Consideration of Qualitative Changes in Agricultural Settlements Due to Land Consolidation: A Case Study Based on the Perceptions of Non-Farmers

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Consideration of Qualitative Changes in Agricultural Settlements Due to Land Consolidation

A Case Study Based on the Perceptions of Non-Farmers

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Abstract: Land consolidation (LC) is implemented as a public project that contributes to the improvement of agricultural productivity, and its effect is evaluated mainly by labour productivity and land productivity. However, to maintain both agricultural production and the social community, understanding the impact on non-farmers in the community as one of the aspects of LC is extremely important. In this study, we surveyed rural areas about eight years after the LC was implemented by posted questionnaire and analysed the difference between farmers' and non-farmers' perceptions of the multifaceted evaluation items on the policy effect. The evaluation points for the LC include the following: [1] Impact on farming and farmland preservation, [2] Impact on community activation, and [3] Impact on collaboration between farmers and non-farmers. Results can be summarized as follows: First, it was confirmed that there is a trend for non-farmers' attachment to the area to be reduced because of LC. Second, non-farmers evaluations that LC attracts young farmers were also low. However, this opinion was much more noticeable in non-farmers who had quit agriculture recently than in the generation that had left agriculture because of LC. In other words, LC is a useful policy for improving agricultural conditions and agricultural structure. However, in some cases, the connections between farmers and non-farmers is weakened. Thus, cooperative activities to actively prevent this weakening are important.

1. INTRODUCTION

1.1 About Land Consolidation

In this report, we first describe the formation process of land consolidation (LC) projects, which are one of the main methods used in today's agricultural land development policy. In a study on policy evaluation in Japan, it became clear that the evaluation index was biased toward improving agricultural productivity. This was not a problem during the time that Japan was experiencing a population increase and there were plenty of workers to maintain the communities in rural areas. However, today's population is rapidly decreasing. Therefore, it was hypothesized that if only agricultural productivity is regarded as important, there is a possibility that

the sustainability of rural communities could be dampened. A survey on the sustainability of rural communities focusing on non-farmers was carried out using a questionnaire that was designed based on this hypothesis. The results showed that the hypothesis was supported, especially based on the recognition of non-farmers who had retired from agriculture. In the following, a series of case studies whose findings can be used to suggest future policy formation processes are presented and then some countermeasures are considered.

LC projects have been used as part of public policy for rural development. They seek to comprehensively improve agricultural land conditions by applying soil improvements and compartmentalization, area expansion, and irrigation and drainage capacity to farmland with poor workability. There is evidence that LC is carried out voluntarily by adjacent villages (Bonner, 1987). The prototype of LC projects similar to the current type dates back to the nineteenth century, and projects were practiced in each country as a policy in the 1950s (Food and Agriculture Organization of the United Nations, 2003). Against this backdrop, the progress of LC is said to have been hampered by the green revolution (Bullard, 2007). In the past, the possibility of cultivating multiple types of produce simultaneously was argued to be an advantage derived from the fragmentation of agricultural land (Hardjono, 1987). Even today, this is recognized as an advantage of agricultural land fragmentation (Kawasaki, 2010, 2011), which has gradually spread; further, there is greater concern about the current environmental burden and improving the quality of the environment (Fourie, 2004). Until now, policy details have been widely adopted as a method of rural development while being localized to specific regions in Europe (Thomas, 2006), Central Asia (Gun, 2003), and Africa (Lawry, 1989). LC has been useful as a method of rural development in East Asia (Long, 2014), and even in Japan, the subject of this study, it was institutionalized through the implementation of the post-war Land Improvement Act (Horiguchi, K., & Taketani, 2012). Later, large-scale agricultural land of several hectares or more was targeted (Ishii, 2005), and in recent years, it has been applied to the regeneration of agricultural land damaged by the Great East Japan Earthquake (Hattori, Shimizu, & Saito, 2018). According to Japanese national agricultural and forestry statistics, which are based on the same statistical method, for the past 10 years the number of agricultural management entities with a farm size greater than 2 ha has gradually increased *Figure 1*.

