# SOLUTIONS TO IMPROVE THE SUSTAINABILITY OF SCIENCE AND TECHNOLOGY APPLICATION PROJECTS FOR SOCIO-ECONOMIC DEVELOPMENT IN THE NORTH CENTRAL REGION

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***Summary:***

*Science and Technology (S&T) are developing rapidly in the context of economic globalization. Therefore, applying S&T to socio-economic development, especially in agriculture in rural and mountainous areas, is very essential. The program "Supporting for the application and transfer of S&T advances to serve socio-economic development in rural and mountainous areas" (Rural and Mountainous Program) approved by the Prime Minister has gone through several stages (20 years of implementation): 1998-2002, 2004-2010, 2011-2015, 2016-2020, and is currently being implemented in the 2021-2025 phase. It has contributed to the development of region-advantageous agricultural products, formed high-tech-applied agricultural businesses, improved managerial and technical skills for grassroots officials, created jobs and increased income for millions of farmers in rural and mountainous areas. Although many successes have been achieved, there have also been many difficulties during the implementation process in ensuring the sustainability of projects (projects that did not complete tasks, did not maintain or replicate the models after project completion) - a very important criteria that determines the success of the Rural and Mountainous Program. In this paper, the authors suggest number of solutions to improve the sustainability of projects under the Rural and Mountainous Program through investigation of the North Central region cases.*

***Keywords:*** *Mechanism and policy solutions; Rural and Mountainous Program; North Central region.*

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## 1. Introduction

Over more than 20 years, the Rural and Mountainous Program has gone through 4 phases of implementation, and contributing along with other National Targeted Programs, such as New Rural Development Program, Program for Developing Key Commodity Products, etc. in the socio-economic development of economic zones throughout the country. Many

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S&T advances in agriculture have been transferred to farmers through Rural and Mountainous program projects. However, the effectiveness of these projects is still limited due to the lack of appropriate measures and many shortcomings in the transfer method existed. The project implementation location selection has not been closely linked to the product consumption market. During the project implementation process, the effective participation of farmers and communities has not been mobilized, so the project results are often not sustainable.

Until now, there have been many summary reports, evaluations, as well as studies on the effectiveness of the Rural and Mountainous Program in each stage. For example, the project named *"Research on theoretical basis and practical review of building a S&T application model of to serve rural and mountainous development"* in 2007 done by Dr. Bui Manh Hai; The project "*Research and propose measures to ensure the sustainability of the transfer of S&T advances in agriculture in the northern mountainous provinces"* in 2008 done by Dr. Tran Anh Tuan. However, none of the studies has yet proposed solutions to improve the sustainability of projects, specifically for Rural and Mountainous Programs. Based on these practical requirements, the research team has carried out the project of "*Research and propose solutions to improve the sustainability of science and technology application projects under the Rural and Mountainous Program*" to solve the above-mentioned shortcomings.

## 2. Background of the rural and mountainous program

The main activity of the Rural and Mountainous Program is to implement application projects and transfer S&T advances associated with specific products and objectives such as: improving the efficiency of agricultural product production; applying advanced technology to export rare/special agricultural products; applying new technology to production, processing, preservation in agriculture, forestry, fisheries, handicrafts, and industries that use local raw materials. Therefore, Rural and Mountainous Program projects can be considered as socio-economic development projects.

To propose solutions to improve the sustainability of Rural and Mountainous Program projects, it is necessary to clarify the concept of "sustainability", which is a basic theoretical background that the authors believe should be mentioned in this article. In the authors' view, for a project to achieve "sustainability", the project implementation process must be continuous, or its benefits must be maintained indefinitely. Evaluating whether a project is sustainable or not is a future prediction with high risk because "sustainability" is a random process that is uncertain. In summary,

"sustainability" is defined as a combination of activities that can help improve operating conditions in a way that can maintain that improvement.

In this article, the "sustainability" of Rural and Mountainous Program projects is determined by the following criteria:

- *First, successfully applying technological processes to production practice*: building production models that apply technological processes to create products that meet the set forth quality standards and achieving the committed results;
- *Second, replicating models*: After the project completion, many people or organizations can apply the project's technological processes to their own production practice to increase productivity, product quality, and help improve living standards and income.

## 3. The status of the sustainability of projects implemented in the North Central region

The sustainability of projects under the Rural and Mountainous Program implemented in the North Central region is expressed through information on the number of projects implemented, the number of projects that have stopped implementation, the project acceptance results, the projects maintenance and replication results, difficulties and issues in implementation, maintenance, and replication of project results.

