[*Jpn. J. Agric. Econ.* Vol.26, pp.1-22, 2024]

Empirical Study on the Rice Flour Business in Japan: Introducing Structural Equation Modeling (SEM) and Cognitive Mapping

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The purpose of this study is to clarify the relationships among the business philosophy, business strategy and business outcome of rice flour-related corporations in Japan. Specifically, structural equation modeling (SEM) and cognitive map analysis are introduced to the results of a questionnaire survey. The following results are obtained from the empirical analysis. First, the management philosophy (Effective Altruism, and membership in the Rice Flour Association) of rice flour-related corporations influences their business strategies (potential head market, tail market, organizational learning and proposals from stakeholders) which induce innovation and determine business performance (current performance and future prospects for shared value creation). Secondly, the business performance reflects their expectations for the rice flour market, and influences the direction of market development. Therefore, a policy innovation that strengthens effective altruism and the creation of shared value through organizational learning of stakeholders in rice flour-related businesses is called for.

Key words: rice flour, structural equation modeling, cognitive map analysis, long tail market, effective altruism, organizational learning

1. Introduction

The annual per capita consumption of rice peaked in 1962 and has consistently been on a downward trend in Japan. Specifically, in 1962, 118.3 kg of rice was consumed per capita, but in 2021, it decreased to 51.5 kg, less than half of that (MAFF, 2023a). It is generally explained that the cause of the decrease in rice consumption in Japan is the westernization of diets. In contrast, the relatively high price of rice and the inability to provide products that meet the needs of consumers promoted this westernization. In other words, due to the delay in structural reform, it has been difficult to induce market-creating innovation (Christensen *et al.*, 2019) in the rice sector, and the habit-forming effect further reduces the rice consumption of the next-generation.

On the other hand, the production of rice has an important environmental and social significance. As paddy field agriculture advances, it is possible to expect ecological conservation and landscape formation from an environmental aspect, and flood prevention and food security from a social aspect. Although rice flour has been conventionally used for rice confectionery and Japanese confectionery, there is great room for widespread use of rice flour products for new applications such as bread, cakes, and noodles, due to a dramatically advanced manufacturing technology recently. As the demand for staple food rice is declining year by year, it is important to increase the demand for rice flour that can be used for new purposes. In terms of demand for rice flour products, there are high potential needs both inside and outside Japan, and the market is expanding. According to MDB (2023), the market size of rice flour products in 2021 is estimated to be approximately 16.4 billion yen, and is predicted to expand to approximately 35 billion yen in 2027. Additionally, in a consumer survey conducted in 2023 by MyVoice Communications, Inc (2023), approximately 80% of consumers answered that they had eaten rice flour products in the past.

However, there are two problems with the cost of rice flour: the cost at the production stage of rice for flour and the cost at the milling/commercialization

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stage（Kiminami *et al*., 2021a）. First, regarding the supply stage of raw material rice, the production cost of rice is higher than that of wheat, they are 188 yen/kg and 132 yen/kg, respectively（MAFF, 2022）. Secondly, regarding the cost of milling and commercialization, the cost of wheat flour is 60 yen/kg, while rice flour is high at 80-290 yen/kg, so the price of rice flour products is 2.4 times that of wheat（MAFF, 2023a）.

The production volume of rice for rice flour（new demand rice）in 2022 reached 45,903 tons in Japan. The top five prefectures of Niigata（12,731 tons; 27.7%）, Tochigi（8,035 tons; 17.5%）, Saitama（4,395 tons; 9.6%）, Akita（2,569 tons; 5.6%）, and Ishikawa（2,176 tons; 4.7%）account for 65.1% of the whole country（MAFF 2023b）. The reason why the production of rice for rice flour is concentrated in specific regions is that it is necessary to develop actual users and to collaborate with primary processors, secondary processors, and distributors in order to receive subsidies（Kinoshita 2012）.

On the other hand, a survey report on the use of rice flour by food manufacturers conducted by the NPO Domestic Rice Flour Promotion Network（2017）pointed out that the characteristics of consumers targeted by companies that sell domestically produced rice flour products are those with high health consciousness and allergies, and those insisting on 'domestic production' and 'local production for local consumption'; the high price of rice flour is the most important issue in expanding its usage.

The current production and supply of rice as a raw material for rice flour is constraining the business strategies of actual users and the demand side, so there is a need for a shift to a rice policy that emphasizes innovation. In other words, the transformation of the rice market from a short tail to a long tail（Anderson, 2008）seems to be necessary. In addition to companies' strategy for investments in reducing costs at the processing and commercialization stages, it is important to create new markets such as gluten-free products instead of alternatives to conventional wheat products. Furthermore, rice policies to promote the businesses conducted in partnership with consumers and local residents for "creating-shared value"（Porter and Kramer, 2011）are thought to be effective. Therefore, the purpose of this study is to clarify the relationships among the business philosophy, business strategy and business performance of rice flour related businesses in Japan. In addition, we will derive policy implications for building a sustainable rice market in Japan based on the results of empirical analysis.

