

Perception Formation of Farm Households about Land Improvement Projects A Case Study from Nishi-Kanbara, Niigata Prefecture, Japan

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(Received December 26, 2006)

Summary

Land improvement projects are implemented with government subsidies. Among the reasons for this are the externalities of the economic effects of such projects and the fact that these projects have the aspect of public goods. Moreover, land improvements have a feature of the non-exclusive goods, which makes these projects difficult to implement with market-based transactions alone. At the same time, Japanese people's demands for the functions provided by agriculture and rural communities are changing in the past few years. Regarding the effects of land improvements, multiple functions are also being sought. Furthermore, the aging of existing land improvement facilities, co-mingling of non-farming households in rural areas, and the diminishing ability of farming households to maintain and manage land improvement facilities due to sluggish regional agriculture are now considered new challenges. Thus, encouraging the participation of community residents, including members of non-farming households, has become important in the planning and implementation of projects. However, reaching a consensus among diverse stakeholders is not expected to be easy. This study attempts to reveal the formation of perception structure among farm households about land improvement projects. It also draws policy implications for an effective rural planning.

Bull.Facul.Agric.Niigata Univ., 59:72-81, 2007

Key words : evaluation of externalities, land infrastructure improvement project, management objective, management philosophy, perception formation of farm households

Land improvement projects are implemented with government subsidies. Among the reasons for this are the externalities of the economic effects of such projects and the fact that these projects have the aspect of public goods. In other words, the consent of many farming households is required since the product itself is land improvement and involves goods that are subject to an economy of scale, provided that farmlands concerned are assumed to be minuscule, dispersed, and intermingled. This causes the transaction cost to be high. Moreover, land improvements have a feature of the non-exclusive goods, which makes these projects difficult to implement with market-based transactions alone. For these reasons, these projects have been undertaken with government subsidies and based on the benefit principles (Nakashima, 1998).

At the same time, recent changes in the agricultural environment both in Japan and abroad in the past few years have resulted in demands by the Japanese people for major changes in the functions provided by agriculture and rural communities. Regarding the effects of land improvements, multiple functions are also being sought. These include preserving national lands, taking disaster prevention measures, and improving a water-friendly environment, in

addition to agricultural production. (For details of the multifunctionality of agriculture, see OECD(2001) and OECD(2003)). Furthermore, the aging of existing land improvement facilities, co-mingling of non-farming households in rural areas, and the diminishing ability of farming households to maintain and manage land improvement facilities due to sluggish regional agriculture are now considered new challenges. Thus, encouraging the participation of community residents, including members of non-farming households, has become important in the planning and implementation of projects. For this reason, the Land Improvement Law was partially revised in June 2001, with "attention to harmony with the environment" becoming the new principle of project implementation. Moreover, the planning of projects must now be designed to reflect the community's desires (submitted by community residents in the form of opinion statements).

Ongoing investments in land improvement have been made through government subsidies over the years. Conversely, the economic effects of land improvement projects have yet to be adequately evaluated (see Furuzawa and Kiminami, 2006; Kiminami and Kiminami, 2005). Furthermore, a planned project that involves the participation

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This Paper was presented at International Conference "The 9th PRSCO(Pacific Regional Science Conference Organization) Summer Institute," (Kuala Lumpur, Malaysia, July 18-20, 2006).

of community residents implies the presence of diverse stakeholders. Consequently, reaching a consensus is not expected to be easy.

The relationship presented in **Fig. 1** is assumed to be the framework of overall analysis. In other words, the “directionality of land improvement” is determined through the formation of two structures of perception, namely the “the intention of entities” and the “wishes of community residents” (see Furuzawa and Kiminami, 2004). Moreover, the “evaluation of land improvement” affects the formation of these structures of perception, and is considered made from two facets: “economic effects” and “externality.” Therefore this study attempts to reveal the structure of perception among farm households about land improvement projects. It also draws policy implications for rural planning.