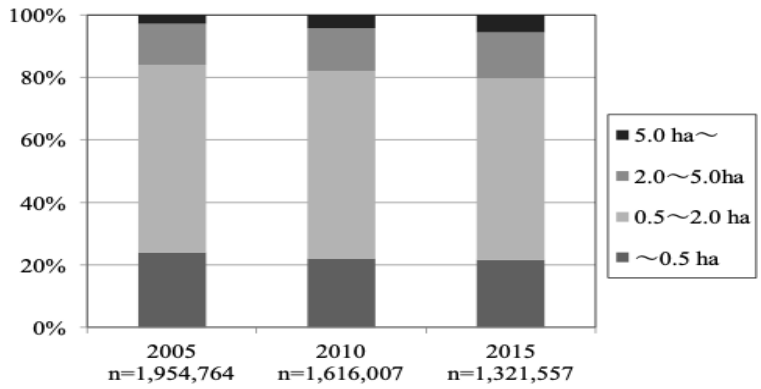

Figure 1. Number of agricultural management entities by farm size (excluding Hokkaido)
Source: Ministry of Agriculture, Forestry and Fisheries (MAFF, 2017)

Thus, in addition to the improvement of the physical condition of agricultural land, the current agricultural policy promotes the concentration of villages' agricultural capital (labour or agricultural machinery) into the hands of a few influential farmers or corporate entities. The reasons the selection and concentration of agricultural capital are packaged in LC are as follows. First, because it was clear that the population on Japan's agricultural land would continue to decline in the period immediately following the war, a breakaway from an agricultural structure based on many individual farmers was targeted as quickly as possible. LC was expected to be the driving force behind this change in structure; however, in the 1980s, there was nationwide criticism that voluntary aggregation was not progressing in the regions that had adopted LC (Motosugi, 2008). As a countermeasure, it was advanced through incentives in the form of subsidies. Hashimoto & Nishi (2016) provide a useful account of the policies relating to LC from the post-war period to recent times.

Second, owing to the concentration of agricultural resources, many small farmers (most of them elderly) are retiring from independent farm management. It has been shown that effective utilization of this kind of surplus labour for auxiliary work, such as weeding and wastewater management, improves the sustainability of regional agriculture (Taisuke Takayama, Horibe, & Nakatani, 2018; Yamashita & Hoshino, 2006). Voluntary cooperation of residents who have retired from the independent farming business and those who do not have a history of farming is expected; however, in practice, cooperation is promoted through incentive policies targeting a series of activities, including environmental conservation, around the agricultural land and rural society in general. This kind of comprehensive agricultural policy has seen full-scale implementation since 2000; however, its results are still being evaluated (Hashiguchi, 2011; Komiyama & Ito, 2017; T Takayama & Nakatani, 2014).

1.2 Research Background

Our awareness of the issues is influenced by the scarcity of objective evaluations of whether the surplus labour generated by LC can be smoothly redirected toward progress. Evaluations of LC primarily use indices relating to agricultural production; this is true not only in Japan (Arimoto, 2011; Hoshino, 1992; Kunimitsu, Nakata, & Toshima, 2005) but also overseas (Bizimana, Nieuwoudt, & Ferrer, 2004). A study was also conducted to evaluate the strengthening of regional social capital through LC by using large-scale statistical materials as data (Taisuke Takayama & Nakatani, 2018). However, because these studies conducted statistical analyses, the specific opinions of residents who had retired from the agricultural business were treated abstractly. Previous research on the conflicts of farmers or interest adjustment related to LC projects in a broad sense focused on, for example, the difference in agricultural land conditions before and after the project in one case study (Wójcik-Leń et al., 2018) and the consensus-building leading to project implementation in another case study (Haldrup, 2015). One needs to show the legitimacy of the incentive policy's aim to effectively return the surplus labour force created by LC to the area; thus, it is necessary to prove the hypothesis that negative changes in village society will impede voluntary cooperation between farmers and non-farmers.