2. Literature Review

1) Existing research on the scope of rice flour products in Japan

Nakamura *et al*.（2013）conducted interviews with small-scale rice flour-related businesses in Akita Prefecture and found that they wanted to develop and sell products that make the most of the characteristics of rice flour, rather than simply as a substitute for wheat flour. As a review of the existing support measures for the production of rice flour products, they pointed out that it is necessary to strengthen soft measures. On the other hand, Ikeuchi *et al*.（2010）focused on large-scale rice farming entities in Okayama Prefecture, and found that the introduction of rice for rice flour as a crop change has advantages in terms of both agricultural income and labor remuneration on the premise of providing subsidies. In addition, through interviews with rice flour bread manufacturers, they pointed out that there is a gap between the aims of policy support and the needs of consumers.

However, Omuro（2018）conducted a consumer survey on the taste of rice flour bread, and found that there are consumer needs for the chewy texture of rice flour bread and consumer needs for the crispy texture of wheat flour bread. He pointed out that it is important to select the raw material rice flour and formulate marketing strategies according to the bread item category. Furthermore, Omuro（2019）conducted an online questionnaire survey of consumers and found that rice flour bread is highly recognized and the percentage of those who have eaten it is high, but the frequency of consumption is low. Therefore, he pointed out that the target group for expanding consumption of rice flour bread is suitable for those who eat bread for breakfast about two to three times a week or those who do not eat breakfast. In addition, it is possible that the label "100% rice flour bread" will be more appealing to Japanese consumers than the label "gluten-free rice flour bread."

According to MAFF（2023a）, the demand for rice flour remained at around 20,000 tons until FY2017 in Japan;, it has increased since 2018 with the implementation of the Third-Party Certification System for Gluten-Free Rice Flour and the Rice Flour Usage Standards. The effort target for producing material rice for rice flour by 2030 is 130,000 tons. Regarding rice flour, in addition to subsidizing producers through direct payment subsidies for the use of paddy fields, in order to build a stable supply system, support is being provided for the development of processing facilities, drying, preparation, collection, shipping and storage facilities. Furthermore, the government and the private

sector are working together to promote awareness and consumption of rice flour through the Rice Flour Club.

However, rice for rice flour has been subsidized as a strategic crop from approximately 55,000-105,000 yen per 10a (approximately 145-154 yen/kg). Furthermore, a subsidy of 12,000 yen/10a will be provided by the government to the farmers who adopt a high-yield variety. Therefore, as in the case of rice for flour, it is necessary to reduce production costs through the expansion of management scale and the introduction of labor-saving technology to remove dependence on subsidies and build a sustainable system for raw material rice supply (Kiminami *et al*., 2021a).

2) Market-creating innovation

Christensen *et al*. (2019) categorized innovation into three types: sustaining, efficiency and market-creating, and pointed out that "while all innovations are important to keeping an economy vibrant, one type in particular—market-creating innovation—plays a significant role, providing a strong foundation for sustained economic prosperity." Market-creating innovations create new markets that serve people for whom either no products existed or existing products were neither affordable nor accessible for various reasons, and these innovations transform complicated and expensive products into ones that are so much more affordable and accessible that many people can buy and use them. For a market to be created and then sustained, it must create profits or at least have the prospect of profit generation in the future. It is also important that it creates jobs. Most importantly, it changes the culture through a new market. Therefore, even when the intentions are to help spur an economy's growth, effective institutions cannot simply be pushed in. They require pull strategy because the institutions in a society are a reflection of the culture and values of the people of that society. However, in the case of rice flour-related businesses in Japan, push and pull strategies are not exactly alternatives for corporate management, because they are founded on entirely different competitive premises: each corporate process may be developed according to a push or pull solution, the conditions and the corporate skills that characterize the application context (Corniani, 2008).

3) Long-tail market

The conventional consumer choice theory in economics has been extended to allow factors such as the cost of gathering information, imperfections in the perception of information and limitations to consumers' cognitive powers in gathering and processing information. As argued by Anderson (2008) e-commerce and other new technologies improve efficiency by encouraging the entry of new producers and innovations, creating a "long tail" of niche products while reducing the market share of previously popular products. However, the development of a long-tail market requires not only an efficient distribution system for a wide variety of products and services, but also the existence of consumers with diverse niche needs and suppliers who can provide products and services that meet the needs of consumers. Salvador *et al*. (2020) pointed out that business success in long-tail markets requires reducing the cost of creating and maintaining a large assortment on the supply side, and reducing the cost of consumers exploring a large assortment on the demand side. Moreover, von Hippel *et al*. (2011) proposed a new innovation paradigm that emphasizes the role of consumers as innovators. In this paradigm, innovation consists of three phases: consumers develop new products for themselves, other consumers evaluate and improve them, and producers enter when market potential is clear. In the food-related field, there is a study (Richards and Rabinovich 2018) targeting online supermarkets in the United States, which revealed that a richer product lineup contributes to increased overall sales.

