TECHNOLOGICAL INNOVATIONS IN AGRI-SYLVICULTURE PRODUCT PROCESSING SECTOR BY SMALL-MEDIUM ENTERPRISES IN RED RIVER DELTA REGION: ACTUAL STATUS AND SOLUTIONS

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Abstract:

Policies to promote enterprises to innovate production technologies hold important roles in efforts to produce high competitive products. This leads to an effective exploitation of endogenous resources, enhancement of endogenous technological capacities, creation of active positions for economic systems and prerequisites to become a component in global production chains. This paper is focused on study of actual status of technological innovations in agri-sylviculture product processing sector in Red River Delta Region (North Vietnam Delta Region) and also assessment of effects of policies towards promotion of technological innovations in enterprises in general and SMEs in particular in agri-sylviculture product processing sector.

Keywords: *Technological innovation; Agri-sylviculture product processing; Small-medium enterprise (SME).*

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1. Introduction

Actually, technological innovations have become important factors which cause direct impacts to productivity, quality, competitiveness and business operation effects of enterprises, particularly in context of international economic integration. SMEs in Red River Delta Region keep a high rate (more than 95%) of in the whole community of enterprises in agri-sylviculture processing sector and they give large contributions to development of traditional production activities, extended exploitation of resources of local populations and socio-economic development in global.

In addition to these large contributions of SMEs in agri-sylviculture processing sector in Red River Delta Region, there exist some limitations such as the use of out-dated technologies and low effectiveness of production activities. The promotion of technological innovations in SMEs remains one of important tasks which gets the most attention in actual

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stages of development. Many mechanisms and policies were issued to support efforts by enterprises for technological innovations. In practice, however, further studies should be conducted to identify impacts of these measures to technological innovations in enterprises. Therefore, the assessment of status and the proposal of policies of technological innovations for SMEs in agri-sylviculture processing sector are really necessary and meaningful to meet requirements of research activities and policy making process of organizations of the Party and the Government in the coming time.

1.1. Research objectives

- Assessment of the actual status of activities of technological innovations in agri-sylviculture processing sector by SMEs in Red River Delta Region;
- Analysis and assessment of factors which impact the process of innovation of agri-sylviculture processing technologies by SMEs in Red River Delta Region;
- Proposal of recommendations for policies to encourage SMEs in Red River Delta Region to conduct technological innovations for enhancement of competitiveness.

1.2. Research methodology

Research is conducted mainly on basis of document-based studies and on-site surveys. These two modes of research were not applied separately but closely joint and supportive each for other during the whole process of project implementation.

Document-based studies include:

- Collection and study of documents and information in relation to aspects of innovation of agri-sylviculture processing technologies in enterprises over the whole country in general and in SMEs in Red River Delta Region in particular;
- Collection and study of documents and information in relation to development of product processing sectors including cultivation, livestock breading, aquaculture and sylviculture;
- Collection and study of State issued mechanisms and policies in relation to S&T in general, and legal documents and regulations in relation to activities of technological innovation in enterprises in particular.

On-site surveys are conducted through direct interviews made with the enterprises which are selected on basis of pre-defined criteria and scopes of investigations. Investigation activities are carried out through questionnaires for purpose of collection of research driven information and contents, namely:

- Global information of enterprises including the name, year of started operation, scope of business, labors and actual status of production and business activities;
- Information about the status of technological innovations by enterprises including the technological level, activities and investment rate for technological innovation (aspects of financial and human resources), modes of implementation, demands and strategies for technological innovation and etc.;
- Evaluation by enterprises for factors which cause impacts to the process of technological innovation by enterprises including driving factors and barrier ones;
- Plans for technological innovation of enterprises in the coming time and expected proposal of recommendations towards support policies to be issued by the Government.

In addition, the research team uses additional expertise-based methods through workshops and round tables. These activities are very useful for the research team to get points of view from experts, State authority agencies and business community to enhance further the values of findings and recommended solutions.

