



# Diffusion of Innovation in Fighting Disparities among Localities and Ethnicities: A Case Study of the Project on Food Security Improvement for Small Scale Farmers in Central Vietnam

**KAKO INOUE\***

*University of Miyazaki, Miyazaki, Japan*

*Email: kako.inoue@gmail.com*

Received 15 December 2018 Accepted 30 April 2019 (\*Corresponding Author)

**Abstract** The purpose of this paper is to demonstrate how the reduction in poverty and improvement of food security in ethnic minority areas can be realised by the diffusion of agricultural innovation with a social networking system, established through a case study of the Project on Food Security Improvement (PFSI) for Small Scale Farmers in Central Vietnam. The project had developed and expanded the PFSI model, which consists of three components of technical, network, and monitoring submodels. The model was promoted to distribute an innovative agricultural technique of the System of Rice Intensification (SRI) method to local farmers, as well as strategic arrangements to identify talented key adopters, who are constructing effective networks among traditional minority group communities. The results of the project implementation revealed dramatic improvements in the capacity for food self-supply, by improving rice productivity with an average yield increase of 1.4 ton/ha, compared with the conventional method. Moreover, the arrangement of identifying key adopters and establishing a network system had led to further diffusion of innovation to the minority groups. The paper explains the importance of understanding the heterogeneous features of Vietnamese localities and ethnicities, pointing out how participation of minority groups can influence others in their community. The lesson learned from the case gives an important insight towards solving the issue of disparities between rural and urban, among regions, and between ethnic majorities and minorities in Vietnam, which may be hidden easily in the face of the country's recent rapid economic growth and "average" improvement of the country's social welfare.

**Keywords** Vietnamese ethnic minorities, food security, poverty reduction, system of rice intensification (SRI), diffusion of innovation

## INTRODUCTION

### Background: A Widening Gap among Localities and Ethnicities

Vietnam has experienced rapid economic growth, transforming from one of the poorest developing countries into a lower middle-income country. Vietnam has turned out to be one of the largest rice exporters in the world. Agricultural growth was accelerated in recent decades through improved land use with price liberalisation, land titling policies, irrigation, and technology adoption.

Despite the country's growth, Vietnam's rural populations continue to face challenges in overcoming income and food-security inequality. Vietnam's poorest households, in particular, are concentrated in highlands and mountainous areas. Rural villages in the upland and central region of the country even face frequent natural disasters, being vulnerable to extreme weather conditions. Vietnamese ethnic minority groups typically live in such difficult situations in mountainous areas. Vietnam has 54 ethnic groups. The Kinh or Viet (ethnic Vietnamese) is the largest group, accounting for 86% of the population, followed by the Tay, the Thai, the Muong, the Khmer (ethnic Cambodian), the Hoa (ethnic Chinese), and the Hmong, which together account for 10% of the population. The remaining 4% consists of remaining ethnic groups (Dang, 2010). It has been

reported that as much as 72% of the population of ethnic minority groups fall into the poorest three consumption deciles; 88% of ethnic minority groups fall into the lower half (50% of the population consumption distribution; General Statistical Office (GSO), 2006).

### **Project for Spreading the PFSI Model**

Recognizing the food shortage problem in the mountainous areas of central Vietnam, where most residents are classified as ethnic minorities, the Project on Food Security Improvement for Small Scale Farmers in Quang Nam Province (PFSI-1) had been implemented in the period 2012-2015, under the agreement between the Foundation for International Development/Relief (FIDR) and the Quang Nam provincial government, to establish a model to alleviate food shortages among small-scale farmers, transferring the cultivation technique known as the SRI method, targeting the three poorest mountainous districts, namely Nam Giang, Dong Giang, and Tay Giang Districts in Quang Nam Province, Vietnam. After three years of project implementation, the PFSI-1 had developed the PFSI model, which was evaluated as a successful model to alleviate food shortages with the climate-smart SRI method. It received attention from local authorities and potential beneficiaries to deepen and extend the model to other areas. This paper reviews and extracts lessons learned from the project in ethnic minority communities.

