# The Impact of the Stage of Management Growth and Self-Evaluation of Agricultural Corporations on Awareness of Contribution to Regional Agriculture

CHOMEI, Yosuke
Graduate School of Integrated Sciences for Life, Hiroshima University

NANSEKI, Teruaki
Kyushu University : Professor Emeritus

https://doi.org/10.5109/7169364

出版情報：九州大学大学院農学研究院紀要. 69 (1), pp.45-53, 2024. 九州大学大学院農学研究院
バージョン：
権利関係：

J. Fac. Agr., Kyushu Univ., **69** (1), 45–53 (2024)

# The Impact of the Stage of Management Growth and Self–Evaluation of Agricultural Corporations on Awareness of Contribution to Regional Agriculture

**Yosuke CHOMEI[1]* and Teruaki NANSEKI[2]**

Laboratory of Agricultural and Farm Management, Division of Agricultural and Resource Economics,
Department of Agricultural and Resource Economics, Faculty of Agriculture,
Kyushu University, Fukuoka 819–0395, Japan

(*Received October 18, 2023 and accepted November 6, 2023*)

This study aimed to clarify the awareness of the contribution of agricultural corporations to regional agriculture and determine the influence of the attributes of agricultural corporations and their self–evaluations on their awareness of their contribution to regional agriculture. Using an original nationwide questionnaire survey, this study conducted a factor analysis and generalized linear model analysis to elucidate the factors influencing awareness of contribution to the local community. The analysis revealed the following. First, the factor analysis on the awareness of contribution to regional agriculture revealed "contribution to regional agriculture," "contribution to the local economy," and "contribution to solving farmland problem" as latent awareness structures with separate dimensions. Second, the results of the factor elucidation analysis of the consciousness of contribution to regional agriculture revealed that corporations in the growth stage of management had a high consciousness of contribution to economic revitalization and farmland problems, whereas those in the mature and decline stages had a low consciousness, suggesting that the perception of the management stage influences the consciousness of contribution. Finally, regarding self–evaluation, agricultural corporations that perceive "trust from clients and the community and the corporate brand," "ICT utilization and information management," and "management philosophy and management vision" as "strengths" have a higher awareness of contribution to agricultural and economic revitalization.

**Key words**: factor analysis, generalized linear model, questionnaire survey

## INTRODUCTION

In rural areas, the decrease in the number of farm households, lack of successors, aging of farmers, and shortage of producers are becoming issues of concern. Important steps to maintain and develop local agriculture include strengthening the management structure by fostering and securing efficient and stable management entities and improving efficiency by consolidating farmland in the region. Attention has been paid to the incorporation of agricultural management to address these problems.

According to the "2020 Census of Agriculture and Forestry" (2021), 31,000 collective farming enterprises were corporations. The number of agricultural enterprises increased by 4,000 compared with five years ago, and the ratio of incorporated enterprises to collective enterprises was 80.0%. The breakdown of the number of incorporated farmers shows that the number of companies and agricultural cooperatives increased by 3,000 and 1,000, respectively, from five years ago to 20,000 and 7,000, respectively.

As a community-based industry, agriculture has developed using management resources existing in the community, including farmlands. Therefore, establishing a regional system to realize appropriate conservation management and sustainable use of management resources (Tokuda, 2017) is important. Regional agriculture management has a significant impact on the local economy, the local environment and landscape, the food production base, and rural communities. In recent years, some traditional family farm enterprises have developed and evolved into corporate entities, or enterprises outside of agriculture have entered the agricultural industry with their technological capabilities and management skills. As innovative farms, these management entities exist at the core of regional agriculture and are expected to make not only an economic but also a multifaceted contribution to the local community in regional agriculture.

The following studies have focused on the contributions of these innovative farms to their local communities. First, Onaka (2018) pointed out that the agricultural management of firms entering agriculture plays an important role in the bearers of farmland in regional agriculture and the creation of new methods of use and added value for agricultural products. Shibuya (2020) typified firms' entry patterns and presented a framework for analyzing management that focuses on utility. Nishimizu (2016) analyzed expectations from the host local government.

Next, Imai (2013) defined community–based farming organizations that contribute to the maintenance of the local economy, livelihood, and human resources, including the maintenance of farmland through agricultural production activities as "community–based farming organizations that contribute to the community" and examined the possibility of business development in a

[1] Graduate School of Integrated Sciences for Life, Hiroshima University, Japan
[2] Professor Emeritus, Kyushu University
* Corresponding author (E–mail: chomei@hiroshima–u.ac.jp)

new area of Shimane Prefecture, where the government has been promoting its policies since 2008. Inoue *et al*. (2016) analyzed the relationship among the five community contribution activities of "prevention of abandonment of cultivation," "support for human labor," "support for mechanical work," "support for community events," and "life support for the elderly" and their organizational attributes, targeting community farming organizations in mountainous areas. They pointed out that the first three activities are fundamental for community farming organizations.