2. Research findings

2.1. Actual status of activities of technological innovation among agri-sylviculture processing enterprises in Red River Delta Region

a) Number of enterprises

Actually, in Red River Delta Region there are 145,330 SMEs including 5,958 of them in agri-sylviculture processing sector. According to survey data, the rate of sylviculture processing enterprises is 13.7%, the one of agriculture processing enterprises is 86.3%, the one of State-owned enterprises is 0.47%, the one of non-State-owned enterprises is 94.9% and the one of FDI enterprises is 4.6%. In Red River Delta Region, Hanoi and Hai Phong are the two cities with the biggest number of 4,682 and 811 respectively of enterprises in agri-sylviculture processing sector. Average rates of investment for SMEs are highly different between cities and

provinces in the Region, namely: VND10 billion per enterprise in Hanoi, VND15.17 billion per enterprise in Bac Ninh Province, VND12 billion per enterprise in Hai Phong Province, VND10 billion per enterprise in Vinh Phuc Province, VND6.5 billion in Hai Duong Province, VND2.6 billion in Hung Yen Province. Globally, 90% of the surveyed enterprises have less than 50 laborers. The rate of handicraft laborers is high, making 80% of the total number of work forces. The rate of laborers which gets regular forms of technical training is very low, majority of them mainly being on-site trained in enterprises.

b) Global assessment of technological level of SMEs in agri-sylviculture processing sector in Red River Delta Region

The technological level is a crucial indicator to exhibit the development level of enterprises in agri-sylviculture processing sector. Survey data collected from enterprises show a very minor rate of enterprises having the advanced technology level and a high rate of enterprises having the medium technology level. Together, the number of enterprises having the medium and low technology levels makes 80% among the total number of 300 surveyed enterprises. In the mean time, those enterprises which are considered as to have advanced technologies, in their majority, are FDI ones, domestic large corporations or export-based companies. The remaining part which includes cooperatives, private companies, limited companies and even joint stock companies (former State-owned companies which were equitized) have, as norms, medium and out-dated levels of technologies.

- Hard components in technologies (machines and equipment) of agri-sylviculture processing enterprises in Red River Delta Region, in their majority, have the medium level of equipment integration (at rate of 77.9%) and the remaining part has the low level of equipment integration (at rate of 22.1%). Then, we can see in total, production chains of enterprises in Red River Delta Region, in majority, have a very modest level of technologies. Only some newly set-up enterprises, on basis of strong financial investments, may equip their production chains with advanced equipment and technologies. But they are few only and then cannot represent the global view of the Region.
- Human components in technologies include the level of qualifications, skills and capacities of staffs to use technologies. In this aspect, we divide the human components into three categories of an key importance for enterprises, namely:
  + *Managing staffs*: In majority of agri-sylviculture processing SMEs in Red River Delta Region the enterprise owners cover themselves charges of management functions. FDI enterprises and subsidiary

enterprises of large corporations (mother companies) have their management units including a vice-director in charge of technical and technological duties. These vice-directors may, subject to sharing of functions, control also activities of management of production, techniques, administration, finance and organizational matters but do not decide much for deep technological aspects which are under absolute control of mother companies;

+ *Technical staffs*: Agri-sylviculture processing enterprises in Red River Delta Region do not have large teams of technical staffs. Only financially strong enterprises which may have the advanced level of technologies need to hire technical staffs (e.g. joint venture companies, FDI companies, joint stock companies, equitized State-owned companies), while other enterprises do not have technical staffs or a few only (graduated from universities or technical colleges);

+ *High skilled workers (Grade 6 up)*: Almost all the workers of agri-sylviculture processing SMEs in Red River Delta Region lack adequate levels of skill. Some former State-owned enterprises have workers with qualified skills but they resigned or moved to other jobs after equitization. Newly established FDI enterprises do not have enough local technical staffs with qualified skills. The situation is worse with limited companies, cooperatives or handicraft production groups (they do not need them or are financially unable to hire them). According to data collected by the research team, the 300 surveyed enterprises have 85% of their working staffs with Skill Grades 3, 4 or 5. Workers with Skill Grades 6 or 7 are very rare or absent.