### **OBJECTIVES**

The purpose of the paper is to demonstrate how poverty reduction and improved food security in ethnic minority areas can be realised by the diffusion of agricultural innovation with a model designed to diffuse not only innovation but also strategic social arrangements to identify key adopters and to promote communication. Specifically, the paper examines elements of diffusion by describing the model design and its outcome; it explains the strategic benefits of ensuring the involvement of grassroots-level actors, who can actually influence the diffusion in their community. To do so, the paper (1) discusses the context of diffused innovation and the background of adopters, (2) states the results (i.e. how poverty and food security improved) of diffusion initiatives in the target areas, and (3) describes how key adopters functioned to diffuse innovation by analysing social aspects during the diffusion process.

### **METHODOLOGY**

The paper follows the definition of “innovation” as stated in Rogers (2003), “an innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. In the framework of the PFSI model, the SRI method is considered as an agricultural innovation as it was perceived to be a new agricultural technique for target people of the project area.

To understand the local reality and contexts, the author conducted fieldwork, including qualitative surveys with semi-structured and structured surveys in September 2018, and collected data on rice productivity and the SRI areas from the project’s monitoring data. The interviews were conducted with key adopters known as key farmers (KFs) of the project areas, project officers, and local government staffs.

### **CONTEXT**

#### **PFSI Model: Agricultural Innovation (SRI method), Networking, and Monitoring**

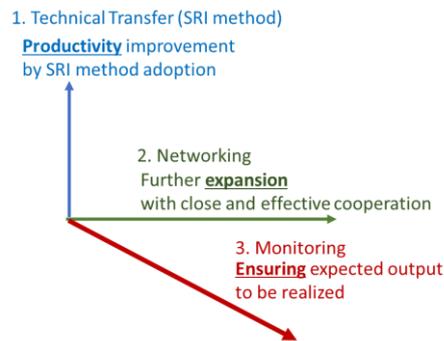
The PFSI model has three critical features, namely a technical model for transferring the SRI method, a network model, and a monitoring model. The technical model is meant to increase the rice productivity for the small-scale farmers through the farmer field school, with an open-ended approach. The network model is meant to disseminate and exchange information on rice cultivation among relevant stakeholders. The monitoring model is meant to monitor the application of

techniques, surrounding environment, and impacts on households, etc., in the mountainous area. A detailed description and implementation method of each submodel is summarized in Table 1 and Figure 1. Figure 1 shows that the model is equipped with three vectors to promote project effectiveness, (i) productivity improvement to improve food security with technical transfer efforts of the SRI method with farmer field schools (FFS), (ii) further expansion of the SRI method adoption involving related stakeholders with networking people with different roles and responsibilities, and (iii) introducing the monitoring system to ensure productivity improvement and expansion. Importantly, the submodels of the PFSI model interact with each other, deepening the quality of each model and improving project effectiveness together with efficiencies.

**Table 1 Key features of the PFSI model**

Submodel	Description
Technical model for transferring the SRI method	<ul style="list-style-type: none"> <li>• Determining the rate/proportion of the target farmers who adopted SRI, with the experience of approximately 30% of FFS registers and SRI adopters with project intervention leading to subsequent autonomic expansion.</li> <li>• There is no financial support, and any material is provided to farmers focusing on capacity building.</li> <li>• Transferring SRI techniques through (i) FFS, (ii) field tours, (iii) sharing workshops, and (iv) information-education-communication (IEC) materials.</li> </ul>
Network model	<ul style="list-style-type: none"> <li>• The purpose of networking is to exchange and share information about SRI among farmers, KFs, agricultural departments in the government sector, and stakeholders in the academic and private sectors.</li> <li>• With regular activities of (i) study tours, (ii) sharing workshops, and (iii) regular meetings, strategies, policies, initiatives and innovation, and any related events and information are to be shared.</li> </ul>
Monitoring model	<ul style="list-style-type: none"> <li>• Monitoring of farmers’ participation, adaptation of SRI techniques and rice yield, and productivity are monitored by different levels of stakeholders, including KFs, commune agricultural staffs, district staffs, and provincial staffs, in addition to external human resources.</li> </ul>