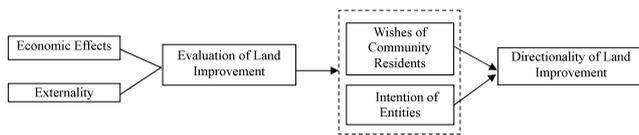


Fig.1. Determination of directionality of land improvement

ANALYTICAL METHOD AND DATA

Investigation area

This research covers Nishi-Kanbara area of Niigata Prefecture. Nishi-Kanbara is an area located around the center of Niigata Prefecture surrounded by Shinano River, Nakanoguchi River, and Yahiko Mountain. This area is composed of 2 cities and 10 towns and villages including a part of Niigata City (including former Kurosaki-machi), Nishi-Kanbara-gun (Tsukigata-mura (village) not included), and Tsubame City. Since one third of the area is made up of flat lowland, it has suffered from injuries to the crops during the time when the flood control measures were yet to be sufficiently established. In recent years, however, many land improvement projects have evolved in this area, and as a result of promoting the improvement of the drainage system, agricultural products are now being stably produced. The agriculture in this area is based on rice cultivation mainly of Koshihikari breed now combined with other products such as soy beans, vegetable, and fruits.

The population and number of households in this area are now on the rise. The percentage of farmers in the total household (farmer ratio), however, has decreased to as low as 6.9% in 2000, revealing the urbanization and the advance of the mixture caused by the increase in the non-farmer residents. Although the ratio of part-time farmers exceeded 90%, the ratio of Class 1 part-time farm households (i.e. farm households earned main income from farming) decreased while the ratio of full-time farm households and Class 2 part-time farm households (i.e. farm households earned main income from other jobs) respectively showed upward trends.

There is a number of problems in the requirements for the supply and drainage of farm-use water in the Nishi-

Kanbara area. Firstly, the farm-use water discharged at the upper reaches of the river is being reused as supply water for crops down the stream. As the result the farmers down the river have no choice other than to use deteriorated water for irrigation. Secondly, there is an issue that canals are not separated for irrigation and drainage. The third issue is that, with a backdrop of the expansion of the residential areas, local residents dumping domestic wasted water into the irrigation/drainage canals is accelerating the deterioration of water. In addition to this, along with the enforcement of the system of charging the waste disposals, there are increasing number of people illegally disposing of garbage in rivers and canals. Fourthly, creating concrete-sided irrigation/drainage canals has resulted in defying fish and other creatures that used to live in the canals. Accordingly, children are having less chance to interact with natural environment. And lastly, since the role of the land improvement district has not been permeated in the region, the non-farmer residents are not sufficiently recognizing the relationship between their daily life and the agricultural facilities. The land improvement projects have been playing a very important part in Nishi-Kanbara area up to date. However, under the influence of the aging of farming population along with the increase in the non-farming population and the urbanization in recent years, the area is now in the process of seeking for a new direction (see Nishi-Kanbara Land Improvement District(2005)).

Analytical method and data

Analysis is conducted based on the assumption that “the intention of entities” regarding individual land improvement projects, such as those to improve service water, consolidate farmland, and improve subsurface drainage and the drainage systems on terminal farmlands, can be explained by their wishes regarding “management attributes,” “goals of farm management,” and the “evaluation of farmlands and agricultural infrastructure.” In other words, the “goals of farm management” are specific objectives to be attained through farm management action. Differences in these goals are believed to affect the wishes regarding investments in land infrastructure as management resources. Moreover, there have been growing demands in recent years for greater multifunctionality in agriculture and farmlands. Accordingly, it was considered necessary to clarify the impact of any externalities regarding farmlands and agricultural infrastructure that represent benefits not traded in the marketplace, on the wishes for land improvement projects, in addition to the “evaluation of farmlands and agricultural infrastructure” when both are used as management resources.

The data used for this research was the questionnaire implemented by the Nishi-Kanbara land improvement district in August 2003. The questionnaire was sent to 704 farmers among which 635 responded (with 90.2% recovery). The questionnaire items included the profile of the respondent, the outline of farm management, remarks on the land improvement project and evaluation of rural environment.

ANALYTICAL RESULTS

Goals of farm management and perception of farmland positioning

Table 1 shows the perception of farm management goals. “Preserving and managing family assets and passing them on to the next generation” ranks at the top among those surveyed. This is followed by such goals as “earning adequate income to live on,” “ensuring enough food for family consumption,” and “enjoying a productive and fulfilling life.” The results show that passive items generally occupy the top places. Among full-time farm households, however, such items as “efforts to improve the unit crop and quality,

and upgrade technology,” and “earning income comparable to that earned for comparable labor expended in other industries” are ranked higher than averages for the entire group on one side, items as “preserving and managing family assets and passing them to the next generation” and “ensuring enough food for family consumption” are ranked lower than the group average on the other. These results suggest that different types of farm households have different goals. Based on farm acreage, a high percentage of small farm households chose such answers as “ensuring enough food for family consumption” and “earning adequate income to live on,” reflecting their inclination toward maintaining the