As mentioned above, analytical studies have focused on community–based farming organizations and corporate participation in agriculture in mountainous areas. However, few studies have investigated agricultural corporations' activities in contributing to local communities, from a nationwide perspective. Furthermore, few studies have focused on agricultural corporations and clarified their awareness of their contributions to regional agriculture.

This study aims to clarify the contribution of agricultural corporations to regional agriculture and the effects of their attributes and self–evaluations on their awareness of such contributions.

## MATERIALS AND METHODS

### Data

The data used in this study were obtained from the "Business Development and Innovation in Agricultural Corporation Management" survey conducted by the Laboratory of Farm and Management at Kyushu University in 2019 (Nanseki, 2021). Information was gathered through mail questionnaires sent to Japanese agricultural corporations. The names of the agricultural corporations were collected from relevant publications, reports, and the website of the Japan Agricultural Corporations Association (https://hojin.or.jp/). The questionnaire was eight A4 pages and consisted of 20 questions. The questions can be roughly categorized as follows: Q1–4: basic business activities, scale, and policies of the corporation; Q5–9: status of innovation in the corporation; Q10–11: utilization of information and communication technology and smart agriculture; Q12–14: detailed business activities and their prospects and self-assessment of the corporation's "strengths" and "weaknesses." Questions 15 and 16 relate to the corporation's relationship with the regional community and its sense of contribution to regional agriculture, Question 17 is about the corporation's views on the Free Trade Agreement on Agricultural Products, Questions 18 and 19 are about the representative's age and background, and Question 20 is about the corporation's interest in the questionnaire survey.

Questionnaires were sent to 2,885 corporations, and 505 corporations provided valid answers (an effective response rate of 17.5%). The outline and basic survey results are presented in Nanseki (2021). The analysis in this study was conducted using data from 313 corporations that responded to all the questions (Table 1).

### Methodology

Table 1 presents the questionnaire and the response options used in the analysis. Eighteen questions were used to identify agricultural corporations' awareness of their contribution to regional agriculture. Next, to elucidate the factors influencing their awareness, analysis was conducted using age of managers, the number of employees, most recent annual sales (hereinafter referred to as "annual sales"), most recent ordinary profit margin (hereinafter referred to as "profit margin"), and management stage annual sales, profit margin, stage of management growth, and self–assessment of their own "strengths" and "weaknesses" compared to other farmers (hereinafter referred to as "self–evaluation").

Regarding the specific analysis, a factor analysis was first conducted on the 18 questions, followed by factor analysis. It was noted that "the region is generally assumed to be about the size of a city, town, or village". The respondents' awareness of their contribution to regional agriculture was quantified on a 5–point Likert scale (from 5 for "contributes" to 1 for "does not contribute"). The maximum likelihood method was used for extraction in factor analysis, and the promax method was used for rotation. The criterion for factor extraction was an eigenvalue of 1.0 or higher.

Next, the factors related to awareness of contribution calculated from these factor analyses were used as the objective variables. The factors involved (independent variables) were the manager's age, number of employees, annual sales, profit margin, and stage of management growth (hereinafter referred to as "fixed effects"). In addition, ten variables (covariates) related to the self–evaluation were considered, and their effects on the objective variables were examined using a generalized linear model (Speed *et al*, 1978). SPSS (version 29.0) was used for these analyses.

## RESULTS

### Breakdown of responding corporations

Table 2 presents the breakdown of the corporations used in the analysis. There were 102 (32.6%) corporations with managers in the under–50 years group, 78 (24.9%) in the 50–60 years group, 92 (29.4%) in the 60–70 years group, and 41 (13.1%) in the > 70 years group. The number of employees under 5 was 67 (21.4%), under 6–10 was 118 (37.7%), under 11–20 was 88 (28.1%), and more than 21 was 40 (12.8%). The corporations with sales of less than 50 million yen were 54 (17.3%), 50–100 million yen were 74 (23.6%), 100–300 million yen were 117 (37.4%), and 300 million yen or more 68 (21.7%). Furthermore, a high percentage of corporations had profit margins of less than 1% to 5%, with 60 (19.2%) in the deficit, 32 (10.2%) breaking even, 100 (31.9%) between 1% and less than 5%, 59 (18.8%) between 5% and less than 10%, and 62 (19.8%) more than 10%.