This case study seeks signs of disharmony that can occur in rural society because of LC. The aim of this paper is to understand the intentions of non-

farmers who have given up farming by using a survey and describing the changes in agricultural village communities.

2. RESEARCH DESIGN

2.1 Concept Definitions

First, we need to define some concepts related to this study. In this study, we developed our research based on an investigative survey. In recent years, other methods such as online surveys have been developed; however, for this study, we conducted a postal survey and collected them once completed. Below, we briefly describe the investigative survey.

"LC beneficiary" refers to all inhabitants who owned farmland within the construction area prior to the implementation of LC. The condition for being a beneficiary was not whether one was a farmer but whether there was ownership of farmland within the LC zone. In the legal procedure of LC in Japan, there were patterns in which the amount of money that local inhabitants should bear and the standard of the subsidy object recognition differed according to whether the project manager was from a prefecture or a country, or what the purpose of the project was. All the members of LC beneficiary had an obligation to pay the amount to be tolerated in the region, except for the public subsidy.

"Agricultural workers" refers to all workers except residents who were, at the time, not at all involved in farming; further, there was no lower limit on the number of days spent as an agricultural worker. In the survey conducted in this study, farmer and agricultural worker were synonymous because only one respondent was selected per household. Strictly speaking, farming households include several members—both agricultural workers and non-agricultural workers. However, in this study, for the sake of simplification, we defined a farmer as an agricultural worker and a non-farmer as a non-agricultural worker.

"Years retired" was defined as the number of years between the non-farmer's retirement from farming and the time of this survey. Notably, there is a possibility that the meaning of "retirement" is not uniform by respondents. For example, there are cases where a person has retired from agriculture completely, or where a person has retired from agriculture as a manager, but is partly involved in agricultural activities. However, in this study, the interpretation of retirement was left to the respondent, because of the constraint of investigation time, and the quantity requested by the examinee was substantial.

2.2 Analytic Framework

By cross tabulation, using data on the intentions of residents, we compared individual differences in non-farmers' positive and negative perceptions of the current situation and trend in regional agriculture. In this study, taking an LC project in which construction was completed 12 years ago as an example, we examined all the beneficiaries living in that area. Then, separating beneficiaries into farmers and non-farmers, we calculated the number of years since retirement in the case of non-farmers. In addition, to measure the subjective influence LC has exerted on the area and the

difference in the evaluations of farmers and non-farmers, we confirmed a difference of opinion in the non-farmer groups classified by retirement year.

Recent surveys in rural areas in Japan have empirically shown that the percentage of elderly people responding to sampling tends to be low. In this study, sequential examination by cross tabulation was the fundamental analysis method (instead of multivariate analysis) based on the possibility that the collection of the data necessary for the analysis was difficult.

The target for investigation was Town A, in Ishikawa prefecture. Ishikawa prefecture is located on the east coast in the centre of Japan. Town A is almost in the centre of the Noto Peninsula in Ishikawa Prefecture (*Figure 2*).