- Information component in technologies include guidelines for modes of use or know-hows of technologies. This component is very limited among agri-sylviculture processing SMEs in Red River Delta Region because the technologies they use are very simple and low rated. Since the rate of investments for R&D activities in agri-sylviculture processing sector is low then there are no demands, no offers and also no close links between enterprises and locally based research organizations. Enterprises prefer the use of available technologies and experiences collected from practical production activities or, in best cases, provided foreign sourced technologies (transferred or bound with purchased production chains).

c) Global assessment of modes to conduct technological innovations

Mode 1, straight purchase of technologies through commercial contracts. The research team had conducted on-site surveys or questionnaire-based investigations in some enterprises and found that many enterprises use this mode (85 from 120 replying enterprises say “yes” in answers). They

pretend that technologies and equipment they import are usually simple or second hand then this mode offers low purchase price and does not require additional heavy costs to hire experts for installation, instruction of use and training service for workers. The volume of reduced costs may be considerable in many cases. This mode fits quite well needs of those enterprises who have limited budgets of VND3-10 million for investment in starting stages.

Mode 2, purchase of technologies and equipment with attached contracts of training services for workers and technology transfer. This mode is comfortably used by local enterprises with considerable finance sources (exceeding VND10 billion), FDI enterprises and those enterprises who get awarded with long-term export contracts. These enterprises pretend that the product quality is the key factor for sustainable market competitiveness in short-term and long-term plans. Therefore, they import advanced technologies and equipment with attached contracts of technology transfer and training service for their workers to master the transferred technologies.

Mode 3, disposal of old and out-dated equipment, maximal use of available equipment and purchase of new equipment to improve and complete technological lines. Surveys show that majority of State-owned enterprises, after having been equitized, use this mode because they need to have changes to adapt production activities to demands of development and market integration.

d) Global assessment of activities of technological innovations in agri-sylviculture processing SMEs in Red River Delta Region

As survey results made through investigation of 300 enterprises show, almost all of them conduct activities of technological innovations at various levels, such as replacement of most out-dated equipment, purchase and installation of new equipment in order to enhance product quality, modification and improvement of production procedures, application of technical and technological advances in production process to enhance productivity and etc. Some of these enterprises, at certain extent, conducted R&D activities but they do not distinguish clearly between activities of R&D research and improvement-application of new technologies. Technological innovations conducted by enterprises in this sector are also different by scales, forms and substantial features of activities of implementation.

The research team had set up the following 4 criteria as backgrounds for assessment of activities of technological innovations by SMEs in Red River Delta Region, namely:

First: R&D activities conducted inside enterprises. It is possible to confirm that R&D activities of agri-sylviculture processing SMEs in Red River Delta Region do not exist or are very low, if they are. The reason is very simple: 95% of the existing enterprises have a very small size of capitals (majority of them have the volume of capitals in range of VND3-10 billion). Laborers which are graduated from universities and colleges are very few then they cannot conduct R&D activities inside enterprises.

From another side, supports provided by universities, research institutes and large corporations are very limited and irregularly conducted, if any. Information sources are also minor and very limited. Globally, enterprises face huge difficulties in implementation of R&D activities.

Surveys and exchanges of views show that these enterprises expect so much to have possible chances to cooperate with local research institutes because they think this cooperation would be low cost and the communication with local experts should be easier and more direct. Of course, the technologies to be transferred are not expected to be advanced ones but they quite potentially fit practical demands of enterprises.

Second: Innovation of technological procedures of enterprises. Efforts are mainly focused on application of available technologies. Some newly established enterprises and FDI enterprises with strong financial sources prefer the import of complete equipment and ready technologies. As example, Hop Chau Poultry Processing Ltd. Co. (Bac Ninh Province), Ha Anh Brewery-Liquor JSC (Vinh Phuc Province), Thaiway Ltd. Co. (Ha Nam Province) followed this way. Art handicraft enterprises continue to use traditional technologies but they put efforts to upgrade styles, fashions and materials to meet requirements of purchase orders. The same way is applied by sylviculture product processing enterprises. They target to modify designs and styles to adapt products to contemporary trends and requirements of buyers. Majority of FDI enterprises are found in animal food producing and aqua product processing sectors. They are almost all newly established and then have no needs for innovation of technological procedures.

