



Role of creative classes in sustainable agricultural development: focusing on creating shared value in rural Japan

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Abstract

The purpose of this study was to clarify the role of creative classes in sustainable agriculture development through creating shared value in rural Japan by applying latent class analysis (LCA), structural equation modeling (SEM) and cognitive map analysis to the results of a questionnaire survey of farmers. Two hypotheses were set for verification: “There are a certain number of Japanese farmers who belong to the creative class” (H1) and “The creative class is highly entrepreneurial, appreciates the attractiveness of agriculture, prefers sustainability policies and seeks to create shared value in agriculture” (H2). We obtained analytical results as follows. First, from the results of the latent class analysis (LCA), farmers were classified into four classes (class 1: Majority, class 2: Early adopter, class 3: Laggard, class 4: Innovator). In addition, Class 4 (innovator) was interpreted as the creative class because most respondents answered positively about creative thinking, job satisfaction, life satisfaction, innovation orientation, social capital and cognitive changes due to the COVID-19 epidemic. Second, the analysis of the structural equation modeling (SEM) revealed the factors affected the entrepreneurship, namely preference for agricultural policy and impact on creating shared value in agriculture in the creative class. In other words, we found that the evaluation of the multi-functionality of agriculture influences each element for entrepreneurship of the creative class, and also influences the preference for agricultural policy and creation of shared value. Thirdly, analysis of cognitive maps revealed that creative classes contribute to sustainable agricultural and rural development through the creation of shared value. However, in current Japan, the creative classes are concentrated in urban areas and farmers highly value the risk of failure, so there is no virtuous cycle for the entrepreneurial environment to shape entrepreneurial attitudes. Therefore, it is important for policies to develop creative classes in flatland agricultural areas and mountainous areas, and build networks for the creative classes among different regions.

Keywords Creative class (CC) · Creating shared value (CSV) · Latent class analysis (LCA) · Structural equation modeling (SEM) · Japan

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JEL Classification R11

1 Introduction

In Japan, as shown in the fact that 96.4 percent of agricultural management bodies are individual management (“Agriculture and Forestry Census” 2020), traditional family management is still the focus of business activities. However, agriculture and rural areas are started to be recognized as creative industries and spaces¹ (Fujinami 2017; Haga 2018) along with a growing awareness of the importance of innovation in Japan (OECD 2019). Additionally, the Ministry of Agriculture, Forestry and Fisheries (MAFF) launched the Strategy MeaDRI (measures for achievement of decarbonization and resilience with innovation) for a sustainable food system, on May 12, 2021(MAFF 2022). It aims to enhance engagement of stakeholders at each stage of food supply chains and promote innovation to reduce environmental load.

On the other hand, local companies, small-scale businesses, and local residents have so far developed regional businesses and urban development activities while making use of local resources such as nature, history, and culture, with the aim of revitalizing the local communities. In recent years, these activities have become more sophisticated, and innovative approaches have emerged through interdisciplinary integration, participation of diverse actors, and local organizational learning that incorporates competitive elements (Tashiro 2022).

Furthermore, it has been seen that the creative classes are taking initiatives to solve the social problems through business in Japan’s rural areas (Odagiri et al. 2016). However, research on entrepreneurship in Japan’s agriculture has been mainly qualitative, and its emphasis is on how to shift agricultural management from livelihood to corporate management compared with other industries. Research on innovation in agriculture and rural areas, by considering it as a process of the collective cognitive innovation among producers, consumers and governments through organizational learning, is extremely scarce (Kiminami et al. 2021). Therefore, in this study, we will apply latent class analysis (LCA), structural equation modeling (SEM) analysis, and cognitive map analysis to the results of a questionnaire survey of farmers to clarify the factors that affect entrepreneurship in the creative class. Based on the results of clarifying the policy preferences of the creative class and their impact on shared value creation, we propose policies for fostering the creative classes in rural Japan.

¹ For the explanation on ‘Creative Industries’ and ‘Rural Creative Economies’, see The Policy Research Group (2013) for details.

2 Literature review

2.1 Study on creative class

Florida (2002) defines creative class (CC) as “people in science and engineering, architecture and design, education, arts, music and entertainment whose economic function is to create new ideas, new technology, and new creative content.” It was classified into super creative core, creative professionals, and artistically creative people. The ‘super creative core’ incorporates the likes of scientists, technicians, university professors, poets, novelists, artists, entertainers, actors, designers, and architects, while the ‘creative professionals’ are made up of professional occupations like tech or finance workers, lawyers, doctors, managers and so forth and tends to reside in areas with a high level of amenities. This approach has effects activating empirical research on ‘creativity’ because it is easy to identify CC. However, ‘creativity’ here was defined only from the aspect of person (or content).² In a series of studies (see Batabyal 2021; Batabyal et al. 2019; Batabyal and Yoo 2020), CC is theoretically analyzed as the Creative Capital using a regional economic growth model based on the framework of microeconomics.

In addition to the fact that there is no guarantee that person (or personality) and process will match, occupation is only an inaccurate proxy variable for Personality. Therefore, not all people engaged in the so-called creative professions are creative (for example, creative thinking), and conversely, those engaged in so-called non-creative professions are possible to be creative in terms of Process. Similar problems arise when defining CC in association with a creative industry. To address this issue, McGrahan and Wojan (2007) used the ‘creative thinking’ element of the 2004 O * NET (The Occupational Information Network) content model to reconstruct occupations often creative in terms of Process as creative occupations. This can be seen as an attempt to match the process aspect of creativity with the person aspect and even with the profession. Kiminami et al. (2018, 2019) also conducted empirical analysis by treating people who emphasize creative thinking as CC in the same way.

There are not many empirical studies on the creative classes in Japan (Westlund and Calidoni 2010; Ishisaka 2014; Yoshimura 2009; Kiminami et al. 2018). Amongst, Westlund and Calidoni 2010 is a pioneering empirical. They confirmed that human capital and population density had significant effects on regional development at the prefectural level of Japan in the early 2000s; however, the effects of tolerance and diversity could not be confirmed due to the low maturity of Japanese civil society. On the other hand, Furuzawa et al. (2020) clarified the determinants of resident distribution of CC and their impact on the sustainable development of the region, by focusing on the role of tolerance and diversity in major cities in Japan. They concluded that a large gender gap of CC hinders the development of cities.

² According to Cropley (2011), there is a process behind a creative product to be created, and there is a person who executes that process. Additionally, environmental pressures promote or impede these activities. Therefore, creativity has four aspects: ‘Person’, ‘Process’, ‘Product’, and ‘Press’.

Recently, studies on the CC have increased not only in large cities but also in small and medium sized cities and in rural areas (Lovett and Beesley 2007; Hatcher et al. 2011; Rickman and Rickman 2011; Argent et al. 2013). McGranahan and Wojan (2007) and McGranahan et al. (2011) proposed a new growth model with the shift of creative class to rural areas because of amenity factors in rural areas by combining Florida's (2002) regional development model based on creative class, and conducted empirical analysis. In addition, Herslund (2012) conducted cases analysis of urban CC moving to rural areas and starting businesses in Denmark. Furthermore, by introducing LCA (latent class analysis), logistic regression and quantile instrumental variable regression to the survey during recovery from the Great Recession (2010–2014) in the USA, Wojan and Nichols (2018) pointed out that the rural areas characterized by design-integrated establishments experienced faster growth in wages. Research on the CC in rural areas so far has centered on tourism and arts (Richards 2019). However, compared to the situation of the CC in USA who are generally living in urban areas, the biggest feature of the CC who think 'work needs fun' in Japan is that they are living in rural and mountainous areas (Odagiri et al. 2016). Therefore, in this research, we will grasp the CC in rural Japan from multiple dimensions including profession, creative thinking, social capital, consumer innovation orientation, etc.