Furthermore, regarding the stage of management growth, in which the respondents were asked to subjectively evaluate the stage of development of management from the position of the corporation's management, 21

**Table 1.** Question items used in the analysis

| Items for analysis | | | | |
|---|---|---|---|---|
| Impact on regional agriculture (Contribution awareness) | Creation of local brands<br>Creation of new regional agriculture business such as value addition<br>Developing sales channels for local farmers<br>Accumulation and improvement of local production technologies and know–how<br>Formation of networks in communities<br>Promotion of local communities<br>Expand consumption and use of regional agricultural products<br>Activation of local activities (events, etc.)<br>Enhancement of local recognition and evaluation<br>Creation of local employment<br>Agricultural land integration in the region<br>Resolution of abandoned farmland in the region<br>Use of local biomass resources (food waste, compost, etc.)<br>Stimulation of local farmers<br>Revitalization of local economy (through expansion of own sales)<br>Revitalization of local economy (through expansion of sales outside of the own company)<br>Increased sales of regional agriculture–related industries such as agricultural materials and food industry<br>Increase in visitors to the region (direct sales, green tourism, etc.) | | | |
| Items used as factors | | | | |
| Age of managers | 1.under 50 year old | 2.50–60 year old | 3.60–70 year old | 4.over 70 year old |
| Number of employees | 1. under 5 persons | 2. under 6–10 persons | 3. under 11–20 persons | 4. over 21 persons |
| Annual sales | 1. under 50 million yen | 2. between 50 and 100 million yen | 3. between 100 and 300 million yen | 4. over 300 million yen |
| Profit margin | 1. deficit<br>5. over 10% | 2. 0% (break–even) | 3. 1–5% | 4. 5–10% |
| Stage of management growth | 1. start–up stage<br>5. second founding stage | 2. growth stage<br>6. second growth stage | 3. maturity stage | 4. recession stage |
| Evaluation of strengths and weaknesses of the company | 1. Production and processing technology<br>2. Sales and marketing<br>3. Production and business management<br>4. Financial strength<br>5. Trust from clients and the community and the corporate brand<br>6. New product development / New technology development<br>7. Risk management<br>8. ICT utilization and information management<br>9. Human resource management<br>10. Management philosophy and management vision | | | |

**Table 2.** Breakdown of responding corporations

| | | Number | (%) |
|---|---|---|---|
| Age of managers | under 50 years | 102 | (32.6) |
| | 50–60 years | 78 | (24.9) |
| | 60–70 years | 92 | (29.4) |
| | over 70 years | 41 | (13.1) |
| Number of employees | under 5 | 67 | (21.4) |
| | under 6–10 | 118 | (37.7) |
| | under 11–20 | 88 | (28.1) |
| | over 21 | 40 | (12.8) |
| Annual sales | under 50 million yen | 54 | (17.3) |
| | between 50 and 100 million yen | 74 | (23.6) |
| | between 100 and 300 million yen | 117 | (37.4) |
| | over 300 million yen | 68 | (21.7) |
| Profit margin | deficit | 60 | (19.2) |
| | 0% (break–even) | 32 | (10.2) |
| | 1–5% | 100 | (31.9) |
| | 5–10% | 59 | (18.8) |
| | over 10% | 62 | (19.8) |
| Stage of management growth | start–up stage | 21 | (6.7) |
| | growth stage | 118 | (37.7) |
| | maturity stage | 58 | (18.5) |
| | recession stage | 23 | (7.3) |
| | second founding stage | 49 | (15.7) |
| | second growth stage | 44 | (14.1) |

(6.7%) rated it as the start–up stage, 118 (37.7%) as the growth stage, 58 (18.5%) as the maturity stage, 23 (7.3%) as the recession stage, 49 (15.7%) as the second founding stage, and 44 (14.1%) as the second growth stage. The largest number of corporations rated their businesses in the growth phase, followed by those in the mature phase. However, relatively few corporations rated themselves in the start–up and decline phases.

**Strengths and Weaknesses of the Corporation**

The "Strengths" and "Weaknesses" of the self–assessment are presented in Table 3. The respondents were asked to evaluate their company compared to its competitors using a 5–point Likert scale: 5 for "excellent," 4 for "somewhat excellent," 3 for "undecided," 2 for "somewhat inferior," and 1 for "inferior," and the average score was calculated. The ratings indicate that corporations that evaluated their efforts as "excellent" perceived them as "strengths," while those that evaluated them as "inferior" perceived them as "weaknesses."