Table 1. Perception of farm management goals (multiple selection)

Unit: %

	Full time/Part time			Farm acreage						Total
	Full time	Class 1	Class 2	Below 1ha	1~2ha	2~3ha	3~5ha	5~10ha	Over 10ha	
Preserving and managing family assets and passing them on to the next generation	55.6	70.4	61.9	61.5	50.0	64.4	68.0	69.0	50.0	63.6
Earning adequate income to live on	36.1	26.8	29.9	19.2	31.9	44.4	25.5	21.0	7.1	30.1
Earning income comparable to that earned for comparable labor expended in other industries	24.9	24.1	9.1	7.7	5.3	16.3	21.2	30.0	71.4	19.5
Pursuing profit	12.4	11.3	5.1	0.0	2.1	8.8	10.4	18.0	14.3	9.4
Enjoying a productive and fulfilling life	36.1	28.4	25.9	15.4	27.7	33.8	28.6	28.0	42.9	29.3
Ensuring enough food for family consumption	21.3	21.4	47.7	57.7	47.9	39.4	23.4	10.0	0.0	29.8
Efforts to improve the unit crop and quality, and upgrade technology	31.4	28.0	17.8	3.8	9.6	26.9	28.6	35.0	42.9	25.5
Creation of customers and demand	11.8	10.1	7.1	0.0	3.2	8.1	12.1	14.0	21.4	9.6
Business expansion	16.0	17.1	5.6	0.0	2.1	10.0	13.4	25.0	50.0	12.9
Expanding market share	7.1	3.9	3.0	0.0	2.1	3.8	3.5	5.0	42.9	4.7
Etc.	0.6	1.2	2.0	0.0	0.0	1.3	1.7	2.0	0.0	1.4

Note: “Class 1” is part-time farm households earned main income from farming.
 “Class 2” is part-time farm households earned main income from other jobs.
 Both five points higher and lower than average are marked respectively.

Table 2. Perception of farmland positioning

Unit: %

	Full time/Part time			Farm acreage						Total
	Full time	Class 1	Class 2	Below 1ha	1~2ha	2~3ha	3~5ha	5~10ha	Over 10ha	
Inheritance to be passed on to their offspring	13.0	19.1	31.5	50.0	35.1	21.9	18.6	10.0	7.1	21.3
Management resources	75.7	70.8	46.2	19.2	46.8	58.1	70.6	82.0	78.6	63.9
Assets	6.5	8.2	14.2	11.5	12.8	13.8	7.8	6.0	0.0	9.6
Etc.	0.0	0.0	3.6	3.8	2.1	0.6	1.3	0.0	7.1	1.3
Null and non answer	4.7	1.9	4.6	15.4	3.2	5.6	1.7	2.0	7.1	3.9

Note: Both five points higher and lower than average are marked respectively.

status quo. Among large-scale farm households, high rates of response were shown for “labor and income comparable to those of other industries,” “efforts to improve the unit crop and quality, and upgrade technology” and “business expansion,” thus reflecting the strong desire among these households for expanding their farming operations.

Table 2 relates to the perception of farmland positioning. The table shows that more than 60 % of all farming households surveyed positions their farmlands as management resources. However, an analysis based on household attributes reveals that those who view their farmlands as assets and inheritance to be passed on to their offspring accounted for the highest percentage among Class 2 part-time farm households, followed by Class 1 part-time farm households and full-time farm households, in that order.

Among Class 2 part-time farming households, the percentage of respondents who view their farmlands as management resources was lower than that of households who view their farmlands otherwise. By the size of farm acreage, a large percentage of small-scale households view their farmlands as assets and future inheritance to be passed on to their offspring. In contrast, a large percentage of large-scale farming households view their farmlands as management resources. These observations have significant implications on any attempt to effectively use farmlands in a community.