Third: Innovation of products (changes of designs for new products). On-site surveys conducted in some enterprises show that the actually produced products remain accepted by markets and are fully capable to compete import products. Then, the needs of innovation of products would appear when markets experience major disturbances (large import of foreign products, low interest and attraction of local consumers for products). Actually, the decisions by enterprises for innovation of products need to be considered carefully because the renovation of products would require heavy costs (for design of new products, materials, equipment, training of

workers, advertisement, filing procedures for related IP rights (industrial design) and etc.). Enterprises, once getting long-term and large-volume contracts for new products, should be ready to make investments for innovation of products. The global picture can be summarized as follows:

- FDI enterprises are fully dependent on their mother companies (which are overseas based in majority of cases) for decision of matters related to products;
- Export sector enterprises which have contracts of export products are dependent on requirements of importing partners in term of industrial designs, styles and materials of commodities;
- Those enterprises which produce goods mainly for local consumption have low rate of innovation of products. Their market segments are products which have a range of prices to fit financial payment capacities of majority of users in the society. This range of consumers is large and they prefer products with accepted quality and moderate prices to the ones with high quality and high prices.

Fourth: Improvement of products. Majority of agri-sylviculture processing SMEs in Red River Delta Region have a very special practice of innovation of products. Namely, they buy products of the same category which may be imported from overseas or produced by other domestic enterprises then conduct studies for modification to make them different from original products (partial change of materials, use of some other additives, change of designs and styles and etc.). Actually, markets experience many disturbances: higher prices of materials and higher costs of energy which lead to limited options for improvement of quality and higher value of products. Many enterprises think that, in this situation, they should feel lucky and successful if they are able to keep business running without being bankrupted.

e) Factors which impact the process of technological innovation

The research team pays great attentions for identification of factors which cause impacts to activities of innovations. The team did tough analysis of collected information and data on basis of the questionnaires sent to 300 surveyed agri-sylviculture processing enterprises in the Region. Legal documents and regulations are also supports for this research. The team defined the following sets of driving factors and barrier factors.

- 6 driving factors to promote positively activities of technological innovation are:
  + Regulations for incentive taxation;

+ Regulations for preferential loans;
+ Regulations for favourable land use;
+ Regulations for environment control;
+ Regulations for standards and quality of products;
+ Requirements for higher competitiveness.

Among received answers, all the 180 replies (100% rate) said to agree with this list of factors to promote technological innovation.

Now, the problem is to turn these factors to implementation by enterprises. It is necessary for them to have access to documents and regulations related to promotion of technological innovation and supports for SMEs to do this. From another side, State management agencies, per their duties to serve enterprises, need to make a faster and more effective circulation of the issued regulations and guidelines of supports for enterprises to implement technological innovation.

- 6 barrier factors for implementation of technological innovation.
  + Long and complex formality procedure for applications of supports for technological innovations;
  + Lacks of market information for enterprises;
  + Lacks of technology information for enterprises;
  + Lacks of chances get contacts with sources of new technologies and lacks of cooperation with S&T organizations;
  + Lacks of high qualified staffs;
  + Lacks of capitals.

These factors are listed in the following table with attached rates of statements by enterprises for each factor among the 180 received answers.

Unit: %

Cities and provinces	Formality procedure	Market information	Technology information	Contacts and cooperation	Qualified staff	Capitals
Hanoi	9	70	70	50	30	100
Hai Phong	45	30	30	70	-	100
Hai Duong	30	50	50	50	50	100
Hung Yen	10	66	66	66	66	100
Ha Nam	40	50	66	70	33	100
Bac Ninh	30	70	70	50	100	100

Vinh Phuc	19	60	60	60	80	100
Ninh Binh	-	50	33	70	70	100
Thai Binh	30	60	60	30	-	100
Nam Dinh	10	70	70	50	50	100

Source: Survey data collected by the research team

It is worth to note that the lack of capitals is the factor unanimously agreed by all the surveyed enterprises because 95% of SMEs have the volume of capitals in range of VND3-10 billion. These capital volumes can permit them to cover only the construction of producing facilities and the purchase of machines and equipment in initial stages and then they do not have finances for next stages of technological innovation. Formality procedures for loans offered by banks and credit providing agencies are complex and require mortgages. From another side, enterprises experience lacks of market information, technology information and contacts with research organizations.