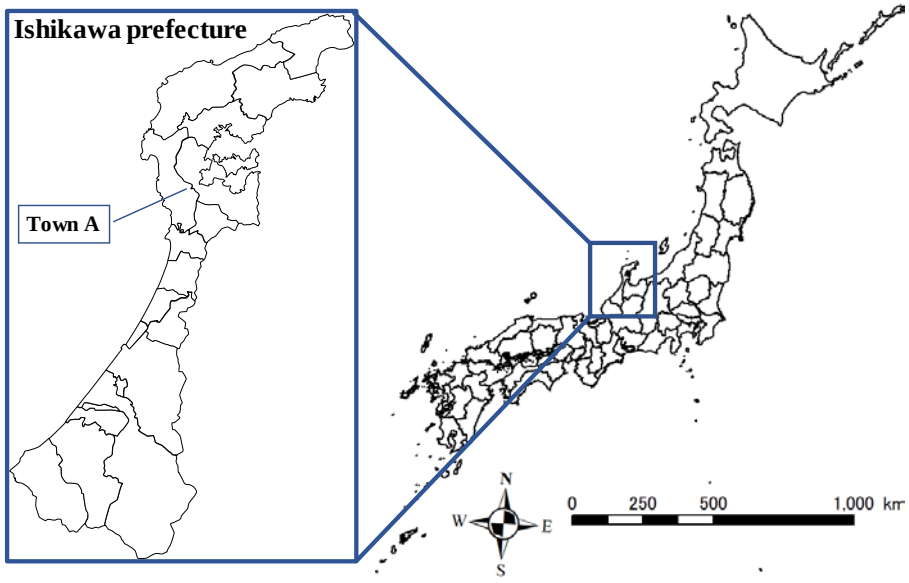

Figure 2. Location of study site

Basically, Ishikawa Prefecture has a greater proportion of abandoned agricultural land than the Japanese average (*Figure 3*). The total population of Town A is decreasing at a rate that greatly exceeds that of Ishikawa Prefecture on the whole, which has been slightly higher than the national average.

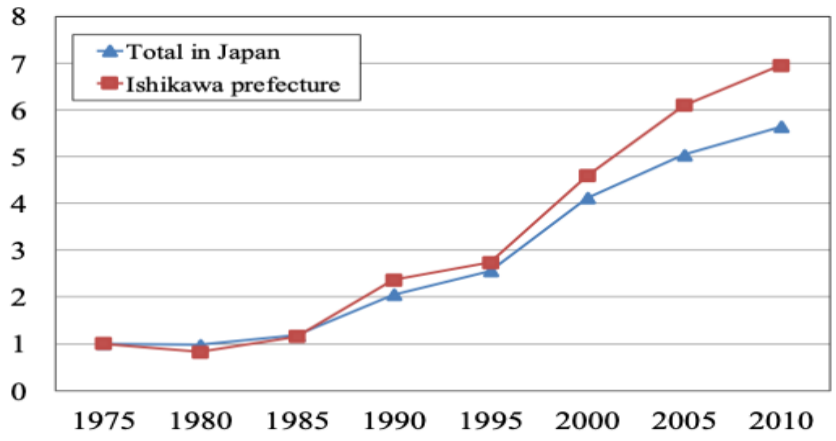

Figure 3. Trend of abandoned farmland area in Ishikawa Prefecture compared with Japan as a whole (1975 data = 1)
Source: (MAFF, 2017)

Furthermore, although the total number of farmers in Town A is decreasing at a slightly lower rate than that of Ishikawa Prefecture, it has decreased continuously (*Figure 4*). Thus, an improvement of the agricultural land conditions was desired. Town A's administration began explicit investigations in 1998, following requests for LC from residents. The project began in 2000, and the construction period concluded in 2006, when the current layout of the agricultural land was created (*Figure 5*). The total construction area was 129.2 ha.

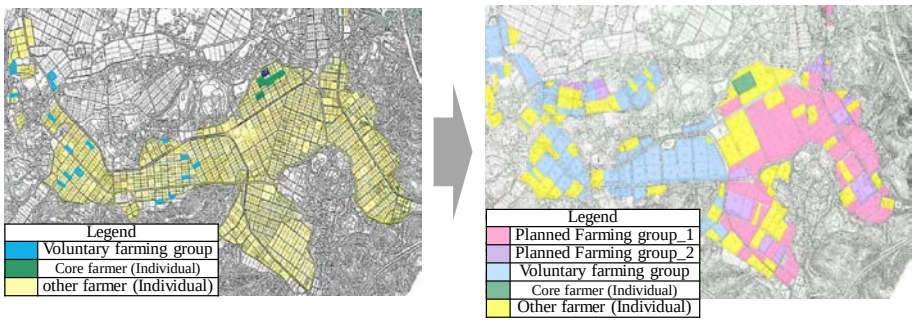

Figure 4. Comparison of agricultural land maps before LC project in 2000 (left) and after completion (right)
Source: Project plan document of land improvement district in Town A