Table 3 concerns the evaluation of externalities of farmlands and agricultural infrastructure. The evaluation stating that “farmlands are instrumental in flood control” ranks high for the whole group, followed by “domestic wastewater treatment using agricultural drainage ditches,”

Table 3. Evaluation of externalities of farmlands and agricultural infrastructure

Unit: %

	Full time/Part time			Farm acreage						Total
	Full time	Class 1	Class 2	Below 1ha	1~2ha	2~3ha	3~5ha	5~10ha	Over 10ha	
Farmlands are instrumental in flood control	59.8	64.2	57.4	34.6	52.1	64.4	60.2	68.0	71.4	60.5
Farmlands help beautify the community	33.1	30.7	26.4	11.5	16.0	35.6	31.2	33.0	57.1	29.6
Water systems are instrumental in flood control	56.2	56.0	53.8	42.3	47.9	53.1	57.1	62.0	71.4	54.8
Water systems are useful as community recreation spots and children's play areas	8.9	9.7	3.6	0.0	3.2	10.0	9.5	9.0	7.1	8.0
Domestic wastewater treatment using agricultural drainage ditches	57.4	64.2	52.3	38.5	48.9	58.8	61.9	68.0	28.6	58.3
Farm roads are useful for residents' passage	44.4	50.6	49.2	46.2	48.9	53.1	46.8	49.0	42.9	48.8
Etc.	0.6	1.9	1.0	0.0	2.1	0.6	1.3	2.0	0.0	1.3

Note: Both five points higher and lower than average are marked respectively.

Table 4. Perception of land improvement projects on which communities should place high priority (up to 2)

Unit: %

	Full time/Part time			Farm acreage						Total
	Full time	Class 1	Class 2	Below 1ha	1~2ha	2~3ha	3~5ha	5~10ha	Over 10ha	
Projects to improve service water systems	26.0	32.7	27.9	23.1	22.3	30.6	27.7	37.0	28.6	29.1
Consolidating large-lot farmlands	36.7	41.6	37.6	34.6	26.6	31.9	42.9	52.0	50.0	38.7
Improving subsurface drainage	20.1	13.2	21.3	26.9	18.1	16.9	16.9	17.0	21.4	17.3
Pipelining	22.5	23.7	19.3	7.7	24.5	23.1	24.2	16.0	35.7	22.2
Improve water systems at terminal points	29.6	27.2	25.4	26.9	25.5	28.8	32.0	19.0	28.6	27.4
No need to change the status quo	10.7	5.1	10.2	15.4	12.8	8.8	5.6	6.0	0.0	8.2
Etc.	1.8	3.9	3.0	0.0	4.3	3.8	2.6	3.0	0.0	3.0

Note: Both five points higher and lower than average are marked respectively.

“water systems are instrumental in flood control,” and “farm roads are useful for residents’ passage” in that order. In contrast, such evaluations as “farmlands help beautify the community” and “water systems are useful as community recreation spots and children’s play areas” did not receive many votes, indicating low levels of interest in the non-agricultural functions of farmlands.

Perception of land improvement projects

Table 4 summarizes the perception of land improvement projects on which communities should place high priority. The group as a whole has the greatest wish for “consolidating large-lot farmlands,” followed by “projects to improve service water systems,” “improve water systems at terminal points,” and “pipelining” in that order. Few chose “no need to change the status quo,” thus reflecting a certain demand for land improvement projects in the communities. However, the wish for “consolidating large-lot farmlands” is strong among large-scale farming households, but weak among small-scale ones. Moreover, the percentage of respondents that selected “no need to change the status quo” rises with a fall in the size of farm acreage.

Table 5 summarizes the perception of land improvement projects among respondents divided into two groups—the upper river area and the lower river area—based on the municipalities in which they live. (The upper river area was defined as including Tsubame-shi, Yoshida-cho, Bunsui-machi, Yahiko-mura, Iwamuro-mura, Nakanokuchi-mura, Katahigashi-

mura, Ajikata-mura, with the lower river area defined as including Niigata-shi, Kurosaki-machi, Maki-machi, and Nishikawa-machi.) This summary suggests strong wishes for “projects to improve service water systems” and “improve water systems at terminal points” in the lower river area, thus revealing a prevalent desire for improving the use of recycled water.