The average value shown in Table 3 indicates that the highest value of 3.71 was for "trust from clients and the community and the corporate brand," indicating that many corporations evaluated these efforts as "strengths." The next highest values were 3.41 for "production and processing technology" and 3.23 for "management philosophy and management vision" These results suggest that many corporations evaluated these variables as "strengths" in relative terms. In contrast, "ICT utilization and information management" had the lowest value at 2.59. The scores for "risk management," "human resource management," and "new product development/ new technology development" were also relatively lower. For the initiatives whose scores were below 3, it can be considered that a relatively large number of corporations evaluated these initiatives as "weaknesses." Thus, it can be considered an important management problem that needs to be solved and overcome in the future.

**Table 3.** Strengths and weaknesses of the corporation

| Evaluation of strengths and weaknesses of the company | Average |
|---|---|
| Trust from clients and the community and the corporate brand | 3.71 |
| Production and processing technology | 3.41 |
| Management philosophy and management vision | 3.23 |
| Production and business management | 3.20 |
| Sales and marketing | 3.18 |
| Financial strength | 3.04 |
| New product development / New technology development | 2.81 |
| Risk management | 2.81 |
| Human resource management | 2.81 |
| ICT utilization and information management | 2.59 |

**Table 4.** Sense of contribution to regional agriculture

| Impact on regional agriculture (Contribution awareness) | Average |
|---|---|
| Creation of local employment | 3.87 |
| Enhancement of local recognition and evaluation | 3.67 |
| Creation of local brands | 3.65 |
| Stimulation of local farmers | 3.65 |
| Agricultural land integration in the region | 3.59 |
| Revitalization of local economy (through expansion of own sales) | 3.58 |
| Creation of new regional agriculture business such as value addition | 3.48 |
| Resolution of abandoned farmland in the region | 3.44 |
| Formation of networks in communities | 3.37 |
| Promotion of local communities | 3.29 |
| Accumulation and improvement of local production technologies and know-how | 3.28 |
| Activation of local activities (events, etc.) | 3.27 |
| Increased sales of regional agriculture-related industries such as agricultural materials and food industry | 3.25 |
| Revitalization of local economy (through expansion of sales outside of the own company) | 3.20 |
| Expand consumption and use of regional agricultural products | 3.18 |
| Developing sales channels for local farmers | 3.12 |
| Increase in visitors to the region (direct sales, green tourism, etc.) | 2.96 |
| Use of local biomass resources (food waste, compost, etc.) | 2.76 |

**Sense of contribution to regional agriculture**

Table 4 shows the results of agricultural corporations' perceptions of their contribution to regional agriculture. The highest value was "creation of local employment" (3.87), followed by "enhancement of local recognition and evaluation" (3.67), "creation of local brands" (3.65), "stimulation of local farmers" (3.65), and "agricultural land integration in the region" (3.59). These variables indicate a high level of awareness of contribution to regional agriculture. In contrast, the respondents' awareness was lowest for "use of local biomass resources (food waste, compost, etc.)" (2.76), followed by "increase in visitors to the region (direct sales, green tourism, etc.)" (2.96), "developing sales channels for local farmers" (3.12), and "expand consumption and use of regional agricultural products" (3.18). These results may have been influenced by the fact that respondents highly evaluated the tangible effects of their company's initiatives, whereas they did not evaluate the initiatives that were difficult to grasp.

**Results of Factor Analysis**

Next, this study attempted to extract the latent factors related to the awareness of contribution to regional agriculture. Table 5 presents the results of the factor analysis with promax rotation. The factors were extracted under the condition of an eigenvalue of 1.0 or higher. In doing so, variables with factor loadings of less than 0.4 were deleted and the analysis was repeated. In this process, "use of local biomass resources (food scraps, compost, etc.)," "accumulation and improvement of local production technology and other know–how," and "development of sales channels for local farmers" were deleted. Finally, factor analysis was conducted on 15 variables.

As a result of the analysis, three factors were identified, which explained 51.9% of the total variance. Contributing to the first factor were "Promotion of local communities (production and consumption, etc.)," "activation of local activities (events, etc.)," "expand consumption and use of regional agricultural products," "creation of local brands," "creation of new regional agricultural businesses such as value addition," "enhancement of local recognition and evaluation," "increase in visitors to the region (direct sales, green tourism, etc.)." The factor loadings of all variables showed positive correlations. Since these variables contributed to the expansion of regional agriculture, they are factors related to the "contribution to regional agriculture."

The second factor consisted of five variables: "revitalization of local economy (through expansion of own sales)," "revitalization of local economy (through expansion of sales outside of the own company)," "increased sales of regional agriculture–related industries such as agricultural materials and food industry," "stimulation of local farmers," and "creation of local employment." All showed a positive loading. Since these were composed of variables related to the local economy, they can be considered "contribution to the local economy." Finally, the third factor consisted of the two variables of "resolution of abandoned farmland in the region" and "agricultural land integration in the region." Therefore, this factor is considered "contribution to solving farmland problem" factor.