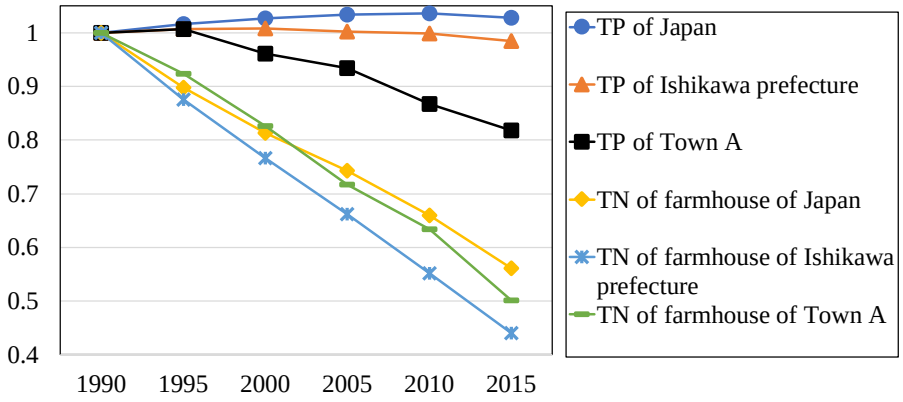

Figure 5. Demographic statistics of Town A compared with the data on Ishikawa Prefecture and the whole of Japan (1990s data=1, TP=Total population, TN=Total number)
Source: (Statistics Bureau of Japan, 2019) and (MAFF, 2017)

Prior to the beginning of the project in 2000, only 2.3 ha of agricultural land, corresponding to about 2% of the project's target area, was under the control of influential farmers and arbitrary organizations. Following the completion of LC, 91.5 ha, corresponding to about 70% of the project area, was under the control of influential farmers or systematically created agricultural organizations.

In this process, we clarified changes in the evaluation of local communities spread among general small-scale farmers. There were six evaluation items based on the survey questions shown in *Table 1*.

2.3 Data Collection

A questionnaire survey sheet was mailed to all beneficiaries' houses in December 2014. By the middle of January 2015, 94 responses had been received (a response rate of 31%). The questionnaire consisted of items relating to personal attributes such as sex, age, presence or absence of successors, and farmer or otherwise; non-farmers were asked how many years had passed since they quit farming. Since the number of samples that could be collected on this occasion was few, the analysis did not include sex, age and presence or absence of successors.

The items for evaluating the effects of LC were categorized as follows: 1) items relating to substantial agriculture and agricultural land; 2) items relating to the local community; and 3) items regarding cooperation between farmers and non-farmers. There were two questions listed for each item, giving a total of six questions. The six questions and the answer choices are shown in *Table 1.*

Table 1. Questions and choices in survey questionnaire

Items	Question	Choice
About farming	Did LC in this area have a positive effect on farmland conservation?	1. It was very effective. 2. It was not very effective. 3. On the contrary, there was a negative effect.
	Has the convenience of daily life improved with farm roads developed as a part of LC in this area?	1. It became very convenient. 2. It did not become very convenient. 3. It became rather inconvenient.
About community	Has the attachment to the area improved as a result of this LC?	1. Attachment became stronger. 2. Attachment did not change. 3. Attachment weakened.
	Has the younger generation been able to continue settling in this area as a result of this LC?	1. I think so. 2. I do not think so. 3. Instead, it got worse.
About collaboration between farmers and non-farmers	Has the LC of this area promoted collaboration between farmers and non-farmers in landscape conservation activities around the farmland?	1. I think so. 2. I do not think so. 3. Instead, it got worse.
	Has the LC of this area promoted collaboration between farmers and non-farmers in the maintenance and management of agricultural irrigation facilities?	1. I think so. 2. I do not think so. 3. Instead, it got worse.

