

FACTORS AFFECTING TECHNOLOGY ADOPTION AMONG RICE FARMERS IN THE MEKONG DELTA THROUGH THE LENS OF THE LOCAL AUTHORIAL MANAGERS: AN ANALYSIS OF QUALITATIVE DATA

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ABSTRACT

Through the lens of local managers, factors affecting adoption of new technologies included farmers' perception and education, extension workers' knowledge, ways of organization and management of extension programs, and physical conditions of the area. The important barriers in adoption of new technologies were farmers' low educational level, their weak perception of technologies and limited teaching skill of extension staff. The extension program did not reach remote area. The technical information orally transmitted from trained farmers to non-trained farmers might be lost some. The IPM and three reductions and three gains were complicated strategies to farmers. There was time consumption, high labor and capital requirement in adoption of these technological strategies. Farmers need capital to purchase row seeding tools and certified seeds. Mechanization was not popular in harvesting and post harvesting due to high cost, small pieces of lands with the web of irrigation canals and branches of rivers.

INTRODUCTION

Rice plays important roles in both producers' and consumers' life in rice cultivated area in the Mekong Delta. The technology adoption aims to increase production not only for national food security but also for exporting. In recent years, the technology development in reaching the sustainable agriculture and friendly environment, the technologies as IPM, three reductions - three gains, row seeding, using certified seeds have been recommended. Though there have been trainings and campaigns to trigger farmer using of the technologies, the adoption extent was still low or adoption in short period. Dung (2005) reported that rice variety has special roles in increasing agricultural production. According to Ministry of Agriculture and Rural Development, the increase of 30% of total agricultural production of the nation in the past time was due to the introduction of new varieties. However, the rate of farmers used certified rice seeds in the Mekong Delta was low. The cost in rice production can be reduced 30% when farmers applied certified seeds, row seeding and IPM. In fact, the area applied three reductions and three gains in 2005 in the Mekong Delta only accounted for 15% of rice area (Khanh Mau 2006). The socio-economic change in Viet Nam has affected farmers' adoption of

technologies. This paper focuses on factors affecting technology adoption in rice production through the lens of local managers to contribute to the building of strategies and policies for technology adoption.

METHOD OF DATA COLLECTION

The qualitative data on socio-economic factors affecting the adoption of IPM, three reduction - three gains, row seeding, certified seeds and rice varieties, dryer and mechanization in rice harvesting was collected by using participatory rural appraisal (PRA). The key informants included the staff working in provincial departments of agriculture and rural development, provincial extension centers, provincial plant protection departments in 13 provinces. The focus group discussion was conducted with the staff at communes and villages. The key informants were also requested to evaluate the advantages and disadvantage of the technologies.

RESULTS AND DISCUSSION

IPM strategy (Integrated pest management)

The advantages of IPM included input cost reduction (saving from less seed and pesticide use); benefit increase, and environment protection. However, the extent of IPM application was low

due to the disadvantages as its complexity leading to difficulty to be applied by farmers. IPM comprises of many measures, which are not well acquired by farmers' educational limitation.

The conditions, which are necessary for farmers to follow IPM included increase of farmers' technical knowledge by training, farmers' understanding the usefulness of IPM by witness of demonstration fields. Farmers should obtain certain education level and well associate with rice farming to be enthusiastic in learning new technology. The well-organized mass media and people associations play important role in farmers' adoption of IPM. The extension staff's knowledge and updated knowledge and their satisfied wages can increase IPM adoption. The extension staff at commune level should know well farmer cultivation schedule to arrange suitable timing for training. The staff should teach IPM by the stages of rice plant and let farmers discuss themselves. The staffs do practices together with farmers. The training also should be organized in the remote villages to have chance for remote rural farmers to attend. The materials distributed to farmers should be easy to understand by farmers.