2.2 Creating shared value in agriculture and policy innovation

Multi-functionality and multiple functions of agriculture are terms used to indicate generally that agriculture can produce various non-commodity outputs in addition to food (OECD 2000). Multi-functionality of agriculture is composed of economic, environmental, and social aspects that supplies foods and services such as environmental conservation, good scenery and farm experience. Although many studies have specified the existence of multi-functionality of agriculture, it is necessary to generate economic value and social value at the same time. The rationale is the theory of creating shared value (CSV), which is the idea that a company creates social value by working to solve social needs and problems, and as a result, economic value is created (Porter and Kramer 2011). Unlike the conventional way of thinking about CSR (corporate social responsibility) and social contribution activities, CSV is positioned at the center rather than around corporate activities, and it is significant that it changes the way of thinking about business itself. To realize CSV in agriculture, it is important for agricultural managers to be aware of the management philosophy and the current state of society. Furthermore, as a prerequisite for strategic innovation of a company, Rajagopalan and Spreitzer (1997) and Kida (2007) focused on the changes in organizational knowledge structure including manager's cognitive structure from a cognitive perspective. Therefore, the CSV strategy in agriculture is influenced by the reality of CSV of other farming and non-farming companies competing for resources, products, services, and by the recognition and evaluation of consumers including local stakeholders toward multi-functionality of agriculture (Kiminami et al. 2022).

Policy innovation is the application of new processes, tools and practices in the design and development of policies that lead to better solutions to complex problems (Brookfield Institute 2018). In general, policy innovation introduces various approaches such as system design, strategic foresight, service design, experimental policy, behavioral insight, and open policy. It is characterized by an emphasis on collaboration and design thinking. In addition, Whitbread et al. (2017) identified three areas as important for achieving policy innovation: new ways of thinking, new skills, and new tools, through a literature review and investigation of innovative policies and regulatory cases in each country. New ways of thinking include understanding human behavior and cognitive biases, complex thinking (the ability to interconnect different dimensions of reality), timelines and scenario analysis. The challenges we face today are wicked problems that are intricately intertwined with social, economic, and environmental aspects. To realize sustainable agriculture and rural development, policy innovation that can deal with such troublesome problems is required.

3 Theoretical model and analytical framework

3.1 Theoretical examination

Based on the results of the above literature review, we make theoretical examination on the mechanism of the CCs (creative classes) in agriculture and rural development from the perspective of creating shared value.

We suppose that there are N members in the region (including non-CC members (N_g) and CC members (N_c)), and the ratio of CC members to the total members is x .

$$N_c/N = x (0 \leq x \leq 1).$$

If the non-CC members (N_g) use the capital (K_{ge}) and entrepreneurship (E_g) to produce the economic value (EV_g) under the profit maximization action.

$$EV_g = EV_g(K_{ge}, E_g). \quad (1)$$

Entrepreneurship (E_g) is determined by entrepreneurial ability (AB_g), entrepreneurial attitude (AT_g), entrepreneurial intention (IN_g), and entrepreneurial environment (EN_g).

$$E_g = E_g(AB_g, AT_g, IN_g, EN_g). \quad (2)$$

The optimal solution for profit maximization can be obtained by the following conditional expression while the price of capital is r , and the economic value (EV_g) produced is EV_g^* at this time.

$$\partial EV_g / \partial K_{ge} = r.$$

However, if the CC members produce social value SV_c (social evaluation value obtained by solving social issues) and economic value EV_c (monetary value

obtained by providing goods and services), let the capital held by CC be K_c . Since the CCs are more productive than the non-CC members and have higher social entrepreneurship (Sec), their capital K_c is assumed to be greater than K_{ge} . α is the capital attraction of CC and is a function of Sec.

$$K_c = \alpha K_{ge} (\alpha > 1).$$

Additionally, social entrepreneurship (Sec) is a function of multifunctional evaluation of agriculture (MFA), entrepreneurial environment (ENg), entrepreneurial ability (ABg), entrepreneurial attitude (ATg), and entrepreneurial intention (INg).

$$Sec = Sec(MFA, ENg, ABg, ATg, INg). \quad (3)$$

We suppose that the CC members adopt CSV strategies. At this time, the social value (SVc) produced by the CC members is assumed to be a function of K_c and Sec.

$$SVc = SVc(K_c, Sec). \quad (4)$$

On the other hand, EVc is a function of K_c and Sec, and as an effect of the CSV strategy, activities that produce SVc (social value) increase economic value ($\partial EVc / \partial SVc > 0$).

$$EVc = EVc(K_c, Sec). \quad (5)$$

In the long run, the CC members will take action to maximize the production of shared value $V_c = EVc + SVc$, which is the sum of economic value and social value. The condition for maximizing $V_c(K_c, Sec)$ is as follows.

$$\partial V_c / \partial K_c = 0. \quad (6)$$

The V_c supplied at this time is assumed to be V_c^* . However, as a condition for the CC business to be economically sustainable, there is a long-term constraint of $EVc - K_c \geq 0$. Based on the above, the value V^* produced by the members of the region is as follows.

$$V^* = [EVg^* \cdot (1 - x) + Vc^* \cdot x] \cdot N. \quad (7)$$

Then, the establishment of the following formula is a condition for the increase in CC to contribute to the expansion of regional value creation.

$$EVg^* < Vc^*. \quad (8)$$

This condition becomes more likely to hold the larger the social entrepreneurship (Sec) and the larger the effect of the CSV strategy ($\partial EVc / \partial SVc$).

Furthermore, if policy innovation (P_i) has a feedback effect on sustainability and can enhance social entrepreneurship Sec, the following formula holds.

$$\partial V^* / \partial P_i > 0. \quad (9)$$

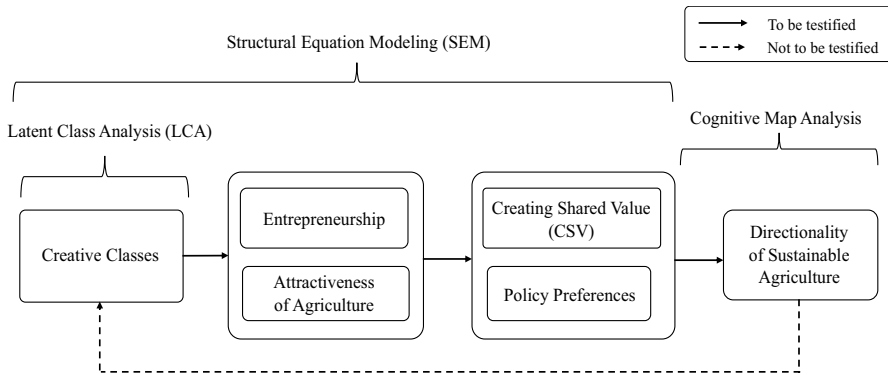


Fig. 1 Analytical framework

And the level of policy innovation will further increase through the increase of CC, the rise of social entrepreneurship, and the rise of CSV strategy effectiveness. At this time, we believe that a virtuous cycle of sustainable agricultural and rural development will be formed through the CSV strategy.

$$Pi_{t1} > Pi_{t0}. \quad (10)$$

3.2 Analytical framework and methods

Based on the results of the above theoretical model, this research constructs the analytical framework shown in Fig. 1. In other words, the direction of human resource development policy influences the generation of creative classes in rural areas, leading to the improvement of entrepreneurship and the evaluation of the attractiveness of agriculture. In addition, a virtuous cycle will be created in which the creative class achieves the creating shared value in agriculture through communication with stakeholders, leading to policy innovation. Furthermore, feedback loops in policy innovation mean that CCs (creative classes) have new policy directions (demands) and can become policy entrepreneurs by being actively involved in them. We set the following hypotheses in line with the framework of this analysis. To verify our hypotheses, we conducted a questionnaire survey of farmers, and introduce Latent Class Analysis (LCA), Structural Equation Modeling (SEM), and Cognitive Map Analysis into the results.

Latent class analysis is a method of identifying potential types (=latent classes) that make up a population of respondents and clarifying the structure of each. Assuming population diversity, analysis can be performed using multiple qualitative data (quantitative data can be combined), and the optimal number of classes can be determined using statistical criteria (AIC: Akaike's Information Criterion and BIC: Bayesian Information Criterion). Structural equation modeling is an analysis in which the relationships among a large number of variables, set as hypotheses, are modeled in the form of linear combinations. A cognitive map is a type of mental

representation which serves an individual to acquire, code, store, recall, and decode information about the relative locations and attributes of phenomena in their everyday or metaphorical spatial environment. Although these methodologies have been studied in various fields, such as psychology, education, archeology, planning, geography, cartography, architecture, landscape architecture, urban planning, management and history, they are rarely applied to the research on creative class and rural development.

Hypothesis 1: “There are a certain number of Japanese farmers who belong to the creative class.”

Hypothesis 2: “The creative class is highly entrepreneurial, appreciates the attractiveness of agriculture, prefers sustainability policies and seeks to create shared value in agriculture.”