Source: Project Document “Model Guideline for Alleviation of Food Shortage”



**Fig. 1 Function of each component of the PFSI model**

### Ethnic Minorities and their Agricultural Skill

Vietnam’s household poverty rate fell to 7% in 2015 from 12.6% in 2011. However, the rapid economic growth of recent decades brought widening income disparity between rural and urban residents and among ethnicities. For example, the 2015 Household Living Standard Survey of the GSO indicates that the poverty rate in urban areas was 2.5%, whereas it was 9.2% in rural areas. For project areas, Table 2 gives several insights into how ethnic minority groups still have poverty rates much higher than the national poverty level. In addition, the baseline survey of 2015 ( $n = 180$ ), which was conducted in Bac Tra My, Nam Tra My, and Nam Dong Districts, revealed that each household uses small-scale wet-rice land (e.g. less than 1,000 m<sup>2</sup>, approximately 2,000 m<sup>2</sup> per

household, depending on localities) with relatively low yield. Such disparity in rice productivity was observed among localities even within the same province. Quang Nam had the highest average yield at 5.993 ton/ha in Dai Loc District (located near Da Nang city and in the lowlands). The lowest average yield of 1.901 ton/ha was in Nam Giang District (one of the project targets, located in a mountainous and remote area), found in the Quang Nam statistic year book 2013 (Project Document “Master Plan”).

**Table 2 Ethnicity and poverty situation**

District	Ethnicity	Poverty situation
Dong Giang	Co Tu ethnic: 63.46%; Kinh: 27.84%; Others: 0.97%	46% (2014)
Nam Giang	Ca Tu/Ko Tu, Gie, Trieng: approximately 80%	53% (2014)
Tay Giang	Ca Tu/Ko Tu: More than 90%	46% (2014)
Bac Tra My	Mainly Kinh, KaDong, Cor, etc.	50% (2014)
Nam Tra My	Mainly Ca Dong, Xe Dang, M’Nong, Cor, and Kinh	72% (2013)
Hiep Duc	Ka Dong & Mo Nong	23% (2014)
Nam Dong	Kinh: 56%; Co Tu and others: 44%	7% (2014)

Source: Project Document “Master Plan for the period from December 2015 to March 2019” and project data “General information of district” prepared from the Statistical yearbook of districts

### Key Farmers (KFs) as Lead Innovation Adopters

In the PSFI-1, from the outstanding performance observed during the farmer field school, 36 KFs were identified in three districts, which were the target districts under Phase 1, namely Dong Giang, Tay Giang, and Nam Giang Districts. During Phase 2 starting in 2015, the number of KFs has increased, and the certificate system to acknowledge the advanced level of KFs was introduced as 16 Level A KFs, and 182 Level B KFs were certified in 2017. By identifying KFs in the area, even without a technical transfer effort brought from outside the locality, KFs in their community or neighbouring community are able to transfer the SRI method to non-SRI adopters. By means of such KF development, empowerment of grassroots resources with internal arrangement became possible.

### The SRI Method

The SRI method was first tested in Vietnam in 2002, and it has been greatly popularised in Northern Vietnam since 2007 (Inoue and Yamaji, 2011). The principles of SRI in Vietnam include: (i) transplanting young seedlings with two or three leaves, (ii) transplanting single seedlings and spacing them widely, giving them maximum access to the sun and room to grow to their full potential, (iii) managing water carefully, providing intermittent irrigation to keep the fields moist, but not continuously flooded, (iv) weeding frequently, either by hand or with mechanical weeding devices, and (v) using organic fertilisers, such as animal and plant waste, to promote the development of a healthy soil ecosystem (<http://vietnamsri.wordpress.com/>). SRI allows plants to grow efficiently through soil that is more fertile and to produce healthier plants with greater root growth.