**Results of the Generalized Linear Model**

Table 6 shows the results of the generalized linear model. The variables found to be significant for contribution to regional agriculture were "trust from clients

**Table 5.** Results of Factor Analysis

| | Contribution to regional agriculture | Contribution to the local economy | Contribution to solving farmland problems |
|---|---|---|---|
| Promotion of local communities (production and consumption, etc.) | ***0.930*** | –0.206 | 0.001 |
| Activation of local activities (events, etc.) | ***0.795*** | –0.072 | 0.081 |
| Expand consumption and use of regional agricultural products | ***0.784*** | –0.023 | –0.010 |
| Creation of local brands | ***0.620*** | 0.147 | –0.072 |
| Creation of new regional agriculture business such as value addition | ***0.597*** | 0.215 | –0.103 |
| Enhancement of local recognition and evaluation | ***0.572*** | 0.155 | 0.093 |
| Increase in visitors to the region (direct sales, green tourism, etc.) | ***0.529*** | 0.157 | –0.034 |
| Formation of networks in communities | ***0.433*** | 0.253 | 0.040 |
| Revitalization of local economy (through expansion of own sales) | –0.040 | ***0.901*** | –0.067 |
| Revitalization of local economy (through expansion of sales outside of the own company) | 0.032 | ***0.761*** | –0.075 |
| Increased sales of regional agriculture–related industries such as agricultural materials and food industry | 0.045 | ***0.632*** | 0.012 |
| Stimulation of local farmers | –0.052 | ***0.592*** | 0.202 |
| Creation of local employment | 0.113 | ***0.477*** | 0.073 |
| Resolution of abandoned farmland in the region | 0.013 | 0.023 | ***0.874*** |
| Agricultural land integration in the region | –0.013 | 0.007 | ***0.819*** |
| Alpha coefficient | 0.889 | 0.819 | 0.839 |
| Cumulative Factor Load (%) | 24.45 | 41.77 | 51.93 |

**Table 6.** Results of the Generalized Linear Model

| | | Contribution to regional agriculture | Contribution to the local economy | Contribution to solving farmland problem |
|---|---|---|---|---|
| Age of managers | under 50 years | – | – | –0.256 b |
| | 50–60 years | – | – | –0.151 b** |
| | 60–70 years | – | – | 0.114 a |
| | over 70 years | – | – | –0.011 ab |
| Number of employees | under 5 | – | – | – |
| | under 6–10 | – | – | – |
| | under 11–20 | – | – | – |
| | over 21 | – | – | – |
| Annual sales | under 50 million yen | – | – | – |
| | between 50 and 100 million yen | – | – | – |
| | between 100 and 300 million yen | – | – | – |
| | over 300 million yen | – | – | – |
| Profit margin | deficit | – | – | –0.316 c |
| | 0% (break-even) | – | – | 0.102 ab |
| | 1–5% | – | – | –0.172 bc* |
| | 5–10% | – | – | –0.110 abc |
| | over 10% | – | – | 0.115 a |
| Stage of management growth | start–up stage | – | 0.049 ab | 0.091 ab |
| | growth stage | – | 0.204 a | 0.306 a |
| | maturity stage | – | –0.227 b*** | –0.269 b*** |
| | recession stage | – | –0.189 b | –0.222 b |
| | second founding stage | – | 0.015 ab | –0.125 b |
| | second growth stage | – | –0.195 b | –0.237 b |
| Evaluation of strengths and weaknesses of the company | Production and processing technology | – | – | –0.126 ** |
| | Sales and marketing | – | – | – |
| | Production and business management | – | – | – |
| | Financial strength | –0.114 * | – | – |
| | Trust from clients and the community and the corporate brand | 0.298 *** | 0.378 *** | – |
| | New product development / New technology development | – | – | – |
| | Risk management | – | – | – |
| | ICT utilization and information management | 0.170 *** | 0.195 *** | – |
| | Human resource management | – | – | – |
| | Management philosophy and management vision | 0.194 *** | 0.259 *** | 0.149 ** |
| AIC | | 819.9 | 747.7 | 827.3 |
| BIC | | 932.3 | 860.1 | 939.7 |

Note 1: In the table, *** indicates statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.
2: In the table, lowercase alphabets indicate statistical significance at 5%.
N = 313

and the community and the corporate brand," "ICT utilization and information management," and "management philosophy and management vision" in the self–evaluation, with statistically significant differences at less than 1%. Significance was also found for "financial strength" at 10%. The analysis revealed that corporations that perceived themselves as "strengths" in the variables that were found to be significant in their self–evaluations had a higher awareness of their contribution to regional agriculture.