4 Analytical results

4.1 Results of latent class analysis (LCA)

4.1.1 Classification of respondents

To clarify the actual status of the creative classes in rural Japan, we conducted a web questionnaire survey on farmers’ entrepreneurial awareness in this research. The actual inspection was outsourced to GMO Research Co., Ltd. and was conducted from October 18th to October 21st, 2021. The survey was conducted until the target of 1,000 samples was reached, and the survey period was 4 days. We conducted this survey by narrowing down the respondents who have been working in agricultural sector for more than a year through screening questions for the monitors owned by the company. To confirm the bias of the respondents of this questionnaire from the sample population, Table 1 compares the distribution of respondents for basic attributes (including management) with the results of the Agriculture and Forestry Census (Hereafter “Census”). However, the Census is a management-based survey, and there are cases where the questions and option items do not match strictly, so they are shown for reference only. As a result of test, the goodness of fit and significant differences were confirmed for gender, age, manager, location, agricultural-related business diversification, and sales amount. In addition, the difference in the proportions for each production item, was confirmed to have a significant difference at the 1% level. Therefore, the respondents to this questionnaire survey can be summarized as follows. By gender, most of them are male, and by age, they are mostly in their 20–50s. Many of them are working on the crops other than rice and implementing agricultural-related business. Their sales amount are large.

Considering that innovative agricultural models will permeate farmers according to the stage of social innovation diffusion, it is meaningful to apply latent class analysis to farmers. In the following, we will make classification of farmers by latent class based on six indicators: creative-oriented (2004 O*NET Model: The

Table 1 Distribution of basic attributes of respondents

Attributes	Survey type	Total	Ratio (%)	
		(Person)	Male	Female
Gender	Census ^a	1,635,748	62.3	37.7
	This survey	1,000	76.6	23.4
Age	Census ^b	1,416,822	10 s	20 s
	This survey	1,000	0.1	1.8
Manager	Census ^c	1,635,748	0.1	9.0
	This survey	1,000	0.1	9.0
Location	Census ^d	1,377,266	65.8	34.2
	This survey	1000	58.5	41.5
Production items	Census ^d	1,377,266	21.7	35.6
	This survey	1000	8.1	58.9
Agricultural-related business diversification	Census ^e	1,075,705	66.4	–
	This survey	1000	45.1	32.0
	Census ^e	–	–	–
	This survey	–	–	–
	Census ^f	1,075,705	8.2	91.8
	This survey	1000	34.8	65.2

Table 1 (continued)

Attributes	Survey type	Total	Ratio (%)						
Sales amount		(Entity, person)	Less than 1 million yen	1–3 million yen	3–5 million yen	5–10 million yen	10–30 million yen	30–50 million yen	500–100 million yen or more
Census ^a		1,075,705	47.3	21.8	8.5	9.4	8.8	2.1	1.3
This survey		1000	20.7	18.2	13.0	13.3	15.0	5.4	6.2
									8.2

“This questionnaire survey (This survey)” is based on responses from respondents (farmers). The “Agriculture and Forestry Census (Census)” is the result of the “2020 Agriculture and Forestry Census” (other than location), and the contents of each item are as follows

^aNumber of household members, executives and working members (including managers) who have been engaged in agriculture for 60 days or more

^bExcludes those in their 80s and older who have been engaged in agriculture for more than 60 days, including executives and members (including managers)

^cThe number of farming entities was regarded as the number of managers. The number of non-managers is calculated by dividing the number of managers from the total number of household members, executives, and members who have been engaged in agriculture for 60 days or more

^dLocations are agricultural management entity base. The number of management entities by type of agricultural area in the 2015 Census of Agriculture and Forestry

^eCrops are agricultural management entity base. Field crops, mushrooms, other cultivated crops, and others are omitted due to difficulty in comparison

^fImplementation status of agricultural-related business diversifications are based on agricultural management entities. The items include processing of agricultural products, retail business, tourist farms, rental farms, hands-on farms, etc., farm guest houses, farm restaurants, overseas exports, renewable energy and power generation, and others

^gSales of agricultural products based on agricultural management entities. It is not the sales of the entire management entity

Occupational Information Network), consumer innovation-oriented (Hippel et al. 2011), social capital (Putnam 1993), changes in dietary habits and agricultural views due to the COVID-19 epidemic, job satisfaction, and life satisfaction. Then, we will perform a cross-tabulation analysis of socio-economic attributes, agricultural management attributes, and awareness of management and entrepreneurship in each class. First, because of searching for the optimum number of classes using AIC and BIC, the number of four classes was optimal according to the BIC criterion (AIC = 14,723, BIC = 15,209, chi-square value = 27,794.76). Table 2 shows the analysis results when the number of classes is specified as 4. The percentage of each class was 17.9% for class 1 (majority), 58.7% for class 2 (early adopters), 7.0% for class 3 (laggard), and 16.4% for class 4 (innovator).

“Class 1” can be interpreted as a “majority” because most of the farmers answered “cannot say either” for all items, and there is a high possibility that it depends on environmental conditions. “Class 2” can be interpreted as an “early adopter” because the largest number of farmers are “relatively agree” in terms of creative thinking, innovation orientation, social capital, and satisfaction with community life. “Class 3” can be interpreted as a “laggard” because many farmers “strongly disagree” in all items. “Class 4” can be interpreted as “innovators”

Table 2 Results of LCA and characteristics of each class of farmers

		Latent class name (Ratio of each class)	Class 1: Majority 17.9%	Class 2: Early adopter 58.7%	Class 3: Laggard 7.0%	Class 4: Innovator 16.4%
[Creative thinking] "Creative thinking" is important in the outcome of my current job.	1	I strongly think so	0.00	0.04	0.09	0.42
	2	If anything, I think so	0.03	0.40	0.00	0.42
	3	I can't say either	0.94	0.32	0.02	0.10
	4	If anything, I don't think so	0.02	0.20	0.02	0.05
	5	I don't think so at all	0.01	0.03	0.87	0.01
[Consumer innovation-orientation] I like to improve and devise tools, accessories, sundries, toys, clothing, sporting goods, cars, household appliances, software, etc. in my daily life.	1	I strongly think so	0.00	0.04	0.08	0.30
	2	If anything, I think so	0.03	0.36	0.08	0.45
	3	I can't say either	0.96	0.32	0.02	0.10
	4	If anything, I don't think so	0.01	0.23	0.08	0.05
	5	I don't think so at all	0.00	0.05	0.74	0.10
[Social capital] I have good relationship with my acquaintances / friends and neighbors.	1	I strongly think so	0.01	0.02	0.06	0.45
	2	If anything, I think so	0.01	0.49	0.05	0.47
	3	I can't say either	0.95	0.32	0.14	0.07
	4	If anything, I don't think so	0.03	0.14	0.03	0.01
	5	I don't think so at all	0.00	0.03	0.72	0.00
[Cognitive changes due to COVID-19] I changed my view of diet and agriculture because of the epidemic of the new coronavirus.	1	I strongly think so	0.00	0.04	0.04	0.27
	2	If anything, I think so	0.05	0.23	0.02	0.42
	3	I can't say either	0.91	0.39	0.04	0.11
	4	If anything, I don't think so	0.04	0.26	0.03	0.09
	5	I don't think so at all	0.00	0.08	0.87	0.12
[Satisfaction with job] I am satisfied with the current job.	1	I strongly think so	0.00	0.02	0.05	0.49
	2	If anything, I think so	0.01	0.33	0.00	0.37
	3	I can't say either	0.97	0.35	0.07	0.09
	4	If anything, I don't think so	0.02	0.23	0.09	0.03
	5	I don't think so at all	0.00	0.08	0.79	0.02
[Satisfaction with community life] I am satisfied with the area I currently live in.	1	I strongly think so	0.00	0.03	0.07	0.49
	2	If anything, I think so	0.00	0.41	0.01	0.39
	3	I can't say either	0.97	0.29	0.05	0.07
	4	If anything, I don't think so	0.02	0.20	0.08	0.05
	5	I don't think so at all	0.00	0.06	0.79	0.00

The numbers in the table are the expected probabilities for each class in which the option is selected for each question. Among the classes, the cells with the highest probability in each option are shaded. Within each class, the cells in which each option is most probably selected are shown in bold

because most of farmers “strongly agree” in terms of creative thinking, satisfaction with work, and satisfaction with life, and “relatively agree” in terms of innovation orientation, social capital, and cognitive changes due to COVID-19. However, it is thought that the proportion of class 4 in a Web questionnaire survey is higher than in the entire population of farmers.