**Table 3 Multidimensional aspects of the SRI method**

Good-match with	Effects and/or characteristics of SRI
1. Poor farmers to save input cost	Reduce amount of seeds (single seedling) – lower cost
2. Farmers to produce chemical-free/safe crop	Reduce/avoid the use of chemicals (i.e. pesticides, chemical fertilisers)
3. Farmers in disaster-prone areas (climate-change adaptation)	Healthy and strong paddy – resilient to disaster, pest and disease management
4. Farmers with less experience in rice cultivation	Increased productivity (accelerated tilling) Simple and flexible in SRI application rules

Although the SRI method is simple and understood as described above for practitioners, the effects with people’s focus vary depending on location and characteristics of SRI evaluators. Table 3 shows how the SRI method was evaluated by different stakeholders who have their own expectations of different aspects.

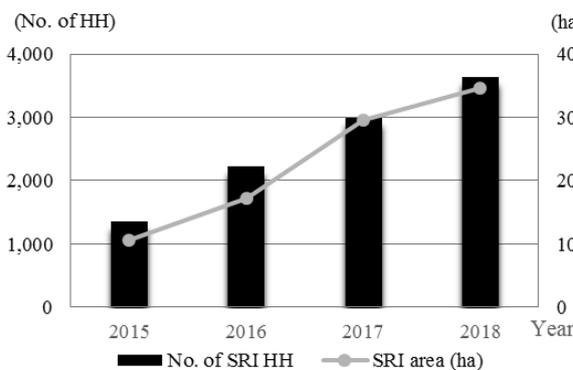
**RESULTS**

**Diffusion of Agricultural Innovation and Changes in Minorities’ Livelihood**

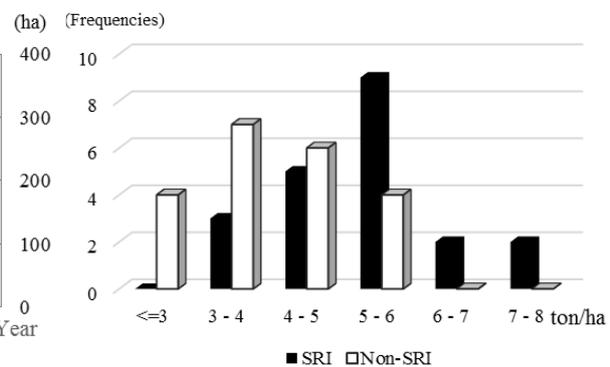
Figure 2 shows the transition of the number of SRI households and total SRI areas of project sites. The figure indicates widespread diffusion in the project area. According to project monitoring data, the total number of SRI households was 1,360 in 2015, 2,222 in 2016, 2,986 in 2017, and 3,641 in 2018, a total of 10,209 households. These numbers are considered the minimum number of SRI households that the project could count within the project frames. Automatic and autonomous diffusion through people’s interaction with non-project sites seems to occur, which is exactly what the model was expected to influence in the mountainous/remote areas. As the number of SRI household increases, the SRI areas also expand. The total area of SRI applied in the project areas amounted to 346.8 ha by 2018.

Regarding the change in yield owing to adoption of the SRI method, “with” and “without” data is presented in Fig. 3. Figures of average rice yield in each district for the years 2015, 2016, and 2017, for SRI sites and non-SRI sites (i.e. 1 plot/district/year x 2 versions (one with SRI, and the other with non-SRI) x 7 districts x 3 years => 21 samples with SRI, and 21 samples without SRI) are compared. The average yield of the SRI sites is 5.3 ton/ha with standard deviation of 1.0 ton/ha, while the average of yield of non-SRI areas is 3.93 ton/ha with standard deviation of 0.9 ton/ha. The difference between “with” and “without” is 1.4 ton/ha, and it is statistically significant,  $t = 4.73$  and  $p = 0.000014$ , < 5%. Thus, it can be concluded the productivity of the project area was improved.