### *3.1. Total project approval status*

From 2004 to 2020, the Rural and Mountainous Program has approved for implementation 61 projects with a total support budget from the central budget of VND 200,240 million, specifically as follows

**Table 1.** Number of projects approved for implementation in provinces of North Central region

| No. | Province/City | Number of projects | Funding support from state budget (mil. VND) |
|---|---|---|---|
| 1. | Thanh Hoa | 16 | 60.190 |
| 2. | Nghe An | 11 | 35.450 |
| 3. | Ha Tinh | 10 | 31.390 |
| 4. | Quang Binh | 9 | 30.950 |
| 5. | Quang Tri | 10 | 28.560 |
| 6. | Thua Thien Hue | 5 | 13.700 |
| | **Total** | **61** | **200.240** |

*Source: Synthesis by research team*

### *3.2. Project implementation status*

**Table 2**. Project implementation status

| No. | Province | Total number | Being stopped and discontinued | Still being under implementation | Evaluation Results | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Excellent | Good | Passed | Failed, Not Passed |
| 1 | Thanh Hoa | 16 | 3 | 8 | 0 | 4 | 1 | 0 |
| 2 | Nghe An | 11 | 0 | 4 | 0 | 7 | 0 | 0 |
| 3 | Ha Tinh | 10 | 0 | 3 | 0 | 6 | 1 | 0 |
| 4 | Quang Binh | 9 | 0 | 4 | 0 | 5 | 0 | 0 |
| 5 | Quang Tri | 10 | 1 | 2 | 1 | 5 | 1 | 0 |
| 6 | Thua Thien Hue | 5 | 1 | 1 | 0 | 3 | 0 | 0 |
| **Total** | | **61** | **5** | **22** | **1** | **30** | **3** | **0** |

*Source: Synthesis by research team*

So out of the 61 projects approved for implementation in the North Central region, 34 projects have been accepted after evaluation, including:

+ 01 project was rated Excellent.
+ 30 projects were rated Good.
+ 03 projects were rated Pass.
+ No project was rated Fail.
+ The number of projects still being implemented and not evaluated yet is 22, mainly that projects started in 2019 and 2020.
+ 05 projects were being stopped, including:

  Thanh Hoa Province (03 projects): Project "Application of advanced technology to expand the production and export scale of lanterns, associated with rational exploitation of rattan forests in Thanh Hoa"; Project "Application of S&T to build models of planting, processing red Fallopian multiflora and Vietnamese Codonopsis pilosula in 2 districts of Ba Thuoc and Quan Hoa, Thanh Hoa province"; Project "Application of S&T advances in building a model of breeding ostriches for reproduction, commercial ostriches and leather processing in Thanh Hoa".

  Quang Tri Province (01 project): Project "Building a model of applying advanced technology in industrial-scale pig farming in Quang Tri province".

  Thua Thien Hue Province (01 project): Project "Application of S&T advances in building a model of safe vegetable production with advanced technology, meeting Vietgap standards" in Phu Loc district, Thua Thien Hue province.

To identify the reason leading to project tasks incompletion, the research team collected information from project inspection records, confirmation records of funding amounts, project components acceptance records or project model acceptance records, and interviewed project management officials at the Department of Science and Technology, and local monitoring specialists from the Rural and Mountainous Program office.

**Table 3:** Reasons for being stopped and discontinued projects

| No. | Province | Project name | Type of leading organization | Main reasons |
|---|---|---|---|---|
| 1. | Thanh Hoa | Project "Application of advanced technology to expand the production and export scale of lanterns, associated with rational exploitation of rattan forests in Thanh Hoa"; | Enterprise | In project preparation time, the business had a good market for its products in many countries, but during project implementation, company faced a lot of difficulties in export. Then company changed ownership, and the new board of directors did not want to continue the project. |
| 2. | | Project "Application of S&T advances in building a model of breeding ostriches for reproduction, commercial ostriches and leather processing in Thanh Hoa" | Enterprise | Unable to mobilize people/ peasants to participate in the project. |
| 3. | | Project "Application of S&T to build models of planting, processing red Fallopian multiflora and Vietnamese Codonopsis pilosula in 2 districts of Ba Thuoc and Quan Hoa | Enterprise | Due to weather conditions, many medicinal plants died. People/ peasants did not continue to participate in the model, so there was not enough area for planting |
| 4. | Quang Tri | Project "Building a model of applying advanced technology in industrial-scale pig farming in Quang Tri province" | Enterprise | Unable to find a market for the product. |
| 5. | Thua Thien Hue | Project "Application of S&T advances in building a model of safe vegetable production with advanced technology, meeting | Enterprise | Funding support from State budget to implement the project was low. |

| | | | | |
|---|---|---|---|---|
| | | Vietgap standards" in Phu Loc district, Thua Thien Hue province | | |