4.1.2 Characteristics of the CCs in Japan’s agriculture

Table 3 shows the socio-economic attributes of each class. Males are higher than females overall, but the proportion of males is highest in class 1 and the proportion of females is highest in class 4. In addition, the ratio of 50s and above in class 2, the ratio of 30s and 40s in class 3, and the ratio of 20s in class 4 are the highest. Furthermore, regarding the number of years of farming, respondents with 10 years or more have the highest percentage in class 2 and respondents with 5–10 years have the highest percentage in class 3. However, respondents who have been engaged in agriculture for 1–3 years and 3–5 years have the highest percentage in class 4. In most, but not all economies, men are more likely to start new businesses than women, younger people are more likely to do so than older people, and graduates are more likely to start a business than non-graduates (Global Entrepreneurship Monitor 2021/2022 Global Report). The results of our survey revealed that the socio-economic attributes of CC (Class 4: Innovator type) in Japanese agriculture have the characteristics of being young age and female.

Table 4 shows the farming business attributes of each class. In terms of responses regarding production items, rice farming was the most common, followed by open-field vegetables, upland cultivation, and fruit trees. However, by class, rice farming had the highest proportion in class 1, fruit trees, other tilling, broiler, others in classes 3 and 4, and upland farming, open-field vegetables, greenhouse vegetables, open-field flowers, industrial crops, mushrooms and beef cattle had the highest in class 4. In terms of responses regarding agriculture business, production was the most common, followed by distribution/sales, direct sales, and food processing/manufacturing. By class, the percentage of respondents working on production was large in class 2 and on various businesses in class 4. Although sales are most often less than 1 million yen overall, many respondents have high sales in class 4. In terms of location, class 1 is the most common in flatland agricultural areas, and class 4 is the most common in urban and mountainous areas. As a whole, managers who inherited from their predecessors and parents are in common, but in class 4, there are many managers who started their own businesses. Therefore, the management characteristics of CC (Class 4: Innovator type) in Japanese agriculture can be summarized as follows: they started their own business and produced items other than rice, diversified their business with high sales, and are located in urban areas (see “Appendix” Table 12).

Table 5 shows the intention to start a business in each class. Most people in Class 4 are about to start a new business. Regarding the business content, many of the respondents of class 4 are considering social businesses and a relatively high percentage of respondents said they knew someone who had started a new business within the last two years. Therefore, the results of the above analysis support our

Table 3 Socio-economic attributes (Unit:%)

	Latent class name (Ratio of each class)	Class 1: Majority	Class 2: Early adopter	Class 3: Laggard	Class 4: Innovator	Total	Statistical significance
		17.7	60.8	6.8	14.7	100.0	
Sex	Male	80.2	77.8	70.6	70.1	76.6	*
	Female	19.8	22.2	29.4	29.9	23.4	
Age	10s	-	0.2	-	-	0.1	***
	20s	9.0	6.9	13.2	15.6	9.0	
	30s	20.3	20.6	29.4	27.2	22.1	
	40s	25.4	18.9	29.4	21.8	21.2	
	50s	22.0	24.5	16.2	17.0	22.4	
	60s	18.6	19.4	11.8	13.6	17.9	
	70s	4.5	9.5	-	4.8	7.3	
Working period at the current place of employment	1 year ~ less than 3 years	13.6	10.0	10.3	17.0	11.7	
	3 years ~ less than 5 years	12.4	14.6	16.2	19.0	15.0	
	5 years ~ less than 10 years	24.3	20.9	25.0	19.7	21.6	
	10 years or more	49.7	54.4	48.5	44.2	51.7	

The numbers in the table are the expected probabilities for each class in which the option is selected for each question. Among the classes, the cells with the highest probability in each option are shaded. Within each class, the cells in which each option is most probably selected are shown in bold

The chi-square test was used to testify the statistical significance. “***”, “**”, and “*” indicate that there is a significant difference at the 1%, 5%, and 10% levels, respectively (the null hypothesis is rejected)

hypothesis that “There are a certain number of Japanese farmers who belong to the creative class” (H1).

4.2 Results of structural equation modeling (SEM)

Here, based on the results of each class classification obtained by LCA (latent class analysis), we clarify the factors that determine their evaluation of the attractiveness of agriculture and entrepreneurship. In addition, we clarify the impact of these factors on creating shared value (CSV) and preferences for agricultural policies. To do so, we use structural equation modeling (SEM) analysis, which can model causal relationships between multiple variables. Figure 2 shows the analytical framework for structural equation modeling. Tables 6 and 7 list explanatory variables and descriptive statistics. The first layer is the class classification, the 1.5th layer is the attractiveness of agriculture, the second layer is the entrepreneurship, and the third layer is the creation of shared value (CSV) and preferences for agricultural policies. The attractiveness of agriculture is composed of the entrepreneurial environment and multifunctional evaluation of agriculture, and it is assumed that the entrepreneurial environment affects only the second layer, and that the multi-functionality of agriculture affects the second and third layers. For class classification, among majority (class 1), early adopters (class 2), laggards (class 3), and innovators (class 4) classified in LCA, early adopters and innovators are introduced as variables.

Figure 3, Tables 8 and 9 summarize the path diagram of the estimation results and estimated values. The model fit is generally good (CFI: comparative fit index=0.905, RMSEA: root mean square error of approximation=0.061). Here, we focus on those with significant path coefficients at the 1% level. The estimation results show that the generation of the creative class influences the entrepreneurship

Table 4 Attributes of farm management (Unit: %)

	Latent class name (Ratio of each class)	Class 1: Majority 17.7	Class 2: Early adopter 60.8	Class 3: Laggard 6.8	Class 4: Innovator 14.7	Total 100.0	Statistical significance
Q1. What kind of agricultural and livestock products does your farming business (you run or work as an employee) produce? (Please select all that apply)	Rice farming	47.5	45.2	47.1	40.8	45.1	
	Upland farming	28.2	30.8	29.4	42.9	32.0	**
	Open field vegetables	32.8	38.3	17.6	44.2	36.8	***
	Greenhouse vegetables	17.5	18.6	19.1	30.6	20.2	***
	Fruit trees	15.3	24.0	27.9	27.9	23.3	**
	Open field flowers	2.8	4.8	1.5	7.5	4.6	***
	Greenhouse flowers	4.0	5.8	7.4	8.2	5.9	
	Industrial crops	-	0.8	-	3.4	1.0	**
	Mushroom	0.6	2.3	1.5	6.1	2.5	**
	Other tilling	1.7	2.1	2.9	2.7	2.2	
	Dairy	2.8	4.1	4.4	8.2	4.5	
	Beef cattle	3.4	5.4	2.9	10.2	5.6	*
	Pig farming	1.7	1.6	-	2.0	1.6	
	Egg-laying chicken	0.6	1.3	1.5	2.7	1.4	
	Broiler	-	0.8	1.5	0.7	0.7	
	Others	3.4	2.8	7.4	4.1	3.4	
Q2. What kind of business is your farming business (you run or work as an employee) working on? (Please select all that apply.)	Production	91.0	92.4	86.8	85.7	90.8	**
	Food processing / manufacturing	2.3	8.6	10.3	19.0	9.1	***
	Distribution / sales	9.0	19.6	14.7	30.6	19.0	***
	Tourism farm	0.6	3.3	5.9	7.5	3.6	***
	Education farm	2.3	1.3	-	3.4	1.7	
	Direct sales store	5.6	9.0	8.8	15.6	9.4	**
	Consumer direct sales	1.7	9.0	7.4	13.6	8.3	***
	Restaurant	0.6	1.8	2.9	2.7	1.8	
	Work consignment	3.4	5.3	4.4	7.5	5.2	
	Farm-inn	-	0.2	1.5	0.7	0.3	
	Others	2.8	1.6	4.4	4.1	2.4	
Q3. What are the sales (last year) of your farming business (you run or work as an employee)?	Less than 1 million yen	19.2	22.2	23.5	15.0	20.7	**
	1 to 3 million yen	19.2	20.2	8.8	12.9	18.2	
	3-5 million yen	12.4	12.0	26.5	11.6	13.0	
	5-10 million yen	15.8	12.3	16.2	12.9	13.3	
	10 to 30 million yen	13.0	15.3	13.2	17.0	15.0	
	30 to 50 million yen	5.6	4.9	2.9	8.2	5.4	
	500-100 million yen	7.9	4.9	4.4	10.2	6.2	
	100 million yen or more	6.8	8.1	4.4	12.2	8.2	
Q4. Please choose the one that best fits your farming (you run or work as an employee) area of activity.	Urban area	6.8	7.1	8.8	13.6	8.1	**
	Flat agricultural area	67.2	58.9	55.9	50.3	58.9	
	Hilly and mountainous agricultural area	26.0	34.0	35.3	36.1	33.0	
Q5. Which of the following is your position in current farming?	I have become an agricultural manager by inheriting management from my parents and previous owners.	44.1	46.1	48.5	36.7	44.5	***
	I started my own business and became an agricultural manager.	13.6	12.8	4.4	23.8	14.0	
	I am engaged in family farm business run by parents.	26.0	21.9	22.1	17.7	22.0	
	I am employed by agricultural corporations, etc.	16.4	19.2	25.0	21.8	19.5	