3. RESULTS AND DISCUSSION

3.1 The Attributes of the Survey Respondents

Figure 6 shows the cross tabulation of the sex and age of respondents. All respondents were over the age of 50, and male respondents constituted about 70% of the sample. Moreover, while there were 51 farmers and 39 non-farmers, only 36 non-farmers entered the number of years elapsed since their retirement from farming. The number of years since retirement was 1–2 years for two respondents, 3–5 years for five of them, 6–10 years for 14 respondents, and over 11 years for 15 of them. Of the 14 who had retired 6–

10 years ago, 12 said that they had retired because of the implementation of LC.

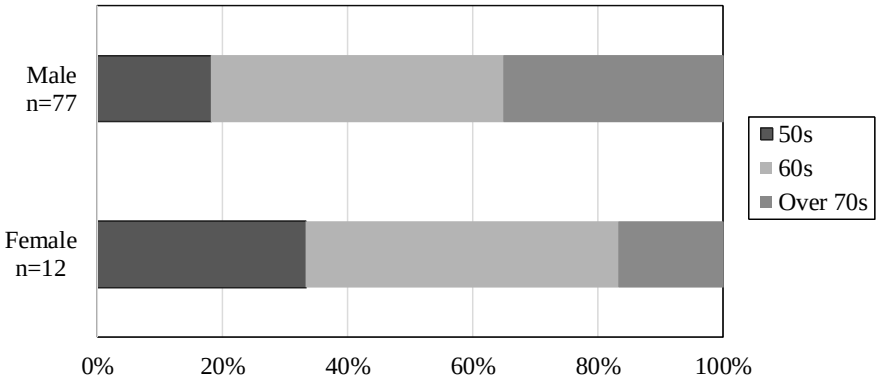

Figure 6. Cross tabulation of gender and age of the respondents
Note: Five respondents did not select a gender

And, within the present farmers, the total number of the answer to the question on the existence of the successor was 41. Of these, four (9.8%) answered "Be sure to have successors", 14 (34.1%) answered "Having no successor", and 23 (56.1%) answered "I don't know. (Undetermined)". From this survey result, it was proven that it was difficult for individual farmers to maintain the farmland of the region.

3.2 Considerations for the Differences between Farmers and Non-farmers

Table 2 shows whether there was significant difference between farmers and non-farmers in their answers to the six questions and three items of *Table 1*. Because some non-respondents' answers were included for each question, the sample size of the number of farmers and non-farmers is not uniform.

First, items relating to the convenience of farmland and farm roads because of LC (Questions 1 and 2) evoked positive evaluations. This was the stated purpose of the LC project and can be said to be an obvious result. Next, items on cooperation between farmers and non-farmers resulted in a lower evaluation by non-farmers. However, a majority of the evaluations of both farmers and non-farmers was positive. Conversely, their evaluations of the effects that LC exerted on the community were relatively low, as seen from Q3 and 4 in *Table 2.*

Next, we evaluated the significant differences between farmers and non-farmers. The Cramer's V coefficient shown in *Table 2* can be interpreted as moderately significant when above 0.1 and definitely significant when above 0.2 (Cohen, 1988). As a result, it was inferred that there was a significant difference in questions other than Question 2. In particular, opinions about the effects of LC on the local attachment of beneficiaries were evaluated as showing the clearest and most significant difference between farmers and non-farmers.

In the above analysis, the impact of LC on the attitude of non-farmers has not been extracted, because the difference of which stage in life non-farmers retired from agriculture was not considered. Therefore, in the following

analysis, the difference by category is evaluated after the non-farmers are divided by the number of years retired from agriculture.