Additionally, Kiminami *et al*. (2021b) explicitly use the long-tail market concept to study the Japanese rice market. The results show that rice consumption can be expanded through market-creating innovations. In other words, it is important to expand the head portion by satisfying latent needs for rice, and expand the tail portion by doing business that leverages consumers' internal motivations. The consumption of rice flour in Japan is a new way of eating rice and falls under the tail portion, but simply replacing wheat flour with it cannot be considered as expanding the tail market in the true sense.

This study broadly views the long-tail market in two senses. First, it targets all sales channels, not just the e-commerce market. As the real economy is rapidly becoming omnichannel, combining online sales and in-store sales (Ernst & Young ShinNihon 2014), we think it is appropriate to consider a wide range of sales channels for the rice market and rice flour. Second, this study takes into account externalities and assumes that not only economic value but also social value is created in the rice flour business. This is because rice flour production, which is the raw material for rice flour, has the potential to play a multifaceted role in agriculture (OECD 2001), and when efforts are made on a regional basis rather than on a single company basis, ripple effects can be expected (MAFF 2018). Therefore, in this study, we will clarify whether the market strategy of rice flour businesses focuses on the overt needs and potential needs in the head part, or the internal motiva-

tions of consumers in the tail part.

4) Creating-shared value

Creating shared value (CSV) is the idea that a company creates social value by working to solve social needs and social problems, and as a result, economic value is created (Porter and Kramer, 2011). Unlike the conventional way of thinking about CSR 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. However, Kramer and Pfitzer (2016) pointed out that it is not easy when a company implements a CSV strategy; it faces barriers that the company cannot control, such as changes in demand due to government regulations and cultural norms. They added that it is necessary to involve governments, NGOs and communities to form a shared value ecosystem and create collective impact. In particular, it is important to exert a collective impact through collaboration between social enterprises and various stakeholders (Kania and Kramer, 2011).

Although there are no studies targeting the rice industry or rice flour, there are some empirical analyses on shared value creation in the agriculture and food sectors. Wiśniewska-Paluszak and Paluszak (2019) found that companies engaged in CSV in Polish agribusiness are gaining new competitive advantages through solving social issues and redefining business models through cooperation with stakeholders. Additionally, Saraswati (2021) points out that Indonesian food companies create value by placing the highest priority on consumers, while also creating shared value with society, employees, the environment, and business partners. Furthermore, Kiminami *et al*. (2022) used mixed research methods to find that in Japanese urban agriculture, the creative class as social entrepreneurs realized shared value creation through cognitive innovation through organizational learning with stakeholders.

5) Effective altruism

Effective Altruism (EA) is an evidence- and theory-based philosophy or movement that seeks to maximize the betterment of the world, with particular emphasis on the areas of global poverty, human existential risk and animal welfare (MacAskill, 2015). EA is especially useful for maximizing the social impact with limited resources when the scale is large (social problem that can be solved), the attention is low (niche), and there is no viable alternative other than that method. The idea of effective altruism enables the impact evaluation and prioritization of projects for solving social issues, and many efforts have already been put into practice. As a practical initiative in the agricultural and food fields, there is a movement to promote the production of alternative proteins (e.g. Good Food Institute), and R&D and market entry by private companies are becoming more active. In addition, research is being conducted that focuses on the awareness and behavior of individuals who perform donation behavior based on effective altruism and analyzes the factors promoting and inhibiting it (for example, Jaeger and van Vugt, 2022). However, there is almost no empirical analysis of the decision-making and behavior of existing businesses and companies from the perspective of effective altruism.

There are no studies that have introduced the idea of effective altruism regarding the rice industry or rice flour. Broad (2018) focuses on animal welfare, and the effective altruism approach can be said to be a type of social entrepreneurship and social innovation. Because it supports highly persuasive decision-making that clearly demonstrates cost-effectiveness, it has the potential to bring about changes in systems and consumer behavior that were difficult to achieve with traditional animal protection movements. In addition, Reese (2020) argues that in the transformation of industrial livestock production, not only an individual behavior change approach but also an institutional change approach based on effective altruism (changes in government, corporate and social norms, development and commercialization of new food technologies, etc.) are considered to be effective.