Analysis of the structure of perception about “Farm Management Goals”

Next, Quantification Type III analysis was conducted to reveal the composition of the perception among farming households about the goals of farm management. **Table 6** shows the results of this analysis. Along the first axis, the items with large negative scores are “expanded market share” and “business expansion.” The items with large positive scores are “earning adequate income to live on” and “ensuring enough food for family consumption.” This axis can thus be interpreted to explain the “purposes of farm management (wishes for expansion - wishes for maintaining the status quo). Along the second axis, the item with a large positive score is “earning adequate income to live on.” The items with large negative scores are “enjoying a productive and fulfilling life” and “ensuring enough food for family consumption.” This axis can be interpreted to explain the “philosophy of farm management (enjoying a fulfilling life - making a living). These differences in perception about the goals of farm management are believed to affect the general

Table 5. Perception of land improvement projects (Upper/Lower river area)

Unit: %

	Projects to improve service water systems	Consolidating large-lot farmlands	Improving subsurface drainage	Pipelining	Improve water systems at terminal points	No need to change the status quo	Etc.
Upper river area	23.6	39.2	20.0	23.0	23.8	9.9	2.5
Lower river area	36.7	38.1	13.7	21.1	32.2	5.9	3.7
Total	29.1	38.7	17.3	22.2	27.4	8.2	3.0

Note: Both five points higher and lower than average are marked respectively.

Table 6. Quantification Type III analysis on “Perception of farm management goals”

	1 st axis	2 st axis
Preserving and managing family assets and passing them on to the next generation	0.273	-0.503
Earning adequate income to live on	1.388	2.216
Earning income comparable to that earned for comparable labor expended in other industries	-1.413	0.333
Pursuing profit	-1.437	0.622
Enjoying a productive and fulfilling life	0.336	-1.267
Ensuring enough food for family consumption	1.189	-0.856
Efforts to improve the unit crop and quality, and upgrade technology	-0.780	0.272
Creation of customers and demand	-0.788	0.366
Business expansion	-1.621	0.380
Expanding market share	-1.863	0.366
Accumulated contribution ratio	18.1%	32.6%

perception about land improvement projects.

Analysis of the structure of perception about “Evaluation of Farmlands and Agricultural Infrastructure”

Table 7 shows the results of Quantification Type III analysis of the perception about the “evaluation of farmlands and agricultural infrastructure.” The results indicate that items with large positive scores along the first axis affirm such functions as “water systems as recreational and play areas” and “improvement of farmland landscape.” The items with large negative scores negate such functions as “the use of farmlands in flood control” and “domestic wastewater treatment using agricultural drainage ditches.” The axis can be interpreted to explain the “evaluation of externalities of farmlands and agricultural infrastructure (high - low).” Along the second axis, the items with large positive scores affirm such functions as “farm roads useful for residents’ passage” and “domestic wastewater treatment using agricultural drainage ditches.” Items with large negative scores affirm the functions of “water systems as recreational and play areas” and “improvement of farmland landscape.” This axis can be interpreted to explain the “externality of the manifestation function (living infrastructure - regional environmental infrastructure)” that separates such functions as roads for living and domestic wastewater treatment from the recreational functions. Along the third axis, the item with a large positive score is the “property value of farmlands.” The item with a large negative score is the “utility value of farmlands.” This axis is interpreted to explain the “evaluation of the utility value of farmlands (high - low).”

The foregoing analysis reveals that the “evaluation of farmlands and agricultural infrastructure” can be interpreted along the three axes that consist of the “evaluation of externalities of farmlands and agricultural infrastructure (high - low),” the “externality of the manifestation function (living infrastructure - regional environmental infrastructure)” and the “utility value of farmlands.”

Structure of perception of farming households and land improvement projects

In order to reveal the factors that determine the wishes for individual land improvement projects, Quantification Type II analysis (discriminant analysis) was conducted. Wishes for a land improvement project are used as explained variables. For such explanatory variables, the attributes of individuals and those of farm management, the goals of farm management, and evaluation of farmlands and agricultural infrastructure are used. **Table 8** shows the analytical results. Based on these results, such factors as “the upper or lower river area,” “age brackets,” “full-time or part-time farming,” “farm acreage,” “ensuring enough food for family consumption,” and “expanded market share” had great influence on projects to improve service water systems. In projects to consolidate large-plot farmlands, “farm acreage,” “creation of customers and demand,” “business expansion,” and “expanded market share” have strong influence. In the area of improving subsurface drainage, “age brackets,” “full-time or part-time farming,” “farm acreage,” “labor and income comparable to other industries,” and “ensuring enough food for family consumption” are found to exert strong influence. In the area of pipelining, “age brackets,” “labor and income comparable to other industries,” “efforts to improve the unit crop and quality,” and “business expansion” heavily influence the results. In the area of improving water systems at terminal points, “the upper or lower river area,” “full-time or part-time farming,” “farm acreage,” “efforts to improve the unit crop and quality, and upgrade technology,” “creation of customers and demand,” “expanded market share” and “value of farmlands” strongly affect the outcome. With the exception of pipelining, farm acreage has a strong influence on all results, revealing the highest impact exerted by individual and business attributes. However, the results are not continuous by attribute type, and the fact that other factors have influence can be seen.