The survey conducted during fieldworks included interviews with farmers in Phu Mua Village of the Dong Giang District, who have joined the project since 2013; the rice production and rice shortages were explained by farmers as summarised in Table 4. It can be understood from the interviews that farmers had to work upland to earn money for their food, and such a difficult situation became harsher because people are poorer in the remote mountainous areas. The adaptation of agricultural innovation for those people is confirmed to be very important for their livelihood reducing their cash spending, not forcing them to invest their time and labour in the upland for their subsistence.



**Fig. 2 Number of SRI households and SRI areas of project sites**  
 Source: Author calculation from Project Data



**Fig. 3 Rice productivity of “with” and “without” project**  
 Source: Author calculation from Project Data

**Table 4 Food security before and after**

Before project	After project
<ul style="list-style-type: none"> <li>• About 50% of their rice was self-supplied by rice production: volume of produced rice was 1.2 bag (1 bag = 10 kg).</li> <li>• The remaining 50% was bought from others. It cost 140,000 dong/bag/month x 4 bags x 10 kg/bags, spending a total of 560,000 dong/month. To earn money to finance rice purchases, farmers typically sold their labour to work upland, planting banana, acacia, casaba, etc., earning 150,000 dong/day (female), 180,000 dong/day (male).</li> <li>• The duration of the rice shortage was 6-10 months/year.</li> </ul>	<ul style="list-style-type: none"> <li>• Of 34 households in the village, approximately 50% of households have a sufficient level of rice available throughout the year, and the remaining 50% of households lack rice for 2-3 months.</li> <li>• With the SRI method, farmers can save seed cost and labour for transplanting and weeding, as they were spending much time for those activities, and traditionally not using herbicides.</li> </ul>

### Key Adopters as Social Communicators

To understand the community-specific characteristics of the target beneficiaries, two kinds of questions were asked of KFs during the survey: (i) what was the happiest moment, and (ii) what was the most difficult moment. This section describes some findings on social relations with diffusion of innovation in the target areas, by showing the survey results. The survey was conducted on three groups of key farmers in Tay Giang, Dong Giang, and Hiep Duc Districts. The first group in Tay Giang consists of 12 KFs, all young females, mainly of the Co Tu ethnic minority. The second group in Dong Giang consists of 11 KFs (5 males, 6 females), mainly of the Co Tu ethnic minority of a younger generation, except one landless Kinh woman. The third group in Hiep Duc consists of 7 KFs (2 males, 5 females), Kinh senior farmers, aged 50 - 60, with a total sample size of  $n = 30$ . The first and second groups did not have much rice cultivation experience before the project, whereas the third group in Hiep Duc had long experience in rice cultivation, having used many agro-chemicals previously. The answers received from KFs in their happiest moment and the most difficult experience are summarised in Tables 5 and 6. Table 5 indicates that groups of ethnic minorities place a relatively higher value on others' success and the opportunity to meet others, which was not the case with Hiep Duc's KFs, who are mainly Kinh people, whereas KFs of all groups expressed their happiness when they shared knowledge with other farmers, teaching others. Such results are consistent with the nature of the Co Tu ethnic minority community, who are closely united internally and care for other members' happiness together. Also, from the interviews with Kinh KFs in Hiep Duc, farmers shared their experience of visiting mountainous areas to teach the SRI method to ethnic minorities, who had less confidence at the beginning, but later win trust from the villagers he taught. Moreover, KFs seem enthusiastic about meeting others (including government officials and visiting other regions through the study tours), which may be the indication of increased opportunities to interact with outside communities. Table 6 shows that KFs' main concerns were coming from relations with others (e.g. the difficulty of inviting other farmers to participate in the training activities). Such results indicate that they are playing an important role in connecting farmers in remote areas, leading to inclusive training opportunities, although government sectors were not so easily accessible previously.