The numbers in the table are the expected probabilities for each class in which the option is selected for each question. Among the classes, the cells with the highest probability in each option are shaded. Within each class, the cells in which each option is most probably selected are shown in bold (the top three cells for multiple selections)

The chi-square test was used to testify the statistical significance. “****”, “***”, and “**” indicate that there is a significant difference at the 1%, 5%, and 10% levels, respectively (the null hypothesis is rejected)

Table 5 Intention to start a business (Unit: %)

	Latent class name	Class 1: Majority	Class 2: Early adopter	Class 3: Laggard	Class 4: Innovator	Total	Statistical significance
	(Ratio of each class)	17.7	60.8	6.8	14.7	100.0	
Q6. Are you currently trying to start a new business, including some self-employed, goods sales, service, etc., with one or more people?	Yes	11.3	14.8	10.3	46.3	18.5	***
	No	53.7	61.2	66.2	35.4	56.4	
	Do not know	35.0	24.0	23.5	18.4	25.1	
Q7. Are you currently one or more trying to start a new business or venture as part of your regular job for your employer?	Yes	6.8	7.7	7.4	37.4	11.9	***
	No	48.0	56.9	69.1	33.3	52.7	
	Do not know	29.4	22.9	11.8	19.7	22.8	
	Not applicable as it is not employed	15.8	12.5	11.8	9.5	12.6	
	Eligible for Q8 answers	11.9	15.5	11.8	49.0	19.5	
Q8. Asking the person who chose "Yes" at least one of Q6 and Q7. What kind of business are you thinking of starting?	Agricultural business	66.7	57.4	87.5	70.8	64.6	
	Business related to agriculture (processing, distribution, restaurants, etc.)	38.1	47.9	50.0	33.3	41.5	
	Business whose main purpose is to solve social problems (social business)	14.3	7.4	12.5	15.3	11.3	
	Other businesses	9.5	16.0	37.5	15.3	15.9	
Q9. How many people do you personally know who have started a new business within the last two years?	There is no one	79.1	72.2	86.8	48.3	70.9	***
	1 person	7.3	13.5	4.4	10.2	11.3	
	2–4 people	8.5	10.0	5.9	24.5	11.6	
	5 or more	5.1	4.3	2.9	17.0	6.2	

The numbers in the table are the expected probabilities for each class in which the option is selected for each question. Among the classes, the cells with the highest probability in each option are shaded. Within each class, the cells in which each option is most probably selected are shown in bold

The chi-square test was used for testifying the statistical significance. “***”, “**”, and “*” indicate that there is a significant difference at the 1%, 5%, and 10% levels, respectively (the null hypothesis is rejected)

of farmers and the attractiveness of agriculture, which in turn influences creating shared value (CSV) and preferences for agricultural policies. Specifically, we will look at the following impact processes.

First, looking at the impact on the attractiveness of agriculture from the class classification, early adopters and innovators all have a positive impact on each element of the entrepreneurial environment and the multi-functionality of agriculture. Also, when comparing the path normalization coefficients across classes, innovators are higher than early adopters. It means that the creative class (innovator) evaluates the attractiveness of agriculture the highest.

Second, looking at the factors affecting entrepreneurship, innovators and the entrepreneurial environment have a positive impact on entrepreneurial ability. However, early adopters and the entrepreneurial environment have negative impacts on entrepreneurial attitudes. On the other hand, innovators, the entrepreneurial environment, and the economic evaluation of agriculture have positive impacts on entrepreneurial intentions. Furthermore, the social function of agriculture has a positive impact on the intention to start a social business (SB). Therefore, the fact that the influence of the entrepreneurial environment on entrepreneurial attitudes is negative

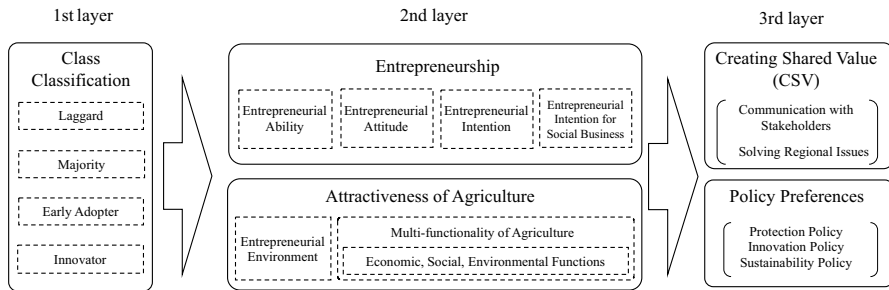


Fig. 2 Analytical framework for SEM

suggests that a virtuous cycle is not created between the entrepreneurial environment and entrepreneurial attitudes, as the risk of failure is highly valued (Fig. 3a).

Entrepreneurship is a key driver of economic development and recovery. Observing other people started businesses in their own communities, being able to spot business opportunities, and having confidence in their own ability to start a business, are all important positive influences on the intention to start a business and its realization. However, fearing of failure exists for numerous reasons but one major influencing factor is the business environment. Table 10 shows the results of attitude and perception of farmers toward starting businesses in our survey comparing to that of in GEM (Global Entrepreneurship Monitor 2021). As for the Japanese farmers in our survey, entrepreneurial intentions (18.5%), observing other people started businesses in their own communities (29.1%) and personally having the skills and knowledge (16.1%) are much higher than those of the average in Japan. Therefore, the capacity of entrepreneurs to realize their hopes, dreams and intentions may be hampered by their fearing of failure (57.1%).

Thirdly, with regard to the impact on the creating shared value (CSV), both communication with customers and the resolution of regional issues are positively affected by entrepreneurial ability and the economic and social aspects of agriculture, and negatively by entrepreneurial attitudes. This means that the higher the evaluation of agriculture's multifaceted functions and the higher the entrepreneurial spirit, the easier it is to promote value co-creation.

Fourthly, regarding the impact on preferences for agricultural policies, entrepreneurial ability has a positive impact and entrepreneurial attitude has a negative impact on all three policies. Entrepreneurial intentions (including SB) have no effect on policy preferences. Looking at the size of the path standardization coefficient, the impact of entrepreneurial ability on policy is positive in the order of sustainability policy > innovation policy > protection policy. In terms of the impact of entrepreneurial attitudes on policy, the order of protection policy > innovation policy > sustainability policy is negative and large. Therefore, the higher the entrepreneurial ability, the more emphasis is placed on sustainability policies. Also, looking at the impact of agricultural evaluation on policy preferences, there is no impact on protection policy. On the other hand, the economic and social aspects of agriculture have a positive impact on innovation policies, and the economic, social, and environmental