*Source: Research team's survey results in 2023*

### *3.2.1. Project implementation status*

The project implementation results have been described as follow:

**Table 4.** Total project implementation results

| No. | Province | Total number | Being stopped and discontinued | Still under implementation | | Evaluated and Accepted | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Total | Including | | |
| | | | | Total | Including, replication | | Not maintained | Maintained and being continued | |
| | | | | | | | | Total | Including replication |
| 1 | Thanh Hoa | 16 | 3 | 8 | 8 | 5 | 1 | 4 | 4 |
| 2 | Nghe An | 11 | 0 | 4 | 4 | 7 | 2 | 5 | 4 |
| 3 | Ha Tinh | 10 | 0 | 3 | 3 | 7 | 1 | 6 | 4 |
| 4 | Quang Binh | 9 | 0 | 4 | 3 | 5 | 3 | 2 | 1 |
| 5 | Quang Tri | 10 | 1 | 2 | 2 | 7 | 0 | 7 | 4 |
| 6 | Thua Thien Hue | 5 | 1 | 1 | 1 | 3 | 1 | 2 | 2 |
| **Total** | | **61** | **5** | **22** | 21 | **34** | **8** | **26** | **19** |

*Source: Research team's survey results in 2023*

In addition to the 5 being stopped and discontinued projects, there are a total of 22 projects that still being under implementation and have not been evaluated yet and 34 projects that have been accepted according to the results mentioned above.

Out of the 34 evaluated and accepted after project completion, 26 are still maintained and being continued their existence and 19 of them have replicated the accepted model. Out of the 22 still being under implementation projects and not been accepted, 21 projects also have replicated the model.

### *3.2.2. Comments on the project sustainability*

The evaluation of the project sustainability under the Rural and Mountainous Program is based on the following basic criteria: *First,* successfully applying technological processes or completing the objectives and content in the project description; *Second,* the project results are maintained and developed after the project ends.

*Completed projects that meet sustainability criteria:* Projects that have completed the implementation period are evaluated based on the level of achievement of the objectives, outputs, and direct results including the project contents and products. The content of the project is the application of S&T models to production and the creation of specific results. The project with acceptance rating of Excellent and Good are projects that have completed all objectives, content, and products of the project, or exceeded the scale and targets set forth. There are 19 projects out of a total of 34 accepted projects met the acceptance rating of Excellent and Good (accounting for 55.88%).

*Completed projects that do not meet sustainability criteria:* Among projects implemented in the North Central region, there are 15 projects (accounting for 44.12%) that do not set sustainability criteria, of which 4 projects have been accepted with a Pass acceptance rating. These are projects that have completed the project objectives and content such as implementing enough quantity and scale of models, training enough technicians, and completing training for people. Although these projects have completed the project content, the project results are not highly evaluated due to such reasons as the quality of the produced products is not high enough, projects have not helped people find a market for their products, so the economic efficiency is not significant.

*The projects that did not complete and meet the sustainability criteria*: There are 5 projects that had to be stopped and discontinued, meaning that the projects did not achieve the objectives and content set forth. The products, as promised, did not meet both the quantity and quality requirements. Therefore, the discontinued projects did not bring economic benefits to the leading organizations as well as the people. And clearly, the models were not replicated. These projects did not meet all the criteria for sustainability.

*3.2.3. Evaluation of some typical projects*

*(1) Project "Building a model of high-tech application agriculture farm to cultivate orchids, lilies in Quang Tri".*

**Table 5.** Results of project implementation in Quang Tri province

| No. | Product | Unit | According to contract | Implemented | Quality target |
|---|---|---|---|---|---|
| **1** | Advanced technological processes transferred | Process | 07 | 07 | Met requirements |
| **2** | Specific product list | | | | |
| - | Butterfly orchids seedlings | Tree | 5.000 | 5.080 | Met requirements |

| No. | Product | Unit | According to contract | Implemented | Quality target |
|---|---|---|---|---|---|
| - | Commercial Butterfly orchids | Tree | 22.800 | 22.818 | Met requirements |
| - | Commercial Lily flowers | Branches | 38.000 | 38.150 | Met requirements |
| - | Basic technicians training | Person | 6 | 6 | Met requirements |
| - | Technical training | Person | 120 | 120 | Met requirements |

*Source: Synthesis by research team*

So, after completion, the project has been done fully and exceeded the approved term of reference description. During the project implementation, some households participated in replicating the model after being trained in planting and caring for orchids and lilies by the leading organization. By the time the project was evaluated and accepted, the leading organization had expanded production to 2 locations in Huong Phung commune, Huong Hoa district, Quang Tri province. The project ensures the sustainability criteria both in successfully applying technological processes to practical production and replicating models.