The next section discusses the results related to contributions to the regional economy. The analysis showed statistically significant differences of less than 1% in the growth stage of management, "trust from clients and the community and the corporate brand," "ICT utilization and information management," and "management philosophy and management vision" as self–evaluations. The relationship among stage of management growth revealed that awareness was significantly lower in the mature (–0.227), second growth (–0.195), and recession (–0.189) stages than in the growth stage (0.204). Moreover, the three variables were found to be significant regarding self–evaluation ("trust from clients and the community and the corporate brand," "ICT utilization and information management," and "management philosophy and management vision"), and corporations that recognized each as "strengths" had a higher awareness of their contribution to the local economy.

Furthermore, regarding the contribution to solving farmland problem, statistically significant differences were found at less than 5% for the age of managers, profit margin, stage of management growth, and "management philosophy and management vision" as a self–evaluation. Significance was found at less than 10% for "production and processing technology." In terms of the age of managers, the highest scores were found in the 60–70 years group, which was significantly different from the under–60 years group, which had the lowest awareness of the factors. Regarding the profit margin, awareness was lowest in unprofitable management, and there was a significant difference between the profit margin of break–even and the profit margin of more than 10%. In terms of the Stage of management growth, the highest awareness of contribution was found in the growth stage, with a significant difference between this stage and other management stages, except for the start–up stage. In terms of self-evaluation, those who considered "production and processing technology" to be their "strengths" had a lower awareness of contributing to farmland problem. Furthermore, those who considered "management philosophy and management vision" to be "strengths" had a higher level of awareness of contribution to farmland problem.

## DISCUSSION

First, the results of the factor analysis revealed three factors. The "contribution to regional agriculture" factor consisted of variables related to efforts related to agricultural production within the region. Next, variables related to economic activities such as sales of agricultural production contributed to the "contribution to the local economy" factor. Furthermore, variables related to farmland accumulation and abandoned farmland, that is, variables related to farmland problems, contributed to the "contribution to solving farmland problem" factor.

Tokuda (2017) pointed out that advanced agricultural management should not only develop its own business but also realize conservation management and sustainable use of management resources existing in the region by restructuring and strengthening the regional agriculture system, and it is important to adopt initiatives that lead to the maintenance and development of regional agriculture. In this study, the target of the analysis was agricultural corporations in general; about 85% were limited liability and joint–stock companies, about 13% were agricultural cooperatives, about 75% were corporations established under the initiative of farmers, and about 20% were newcomers to the industry. Although this point needs attention, it is considered important that the awareness of the farmland problem was extracted as a different dimension of awareness structure, along with awareness of contributions to regional agriculture and the local economy. As for future studies, a detailed analysis is needed, as this study did not clarify the detailed relationships, for example, between crop type and management strategy.

Next, we discuss the results of the generalized linear analysis. The following discussion focuses primarily on variables affected by more than one factor.

First, the growth stage of management is effected in terms of "contribution to the local economy" and "contribution to farmland problem." In particular, the results of a higher awareness of the local economy and farmland problem during the stage of management growth compared to the other stages are reasonable. Kimura (1994) attempted to clarify the developmental stages of management using Maslow's five–stage theory (1943, 1970) of needs and pointed out that the stages of development become more sophisticated in the order of stability in one's own and family's lives, social self–realization such as one's dreams, and contribution to regional agriculture, regional society, and consumers' needs. Kimura (1994) also pointed out that contributing to regional agriculture and local communities is the most advanced management vision, but the analysis mainly focused on family management. Regarding the contribution to the local economy, awareness was highest in the growth stage and lowest in the mature, recession, and second growth stages. In addition, awareness of contribution to farmland problem was highest in the growth phase and significantly lower in the other management stages, except for the start–up stage. Sakai's (2011) suggestion is important in indicating the future relationship between agricultural corporations' management and regional agriculture. He stated that today's companies are no longer just required to pursue a classical corporate image but are expected to be socially responsible in consideration of their stakeholders. They are expected to play a greater social role than companies in other industries. He also pointed out that the corporate management of land–use agriculture necessarily requires corporate social responsibility in the regional community and has a different character from general corporate management, making it difficult to manage land–use agriculture solely for profit.