Table 2. Differences between responses of farmers and non-farmers.

Items	No.	Question	Choice	Answer of farmers	Answer of non-farmers	Cramer V
About farming	1	Did LC in this area have a positive effect on farmland conservation?	1. It was very effective.	41 (89.1%)	31 (81.6%)	0.16
			2. It was not very effective.	2 (4.4%)	5 (13.1%)	
			3. On the contrary, there was a negative effect.	3 (6.5%)	2 (5.3%)	
	2	Has the convenience of daily life improved with farm roads developed as a part of LC in this area?	1. It became very convenient.	33 (67.4%)	25 (65.8%)	0.09
			2. It did not become very useful.	15 (30.6%)	11 (28.9%)	
			3. It became rather inconvenient.	1 (2.0%)	2 (5.3%)	
About community	3	Has the attachment to the area improved by conducting this LC?	1. Attachment became stronger.	18 (37.5%)	8 (21.0%)	0.21
			2. Attachment did not change.	27 (56.3%)	24 (63.2%)	
			3. Attachment weakened.	3 (6.2%)	6 (15.8%)	
	4	Has the younger generation become able to continue to settle in this area by conducting this LC?	1. I think so.	18 (36.7%)	10 (27.0%)	0.17
			2. I do not think so.	27 (55.1%)	26 (70.3%)	
			3. Instead, it got worse.	4 (8.2%)	1 (2.7%)	
About collaboration between farmers and non-farmers	5	Has the LC of this area promoted collaboration between farmers and non-farmers in landscape conservation activities around farmland?	1. I think so.	35 (71.4%)	21 (56.8%)	0.16
			2. I do not think so.	12 (24.5%)	13 (35.1%)	
			3. Instead, it got worse.	2 (4.1%)	3 (8.1%)	
	6	Has the LC of this area promoted collaboration between farmers and non-farmers in maintenance and management of agricultural irrigation facilities?	1. I think so.	29 (61.7%)	19 (52.8%)	0.13
			2. I do not think so.	15 (31.9%)	12 (33.3%)	
			3. Instead, it got worse.	3 (6.4%)	5 (13.9%)	

3.3 The Effect of the Number of Years Retired on Non-farmers' Evaluations of LC

In the previous analysis, because the evaluations of non-farmers for Questions 1 and 2 were high, they were not treated as serious concerns. Here, looking only at Questions 3–6, we confirmed a difference in the evaluations between non-farmers based on the number of years of

retirement. Assuming the start year of LC, there were three categories of years retired: less than 5 years (little relation to LC), 6–10 years (strong relation to LC), and over 11 years (no relation to LC). The question was whether characteristic results could be seen in the 6–10 years group. *Table 3 i* shows the non-farmers' answers according to the number of years retired. The percentage shown on the left side in parentheses in the aggregate column is the share of the frequency of each option for the same number of years retired; the percentage on the right side is the share of the frequency of the specific number of years retired in the total responses for the option.

From the results, it can be seen that non-farmers who had been retired for five or fewer years had few positive evaluations in response to Questions 3 and 4, which measured the effects LC has had on the local community. On the other hand, no discernible difference was present between non-farmers who retired 6–10 years ago and those who retired more than 11 years ago.

Regarding Questions 5 and 6, seeking opinions on the effects of LC on cooperation between farmers and non-farmers, there was no significant difference across the number of years retired.