Lessons for the success and sustainability of the project are:

- The resources for the project implementation are ensured sufficiently and timely;
- The project's subjects, include orchids and lilies, have a great market potential at the time of project implementation;
- The leading organization has chosen rightly the project implementation location with suitable natural conditions in terms of weather, climate condition, etc.;
- The selected technologies for implementation are suitable for chosen locality, suitable with the skill level of leading organization and the farmer and are easy to apply in practice;
- The approach and methodology of project organization, leading, management, and implementation ensures the reasonable, scientific, and democratic and transparent principles.

*(2) Project "Application of S&T advances in building a model of planting, processing, and consuming medicinal herbs such as Jiaogulan, red Fallopian multiflora and Vietnamese Codonopsis pilosula in two districts of Ba Thuoc and Quan Hoa, Thanh Hoa province".*

**Table 6.** Results of project implementation in Thanh Hoa province

| No. | Product | Unit | According to contract | Implemented | Quality target |
|---|---|---|---|---|---|
| ***1*** | **Advanced technology processes transferred** | Process | ***09*** | ***06*** | |
| ***2*** | **Specific product list** | | | | |
| 2.1 | Jiaogulan seedlings | Tree | 1.125.000 | 0 | Stopped at the nursery stage, not producing enough standard seedlings for plant cultivation |
| 2.2 | Red Fallopia multiflora seedlings | Tree | 375.000 | 0 | |
| 2.3 | Vietnamese Codonopsis pilosula seedlings | Tree | 330.000 | 0 | |
| 2.4 | Dried Jiaogulan medicinal herbs | Ton | 37,5 | 0 | The planting model has not been harvested, and the preliminary processing and preservation model has not been implemented. |
| 2.5 | Dried Red Fallopia multiflora medicinal herbs | Ton | 6 | 0 | |
| 2.6 | Dried Vietnamese Codonopsis pilosula medicinal herbs | Ton | 6 | 0 | |
| 2.7 | Basic technician training | Person | 6 | 6 | Met requirements |
| 2.8 | Technical training | Person | 200 | 200 | Met requirements |

*Source: Synthesis research team*

Based on the above results, the project did not achieve the results set out in the approved term of reference description. The project had to be stopped and discontinued when it did not complete the content set forth. Therefore, the project did not ensure sustainability.

Lessons from the failure of the project are:

- During the project implementation, there were prolonged floods and heat waves that caused great damage to the original seedlings and the models with trees that were planted;
- The project faced difficulties in matching fund: People participating in the project are living in difficult areas did not have enough matching fund;
- During the project implementation, the prices of seedlings and raw materials increased while there were no regulations on additional funding;
- Many people broke their commitment and not to participate in the project;

- Lack of experience in the field of medicinal herbs from leading organization and both the project leader and members had often changed their participating during the implementation process;
- The coordination between the leading organization and the technology transfer agency was not close.

### *3.3. Factors affecting the sustainability of projects*

*Firstly*, *mechanisms and policies* include regulations on management: structure, proportion of funding sources; coordination, assignment of responsibilities and rights among relevant agencies and related units in the process of implementing the project; the agency responsible for supporting the replication of project results and funding to implement the replication of the model.

*Secondly, applied S&T application support work*: The technologies applied in the project must be recognized as advanced and new technology, which have been allowed to be applied in practical production, have high stability to ensure effectiveness and to limit risks.

The selected technologies must be suitable for the needs, aspirations, and absorption level of businesses and people, can help to solve pressing issues of the locality and businesses, bringing about socio-economic efficiency. Applied technologies must be closely linked with technology application support organizations.

*Thirdly, concerning the organization that leads the project:* The leading organization is both the unit directly implementing the project activities, responsible for mobilizing and using funding sources in accordance with regulations to achieve the best project results, and the unit adopting technological processes, responsible for guiding people when replicating the model to the community.