The analysis of collected information and data as well as direct talks to enterprises show many difficulties enterprises face in their R&D activities, implementation and innovation of technological procedures, improvement and innovation of products in the sector. Here is a conflict: enterprises wish to do technological innovations but the conditions are not enough favourable for practical implementation.

g) Some barriers to activities of technological innovation

There exist certain barriers to activities of technological innovation, namely: High risks related to the nature of these production and business activities, high dependence on market conditions, low return rate of investment capitals and others. Activities of agri-sylviculture processing enterprises, by their nature of operation, require a large use of lands and enterprises face many difficulties for extension of cultivation and production scale since the land use rights are held by farmers. Another aspect important to note is the capacities of SMEs to mobilize investments for agri-sylviculture processing technologies are lower than the required level of development and roles of industrialization in agri-sylvicultural production sector.

2.2. Solutions for improvement of policies to push up technological innovation by enterprises

a) Concepts for improvement

First, the Government should first issue supporting measures for enterprises in form of technology transfer through advanced machines and equipment. The next move should be supporting measures for implementation of R&D activities oriented to successful technological innovation. In reality, the technological innovation is a type of activities which have high risks, require large initial investment of capitals, have high needs of qualified human resources and provide slow returns. Enterprises really hesitate in their plans for technological innovation. However, the Government is to hold only roles to catalyse the process, to coordinate activities and to build up regulatory frameworks and institutional prerequisites for innovation. The establishment of technological infrastructure and legal framework is needed to support and to push up enterprises to conduct technological innovations.

Second, the Government should bind supports for enterprises to innovate technologies with enhancement of technological capacities and skills of SMEs and, at the same time, shifts of production and business structure. For a successful implementation of technological innovation, the human resources are required to have the level corresponding to the one of complex and advanced technologies. Therefore, the Government should issue policies to support training activities for human resources of enterprises to achieve the adequate quality level to meet demands of technological innovation.

Third, measures should be taken to diversify sources of support for enterprises to conduct technological innovations and to facilitate administrative formalities for acceleration of technological innovation. For that, the close coordination of activities are required between State management agencies for issuance of measures to support activities for communication and propagation of related policies so that the latter can be conveyed openly and fully to the community of enterprises. At the same time, activities of inspection, monitoring, collection and analysis of feedbacks should be conducted for purpose of in-time adjustment.

Fourth, technological innovations should become self-driven demands of enterprises. Enterprises would get ready to make investments for technological innovation and to take technological innovations into serious considerations if they have to make decisions between two alternatives: the innovation leading to existence and development or the non-innovation leading to bankruptcy. In this optic, it is difficult or even impossible for the Government to stand on behalf of enterprises to make decisions. The roles of the Government here are to establish an equal and competitive environment for enterprises to conduct technological innovations.

In addition to that, the system of mechanisms and policies issued by the Government should be based on reasonable structures to encourage, to support and to cause strong impacts to activities of technological innovation by enterprises. The system should give contributions to secure social equality and to fit operations of socialist oriented market economy structures.

b) Solutions for improvement

- Group of mechanism-policy solutions: In a global view, mechanisms and policies applied for agri-sylviculture processing SMEs in Red River Delta Region cannot be separated from the ones for the community of SMEs in general. Therefore, the mechanism-policy solutions proposed in this paper are also to target settlement of common problems which SMEs face in other sectors. However, the research team made the best to propose some solutions very specific for agri-sylviculture processing SMEs in the Region.

First, Regulatory aspects: Legal documents and regulations related to activities of technological innovation by enterprises in general and SMEs in particular should be reviewed. Then, a road map of technological innovations for enterprises should be set up on basis of technological forecasts and then compulsorily applied to enterprises if their existing technologies cannot meet requirements of product quality, environment protection and common social interests. For that, State authority agencies need to compare standard systems of Vietnam to international ones and then, on this basis, to adjust and amend the non-conform items and to add the lacked ones. Then, activities of inspection and monitoring should be intensified to control the application of these criteria and standards by enterprises. These criteria and standards should be applied also for their products. Also, every year, State authority agencies need to carry out inspections and assessment of actual technological levels of enterprises to recommend or to force them to conduct technological innovations for purpose of their own existence also.