Table 7. Quantification Type III analysis of the perception about the “evaluation of farmlands and agricultural infrastructure”

		1 st axis	2 nd axis	3 rd axis
Evaluation of farmlands	Inheritance : TENURE VALUE	-1.143	0.307	0.610
	Management resources : UTILITY VALUE	0.388	0.298	-1.026
	Assets : PROPERTY VALUE	0.058	-2.904	5.843
Evaluation of Agricultural frastructure	Farmlands are instrumental in flood control: YES	0.781	-0.301	-0.357
	Farmlands are instrumental in flood control: NO	-1.222	0.471	0.560
	Farmlands help beautify the community: YES	1.846	-1.623	0.425
	Farmlands help beautify the community: NO	-0.783	0.688	-0.180
	Water systems are instrumental in flood control: YES	0.900	0.204	-1.034
	Water systems are instrumental in flood control: NO	-1.131	-0.257	1.300
	Water systems are useful as community recreation spots and children’s play areas: YES	3.806	-4.284	-0.074
	Water systems are useful as community recreation spots and children’s play areas: NO	-0.286	0.322	0.006
	Domestic wastewater treatment using agricultural drainage ditches: YES	0.799	1.175	0.582
	Domestic wastewater treatment using agricultural drainage ditches: NO	-1.214	-1.784	-0.884
	Farm roads are useful for residents’ passage: YES	1.102	1.207	0.971
Farm roads are useful for residents’ passage: NO	-1.016	-1.113	-0.896	
Accumulated contribution ratio		21.7%	35.5%	48.6%

Table 8. Quantification Type II analysis on “Perception of Land Improvement Projects”

			Projects to improve service water systems		Consolidating large-lot farmlands		Improving subsurface drainage	
			Score	Range	Score	Range	Score	Range
Attribute of Individual and Management	Upper/Lower River	Upper Lower	-0.412 0.611	1.023	-0.046 0.068	0.115	0.200 -0.297	0.498
	Age	20-49	-0.593	1.080	0.421	0.616	-0.374	0.867
		50-59	0.003		-0.088			
		60-	0.486		-0.194			
Full/Part Time	Full Time	-0.536	0.803	-0.279	0.500	0.375	0.762	
	Class 1 Class 2	0.135 0.268		0.011 0.221				
Farm Acreage	-2ha 2-3ha 3-5ha 5ha-	-2ha	-0.685	1.199	-0.581	1.309	-0.287	0.701
		2-3ha	0.121		-0.412			
		3-5ha	-0.005		0.186			
		5ha-	0.513		0.728			
Farm Management Goals	Preserving and managing family assets and passing them on to the next generation	Yes	-0.100	0.292	0.162	0.473	0.065	0.189
		No	0.191		-0.310		0.124	
	Earning adequate income to live on	Yes	-0.183	0.256	0.037	0.052	0.382	0.534
		No	0.073		-0.015		-0.152	
	Earning income comparable to that earned for comparable labor expended in other industries	Yes	-0.180	0.227	0.544	0.686	0.573	0.724
		No	0.047		-0.143		-0.150	
	Pursuing profit	Yes	0.573	0.637	0.017	0.019	-0.201	0.223
		No	-0.063		-0.002		0.022	
	Enjoying a productive and fulfilling life	Yes	0.287	0.402	0.268	0.376	0.055	0.078
		No	-0.115		-0.108		-0.022	
Ensuring enough food for family consumption	Yes	0.604	0.841	-0.131	0.183	0.827	1.151	
	No	-0.236		0.051		-0.324		
Efforts to improve the unit crop and quality, and upgrade technology	Yes	-0.262	0.357	-0.039	0.053	0.380	0.516	
	No	0.094		0.014		-0.137		
Creation of customers and demand	Yes	0.398	0.442	-1.025	1.138	0.302	0.336	
	No	-0.044		0.113		-0.033		
Business expansion	Yes	0.003	0.003	1.258	1.441	-0.596	0.683	
	No	-0.000		-0.183		0.087		
Expanding market share	Yes	1.221	1.275	-1.097	1.145	0.228	0.238	
	No	-0.054		0.048		-0.010		
Evaluation of Farmlands and Agricultural Infrastructure	Evaluation of the Value of Farmlands	Utility	0.223	0.683	-0.103	0.315	-0.122	0.373
		Property/Tenure	-0.459		0.212		0.251	
	Farmlands are instrumental in flood control	Yes	-0.026	0.065	0.069	0.176	-0.122	0.313
		No	0.040		-0.107		0.191	
	Farmlands help beautify the community	Yes	-0.077	0.110	0.073	0.104	-0.065	0.093
		No	0.033		-0.031		0.028	
	Water systems are instrumental in flood control	Yes	0.116	0.262	0.139	0.313	0.173	0.390
		No	-0.146		-0.174		-0.217	
Water systems are useful as community recreation spots and children's play areas	Yes	0.215	0.231	0.154	0.165	0.137	0.147	
	No	-0.016		-0.012		-0.010		
Domestic wastewater treatment using agricultural drainage ditches	Yes	0.122	0.308	0.051	0.130	0.172	0.434	
	No	-0.186		-0.078		-0.261		
Farm roads are useful for residents' passage	Yes	0.054	0.104	-0.053	0.102	0.008	0.015	
	No	-0.050		0.049		-0.007		
Discrimination Ratio				65.8%		64.0%		65.4%