Thus, the idea of effective altruism entails a transformation that involves a shift in the values of stakeholders in food systems. Therefore, in this study, we consider effective altruism to be equivalent to a management philosophy for rice flour businesses and grasp the actual situation. Specifically, the following points will be investigated. i) Is the rice flour business a business that aims to solve social issues in food, agriculture, and rural areas? ii) Is it more effective than other alternatives? iii) Is it a niche initiative? iv) Will there be any negative impact on society if this is not done?

6) Organizational learning

There are various theories about organizational learning, and the subject, object, process, mode, and purpose of learning are different in each. Senge (2006) regards an organization that continuously develops the ability to adapt and change as a learning organization, and pointed out it is vital that the five disciplines (systems thinking, personal mastery, mental models, building shared vision and team learning) develop as an ensemble. On the other hand, Huber (1991) describes organizational learning as a process in which an organization acquires new information and

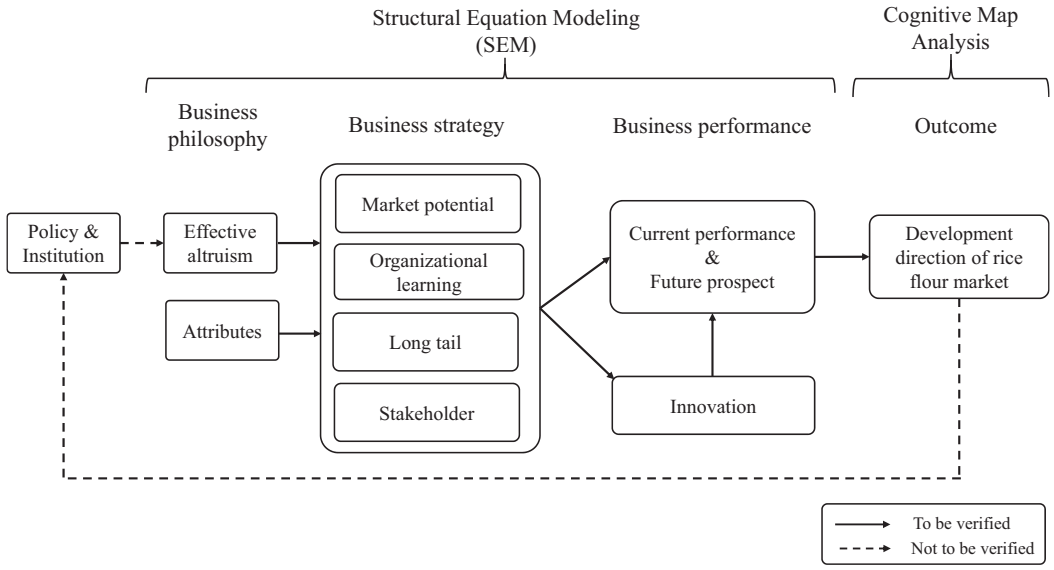

Figure 1. Analytical framework

knowledge, changes that knowledge routinely, and changes the organization's potential range of action. It is defined as consisting of four processes: information acquisition, information distribution, information interpretation, and organizational memory. According to Iriyama (2019), in business administration, innovation is a part of organizational learning in a broad sense, and it is common to acquire new knowledge through learning and reflect it in organizational results.

Various methods are also used in quantitative empirical research on organizational learning, but they can be divided into two: research that focuses on changes in the knowledge structure of companies and research that focuses on the introduction of organizational learning in companies. First, Kida (2007) defined organizational learning as a change in organizational knowledge structure based on a survey of previous studies, as an empirical analysis focusing on changes in corporate knowledge structure. Based on Kida's definition, Kiminami and Furuzawa (2015) clarified the actual situation of cognitive innovation (strategic innovation and technological innovation accompanying organizational learning as a change in knowledge structure) in the food manufacturing industry in Niigata Prefecture. Next, Tippins and Sohi (2003) conducted structural equation modeling to evaluate the introduction of organizational learning in IT companies using four indices (knowledge acquisition, knowledge diffusion, knowledge interpretation, and organizational memory). It was clarified that organizational learning enhances corporate performance. In addition, Attia and Eldin (2018) analyzed the impact of knowledge management capabilities, organizational learning, and supply chain management on organizational performance for food companies in Saudi Arabia, and found that organizational learning enhances corporate performance. However, there has been no empirical analysis that clarifies the role of organizational learning while clarifying the relationship between corporate management philosophy, management strategy, and management performance. Furthermore, organizational learning (learning community) by multiple stakeholders beyond individual company units is important.

In this study, following Tippins and Sohi (2003), we consider organizational learning to comprise four dimensions: knowledge acquisition, knowledge dissemination, knowledge interpretation, and organizational memory, and grasp the actual situation.