Table 6 Variable explanation and descriptive statistics for 1st and 2nd layers

Factors	Variable name	Explanation	Mean	Min	Max
Class classification	Early adopter	Other than LCA Class 2; 0; LCA Class 2:1	0.61	0.00	1.00
	Innovator	Other than LCA Class 4; 0; LCA Class 4:1	0.15	0.00	1.00
Attractiveness of agriculture	Entrepreneurial environment	“Many people think that starting a new business is a desirable career choice.” I don’t think so at all:-2;	-0.29	-2.00	2.00
		If anything, I don’t think so:-1; I can’t say either:0; If anything, I think so:1; I strongly think so:2			
		“People who start a new business and succeed will have high status and respect.” (Same as above)	0.05	-2.00	2.00
	Multi- Functionality of agriculture	“You often see success stories of new businesses on public broadcasts.” (Same as above)	-0.13	-2.00	2.00
		Number of responses (provision of employment places/Revitalization of local industries):0–2	0.52	0.00	2.00
	Environmental function	Number of responses (green and environmental conservation/creation of beautiful landscapes):0–2	0.51	0.00	2.00
	Social function	Number of responses (Supply of fresh and safe agricultural and livestock products/Educational functions such as agricultural work experience and food education/disaster prevention functions such as evacuation places in the event of a disaster/Provision of moisture and peace of mind to daily life/inheritance of local traditions and culture/Provision of places for local communities/Medical and welfare functions such as horticultural therapy/Provision of familiar recreation places):0–8	1.57	0.00	8.00

Table 6 (continued)

Factors	Variable name	Explanation	Mean	Min	Max
Entrepreneurship	Entrepreneurial ability	Chance [CHA]	– 0.85	– 2.00	2.00
		“Within the next six months, there will be a lucrative opportunity to start a business in your area.” I don’t think so at all:-2; If anything, I don’t think so:-1; I can’t say either:0; If anything, I think so:1; I strongly think so:2			
	Knowledge and ability [KNO]	“You have the knowledge, competence, and experience you need to start a new business.” (Same as above)	– 0.64	– 2.00	2.00
		Ease [EAS]	– 0.59	– 2.00	2.00
		“It’s easy to start a business in Japan.” (Same as above)			
	Entrepreneurial attitude	Career plan [CAR]	– 0.04	– 2.00	2.00
		“You’re making all the decisions based on your own long-term career plans.” (Same as above)			
		Fear of failure [FEA]	0.05	– 2.00	2.00
		“You’re afraid of failure and hesitate to start your own business.” I strongly think so:-2; If anything, I think so:-1; I can’t say either:0; If anything, I don’t think so:1; I don’t think so at all:-2			
	Entrepreneurial intention	Difficulty in finding opportunities [DIF]	0.15	– 2.00	2.00
		“You don’t see business or business opportunities in your field, even if you’re experienced and knowledgeable.” (Same as above)			
		Unused opportunities [UNU]	0.10	– 2.00	2.00
		“When you discover a business opportunity or opportunity that makes a profit, you rarely take advantage of it.” (Same as above)			
Entrepreneurial intention	Entrepreneurial intention	No intention to start a business: 0; Having an intention to start a business: 1	0.20	0.00	1.00
	Entrepreneurial intention for social business	No intention to start a social business: 0; Having an intention to start a social business: 1	0.02	0.00	1.00

Table 7 Variable explanation and descriptive statistics for 3rd layer

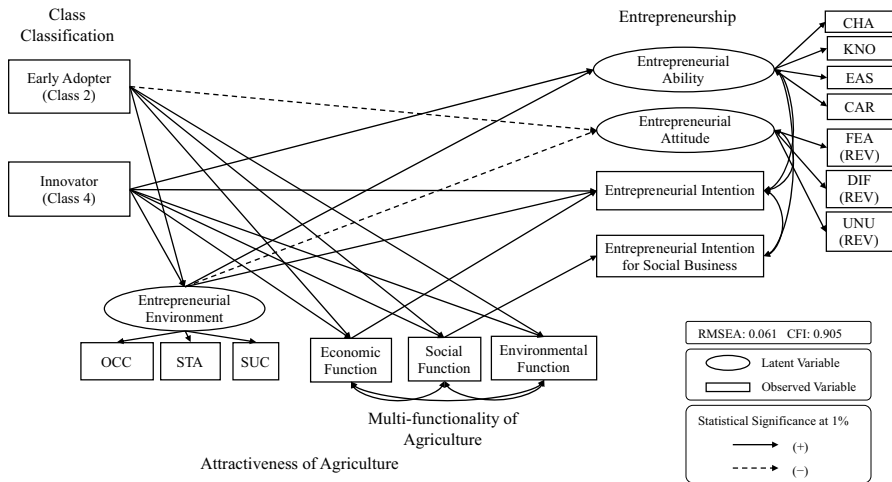
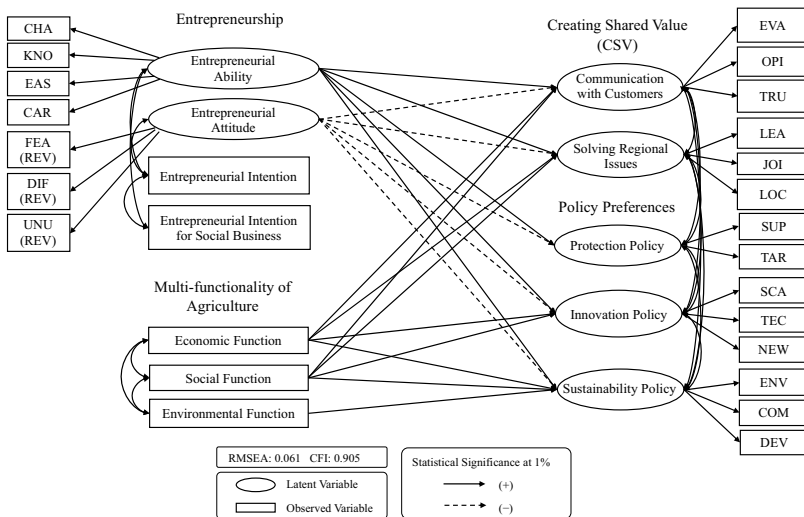
Factors	Variable name	Explanation	Mean	Min	Max
Creating shared value (CSV)	Communication with customers	[Thoughts on transactions and communication with stakeholders such as customers and business partners] Transparency of production methods and product information (No importance at all: - 2, not much importance: - 1, neither: 0, a little important: 1, very important: 2)	0.67	- 2.00	2.00
	Customer's opinion [OPI]	Opinions and ideas from customers (Same as above)	0.52	- 2.00	2.00
	Trust with customers [TRU]	Relationship of trust with customers (Same as above)	0.85	- 2.00	2.00
	Learning attitude together [LEA]	Attitude of learning together with customers and business partners (Same as above)	0.52	- 2.00	2.00
	Joint development [JOI]	Develop new products and business models with customers and business partners (Same as above)	0.26	- 2.00	2.00
	Local problem solving [LOC]	Solving local problems (Same as above)	0.32	- 2.00	2.00

Table 7 (continued)

Factors	Variable name	Explanation	Mean	Min	Max
Preference for agricultural policy	Protection policy				
	Supply adjustment [SUP]	Policy to adjust supply in order to maintain high prices (Not good at all: -2, not very good: -1, neither: 0, a little better: 1, very good: 2)	-0.01	-2.00	2.00
	Tariff [TAR]	Policy to impose tariffs on imported agricultural products (Same as above)	0.31	-2.00	2.00
	Innovation policy				
	Scale expansion [SCA]	Policy to expand scale to reduce costs (Same as above)	0.08	-2.00	2.00
	Technology [TEC]	Policy to promote the introduction of new technologies (ICT, etc.) in order to improve efficiency and stabilize quality (Same as above)	0.43	-2.00	2.00
	New uses [NEW]	Policy to encourage the production of new uses (Same as above)	0.35	-2.00	2.00
	Sustainability policy				
Sustainability policy	Environmental preservation [ENV]	Policy to encourage the introduction of environmentally friendly production methods (such as organic farming) (Same as above)	0.42	-2.00	2.00
	Communication [COM]	Policy to encourage interaction between producers and consumers (Same as above)	0.40	-2.00	2.00
	Development of managers [DEV]	Policies to promote the development of managers (Same as above)	0.52	-2.00	2.00

SB Social Business

“*” , “***” and “*****” indicate statistically significant at 10%, 5% and 1%, respectively

(a) Path diagram of the estimated results for 1st layer and 2nd layer(b) Path diagram of the results for 2nd layer and 3rd layer**Fig. 3** **a** Path diagram of the estimated results for 1st layer and 2nd layer. **b** Path diagram of the results for 2nd layer and 3rd layer

aspects all have a positive impact on sustainability policies. In other words, those who evaluate all three elements of agriculture's multi-functionality are more likely to evaluate agricultural policies that emphasize sustainability (Fig. 3b). Therefore, our hypothesis "The creative class is highly entrepreneurial, appreciates the attractiveness of agriculture, prefers sustainability policies and seeks to create shared value in agriculture" (H2) is supported.