Second, several distinct results were obtained regarding the impact of self–evaluation. First, agricultural corporations that recognized their "strengths" in "trust from clients and the community and the corporate brand" had a higher awareness of "contribution to regional agriculture" and "contribution to the local economy." This result is reasonable. It can be considered that the agricultural corporations' recognition of the efforts they have engaged in so far as their "strengths" led to the results of their awareness of their contribution to regional agriculture and local economies. Chomei and Nanseki (2016) analyzed the characteristics of paddy rice, open field vegetables, institutional vegetables, and livestock, in the management of each type of corporation, and found that the corporations that recognized "trust from clients and the community and the corporate brand" as their "strengths" tended to have higher sales.

The next characteristic result was that significant differences were found in "ICT utilization and information management," indicating that corporations that recognized ICT as "strengths" had a higher awareness of "contribution to regional agriculture" and "contribution to the local economy." In a previous study on "ICT utili-

zation and information management," Chomei and Nanseki (2019) analyzed the relationship between the rate of ICT utilization and the cost–effectiveness of ICT utilization. They revealed that the ICT utilization rate for paddy rice was the lowest at about 55.3–66.0%, while that for livestock was the highest at 71.1–86.3%, indicating that the ICT utilization rate was high in livestock production. In addition, the study revealed that the cost-effectiveness of ICT is relatively high in livestock production and low in rice and open field vegetables. The study statistically revealed that livestock production had a high evaluation in "improving the trust of customers" but low in open field vegetables, and a high evaluation in "increasing sales value" but low in paddy rice and field vegetables. Mi *et al*. (2022) found that the number of technologies introduced in smart agriculture is affected by the type of corporation, whether they are qualified agricultural corporations, their sales targets, profit margin targets, main crops, and their self–evaluation regarding ICT utilization and information management. However, the analysis in this study revealed that self–evaluations of "ICT utilization and information management" were relatively negative. This result may be attributed to the rapid development of ICT innovation in recent years, such as the emergence of various new ICT devices. Thus, the results of this study were perhaps influenced by differences in the relative sense of speed between current trends in ICT and a company's own management development. In the future, ICT utilization is expected to become indispensable in the management of corporations; therefore, it will be an important management problem for the management that evaluates it as a "weakness." Therefore, support measures for the introduction and diffusion of ICT such as the provision of information and hands–on workshops to promote ICT utilization are important.

Finally, it was found that corporations that identified themselves as "strengths" in their self–assessed "management philosophy and management vision" had a higher awareness of contribution in "contribution to regional agriculture," "contribution to regional economy," and "contribution to agricultural land problems." Chomei and Nanseki (2016) analyzed the relationship between management principles and other documentation that contributed to business management and sales. The results revealed that corporations with documented management principles had relatively higher sales of paddy rice, field vegetable, and institutional vegetable corporations. These results suggest that if the management philosophy can be shared within the corporation, and employees understand the purpose of its establishment and the significance of its existence in society, employees will be more motivated to work and unite, and the corporation as a whole will contribute to more efficient production activities.

## CONCLUSIONS

This study aimed to clarify the awareness of the contribution of agricultural corporations to regional agriculture and determine the influence of the attributes of agricultural corporations and their self–evaluation on the awareness of their contribution to regional agriculture.

In this study, using the results of an original nationwide questionnaire survey, factor analysis, and generalized linear model analysis were conducted to elucidate the factors influencing the awareness of contribution to the local community. In the analysis, awareness of contribution to regional agriculture was taken as the dependent variable, and the attributes of agricultural corporations and the self-evaluations of their "strengths" and "weaknesses" were taken as independent variables.

The analysis revealed the following three points. First, the factor analysis revealed that "contribution to regional agriculture," "contribution to local economy," and "contribution to solving farmland problem" were latent awareness structures with separate dimensions. Second, the consciousness structural analysis revealed that corporations in the growth stage of their management had a high consciousness of contribution to economic revitalization and farmland problems, while those in the mature and decline stages had a low consciousness of contribution, suggesting that the perception of the management stage influences the consciousness of contribution. Finally, regarding self–evaluation, agricultural corporations that perceive "trust from clients and the community and the corporate brand," "ICT utilization and information management," and "management philosophy and management vision" as "strengths" have a higher awareness of contribution to agricultural and economic revitalization.

Nevertheless, the analysis of consciousness of contribution to regional agriculture in this study is limited to an exploratory analysis. It is necessary to consider the differences in awareness of contributions to regional agriculture among agricultural corporations depending on the crop type (business sector) and the type of corporation. Moreover, it is necessary to conduct an economic and managerial analysis focusing on the measurement of the economic and managerial effects of initiatives that influence awareness of contributions to regional agriculture. These points will be the subjects of future research in this area.