Table 8. Quantification Type II analysis on “Perception of Land Improvement Projects” (continued)

			Pipelining		Improve water systems at terminal points	
			Score	Range	Score	Range
Attribute of Individual and Management	Upper/Lower River	Upper Lower	0.205 -0.304	0.510	-0.304 0.451	0.755
	Age	20-49	-0.606	1.262	0.333	0.574
		50-59	-0.088		-0.019	
		60-	0.656		-0.242	
Farm Acreage	Full/Part Time	Full Time	0.039	0.176	0.514	1.039
		Class 1 Class 2	0.060 -0.115		0.068 -0.525	
	Farm Acreage	-2ha	-0.007	0.556	-0.091	1.161
		2-3ha	0.166		0.290	
3-5ha 5ha-		0.092 -0.390	0.293 -0.867			
Farm Management Goals	Preserving and managing family assets and passing them on to the next generation	Yes	0.175	0.510	-0.147	0.426
		No	-0.335		0.280	
	Earning adequate income to live on	Yes	-0.431	0.603	0.148	0.207
		No	0.172		-0.059	
	Earning income comparable to that earned for comparable labor expended in other industries	Yes	-0.866	1.093	0.373	0.470
		No	0.227		-0.098	
	Pursuing profit	Yes	-0.231	0.256	0.137	0.152
		No	0.025		-0.015	
	Enjoying a productive and fulfilling life	Yes	-0.409	0.573	-0.039	0.055
		No	0.164		0.016	
Ensuring enough food for family consumption	Yes	0.142	0.198	0.301	0.419	
	No	-0.056		-0.118		
Efforts to improve the unit crop and quality, and upgrade technology	Yes	0.573	0.780	0.595	0.809	
	No	-0.206		-0.214		
Creation of customers and demand	Yes	0.283	0.314	0.649	0.721	
	No	-0.031		-0.072		
Business expansion	Yes	-0.795	0.911	-0.390	0.447	
	No	0.116		0.057		
Expanding market share	Yes	-0.527	0.550	-0.983	1.026	
	No	0.023		0.043		
Evaluation of Farmlands and Agricultural Infrastructure	Evaluation of the Value of Farmlands	Utility	0.156	0.477	-0.259	0.790
		Property/Tenure	-0.321		0.532	
	Farmlands are instrumental in flood control	Yes	0.200	0.514	0.245	0.629
		No	-0.314		-0.384	
	Farmlands help beautify the community	Yes	0.273	0.389	-0.221	0.314
		No	-0.116		0.094	
	Water systems are instrumental in flood control	Yes	-0.085	0.193	0.119	0.269
		No	0.107		-0.150	
Water systems are useful as community recreation spots and children's play areas	Yes	0.026	0.028	0.026	0.028	
	No	-0.002		-0.002		
Domestic wastewater treatment using agricultural drainage ditches	Yes	0.002	0.006	0.030	0.075	
	No	-0.004		-0.045		
Farm roads are useful for residents' passage	Yes	-0.186	0.357	-0.125	0.240	
	No	0.171		0.115		
Discrimination Ratio				59.9%		59.7%

