk	11,500	11,500	11,500
Other incomes	472	472	472
<b>Total income</b>	<b>11,972</b>	<b>11,972</b>	<b>11,972</b>
Benefits (Collections - Expenditures)	3,500	3,741	4,116

*Source: Calculation outcomes from survey data.*

### ***1.3. Models of high tech based aquaculture***

In order to consider the economic benefit rate of agricultural production model with application of high techs for farmers and enterprises, the research team conducted surveys for some models of business link between farmers and enterprises in fish raising-processing business of NTACO JS. Co. in An Giang Province and in shrimp raising-processing business in Hai Phong City and Bac Lieu Province.

Survey outcomes show that, while the households which do not have business links with the enterprises experience high losses (since production costs are higher by VND203 per kilogram than the purchase price by enterprises), the households which have business links with the enterprises have a gain of about VND598 per kilogram. This could occur because the households which have business links with the enterprises, in fact, made a kind of contributions to business through the use of their raising ponds. Then, also, they have access to preferential loans and low purchase price of foods. In addition to that, the whole technical procedure of raising activities of the business linked households is supported and monitored by the enterprises which secure the high quality of their products for export purpose.

**Table 5.** Business efficiency rate of the households developing business links with An Giang NTACO JS. Co.*Unit: VND*

Items of expenditures	Business linked households	Business unlinked households
Studs	1,780	1,780
Foods	16,986	17,880
Labors, machine lease	432	333
Costs of various materials	1,234	1,160
Bank interest payment	1,780	1,880
Asset mortgages	190	170
Total expenditures	22,402	23,203
Selling price	23,000	23,000
Benefits per kilogram	598	-203
Productivity (kg/ha)	250.000	235,000
Grand benefits (VND million/ha)	149.5	-47.7

*Source: Calculation outcomes from survey data.*

Outcomes of economic efficiency of two shrimp-cultivation models in Hai Phong City and Bac Lieu Province also show that the shrimp cultivation provides benefits very much higher than the one of fish cultivation, at the same rate of superficies of raising ponds. However, the fish cultivation is also conducted on basis of business links between farmers and enterprises, then makes farmers ensure their investments and production efforts since the produced volumes and the purchase price get secured by the enterprises.

So, the models of business links between farmers and enterprises are clearly positive economic efficient for the two sides in the both agricultural and aquacultural productions.

## **2. Some difficulties and challenges rising during the development of models of high tech based agriculture**

### ***2.1. Difficulties of farmers***

The most difficulties and challenges expressed through interviews by the farmers participating in the model of business links are related to the access to loan sources. They can use the preferential loans to purchase studs, to build raising facilities, to purchase machines and to buy veterinary services and control which can help them to reduce labor costs, to increase the productivity rate and to enhance the product quality.

In addition to limited access to loans, farmers also pay attention to the unstable prices of input materials. They would face great difficulties if they do not get supports for input materials provided by the linked enterprises, since they themselves are incapable of making investments for production development. Note that the intensive aquacultural production requires big investment volumes. This would explain the benefits gained by the households participating in the model of business links with An Giang NTACO JS. Co., while the other unlinked farmer get losses and have to halt production activities.

One of the important factors to secure the sustainability of the model of business links between farmers and enterprises in high tech based production is based on the institutions of links which can provide tangible benefits and fair treatment of problems of linked partners. Therefore, farmers pay attention to transparency of economic commitments (such as the terms of purchase agreement and the purchasing prices committed by the enterprises) offered by the enterprises, and take it as challenges for development of the business links model.

In addition to the above noted three important factors, farmers participating in the application of high tech based agriculture models talking about some other aspects such as lacks of science-technique supports, lacks of investment for development of infrastructure, lacks of information of domestic and international markets of agricultural products and lacks of lands for extension of production scale.