3. Analytical Framework and Methodology

Based on the above literature review, the analytical framework of this research is as shown in Figure 1. It is thought that a policy transformation toward innovation creation, particularly to market- creating innovation is required in Japan to realize a sustainable development of the rice sector. In addition, it is important to consider innovation as a process of organizational learning that involves the drastic change of collective cognition among producers, consumers and governments. In particular in this study, we believe that the business philosophy (effective altruism) and attributes of rice flour-related corporate entities influence its business

strategy (market potential, long tail, organizational learning and proposals from stakeholders) which determines its business performance (innovation, current performance and future prospects for realizing shared value creation). In addition, the business performance of these companies may indicate the development direction of the rice flour market, and may affect consumer preferences and policy decisions for rice. For achieving the purpose of our study, we set two hypotheses for verification. First, structural equation modeling (SEM)[1] is introduced to the results of a questionnaire of rice flour-related businesses. Secondly, cognitive map[2] analysis is introduced to the data from open-ended questions in the same survey.

4. Analytical Results

1) Overview of questionnaire survey

The distribution targets of the questionnaire are retailers and dealers published on each website of the Regional Agricultural Administration Office, the members of Japan Rice Flour Association (only those posted on the website), the companies supporting the R10 Project,[3] and the rice flour sellers on the website of the Ministry of Agriculture, Forestry and Fisheries. The survey was conducted by mail in September 2022, and the final number of distributions was 974 (excluding unknown addresses), and the number of collections was 240. Key questions included basic attributes (industry classification, number of employees, sales), effective altruism, market potential, organizational learning, innovation and business performance. For the analysis, 231 samples were analyzed, excluding samples with no response to basic attributes.

2) Results of simple tabulation

(1) Attributes of respondents

Table 1 is a summary of surveyed attributes. Looking at the industries, food manufacturing (56.7%) accounts for more than half, followed by agriculture, forestry and fisheries (10.0%), food distribution (9.1%), and restaurant (7.4%). In terms of sales, 10 million yen to less than 30 million yen (19.0%) was the most common, followed by 100 million yen to less than 500 million yen (17.7%) and less than 10 million yen (17.3%). The percentage of companies with sales of 500 million or more is about 24.3%, and large scale companies account for a certain number. In terms of number of employees, 0 to 5 (37.2%) was the highest, followed by 6 to 20(27.7%) and 21 to 50 (16.5%).

Table 2 shows the answers as to whether the company is a registered company of the Rice Flour Association or a company supporting the R10 project from Niigata. 62.3% were not a member or company of any kind, 21.6% were a member of the Japan Rice Flour Association, and 10.4% were a registered company supporting the Niigata R10 Project. 2.6% of companies met both criteria. Regarding the rice flour-related businesses that responding companies are engaged in, manufacturing of rice flour products (69.7%) was the highest, followed by distribution and sales of rice flour products (59.3%), secondary processing and sales of rice flour products (29.0%), and raw material supply for rice flour product manufacturing (17.3%). It can be seen that the companies are mainly engaged in businesses related to the manufacture and sale of rice flour products.

(2) Effective altruism

Four items are investigated for effective altruism (Table 3). First of all, 95.7% of the companies thought that they would contribute to solving social issues through rice flour-related businesses. Looking at the breakdown, increased demand for rice (57.6%) was the highest, followed by diversification of consumer needs for rice (52.4%) and promotion of farm management (46.8%). It can be seen that these companies anticipate that the rice flour business will lead to the expansion of overall rice consumption and the deepening of the market, and that it will have an impact on agricultural production, such as the promotion of agricultural management entities that supply raw materials.

Next, for "a more effective way to solve social issues than the rice flour-related business," the most common response was "I don't know" (65.4%), followed by "There is" (23.8%) and "No" (4.3%). Because companies are entering the rice flour business in consideration of synergistic effects with existing businesses, it seems that companies do not consider the rice flour business to be the only way to solve the above social issues. When asked about the "applicability of the market for rice flour-related products to niche markets," 43.7% of respondents said it was a niche market,

1) Structural equation modeling (SEM) is an analysis in which the relationships among a large number of variables, set as hypotheses, are modeled in the form of linear combinations (Kaplan, 2001).

2) A cognitive map is any visual representation of a person's (or a group's) mental model for a given process or concept.

3) The R10 project is an initiative implemented in Niigata Prefecture as a movement to replace 10% or more of wheat flour consumption with domestically produced rice flour. Efforts are underway to develop large-scale users, develop demand in new fields, and spread the use of the product in household consumption. Companies that support the project and actively promote it themselves will be registered as supporting companies for the R10 project.

