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Full Length Research Paper

Analysis of paddy-field consolidation effects for Iranian rice farmers

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The most important targets of land consolidation projects are reducing expense generation and increasing rice farmers' income. This article analyzes land-consolidation effects from the viewpoint of Iranian rice farmers. The research was conducted in the form of a survey study. The data for this research was collected from 176 farmers cultivating traditional rice fields and 188 farmers participating in a farm-development program in Guilan Province. The farmers were sampled using a stratified random sampling method. The reliability of the questionnaire was calculated using a Cronbach alpha coefficient (alpha >0.66) for different sections after conducting a pilot study. The results showed that there are positive and significant relationships between rice farmer's satisfaction and variants such as rice farmer's education, rice farmer's income, eliminate daring problem, eliminate the problems of irrigation and eliminate the problems of access to farm. The mean contrast results showed that there are significant differences between variants such as rice farmers satisfaction, toxicity usage and number of parcels between the rice farmers with traditional and developed lands.

Key words: Land consolidation, agricultural development, paddy fields, Iran.

INTRODUCTION

Land consolidation is a strategy for development of Iranian rice fields. Rice is the second most important food source after wheat in Iran, particularly in northern areas (Peykani et al., 2008). Land consolidation has led to the expansion of paddy field size, enhancing the efficiency of large machinery, which in turn has resulted in increased productivity. The other important initiative in paddy-field improvement has been the promotion of mixed land use: to cultivate the upland crops such as wheat and soybean along with rice, to minimize rice overproduction. On the whole, paddy-field improvements represent an important technical and political measure to achieve sustainable development of agriculture, reconciling the demands for food production and environmental conservation (Wrachien, 2003). The objective of this article is the analyze land-consolidation effects from the viewpoint of Iranian rice farmers.

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Conceptual framework

Anbumozhi et al. (2001) studied sustaining agriculture through modernization of irrigation tanks. Their study showed that such a program can cut water usage by more than 25%. A pilot project showed that by physical (hardware) modernization alone, irrigation efficiency was improved by 32.25%, and yield increased by about 30%. Also, Castro Coelho et al. (2001) studied a systems approach for estimating the effects of land-consolidation projects. Their results suggested the existence of synergies among the different investments usually included in such projects: in other words, there was an increase in the returns exceeding the sum of impacts from the individual changes. The results showed that land-consolidation projects have led to more rational use of land, an increase in land and labor productivity, a

Table 1. Reliability analysis (Alpha).

Scale name	No. of items in scale	Alpha value
Satisfaction	11	0.68
Easy access	5	0.63
Sustainable development of rice cultivation	5	0.72
Environmental pollution	4	0.62

decrease in production costs, an increase in farmer incomes and, in more general terms, an important improvement in rural standards of living. This research suggests that land consolidation can be an important step in promoting rural development in depressed and fragmented agricultural areas.

Kunimitsu et al. (2005) conducted a benefit-incidence analysis on the far-reaching effects of paddy-field consolidation projects. The results were as follows: first, certain farmer benefits primarily derived from the projects have been transferred to consumers through a recent decline in rice price. The transfer ratio was more than half of the total improvement effect of rice productivity for the farmers, and all economic sectors – including farmers and consumers – received net benefit even though all sectors paid construction costs or taxes. Second, some unexpected benefits with regard to effects on the rural environment were revealed on many project sites. Also, Shuhao et al. (2007) studied the question of whether fragmented landholdings have higher production costs. Their study showed that a reduction of the average distance to plots and an increase in farm size decreased total production costs per ton.

Sanzidur and Mizanur (2009) studied the impact of land fragmentation and resource ownership on productivity and efficiency. Results showed that, as expected, land fragmentation had a significant detrimental effect on productivity and efficiency. These studies give strong evidence that land consolidation programs can only contribute to the joint policy goals of increasing agricultural production capacity. This research investigated the land-consolidation effects from the viewpoint of Iranian rice farmers.

MATERIALS AND METHODS

This study is an applied research carried out by the survey method. The data for this research was collected from 176 farmers cultivating traditional rice fields and 188 farmers participating in a farm-development program in Guilan Province. The farmers were sampled using a stratified random sampling method. The questionnaire-by-interview method was used for data collection. To examine the reliability of the questionnaire a pilot test was conducted on 30 rice farmers in Syahkal County and the Cronbach alpha coefficient for the Likert-type scales used in the survey was calculated. The alpha value confirmed that the selected scales were appropriate for measurement (Table 1). The correlation and mean contrast was used for analysis of data for two groups of farmers in traditional and developed fields.

RESULTS AND DISCUSSION

The survey results showed that rice farmers in both groups were generally middle-aged men. The average size of traditional paddy fields was about 1.3 ha, and in developed paddy field was 1.4 ha. By contrast, the average size of rice paddies across Iran is at least 1.5 ha. The number of traditional plots each farmer worked was three, and the number of developed plots was two. This suggests significant scope for a land-consolidation project to decrease of number of plots in Iranian paddy fields (Table 2). Survey results also showed that farmers' access to developed paddy fields was better than before development had taken place (Table 3). Farmers viewed the sustainability of rice cultivation as critical (Table 4). To analyze the relationship between the variables within the group of farmers working the developed paddy fields, correlation analysis was applied. Table 5 shows a significant correlation between satisfaction with the development project and number of plots, education, income, eliminate daring problem, eliminate the problem of irrigation, reduce land requirements of plan and eliminate the problem of access to farm. The mean contrast results showed that there are significant differences between variants such as rice farmer's satisfaction, number of plots and toxicity usage for the two groups (Table 6).