## ***2.2. Difficulties of enterprises***

During the recent time, the implementation of application of high techs for agricultural production gains successes thanks to courageous efforts by enterprises. The successes observed initially in some models are based on close links and coordination between farmers and enterprises. The farmer-enterprise business links in application of high techs for agricultural production were mobilized and then get certain successful outcomes during implementation stage.

The practice of application of high techs for agricultural production shows that the high tech based agriculture are products of “on-paper” policies but not on basis of demands of production practice. The motivation for application of high tech based agriculture by farmers and enterprises is not high enough to attract investment sources due to high risks related to this business.

Enterprises experience certain difficulties in their efforts to develop the application of high tech based agriculture. They note the following 4 important problems, namely: i) Unstable output market; ii) Lacked capitals for



investment; iii) High rate of investments for infrastructure and difficulty of land collection; and iv) Lacks of domestically developed good technologies which all are explained in more details as follows.

Despite the high demands of market for safely produced vegetable, the most difficult problem of enterprises to produce safe vegetable by application of high techs is the “outputs”. There are many reasons leading to this situation, such as non-professional distribution system, unstable consumption addresses, low competitiveness caused by high costs and others. These factors lead to changing consumption markets which cause difficulties to farmers and enterprises.

Another big difficulty for application of high tech based agriculture is related to high demands of capitals for investment. It is known well that the benefit rising rate for investments in agricultural production is very low and uncertain (since there are so many hidden risks) which make difficult to attract attention of investment sources and enterprises. Therefore, without incentive policies for preferential interest rates, terms of access to preferential loans to encourage investments, the chances to develop and to escalate the models of high tech based agriculture remain limited.

In addition to that, the low development level of domestic technologies causes obstacles to the implementation of high tech based agriculture. We do not have many new, suitably advanced and integrated technologies which are domestically developed. Some high technologies imported in so-called “turn-key” ways do not really meet the actual eco conditions and practical investment rates in Vietnam. We may also note the limited human resources which are properly trained and qualified for application of high tech based agriculture. In many practical cases, we are still experiencing the lack of qualified and experienced managers in these models.

### **3. Proposal of some additional policies for development high tech based agriculture in direction of commercial goods in Vietnam**

#### ***3.1. Targeted beneficiaries of incentive supports for participation to build the models of high tech based agriculture***

Globally speaking, farmers in Vietnam are still poor and financial resources of enterprises remain limited. Therefore, the incentive efforts are required to link and to motivate them together to build the models of high tech based agriculture. The targeted beneficiaries of these supports should be farmers, cooperatives, farm owners and agricultural product processing and consuming enterprises.

The objectives of these activities are to develop the high tech based agriculture models to produce high quality agricultural materials for processing enterprises to meet market demands.

For farmers, cooperatives and farm owners in agricultural material production regions/areas, the central focus of attention for their participation is the business link contracts to be signed with enterprises. The contracts would be also the background for consideration and grant of incentive supports.

For enterprises, the background for consideration and grant of incentive supports are contracts to purchase agricultural product materials produced by farmers, cooperatives and farm owners, and contracts of supply of input materials for agricultural production (such as high quality studs and seedlings, fertilizers, foods, mechanical tools and machines, and etc.)

The solutions to the problems of development of high tech based agriculture in direction of commercial goods in actual small-size of household-based agricultural production require also suitable measures for mobilization of research organizations and scientists.

### ***3.2. Financial sources to build the models of high tech based agriculture***

Actual programs of agricultural development can offer active supports to build the models of high tech based agriculture, namely: Program of supports for application and transfer S&T advances for socio-economic development in rural and mountainous areas, National program for development of high techs up to 2020, Program of national products up to 2020, S&T Program for construction of new rural areas, 2011-2015 period, National program of technological innovations up to 2020, National funds for S&T development and Central key program for agricultural promotion, 2013-2020 period (hosted by Ministry of Agriculture and Rural Development – MARD). However, since the State budgets allocated for the above noted programs and funds remain limited, measures of tax reduction should be considered and applied to enterprises to promote investment sources for the models of high tech based agriculture and quality based moves for agricultural production during future years. In final account, these moves also promote the participation of farmers.