Table 1. Summary of survey target attributes

Industry	Agric., forestry and fisheries	Construction industry	Food manufacturing industry	Pharmaceutical manufacturing industry	Medical equipment manufacturing industry	Other manufacturing industries	Electricity, gas, and water	Information and communication industry
	10.0%	0.0%	56.7%	0.0%	0.0%	0.9%	0.0%	0.0%
	Transportation industry	Food distribution business	Distribution business other than food	Finance and insurance industry	Real estate business	Accommodation business	Restaurant business	Life-related service industry
	0.4%	9.1%	0.9%	0.9%	0.4%	1.3%	7.4%	0.4%
	Amusement industry	Education and learning support business	Medical and welfare business	Others	Null answer	Total		
	0.4%	0.0%	2.6%	6.5%	2.2%	100.0%		
Amount of sales	Less than 10 mil. yen	10 mil. yen to less than 30 mil. yen	30 mil. yen to less than 50 mil. yen	50 mil. yen to less than 100 mil. yen	100 mil. yen to less than 500 mil. yen	500 mil. yen to less than 1 bil. yen	1 bil. yen to less than 5 bil. yen	5 bil. yen to less than 10 bil. yen
	17.3%	19.0%	8.7%	11.7%	17.7%	6.5%	9.5%	2.2%
	10 bil. yen or more	No answer	Total					
	6.1%	1.3%	100.0%					
Number of employees	0 to 5 people	6 to 20 people	21 to 50 people	51 to 100 people	101 to 300 people	301 people or more	Total	
	37.2%	27.7%	16.5%	5.2%	8.7%	4.8%	100.0%	

Notes: Questions are as follows.

Industry: “Please name the business with the highest sales among your company's businesses.”

Amount of sales: “Please provide your company’s sales (average for the past three years). If you have a group company, parent company, or subsidiary, please answer about the activities of your company only.”

Number of employees: “Please provide the average number of employees in your company (average for the past 3 years). Employees here refer to full-time employment, and regular employees who fall under these categories: full-time employees, contract workers, and part-time workers (excluding group companies, parent companies and subsidiaries).”

Table 2. Correspondence of memberships and rice flour-related businesses

Applicability of members and registered companies	A member of the Japan Rice Flour Association and a registered company supporting the Niigata R10 Project	Member of the Japan Rice Flour Association	A registered company supporting the R10 project from Niigata	Neither member nor company	No answer	Total
	2.6%	21.6%	10.4%	62.3%	3.0%	100.0%
Rice flour related business	Manufacture of rice flour products	Distribution and sales of rice flour products	Secondary processing and sales of rice flour products	Raw material supply for rice flour product manufacturing	Others	No answer
	69.7%	59.3%	29.0%	17.3%	7.4%	2.6%

Note: This is the result of the answer to “Is your company a member of the Japan Rice Flour Association or a registered Niigata R10 Project Supporting Company?” and “Please choose the rice flour-related businesses that apply to your company (Multiple choice).”

Table 3. Effective altruism

Solving social issues through rice flour-related businesses	Promotion of farm management	Development of agricultural workers	Promotion of environmental conservation in rural areas	Fostering rural communities	Conservation of farmland	Food security	Increase in farmers' income	Diversification of consumer needs for rice
	46.8%	14.7%	17.7%	10.0%	29.0%	41.6%	39.4%	52.4%
	Increased demand for rice	Creation of local employment opportunities	Others	There is no problem that can be solved	No answer			
	57.6%	17.3%	3.0%	3.9%	0.4%			
A more effective way to solve social issues than the rice flour-related business	There is	No	I don't know	No answer	Total			
	23.8%	4.3%	65.4%	6.5%	100.0%			
Applicability of rice flour-related product market to niche markets	It is a niche market	Not a niche market	I don't know	No answer	Total			
	43.7%	21.2%	32.9%	2.2%	100.0%			
Impact on society if rice flour-related business is not conducted	Decline in farm management	Shortage of agricultural workers	Environmental degradation in rural areas	Decline of rural communities	Decrease in farmland	Growing concerns about food security	Decline in income of farmers	Consumer's moving away from rice
	27.3%	9.1%	13.9%	9.1%	23.8%	19.5%	22.5%	30.7%
	Decrease in local employment opportunities	Others	No impact	No answer	Null answer			
	13.4%	7.8%	35.1%	1.3%	0.4%			

Note: The following four criteria are set for judging effective altruism based on MacAskill (2015).

i) Contribute to solving social issues: "What kind of social issues do you think your company's rice flour- related business will contribute to solving? (Multiple choice)"

ii) Be an effective method: "Do you think there are more effective ways to solve social issues than rice flour-related businesses?"

iii) Be a niche market: "Can you say that the rice flour market is a niche market?"

iv) Have a negative impact on society if the project is not implemented: "If your company does not engage in rice flour-related business, what kind of impact do you think it will have on society? (Multiple choice)"

followed by 32.9% who said they didn't know, and 21.2% who said that it was not a niche market. Finally, 63.2% of companies replied that there would be some kind of negative impact on society if they did not engage in rice flour-related businesses. Looking at the breakdown, "Consumer's moving away from rice" (30.7%) accounted for the highest percentage, followed by "Decline in farm management" (27.3%) and "Decrease in farmland" (23.8%). Although companies are most concerned about the impact on consumption, they are also considering the impact on production and agricultural resources.