The main reasons of non-adoption of IPM included weak perceptions of IPM and low education of farmers, weak teaching capacity and limited knowledge of extension staff, not-well organization and management of extension programs, limitation of concrete conditions of local area and fund. Some measures in IPM cannot be applied in certain locations such as water management to control pest in special conditions of rice areas in the coastal provinces as Ben Tre and Ca Mau. For example, the sandy soil in Ben Tre drains water rapidly after water pumping into the field to control rice thrips. Thus, farmers only applied some measures in the integrated measures in IPM. Moreover, the incomplete irrigation systems led to difficulty in water management to control case worm and sheath borer in Bac Lieu province.

In Long An province, farmers understood wrong meaning of IPM. They understood that IPM is associated with no using insecticide meanwhile IPM is the integration of different methods including proper and timing application of

insecticide when necessary. Gender and neighbors affected the use of IPM. Wife felt worry when husband did not spray insecticide as schedule to prevent pest. Thus, IPM training should have women participation. Farmers used insecticide when neighbor did spray though their field did not need to spray.

The rate of technology adoption was low under limitation of fund for extension activities as training and demonstration. Most of the provinces reflected that the fund of extension program is enough for small demonstration field. Thus, the extension staff usually selected to field for demonstration with more favorable conditions in transportation, well leveled and good field. After seeing the demonstration field, farmers practiced on their own fields and did not get success. Demonstration at small farm level is not representative for the area, farmers did not believe well. Poor farmers, too small or too large field were other reasons for not applying IPM.

Row seeding

The advantages of row seeding included seed saving, crop caring easily, low insect pest attack, and row seeder was bought and used easily. However, row seeding requires well land preparation with well leveling. It also needs high rate of seed germination, proper seed soaking and incubation, and well water maintaining after sowing. The sowing task needs more labors in row seeding (4 mandays/ha) than broadcasting (0.5 mandays/ha).

The important conditions for farmers to adopt row seeding comprised of leveled fields and training. Farmers need capital to buy row seeders. Though the provincial extension centers had subsidy on the cost of row seeders, there was still not sufficient as compared to the demand. Large field demonstration, information transmitted from mass media, good irrigation systems inside the field, and strong belief on row seeding from farmers are necessary for well row seeding adoption. Progressive and highly educated farmers adopted row seeder better. Row seeder adoption also needs well management of golden snail.

The small field with bad leveling land was difficult to pull the row seeding tools during

sowing operation. Some rice areas in coastal provinces of Ca Mau and Tra Vinh cannot be applied row seeding because of saline, shallow, dry soil with large cube and difficult water management. Farmers in these areas also traditionally practice dry seeding. They did not use low seed rate because of bird, rat attack and bad weather. The other reason for not adoption of row seeder related to water. Water was a problem in the coastal areas because the field was dry for 10 days without water to supply or the standing water of 20cm depth in the field without way for drainage. The cost of row seeders was high as compared to the farmers' pockets. The available row seeders were not sufficient for synchronic row seeding for all fields. Farmers were afraid of pest attack as golden snail, thus they still preferred to use high seed rate, especially in wet season.

Three reductions-three gains

“Three reductions-three gains” represented for the methods of reducing seed rate, fertilizer and pesticide in rice production to obtain three increases of yield, rice quality and economics.

To increase adoption of three reductions-three gains, there should be farmers who like new technical learning, curious with the new technology and willing to do trial. Farmers also have capital for farm and they can afford the trial. The poor hesitated in doing trial because of being afraid of failure. Good education farmers, training, information from mass media and good irrigation system inside the fields are necessary to increase adoption.

Not all farmers adopt three reductions and three gains because this comprised of many measures that required highly producing knowledge farmers to follow. Some of farmers only followed some components in three reductions and three gains such as reducing seed rate and nitrogen fertilizer only in . Other fertilizer kinds were not reduced. It was not so sure in insecticide reduction because pesticide using was influenced by the advertisement of pesticide companies. Farmers got some material inputs from the fertilizer and pesticide selling agents by buying on credit. In some areas, farmers only reduced fertilizers and insecticide but not seed rate because of golden snails. Unleveled land and low germination seeds