Table 8 Result of the estimation

		Stand. coef	p value		Stand. coef	p value	
Communication with customers	Entre. ability	0.216	0.000***	Entrepreneurial ability	Early adopters	− 0.077	0.039**
	Entre. attitude	− 0.225	0.000***		Innovators	0.178	0.000***
	Entre. intention	0.064	0.084*		Entre. environment	0.630	0.000***
	Entre. intention for SB	− 0.046	0.129		Economic function	0.042	0.186
	Economic function	0.144	0.000***		Social function	0.018	0.602
	Social function	0.252	0.000***		Envir. function	0.014	0.653
	Envir. function	0.061	0.054*	Entrepreneurial attitude	Early adopter	− 0.165	0.000***
Solving regional issues	Entre. ability	0.378	0.000***		Innovator	− 0.097	0.021**
	Entre. attitude	− 0.103	0.009***		Entre. environment	− 0.540	0.000***
	Entre. intention	0.052	0.163		Economic function	0.029	0.405
	Entre. intention for SB	− 0.022	0.469		Social function	0.064	0.094*
	Economic function	0.118	0.000***		Envir. function	0.004	0.908
	Social function	0.272	0.000***	Entrepreneurial intention	Early adopter	− 0.038	0.311
	Envir. function	0.032	0.310		Innovator	0.223	0.000***
Protection policy	Entre. ability	0.167	0.006***		Entre. environment	0.170	0.000***
	Entre. attitude	− 0.347	0.000***		Economic function	0.116	0.000***
	Entre. intention	0.062	0.210		Social function	0.033	0.357
	Entre. intention for SB	0.021	0.604		Envir. function	0.007	0.831
	Economic function	0.063	0.148	Entrepreneurial intention for SB	Early adopter	− 0.063	0.107
	Social function	0.080	0.095*		Innovator	0.086	0.033***
	Envir. function	0.029	0.513		Entre. environment	0.014	0.720
Innovation policy	Entre. ability	0.254	0.000***		Economic function	0.022	0.528
	Entre. attitude	− 0.212	0.000***		Social function	0.125	0.001***
	Entre. intention	0.006	0.883		Envir. function	0.032	0.353

Table 8 (continued)

	Stand. coef	p value		Stand. coef	p value
Sustainability policy	Entre. intention for SB	0.009	0.794	Early adopter	0.180
	Economic function	0.150	0.000***	Innovator	0.248
	Social function	0.124	0.002***	Early adopter	0.255
	Envir. function	0.014	0.702	Innovator	0.298
	Entre. ability	0.268	0.000***	Early adopter	0.197
	Entre. attitude	− 0.170	0.000***	Innovator	0.207
	Entre. intention	0.016	0.683	Early adopter	0.303
	Entre. intention for SB	− 0.015	0.646	Innovator	0.404
	Economic function	0.154	0.000***		
	Social function	0.196	0.000***		
	Envir. function	0.094	0.006***		

Table 9 Result of the estimation for latent variables and covariance of error terms

		Stand. coef	<i>p</i> value
Latent variables			
Entre. environment	OCC	0.660	0.000***
	STA	0.721	0.000***
	SUC	0.685	0.000***
Entre. ability	CHA	0.753	0.000***
	KNO	0.810	0.000***
	EAS	0.677	0.000***
	CAR	0.601	0.000***
Entre. attitude	FEA	0.588	0.000***
	DIF	0.817	0.000***
	UNU	0.776	0.000***
Communication with customers	EVA	0.882	0.000***
	OPI	0.857	0.000***
	TRU	0.846	0.000***
Solving regional issues	LEA	0.842	0.000***
	JOI	0.827	0.000***
	LOC	0.770	0.000***
Protection policy	SUP	0.559	0.000***
	TAR	0.694	0.000***
Innovation policy	SCA	0.564	0.000***
	TEC	0.829	0.000***
	NEW	0.793	0.000***
Sustainability policy	ENV	0.732	0.000***
	COM	0.773	0.000***
	DEV	0.783	0.000***
Covariance of error terms			
Economic function	Social function	0.406	0.000***
	Envir. function	0.164	0.000***
Social function	Envir. function	0.398	0.000***
Entre. ability	Entre. attitude	− 0.038	0.476
	Entre. intention	0.396	0.000***
	Entre. intention for SB	0.151	0.000***
Entre. attitude	Entre. intention	0.134	0.001***
	Entre. intention for SB	− 0.016	0.686
Entre. intention	Entre. intention for SB	0.266	0.000***
Communication with customers	Solving regional issues	0.859	0.000***
	Protection policy	0.317	0.000***
	Innovation policy	0.467	0.000***
	Sustainability policy	0.578	0.000***
Solving regional issues	Protection policy	0.323	0.000***
	Innovation policy	0.433	0.000***
	Sustainability policy	0.537	0.000***
Protection policy	Innovation policy	0.720	0.000***
	Sustainability policy	0.732	0.000***
Innovation policy	Sustainability policy	0.893	0.000***

Table 9 (continued)

SB Social Business

“*”, “**” and “***” indicate statistically significant at 10%, 5% and 1%, respectively

Table 10 Attitude and perception of farmers toward starting businesses

	Survey in this study (%)	GEM adult population survey ^a	
		Japan (%)	Ranking in 47 GEM-participating economies
Knowing someone who has started a new business	29.1	20.1	47
Good opportunities to start a business in my area	11.2	11.7	47
It is easy to start a business	12.8	29.7	39
Personally have the skills and knowledge	16.1	12.3	47
Fearing of failure (opportunity)	57.1	47.9	17
Entrepreneurial intentions	18.5	3.2	46

^aGlobal Entrepreneurship Monitor 2021/2022 Global Report: opportunity amid disruption

4.3 Results of cognitive map analysis

In the following, we introduce correspondence analysis on 3–5 keywords that come to mind for each respondent regarding <attractiveness of Japanese agriculture and rural areas> among the items and analyze the cognitive structure of farmers (Table 11). Corresponding analysis is a method of visually grasping the relationship between word (answer) appearance patterns and words (answers). Words with large features are placed farther from the origin. Items related to each other are arranged in the same direction as viewed from the origin. Here, we conduct an analysis on the relationships between the class classification obtained by LCA, the creation of shared value (solution of regional issues), and free associative words.

The software used in this research is KH Coder 3.Beta.04e (Higuchi 2014), and the number of samples used is 1000. For analysis, standardization of spelling variations (conversion of hiragana to kanji, etc.), designation of forced extraction of words (“producer”, “consumer”, “delicious”, etc.), designation of words not to be used (“none”, “none in particular”, “I don’t know”, etc.) was undertaken. The total number of extracted words for <Attractiveness of Japan’s Agriculture and Rural Areas> was 13,263 (of which 4018 words were used), and the number of different words was 999.

The results of the correspondence analysis are shown in Fig. 4. First, the cumulative contribution rate up to the second component is 75.8%. Early adopters are placed near the origin, innovators (creative class) are placed below, “majorities” are placed on the right, and “laggards” are placed on the upper right. “Early adopters” have a strong correspondence with characteristic terms related to the environmental and social aspects of rural areas. “Innovators” (creative class) have a strong correspondence with characteristic words related to creativity such as technology,

Table 11 High frequency 150 words

Extracted word	Occurrences	Extracted word	Occurrences	Extracted word	Occurrences
Safety	218	Beautiful	13	Countryside	7
Security	147	Scale	12	Effort	7
Nature	145	Management	12	Specialty	7
Environment	83	Interaction	12	Rural area	7
Area	78	Disaster	12	Rice	7
Quality	65	Breed	12	Disaster preven- tion	7
Landscape	61	Community	11	Kind	7
Delicious	61	Inheritance	11	Green	7
Freshness	57	Production area	11	Warm	6
Local produc- tion for local consumption	48	Information	11	Improvement	6
Preservation	48	Human resource	11	Expansion	6
Stability	45	Peace	10	Exercise	6
Agriculture	43	Machine	10	Symbiosis	6
Rich	41	Cooperation	10	High	6
Production	36	Connection	10	Four seasons	6
Supply	32	Contribution	10	Working in agri- culture	6
Pesticide	31	Domestic produc- tion	10	Generation	6
Employment	27	Crop	10	Local	6
Tradition	27	Original	10	Corporation	6
Price	26	Farming method	10	Satoyama	6
Freedom	26	Transmitting	10	Labor	6
Brand	24	Assistance	10	Slow	5
Foodstuff	24	Taste	10	Development	5
Fun	19	Attractiveness	10	Enterprise	5
Efficiency	19	Good	10	Rest	5
Cultivation	18	Tourism	9	Continuation	5
Food	18	Air	9	Work	5
Trust	18	Formative	9	Support	5
Offer	18	Successor	9	Business	5
Agricultural products	18	Reduction	9	Place	5
Self-sufficiency	17	Staple	9	Maintenance	5
Food education	17	Water	9	Producer	5
Technology	16	Japan	9	Advertisement	5
Scenery	16	Farmland	9	Diverse	5
Protection	16	Culture	9	Earth	5
Cheap	15	Retention	9	Indigenous	5
Securing	15	Heal	9	Folklore	5
Experience	15	Administration	8	Land	5