(3) Business strategies for market expansion and potential demand

As a strategy to expand the market for rice flour products, 90.5% of the companies believe that it is possible to expand the market in some way (Table 4). Looking at the breakdown, products with new health functions (64.1%) accounted for the highest percentage, followed by products with new textures (53.7%) and products with new deliciousness (44.2%). In particular, the latent demand in terms of health and taste is highly evaluated.

Table 4. Potential demand for rice flour product market expansion

	Products with a new texture	Products with new flavors	Products with new processing characteristics	Products with new nutritional functions	Products with new health functions
Potential demand for unprecedented functions	53.7%	44.2%	32.9%	32.5%	64.1%
	Others	There is nothing that I think has a large potential demand.	No answer	Null answer	
	9.5%	2.2%	1.7%	0.9%	

Note: This is the result of answering the question, "In which fields of rice flour products with unprecedented functions do you think the potential demand is high? (Multiple choice)."

Table 5. Emphasis on business strategy for value creation

	Deliciousness	Low price	Convenience	Brand	Value of health and nutrition	Providing safe and secure food
Business strategy for value creation	70.1%	19.0%	8.2%	20.3%	45.0%	52.8%
	Consideration for the environment	Providing opportunities to enjoy the process of eating rice	Providing opportunities to discover new types of rice products	Providing opportunities to discover new ways of eating	Provision of communication related to rice farming, inheritance and creation of rice culture	No answer
	9.5%	10.8%	17.3%	15.2%	24.2%	0.9%

Note: This is the answer result to the question, "Please chose what value you place importance on through the provision of products and services in the rice flour-related business. (Choose up to three)"

Table 6. Emphasis on proposals from consumers, customers and business partners

Emphasis on proposals from consumers, customers and business partners	Very important	Important	Neither	Not very important	Not at all	No answer	Total
	34.6%	48.9%	12.1%	3.0%	0.4%	0.9%	100.0%

Note: This is the answer result to the question "Does your company place importance on ideas for new initiatives proposed by consumers, customers, and business partners?"

(4) Value creation

Regarding the points that companies emphasize on value creation through the provision of rice flour-related products and services are deliciousness (70.1%), safe food (52.8%), health and nutrition (45.0%), and creation of rice culture (24.2%) (Table 5). However, there are a certain number of companies adopting business strategies that emphasize not only the head part of the market but also the tail part (provision of opportunities for communication related to rice farming, inheritance and creation of rice culture, etc.). In particular, many companies put emphasis on proposals from consumers, customers and business partners as very important (34.6%) and important (48.9%) in Table 6.

(5) Commitment to organizational learning

Table 7 shows the company's approach to organizational learning. "Employees share knowledge and experience by talking to each other" (average score: 3.63; the same below) was the highest, followed by "Teamwork has become part of the company culture" (3.54) and "All members of the community share the same purpose to which they feel committed" (3.20). In general, organizational learning related to knowl-

Table 7. Implementation status of organizational learning in companies

Type	Item	Average score
Knowledge acquisition	(1) Employees regularly participate in trade fairs and exhibitions.	2.80
	(2) The organization has a firm and resourceful R&D policy.	2.82
	(3) New ideas and approaches to work performance are continuously experimented.	3.18
Knowledge diffusion	(4) The organization has formal mechanisms to ensure the sharing of best practices across different areas of activity.	2.32
	(5) There is a person in charge of collecting, assembling and disseminating employee suggestions within the organization.	2.91
Knowledge interpretation	(6) All members share the same purpose to which they feel committed.	3.20
	(7) Employees share knowledge and experience by talking to each other.	3.63
	(8) Teamwork is part of the company culture.	3.54
Organizational memory	(9) The organization has directories or emails filed according to subject area so that you can always find an expert on a specific issue.	2.63
	(10) The organization has an up-to-date database of customers.	3.03
	(11) The database is always kept up-to-date.	2.95

Note: These are the responses to the question, "Evaluate your company's efforts to acquire and use knowledge on a 5-point scale."
Scoring is as follows: strongly agree (5 points), somewhat agree (4 points), neither agree nor disagree (3 points), somewhat disagree (2 points), or strongly disagree (1 point).

edge interpretation is addressed. On the other hand, "Have formal mechanisms to ensure the sharing of best practices across different areas of activity" (2.32) was the lowest.