*Fourthly, the readiness of the beneficiaries:* To ensure the sustainability of agricultural production development projects, having a stable consumption market with reasonable prices is essential. However, according to the regulations of the Rural and Mountainous Program and the project implementation reality, there is no mandatory provision to obligate or to demand the projects must have a market plan or prove that the project output products have had a consumption market.

*Lastly, the market factor* is crucial to ensure the sustainability of the project. To ensure that the project is sustainable, it is important to have a stable consumption market with reasonable prices for the agricultural products produced by the project. The market factor needs to be focused on and carefully be considered from the project selection stage, and ones also have

paid attention to it during the project implementation stage as well as after the project ending.

## 4. Proposed solutions to improve the sustainability of the projects

### *4.1. Policy solutions for the program management mechanism*

Supplementing some regulations on project selection, approval, and management:

- The proposed project must be suitable for planning, natural conditions, and help the locality solve urgent and essential issues create key/specific products with highly competitive advantages in the market;
- Prioritize the selection of production projects belonging to the value chain, create conditions and mandate to businesses to lead production projects to produce large-scale products, covering from seed production, develop raw materials areas to preliminary processing, deep processing, and commercialize products;
- There should be a specific mechanism for non-refundable transferring assets after project ending so that the models can continue to maintain and replicate the production, ensure the sustainability of the project;
- Strengthen inspection and supervision of the project implementation: Instead of stipulating 01 inspection/year as it did before, it is necessary to stipulate regular inspections 02 times/year and irregular spot checks when problems arise. In addition, it is necessary to assign the Department of Science and Technology of provinces/cities, which are local management units, to regularly inspect, guide, and assist leading organizations to resolve timely difficulties and obstacles in the project implementation process.

### *4.2. Financial management mechanism solutions*

Increasing support funding for projects under the program, especially projects in extremely difficult areas: At present, the highest support funding from the central budget to implement the project does not exceed 50% of the total project implementation cost. This funding level should be raised to 70% for deep, remote, and extremely difficult areas according to the regulations of the State (Decision No. 861/QD-TTg of the Prime Minister approving the list of communes in III, II, I areas belonging to ethnic minority communities and mountainous areas in the period 2021-2025).

Increasing the budget for technology transfer activities, ensures that the technology application support organization has enough funding to carry out its tasks and the funding is suitable for the characteristics of technology transfer to deep and remote areas.

Clear regulations on financial capacity proving documents of the leading organization and other organizations and individuals who are participating in the project implementation to ensure sufficient matching funding for successfully completing the project.

### *4.3. Solutions to support successful project implementation, maintenance, and replication of results after completion*

Building a mechanism to coordinate resources, integrating the implementation of the Rural and Mountainous Program with other programs to create the comprehensive strength on financial resources and technical personnel in the same area to implement technology transfer to achieve the Program goal.

Developing a policy of preferential loans for businesses participating in the Rural and Mountainous Program. Preferential loans will be supported after the project completion and can be used to maintain and replicate the project model.

Developing tax incentives for products formed from the Rural and Mountainous Program project. The purpose of the tax incentive policy is to reduce the production and business costs for enterprises by reducing tax obligations.

Strengthening information and communication about technology transfer application models implemented in localities to encourage model replication.

### *4.4. Market solutions for project products*

Each project must have a plan for product consumption when drafting the project term of reference description: survey, evaluate the market potential for the product. If a business is the leading organization, it needs to have a specific orientation for the product output. If it is an administrative unit, it needs to have the project product purchase commitment from businesses or leading units in the area.

There must be a plan to build a market and brand for the output product during the project implementation: a plan to disseminate and promote the project results and products, coordinate with local authorities or other organizations to connect product producers and buyers and to promote the product.

Building a network that provides market information, especially export markets, to support businesses is necessary.

## 5. Conclusion

Developing agriculture towards commodity production is a necessary direction for modernizing agriculture and rural areas. The Rural and Mountainous Program projects have been implemented and succeeded with different degrees, but they have brought significant economic and social benefits.

Improving sustainability is a necessary and important task for the Rural and Mountainous Program to truly bring benefits to farmers in rural and mountainous areas. The authors have studied and clarified the difficulties in management, implementation, maintenance, and replication of projects in the North Central region. Based on the study, we analyze and propose some policy solutions to improve the sustainability of projects under the Rural and Mountainous Program. Summarizing, drawing experience extracting, and suggesting suitable policies to step by step improve and replicate models, striving to build a comprehensive agriculture development towards modernization and large-scale commodity production is the goal that needs to be aimed for soon./.

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