Table 3. Variations in responses of non-farmers according to years retired

No.	Question	Choice	Years retired		
			Less than 5	6–10	More than 11
3	Has the attachment to the area improved as a result of this LC?	1. Attachment became stronger.	0 (0%＼0%)	3 (21.4%＼37.5%)	5 (33.3%＼62.5%)
		2. Attachment did not change.	6 (85.7%＼26.1%)	9 (64.3%＼39.1%)	8 (53.3%＼34.8%)
		3. Attachment weakened.	1 (14.3%＼20.0%)	2 (14.3%＼40.0%)	2 (13.4%＼40.0%)
4	Has the younger generation been able to continue settling in this area as a result of this LC?	1. I think so.	0 (0%＼0%)	6 (0%＼60.0%)	4 (0%＼40.0%)
		2. I do not think so.	6 (85.7%＼25.0%)	8 (0%＼33.3%)	10 (0%＼41.7%)
		3. Instead, it got worse.	1 (14.3%＼100.0%)	0 (0%＼0%)	0 (0%＼0%)
5	Has the LC of this area promoted collaboration between farmers and non-farmers in landscape conservation activities around farmland?	1. I think so.	4 (57.1%＼20.0%)	8 (57.1%＼40.0%)	8 (57.1%＼40.0%)
		2. I do not think so.	2 (28.6%＼16.6%)	5 (35.7%＼41.7%)	5 (35.7%＼41.7%)
		3. Instead, it got worse.	1 (14.3%＼33.3%)	1 (7.2%＼33.3%)	1 (7.2%＼33.3%)
6	Has the LC of this area promoted collaboration between farmers and non-farmers in maintenance and management of agricultural irrigation facilities?	1. I think so.	3 (50.0%＼15.8%)	7 (50.0%＼36.8%)	9 (64.3%＼47.4%)
		2. I do not think so.	2 (33.3%＼20.0%)	6 (42.8%＼60.0%)	2 (14.3%＼20.0%)
		3. Instead, it got worse.	1 (16.7%＼20.0%)	1 (7.2%＼20.0%)	3 (21.4%＼60.0%)

3.4 Interpretation of Results and Discussion

Based on these results, it seems that LC is a useful policy for improving agricultural conditions and agricultural structure; however, in some cases, the connections between farmers and non-farmers are weakened. Thus, it is important to promote cooperative activities to actively prevent this weakening. In the absence of an environmental policy that offers sufficiently meaningful incentives, there is the possibility that non-farmers' local attachments will gradually weaken.

The Japanese government's "multifunctional payment" policy—which financially supports the cooperative activity of farmers and non-farmers in rural areas—is being enforced (MAFF, 2015). However, sudden changes in such a policy have occurred frequently in the past due to shifts in government and national fiscal constraints. Therefore, there is no confirmation that the present subsidy system for collective resource management activities in rural areas will continue in the future.

So, it is considered that the premise behind the implementation of LC projects should be to provide a regional agricultural plan that encourages non-farmers not to leave agricultural activities and supports consensus building in the local community.

4. CONCLUSION

In this study, we evaluated LC, which is a mainstay in the measurement of the direct effects of agricultural management and improvements to agricultural productivity, from the perspective of the sustainability of the local community. Then, we searched for secondary negative effects resulting from LC based on the necessity of environmental policy guiding the progress of cooperation between farmers and non-farmers and implemented along with the LC. The results were as follows.

First, it was confirmed that the proportion of non-farmers whose local attachment was lowered by LC was slightly higher than that of farmers. Second, non-farmers' evaluations that LC attracts young farmers were low. However, this opinion was much more noticeable in non-farmers who had quit agriculture recently than in the generation that left agriculture because of LC. Our knowledge of the relationship between agricultural land size and community empowerment is not sufficient; however, there have been some case studies on the subject (Li, Leng, & Yuan, 2019).

Also, there are many other problems worthy of attention such as the abolition of the subsidy for paddy farming, the decrease in rice prices, and the crisis of management continuation due to the decrease in the labour forces of large-scale agricultural management entities. We carried out interviews with some large-scale management farmers at other areas in this prefecture and confirmed that there were concerns about the expansion of the management area. However, this is only estimation at present, because sufficient data are not available to clarify the problem structure and to identify the causal relationship. These subjects should be approached via qualitative research such as through interview investigations in future research.

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