Conclusion

The results of this research showed that as the rice farmers reported the use of machinery to carry inputs improved from 61.4% in traditional fields to 86.7% in developed fields, an increase of 25.3%. The use of machinery to carry crops improved from 52.8% in traditional fields to 89% in developed fields, an increase of 36.2%. The use of machines to harvest improved from 12% in traditional fields to 24.4% in developed fields, an increase of 12.2%. Therefore, it could result, from the view point of rice farmers, that the land consolidation projects could decrease the plots of paddy fields to two plots as an average for each farmer. This result was confirmed by Anbumozhi et al. (2001), Shuhao et al. (2007) and Sanzidur and Mizanur (2009).

The farmers reported that the use of biological pest-control measures improved from 57.4% in traditional fields to 62.8% in developed fields, an increase of 5.4%.

Table 2. Individual characteristics of traditional and developed paddy-fields farmers.

Group	Variable	Parameter
Traditional paddy-field farmers	Age	Mean: 48.23, Sd:11.96
		Mode: 60
	Farming land-size (ha)	Mean: 1.227, Sd:0.723
		Mode: 1
	Number of plots	Mode: 3
Developed paddy-field farmers	Age	Mean: 46.32, Sd:12.33
		Mode: 45
	Farming Land-size (ha)	Mean: 1.399, Sd:0.867
		Mode: 1
	Number of plots	Mode: 2

Table 3. Farmers' perceptions of access to rice fields before and after the land-consolidation project.

Group	Variable	Parameter
Traditional paddy-field farmers	Carrying of inputs	Hand: 38.6%, Machine: 61.4%
	Carrying of crops	Hand: 47.2%, Machine: 52.8%
	Harvest method	Hand: 88%, Machine: 12%
Developed paddy-field farmers	Carrying of inputs	Hand: 13.3%, Machine: 86.7%
	Carrying of crops	Hand: 11%, Machine: 89%
	Harvest method	Hand: 76.6%, Machine: 24.4%

Table 4. Index of sustainability of rice cultivation from rice farmers' viewpoint.

Group	Variable	Parameter
Traditional paddy-field farmers	Chemical fertilizer (kg/ha)	Mean: 305.05, Sd:153.399
	Combat biological	Non-use=42.6%, use=57.4%
	Chemical toxicity (kg/ha)	Mean: 7.095, Sd:8.261
Developed paddy-field farmers	Chemical fertilizer (kg/ha)	Mean: 297.93, Sd:150.614
	Combat biological	Non-use=37.2%, use=62.8%
	Chemical toxicity (kg/ha)	Mean: 5.732, Sd:3.64

Rice farmers with developed fields reported using 5.7 kg of toxic chemicals per hectare, while rice farmers with traditional fields reported using 7.1 kg per hectare, about 17% more. In the whole, the land consolidation could be improved by the suitability index for developed fields for example, reducing the use of chemical toxicity and increasing the biological pest-control measures. This result is in agreement with Kunimitsu et al. (2005).

The result research showed that there was a significant correlation between rice farmers' education level and satisfaction with the land-consolidation project at the 95% level. There was also significant correlation (at the 99% level) between satisfaction with the land-consolidation project and number of plots, income, elimination of drainage problems, elimination of the problem of irrigation, reduction in the land requirements of the plan and elimination of the problem of access to farm lands. Therefore, it could be said that rice farmer's satisfaction related to solve the basic problems in paddy field for example irrigation, daring, accessibility and farmers incomes.

There was a significant difference between the two groups in their rice farmer's satisfaction with the land-consolidation project. Farmers of developed paddy fields reported a better satisfaction from the projects. Also, the rustle showed that there was a significant difference between two groups in the number of plots for each paddy farmers because the land consolidation could reduce the plots of paddy fields and compounded the plots. Also, the land consolidation projects could reduce

Table 5. Correlation between variables for developed paddy-field farmers.

Variable	Correlation type	Satisfaction with project
Number of plots	Pearson	-0.229**
Education	Pearson	0.178*
Attitude toward project	Spearman	0.694**
Income	Pearson	0.230**
Eliminate drainage problems	Spearman	0.331**
Eliminate the problem of irrigation	Spearman	0.330**
Reduce land requirements of plan	Pearson	-0.149**
Eliminate the problem of access to farm	Spearman	0.320**

*Correlation is significant at 0.05 level, **Correlation is significant at 0.99 level.

Table 6. Mean contrast between traditional and developed paddy-field farmers.

Variable	Mean according to group	t	Sig
Number of plots	Traditional paddy-field farmers=2.85 Developed paddy-field farmers=2.36	16.96**	0.000
Rice farmers satisfaction	Traditional paddy-field farmers=12.27 Developed paddy-field farmers=15.77	81.913**	0.000
Chemical Toxicity usage	Traditional paddy-field farmers=7.11 Developed paddy-field farmers=5.73	19.05**	0.000

*Significant at 0.95 level, **Significant at 0.99 level

chemical toxicity usage. This result was confirmed by Castro Coelho et al. (2001) and Sanzidur and Mizanur (2009).

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