Table 11 (continued)

Extracted word	Occurrences	Extracted word	Occurrences	Extracted word	Occurrences
Organic	15	Education	8	Sale	5
Communication	14	Industry	8	Export	5
Preserving	14	Self-sufficient living	8	ICT	4
Training	14	Protect	8	PR	4
Activity	14	Income	8	Appeal	4
Consumer	14	New	8	Life	4
Person	14	Cost	7	Love	4
Vegetable	14	Possible	7	Depopulation	4
Clean	13	Advance	7	Face	4
Health	13	Time	7	Function	4
Youth	13	Consumption	7	Coexistence	4
Heart	13	Field	7	Advanced age	4

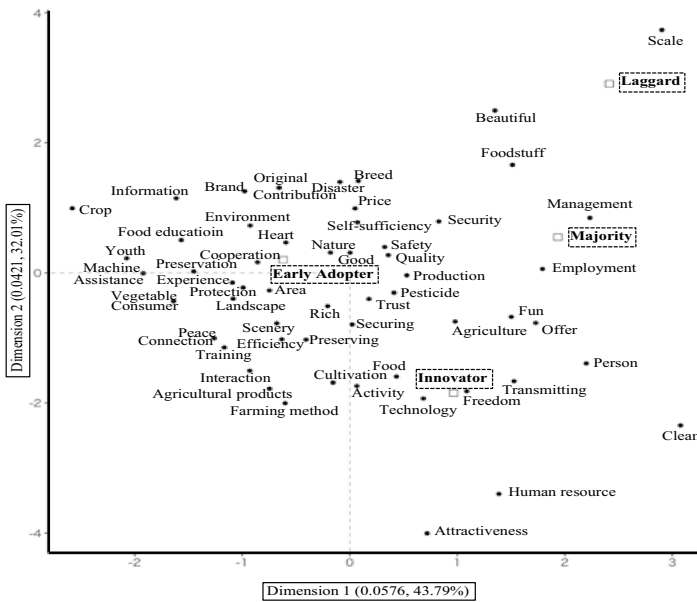
Extracted from the answers to the question <Q24. Please give keywords that comes to mind as the attractiveness of Japan's agriculture and rural areas should demonstrate (3–5 keywords)>

freedom, transmission, and activity, and “majorities” have a strong correspondence with characteristic words related to labor such as management and employment. There is no clear trend for “laggards”(Fig. 4a).

Next, we use the total evaluation value for each item of shared value creation (solution of local issues), and the value ranges from −6 to 6. Although the cumulative contribution rate up to the second component is 29.9%, contrasting characteristics can be seen from Fig. 4b that there are respondents on the left side of the origin (negative direction of component 1) having a low level, and on the right side (positive direction of component 1) having a high level of creating shared value. In addition, the highest level of shared value creation (4, 5, 6) is located in the upper right corresponding with beautiful, community, domestic production, fun, comfort, contribution, trust, vitality, beauty, scenery, and leaders. In other words, the creative class contributes to sustainable agricultural and rural development through the creation of shared value.

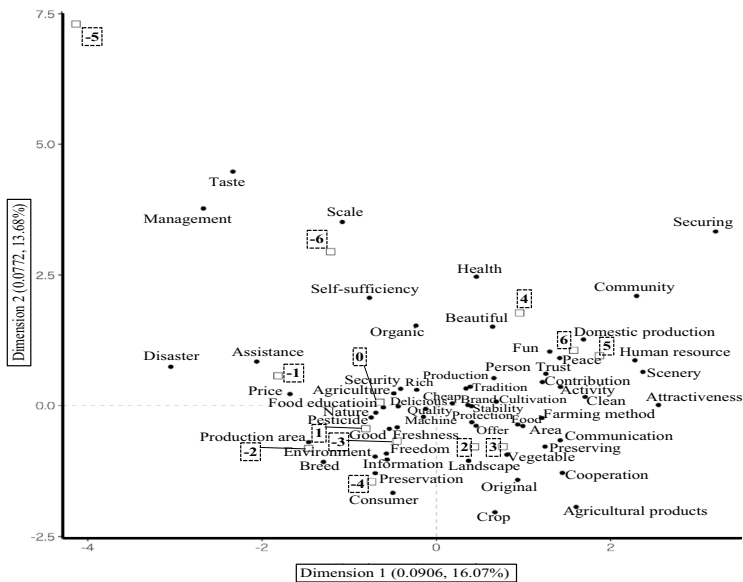
5 Conclusion

Synthesizing the results of the latent class analysis (LCA), structural equation modeling (SEM) analysis, and cognitive map analysis in the above, the hypotheses set in this research: “There are a certain number of Japanese farmers who belong to the creative class” (H1) and “The creative class in rural areas has a high entrepreneurship, highly appreciates the attractiveness of agriculture, and prefers policies that contribute to sustainable agricultural development” (H2) are all supported. In other words, it was found that the evaluation of the multi-functionality of agriculture influences each element of entrepreneurship of creative class, and also influences



Note: Top 60 characteristic words were used.

(a) Class classification and Free association



Note: Top 60 characteristic words were used.

(b) Evaluation on CSV and Free association

Fig. 4 **a** Class classification and free association. **b** Evaluation on CSV and Free association. Top 60 characteristic words were used

the preference for agricultural policy and the creation of shared value. Furthermore, analysis of cognitive maps revealed that creative classes contribute to sustainable agricultural and rural development through the creation of shared value.

However, in current Japan, the creative classes are concentrating in urban areas and farmers highly value the risk of failure, so there is no virtuous cycle in which the entrepreneurial environment shapes entrepreneurial attitudes. Therefore, it is important for policy to develop the creative classes in flatland agricultural areas and mountainous areas, and build networks for the creative classes among different regions. In other words, innovative policies that foster the entrepreneurship, effective altruism (MacAskill 2019) and social capital through organizational learning on agriculture and food among stakeholders may contribute to creating shared value in rural Japan.

This research highlighted a new possibility for the existing research on the creative class by analyzing farmers' cognition and behavior using LCA, SEM and cognitive map analysis from the viewpoint of agriculture and rural development. However, our analysis at the regional level was limited due to it focused on the individual level. In the future, it seems necessary to conduct analyzes (including international comparisons) that combine regional and individual levels.

Appendix

See Table 12.

Table 12 Result of testing the difference in the population proportions (location of activity area, Unit: %)

Latent class name		Class 1: majority	Class 2: early adopter	Class 3: laggard	Class 4: innovator	Total
(Ratio of each class)		17.7	60.8	6.8	14.7	100.0
Urban area	Response Ratio	14.8	53.1	7.4	24.7	100.0
	(<i>P</i> value)	(0.478)	(0.138)	(0.821)	(0.008)***	
Flat agricultural area	Response Ratio	20.2	60.8	6.5	12.6	100.0
	(<i>P</i> value)	(0.013)**	(0.988)	(0.600)	(0.022)**	
Hilly and mountainous agricultural area	Response Ratio	13.9	62.7	7.3	16.1	100.0
	(<i>P</i> value)	(0.029)**	(0.381)	(0.677)	(0.394)	

This is the result of testing the difference in the population proportions using the response ratio of the region and the response ratio of other regions within each class (e.g., For example, set a null hypothesis that the proportion of responses in urban area and the proportion of responses in non-urban areas in class 4 are equal).
 “***”, “**”, and “*” indicate that there is a significant difference at the 1%, 5%, and 10% levels, respectively.

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Data availability The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declare no conflicts of interest associated with this manuscript.

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