Based on the foregoing analysis, the perception among farm households of land improvement projects is believed to look like the model shown in **Fig. 2**. In other words, the perception about land improvement projects is believed to consist of three components: “management attributes,” “farm management goals,” and “evaluation of farmlands and agricultural infrastructure.” Moreover, the “farm management goals” contain two axes, which are “management objectives (desire for expansion - desire to maintain the status quo)” and “management philosophy (enjoying a fulfilling life - making a living).” The “evaluation of farmlands and agricultural infrastructure” consists of three axes: the “evaluation of externalities (high - low),” “externality of the manifestation function (living infrastructure - regional environmental infrastructure),” and “evaluation of the utility value of farmlands (high - low).”

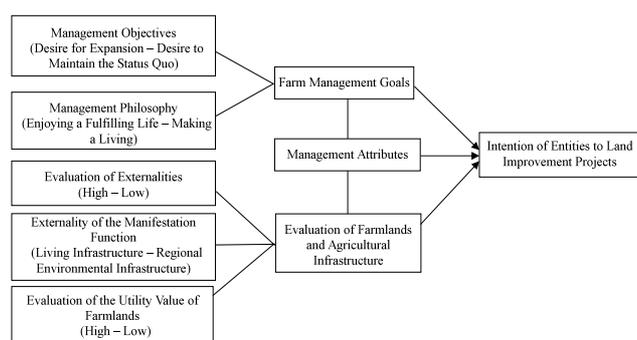


Fig.2. Model of perception formation of farm households to land improvement projects

CONCLUSION AND FUTURE TASKS

This article attempted to reveal the structure of perception among farming households about land improvement projects (“the intention of entities”). The results showed that the perception among farming households about land improvement projects consists of farm management goals, management attributes, and an evaluation of farmlands and agricultural infrastructure. The management attributes, in particular, were found to be a significant factor. It can be pointed out that large-scale farming households maintain a positive attitude toward land improvement projects as a whole, whereas small-scale farming households maintain a more passive attitude. Regarding the environmental assessment of farmlands and agricultural infrastructure, large-scale farming households are more affirming than small-scale farming households. Nonetheless, low levels of interest in non-agricultural functions can be pointed out.

If we assume that differences in business sizes are manifestations of differences in the perception about farm management goals, the issue of reaching a consensus among farming households concerning land improvement projects can be condensed as follows: Differences in the management goals of farming households indicate differences about the

value standards used in choosing action. It is therefore important to design and implement a planned project that employs techniques that properly address these differences (Kiminami and Kiminami, 2004).

The stagnancy of regional agriculture and the aging of farmers raise the cost borne by farming households and lower their income in relative terms. At the same time, community residents frequently find themselves the beneficiaries of land improvement projects as an increasing number of non-farming households move into and urbanize rural communities. As a result, land improvement projects are now at a stage where a new cost-sharing method must be explored with the participation of community residents. Therefore, designing an effective plan requires a clear understanding of the evaluation of economic effects and the structures of perception among community residents and project implementing bodies about land improvement projects. At the same time, a comprehensive and objective evaluation of the multifunctionalities of agriculture and those of farmlands, together with an evaluation of such externalities as their environmental impact, are considered necessary. In addition, schemes such as an environmental payment program that conform to regional realities will have to be designed. These will be our future tasks.

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土地改良事業に対する農家の意識構造 —新潟県西蒲原地域を事例として—

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(平成18年12月26日受付)

要 約

近年、農村の混住化などに伴い、土地改良事業の効果については、農業生産以外の国土保全・防災・親水環境の改善などの多面的機能の発揮が要求されるようになってきている。また、事業の策定・実施や維持管理については、土地改良施設の老朽化や農家の維持管理能力の低下が重要な課題とされている。そのため、非農家を含めた地域住民の参加の促進が土地改良事業の計画・実施において必要とされており、事業をめぐるステークホルダーの多様化が生じてきている。

ところで、土地改良における地域住民間の合意形成は、農家と非農家間だけの問題ではない。事業主体である農家間においても、意識や利害の相違がみられる場合には、合意形成が困難になると予想される。

そこで、本稿では、土地改良事業に対する農家の意識構造を明らかにし、実効性のある計画策定・実施のための政策的含意を提示することを試みる。

新大農研報, 59:72-81, 2007

キーワード：外部性の評価、経営目的、経営理念、土地改良事業、農家の意識構造

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