Second, Incentive aspects: Systems of incentive taxation for technological innovation in general and for technological innovation in agri-sylviculture processing sector in particular are required to be set-up in integrated manner, to have reasonable structures, to give contributions to secure social equality and to fit market economy structures. Important attentions should be focused to set up the Law of Environment Protection Tax which would be applied to prevent enterprises from use of out-dated technologies and import of environment polluting technologies. Also, a two direction channel for information exchange should be established between State authority agencies and enterprises. The purpose of this exchange channel is to provide

fast responses and feed backs of concerns from the side of enterprises about formality procedures to get incentive supports in lines with existing regulations for technological innovation.

Third, Financial aspects: the Government should encourage the set up of independent appraisal organizations where the functions include the assessment of investments for technological innovation. These organizations would provide banks and credit providing agencies with necessary information on projects of enterprises for technological innovation as well as provide enterprises with recommendations for technological innovation. In this optic, these organizations would help to settle conflicts between banks and credit providing agencies (which offer loans of capitals) and enterprises (which use offered capitals). The common practice here is: i) Banks and credit providing agencies usually are not ready to offer loans to SMEs since in many cases the latter do not appear credible enough for loans. In fact, investments for technological innovation are high risk business of enterprises which are much dependent on the qualification level of their human resources to meet demands of technological innovation and/or on the right definition of investment targets, competitors, orientation of markets and products; ii) Enterprises, if wanting to get loans from banks and credit providing agencies, need to demonstrate well the size of their projects of technological innovation, effectiveness of past and present operations and values of mortgages (as rules, SMEs have minor values of mortgages). Banks and credit providing agencies would consider the terms and conditions of loan transactions on basis of this information about client enterprises. Banks and credit providing agencies would combine their professional tools and recommendations provided by independent appraisal organizations to decide volumes, terms, repayment schedules and interest rate of loans which would secure their business benefits and meet highest expectations of enterprises for technological innovation.

National Fund for Technological Innovation should be run as a financial organization without causing difficulties to enterprises in their efforts to access incentive finance sources for technological innovation. Works should be conducted to review operations of two funds: National Fund for Technological Innovation and National Fund for S&T Development. These two funds should not overlap each other in terms of functions, tasks and incentive credit terms. In this line, formality procedures for approval of incentive credits for technological innovations need to be reviewed and amended to become simple for application and capable to encourage the involvement of overseas organizations and enterprises.

Fourth, Communication and propagation activities: State agencies should make efforts focused on enhancement of awareness and communication activities with enterprises, particularly leading bodies of enterprises, on benefits from activities of technological innovation for the community and for their enterprises themselves. This objective can be achieved through short-term training courses held with participation of experts, policy makers and State authority officials in various fields of technologies. In this process, enterprises would have a higher level of awareness for activities of technological innovation and then may change their minds towards decisions of investments for technological innovations in future.

Also, State authority agencies need to develop technology markets, to promote links between demands and offers of technologies and to build up Internet based open sources of information on activities of enterprises where the enterprises conducting technological innovations would be put in focus of attentions./.

REFERENCES

1. Hanoi Center of Technical Supports for SMEs and Japan International Cooperation Agency (JICA). (2005). *Survey results of enterprises in 30 Northern cities and provinces, 2005 year*.
2. OECD. (2009). *Recommendation of guiding principles in collection and interpretation of data in technological innovations.* Oslo guideline document.
3. National Institute for S&T Policy and Strategy Studies (NISTPASS). (2009). *Studies for training documents to guide technological innovations by SMEs.*
4. Central Economic Management Institute and UNDP. (2009). *Report on technological innovations in Vietnam enterprises*.
5. Tran Thi Thu Thuy. (2010). *Studies for policies and solutions to enhance competitiveness of SMEs in agri-sylviculture processing sector in context of international integration*. Ministerial level research project. Institute of Forestry Research.
6. Dau Thanh Tu et al. (2012) *Evaluation of actual status and proposal of solutions to push up the innovation of agri-sylviculture processing technologies by SMEs in Red River Delta Region*. Ministerial level research project. Institute of Regional Research and Development.