from the self-producing seed farmers retarded the adoption. The levels of fertilizer reduction in three reductions and three gains were not specific for certain rice varieties, seasons and areas. The low capacity of the extension staff could not able to convince farmers to adopt. Farmers who were afraid of low rice production due to small rice land hesitated adoption. Weather with heavy rains and typhoon affecting wet rice seasons was difficult for farmers to reduce seed rate, thus farmers could only reduce seed rate in only dry season. The area with traditionally dry seeding cannot be applied all components in the process of three reductions. The reduction in this process was not much significant in the small poor farmers. Small land farmers who were busy in working as hired labors at the slack farming period did not noticed this new technology.

This technology adaptation depended on the ecosystem (irrigation source, fresh or saline water area, inland fields or near to the coastal area)

To increase the adoption of three reductions and three gains, farmers should be increased their knowledge about the benefit and economic efficiency of this technology. Thus, mass media should reach all farmers, especially in the remote areas. Enhancing capacity on the extension and management of the extension staff, increasing fund for extension activities, and merging the small farms are needed for wider adoption.

Certified seeds and new rice varieties

Training farmers on seed technologies and dissemination of information on advantages of using certified seeds are necessary conditions to increase adoption of certified seeds. The increase of fund support for farmer field school and demonstration helps farmers self evaluate the efficiency of using new rice varieties and certified seeds. Farmer group for seed multiplication should be strengthen to produce sufficient certified seed amount for local farmers under the supervision of technical staff.

There were many reasons for not using certified seeds by farmers. Farmers often kept certain seed amount from the rice harvest for the next rice-planting season. They mostly did not care about certified seeds. They self produced or bought

seeds from the neighboring farmers with lower cost than the cost of certified seeds. In fact, the certified seeds in seed markets were not sufficient to supply as demand. Some farmers spent for transportation to buy certified seeds from seed centers or research institutions because there was no place selling seeds at their local area. The transportation may increase cost of rice inputs, thus they were unwilling to go far to buy seeds.

Harvesting by machine

Mechanization in rice harvesting was at low extent because the limitation of machine quality and quantity. The important disadvantage of harvesting machine was too bulky and heavy to move from field to field. The cost of machine was high. The machine operation was mainly in dry rice season. In wet season, it was sunk into the muddy and soft soil. The harvesting machine could not cut the lodging rice and rice at corners of the field parcels.

Mechanization in rice harvesting needs the large

field, capital and standing rice at harvest. In fact, mechanization in rice harvesting in the Mekong delta faced difficulty due to web of irrigation canals and ditches, narrow pathway, small field, soft and muddy soil

Rice dryer

Rice dryer could reduce grain loss from sun drying and pressure of hired labors at post harvest. It also increased rice quality better than those of sun drying, especially in raining season. However, the cost of drying by dryer was higher than those of sun drying. Farmers also paid for transportation from their house to the place of dryer service. Large technical error and long time of drying by some current dryers retarded the drying rice by machine from farmers. Large investment for dryer service and getting back money slowly due to dryer operating mainly in the wet season was obstacle in adoption.

Table 1: Problem in rice dryer adoption

Problem	Ranking (*)	Note
Location of dryer establishment	1	Should be convenient for both road and river/canal transportation
Techniques in operation	2	The person operating dryer should know well the technique according to type of machine to increase the rice quality at milling
Labor	2	Need to manufactured the dryer with saving labor
Fuel cost	3	Fuel cost depends on market price. The dryer owner can replace the diesel and electricity with rice husk

(*) One is the most important

Table 2: Summary the factors affecting the technology adoption by rice farmers in the Mekong Delta

Factor	Ranking (*)	Note
Factor related to household conditions		
Education	1	Farmers with high education had better recognition of advantages of new technologies and acquirement the technical knowledge and information
Farmer's perception	1	Farmers did their old practices and hesitated to adopt the innovation because they worried the yield loss when applied new technologies that they had not known well
Capital/Poverty	1	Poor farmers could not afford for the technologies required more capital inputs as certified seeds and new rice varieties
Age	2	Young farmers had higher rate of adoption than conservative old