### ***3.3. Addition and amendment of policies for encouragement and support to build the models of high tech based agriculture***

#### ***a, Policies towards investment capitals***

First of all, during the initial period of establishment of the models of high tech based agriculture, investment capitals should be focused to upgrade infrastructure for agricultural material areas. In the actual situation, many

enterprises hesitate to make investments build these models, then the Government should make a kick-off move which would mobilize and accelerate this process. The development and escalation of the models of high tech based agriculture should be coupled with other programs by the Government, Ministry of Science and Technology, MARD and, particularly, the Program of development of high tech based agriculture within National program for development of high techs.

It is also needed to re-check the State policies in connection with supports for S&T development and development of production of agricultural goods. It would enhance the roles of State agencies and public service organizations for better “public-private partnership” effects which would lead to higher added values of agricultural products.

In the next stage when we need to complete the development of regions of high tech based agriculture, the attention should be focused on the following problems.

*Firstly*, big land resources should be established for application of high techs in agricultural production. Longer terms should be applied for land lease regulations on basis of market driven mechanisms. The land use license should become a market good and investment source for production and business activities. Favorable policies should be also issued to facilitate the collection of lands for agricultural production (simplified formalities, reduced transaction taxes and etc.). As result, big agricultural production areas suitable for modern production modes will appear and mobilize potentials and advantages of agricultural production in every locality.

*Secondly*, planning of regions of high tech based agriculture should be completed which would gradually direct the State investments for stable development of strategic areas of agricultural production of the country. Surveys should be conducted to withdraw lands of wrongly targeted agricultural production or wrongly implemented commitments and contracts. The re-arrangement of land use should be based on crucial needs of farmers and bidding procedures. The very important principle of “lands to farmers” has to be respected which means that farmers bind always their lives to lands. This means the necessity to collect big lands for big scaled production of agricultural goods but the works require very high careful implementation.

*b, Policies towards training of highly qualified agricultural workforces*

Training programs should include not only vocational training for workers in agricultural fields but also consulting activities of new cultivation methods for production of agricultural goods (agricultural material production and

processing facilities). These activities should get supports from capital sources stipulated in S&T Program for building of new rural areas.

Incentive funds of supports also can be allocated from the State funds for agricultural promotion. This budget allocation should help enterprises implement their plans and get benefits from reduced taxes for activities of charge free consultations of cultivation techniques for farmers.

*c, Policies towards S&T organizations and scientists*

S&T organizations and scientists should integrate research activities with local development programs and projects. Regions of high tech based agriculture should be linked with universities, research centers and institutes for high tech based agriculture.

Preferential loans for implementation of research projects should be offered to research organizations and scientists which sign research and technology transfer projects for production of agricultural goods with enterprises, cooperatives and farm owners. Preferential loans are regulated by Funds for S&T development which were designed to promote investments by enterprises for agricultural production and rural areas on basis of the Government Resolution No. 61/2010/ND-CP dated 4<sup>th</sup> June 2010.

## **Conclusions**

The objectives of development of the models of high tech based agriculture are to promote centralized and large scaled agriculture to produce high added values of agricultural goods where enterprises play the leading roles in business links with farmers, but not to turn farmers with small scaled production to workers or shareholders of enterprises.

In the actual models of high tech based agriculture, the roles of State agencies and scientists are not seen clearly. The above studied models link only two actors: farmers and enterprises.

The development of high tech based agriculture in direction of commercial goods is the necessary trends for modernization of agricultural production, rural areas and national economy. The models of high tech based agriculture were studied in these fields show that these models, even in different levels, produce clear economic effects. The collected lessons and experiences would help to set up suitable policies for improvement and escalation of these models to develop a multi-sectorial agricultural production in direction of modern production of commercial goods for better values of Vietnamese agricultural products in export markets.

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