## AUTHOR CONTRIBUTIONS

All the listed authors discussed the results and contributed to the final manuscript. Yosuke Chomei conceived the questionnaire design, performed the empirical analyses, and drafted the manuscript. Teruaki Nanseki devised the project, designed the questionnaire, collected the data, provided the data source, suggested the conceptual organization and data interpretation of this study, and supervised the findings. All the authors reviewed the results and approved the final version of the manuscript.

## ACKNOWLEDGEMENTS

This work was supported by JSPS KAKENHI Grant

Number JP23H02320. In addition, we would like to thank Professor Norikazu Inoue for his extremely valuable input when discussing the results of the analysis. We would like to express our gratitude to him.

## REFERENCES

Chomei, Y and T. Nanseki 2016 Business Development, Business Management and Farmer's Intention in Agricultural Corporation: An Analysis of a Nationwide Questionnaire Survey. *Sci. Bull. Fac. Agr., Kyushu Univ*., **71**(2): 47–58 (in Japanese)

Chomei, Y and T. Nanseki 2019 Business Management and Information Management of Rice Crops: Characteristics in Comparison with Other Crops. *In* "Smart agriculture practice in rice–farming and perspective of farm in next–generation", ed. by T. Nanseki, Yokendo Press, Tokyo (Japan), pp. 252–273 (in Japanese)

Imai, Y. 2013 Promotion and New Developments of Community Farming–Type Community Contributions in Shimane Prefecture: A Case Study of a Complex Organization Supported by Regional Cooperation. *J. Rural Prob*., **49**(2): 191–196 (in Japanese)

Inoue, N., K. Takeyama, Y. Yamamoto and K. Yamagishi 2016 Characteristics of Supporting Activities for Community on Group Farming Organizations. *J. J. Farm Manag*., **54**(2): 43–48 (in Japanese)

Kimura N. 1994 *Business Management of Growing Agriculture*. Nihon Keizai Hyouronsha, Tokyo (Japan), 222p. (in Japanese)

MAFF (Ministry of Agriculture, Forestry and Fisheries) 2023 Agriculture and Forestry Census in 2020 (in Japanese) https://www.maff.go.jp/j/tokei/kouhyou/noukou/attach/ pdf/index–1.pdf

Maslow, A. H. 1943 A theory of human motivation. *Psychol. Rev*., **50**: 370–396

Maslow, A. H. 1970 *Motivation and Personality (second edition)*. New York: Harper and Row, 369p.

Mi, J., T. Nanseki, Y. Chomei, Y. Uenishi and T. L. Nguyen 2022 Determinants of ICT and Smart Farming Technology Adoption by Agricultural Corporations in Japan. *J. Fac. Agr., Kyushu Univ*., **67**(2): 249–262

Nanseki, T., Y. Chomei and Y. Matsue 2016 *Rice farm management innovation and smart agriculture in TPP era: farming technology package and ICT applications*. Yokendo Press, Tokyo (Japan), 285p. (in Japanese)

Nanseki, T. [Ed.] 2019 Smart agriculture practice in rice–farming and perspective of farm in next–generation, Yokendo Press, Tokyo (Japan) 363p. (in Japanese)

Nanseki, T. 2021 *Agricultural corporations as seen from fact data: profile, business operation, strategy and innovation*. Agriculture and Forestry Statistics Publishing Inc., Tokyo (Japan), 106p. (in Japanese).

Nishimizu R. 2016 Relationships between firms participating in regional agriculture and host regions: Mutual evaluation of firms and host regions in Oita Prefecture. *In* "Farming Businesses Empower Rural Community: New–entries from non–farm Sectors", ed. by K. Hotta and S. Shinkai, Agriculture and Forestry Statistics Press, Tokyo (Japan), pp. 53–80. (in Japanese)

Onaka K. 2018 *Expansion process and present situation of the entry of companies into agriculture*. Agriculture and Forestry Statistics Publishing Inc., Tokyo (Japan), 258p. (in Japanese)

Sakai, T. 2011 The Logic and Foresight Regarding the Development of "Corporate Management" in Agriculture. *J. J. Farm Manag*., **48**(4): 7–16. (in Japanese)

Sibuya, Y. [Ed.] 2020 *Why do the companies enter the agriculture? –Strategy and theory of the entry into agriculture–*. Agriculture and Forestry Statistics Publishing Inc., Tokyo (Japan), 248p. (in Japanese)

Speed, F. M., R. R. Hocking and O. P. Hachney 1978 Methods of analysis of linear models with unbalanced data. *J. Amer Stat. Assoc*., **73**: 105–112

Tokuda, H. 2017 Development of Advanced Corporation Farms and Regional Farming System: A Case of a Fruit Farming Area. *J. Rural. Econ*., **89**(2): 91–105 (in Japanese)