**Table 5 The happiest moment**

Nature of answer	Social capital			Human-capital		Welfare
	Other's success	Teaching others	Meeting others	Learning opportunity	Improved capacity	Yield & SRI merit
Tay Giang ( $n = 12$ ) (All women, minorities, and young)	3 25.0%	3 25.0%	3 25.0%	4 33.3%	1 8.3%	4 33.3%
Dong Giang ( $n = 11$ ) (Gender mixed, mostly minorities and young)	0 0%	2 18.2%	6 54.5%	3 27.3%	2 27.3%	4 36.4%
Hiep Duc ( $n = 7$ ) (Gender mixed, Kinh, relatively older)	0 0%	3 42.8%	0 0%	0 0%	1 14.3%	5 71.4%

**Table 6 The most difficult moment**

Nature of answer	Social capital	Human capital	Others	
Answer	Relation with others	Own mind and attitude related	Pests and natural conditions	Others
Tay Giang ( <i>n</i> = 12) (All women, minorities, and young)	5 41.7%	0 0%	5 41.7%	1 8.3%
Dong Giang ( <i>n</i> = 11) (Gender mixed, mostly minorities and the young)	5 45.5%	4 36.4%	1 9.1%	5 45.5%
Hiep Duc ( <i>n</i> = 7) (Gender mixed, Kinh, relatively older)	3 42.9%	2 28.6%	0 0%	1 14.3%

## DISCUSSION AND CONCLUSION

The review of the components and functions of the PFSI model, together with its results, reminds us that (1) ethnic minorities have the potential to improve their food shortages by adopting agricultural innovation (even if innovative methods for minority groups may not be new to ethnic majorities), saving their time and cost to work upland for their subsistence; and (2) minorities themselves can play an important role in influencing their community, improving communication within minority communities.

Vietnam is now the world's leading rice producer, and often, Vietnamese farmers are rich in their rice production experience. However, such a perception is based on stereotypes formed from the performance of ethnic majorities, which strongly influences the country's average agricultural output; however, this study indicated that some groups are still not familiar with cultivation techniques, because they typically lived upland in mountainous areas and were not used to practising farming in the wet-land. Recognising such minority people's characteristics and potential for diffusion of agricultural innovation, it is meaningful to conduct a project to diffuse such agricultural innovation.

In addition to such an effort to diffuse agricultural innovation, we should reconsider why such initiatives were not possible in the past. The areas where minorities live are typically located in remote areas, where it is difficult for government and/or private sectors to reach them. Also, a socio-cultural barrier stood in the way of connecting with minorities, because their culture is unique and difficult for the majority to understand. Under such conditions, the identification of KFs from their community or neighbouring communities allowed the project to bring innovation more easily via KFs, who played an important role in communicating with minorities, leading to further diffusion of agricultural innovation through the establishment of faster communication channels.

In conclusion, the paper described how poverty and food security of ethnic minorities in the remote and mountainous areas in central Vietnam were improved by providing data and experience of the PFSI model. The lessons learned from the case provide important insights towards solving growing concerns about disparities among ethnicities and localities in Vietnam; the heterogeneous features of Vietnamese localities should be recognised, with more participation from ethnic groups to be enforced in the effort to fight the disparities among localities and ethnicities.

## ACKNOWLEDGEMENTS

The author expresses sincere gratitude to the Foundation for International Development / Relief (FIDR) Vietnam Office, who supported survey activities during the fieldwork.

## **REFERENCES**

- Dang, H.A. 2010. Chapter 8 Vietnam: A widening poverty gap for ethnic minorities. In *Indigenous People, Poverty, and Development*. World Bank.
- General Statistical Office (GSO). 2006. *Vietnam household living standards survey 2006*. Hanoi: Statistical Publishing House, Vietnam.
- General Statistical Office (GSO). 2015. *Vietnam household living standards survey 2014*. Hanoi: Statistical Publishing House, Vietnam.
- Inoue, K. and Yamaji, E. 2012. Introduction and adoption of a system of rice intensification towards low-input agricultural production in Vietnam. *International Journal of Environmental and Rural Development*, 3 (1), 16-21.
- Rogers, E.M. 2003. *Diffusion of innovations*. Fifth Ed. New York: Free Press.