Factor	Ranking (*)	Note
		men
Ethnic	2	Most of the minority people are poor and do earning from working as off-farm hired labors aside from rice farming, they do not have time to pursue the innovation which requires more labors
Gender	3	Women less accessed to technical information and training leading to disagreement with husbands in applying new technologies. Thus, it should increase women participation in training
Land size	4	Small farmers did not care about new technologies. Small rice field prevented the mechanization of harvesting and post harvesting
Family labor	4	Lack of family labor prohibited the adoption of new technology due to young labors working in the industrial zone
Factors outside the household conditions		
Training	1	Training participants should include farmers in the remote areas where farmers have less access to training and information.
Extension personnel, methods and knowledge of extension staff	1	The number of extension staff was too small and they have to do other responsibilities in the village aside from extension works. The extension staff capacity to convince farmer was low. The site, timing, and participant selection for training was not always rational. There is the need of strengthening manpower and equipments for extension
Infrastructures and ecosystem	1	Higher technology adoption in irrigated area than in the rainfed area. There is the need of construction the infrastructure as transportation road and irrigation systems
Information	2	Information systems are available. Information should be converted into typical stories in the community to attract the notice of farmers
Site of training organization	2	Site of training organization should be convenient for farmers to participate
People association	2	Extension clubs, IPM clubs, farmers' Association, Women's Association and tightly cooperation of FATS (Farmers, Administrators, Traders, and Scientist) stimulate the adoption of technologies
Market price	3	High price of rice products can increase the adoption of new innovation. High cost of material inputs (as fertilizer and pesticide) will decrease the use of new technologies. There is the need of co-ordination between producers and businessmen
Advertisement and marketing	3	Advertisement with special offer affected farmers' adoption of new technologies
Neighbors	4	Farmers usually imitate each other
Clinic station	5	Clinic station availability in the village or commune increased health awareness from farmers, which leads to increase adoption of technologies reducing human health affect and environmental hazard as IPM, three reduction - three gains

(*) One is the most important

CONCLUSION

Main factors affecting farmers' adoption of technologies were their perceptions of technologies, knowledge level of extension staff, methods of organization and management of the extension program and local conditions. Low education, low perception, lack of capital, small land, not good infrastructures and limited capacity of extension staff led to low technology adoption. Extension program for farmers in remote area and information transmitted orally among trained farmers were not enough to increase adoption. Technologies with complicated components or required more time and labors were difficult for farmers to apply.

Yếu tố ảnh hưởng đến tiếp nhận và áp dụng tiến bộ kỹ thuật của nông dân trồng lúa dưới sự phân tích của nhà quản lý địa phương

Theo các nhà quản lý địa phương, sự tiếp nhận và áp dụng tiến bộ kỹ thuật bị ảnh hưởng bởi sự nhận thức và trình độ giáo dục của nông dân, trình độ kiến thức của cán bộ khuyến nông, phương pháp tổ chức và quản lý khuyến nông và điều kiện đồng ruộng địa phương. Rào cản quan trọng trong áp dụng tiến bộ kỹ thuật là trình độ văn hoá thấp, nhận thức không đúng đắn về kỹ thuật, kỹ năng khuyến nông hạn chế và chương trình khuyến nông chưa đến tận vùng sâu. Thông tin về tiến bộ kỹ thuật truyền miệng giữa nông dân được tập huấn và nông dân không được tập huấn có thể không chính xác. IPM và Ba giảm Ba tăng là những kỹ thuật phức tạp đối với nông dân. Chúng yêu cầu nông dân tốn nhiều thời gian và công lao động. Một số kỹ thuật yêu cầu nông dân phải có vốn để áp dụng như sạ hàng và dùng giống xác nhận. Cơ giới hoá khâu thu hoạch và sau thu hoạch chưa phổ biến vì chi phí máy móc lớn, diện tích đất nhỏ và hệ thống kênh rạch chằng chịt của ĐBSCL.

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