(6) Creation of innovation

Table 8 shows the status of innovation creation in the rice flour-related business. 61.9% of companies were implementing some kind of new initiative. Looking at the details, the highest percentage was introducing new products to the market (45.5%), followed by new sales channels (27.7%), new production processes (17.7%), and products/services displaying new design (17.7%). Product innovation is the main focus, but a certain degree of process and marketing innovation has been achieved. On the other hand, there are not many organizational innovations. Regarding whether or not they conducted joint activities in realizing innovation (Table 8), 64.3% of the companies conducted some joint activities. Looking at the details, suppliers (20.3%) accounted for the highest percentage, followed by customers/clients (16.1%) and universities/other institutions of higher education (12.6%). Innovation in the rice flour-related business is induced through business collaboration with business partners.

(7) Business performance and prospects

Regarding the business performance of rice flour-related businesses, 67.1% of the companies thought that they had some business results (Table 9). Looking at the breakdown of business results, the highest response rate was improving our company's reputation (42.0%), followed by high business growth potential (23.4%) and generating synergies with our other businesses (19.9%). It can be seen that the rice flour business has a positive impact on the overall business of the company.

As for the future results of rice flour-related businesses, the highest response was better reputation (3.70), followed by efficient use of resources (3.59), and solving social issues (3.50)) (Table 10). It can be seen that in addition to the impact on the overall business of the company and the effective use of the company's management resources, it is expected to contribute to the resolution of social issues. On the other hand, the profitability prospects for the rice flour business itself are the lowest.

3) Structural equation modeling (SEM) analysis

Table 11 is a list of explanatory variables and descriptive statistics. In the structural equation modeling analysis, the industry (rice flour-related business in Manufacturing and Distribution/sales were selected) and scale (number of employees), the rice flour association member companies and the support companies of the Niigata R10 project were used as control varia-

Table 8. Innovation and joint activities in rice flour-related businesses

Innovation	Launching new products into the market	Introducing new services into the market	New production processes	New delivery and distribution methods	Activities such as new maintenance systems, purchasing, accounting, and computer processing	New business practices	New workplace organization such as delegation of authority and allocation/ organization of work	New ways of dealing with external parties such as other companies and institutions
	45.5%	6.1%	17.7%	8.7%	9.1%	7.4%	7.4%	8.2%
	New design of products and services	New sales promotion method	New sales channels	New pricing method	Others	No new initiatives	No answer	
	17.7%	17.3%	27.7%	13.0%	1.7%	36.8%	1.3%	
Joint activity	Group companies	Supplier	Customers /Clients	Competitors	Consulting and private research institutes	Universities and other institutions of higher education	Public research institutions (consortiums)	Joint research association
	4.2%	20.3%	16.1%	4.2%	7.0%	12.6%	10.5%	2.8%
	Others	No joint activities						
	7.0%	35.7%						

Note: These are the answer results to the question, "Please choose all the new initiatives introduced in your company's rice flour-related business in the past three years (Multiple choice)," and "Are there any new initiatives introduced in the past three years in your company's rice flour-related business through joint activities with organizations other than your company? (Multiple choice)."

Table 9. Business performance of the rice flour-related business

Business performance	High profitability	High growth potential	Generation of synergies with other businesses	Improvement of company's reputation	Others	Nothing in particular	No answer
	10.8%	23.4%	19.9%	42.0%	7.4%	30.7%	2.2%

Note: This is the result to the question, "Please choose all the items that apply to your company's rice flour-related business. (Multiple choice)"

Table 10. Future prospects for rice flour-related businesses

Prospects for future business results in the rice flour business	Contribution to higher profitability	Contribution to solving social issues	Contribution to better reputation	Contribution to efficient use of resources
	3.28	3.50	3.70	3.59

Note: These are the results of responses to the question, "What kind of business results can be expected from your company's rice flour-related business? Please rate each on a scale of five."
Scoring is as follows: strongly agree (5 points), somewhat agree (4 points), neither agree nor disagree (3 points), somewhat disagree (2 points), or strongly disagree (1 point).

Table 11. Variable explanations and descriptive statistics

Group of variables	Variable name	Explanation	Ave.	Min.	Max.
Industry (Rice flour business)	Manufacturing	Manufacturing of rice flour products = 1; No = 0	0.72	0.00	1.00
	Distribution/sales	Distribution and sales of rice flour products = 1; No = 0	0.61	0.00	1.00
Scale	Number of employees	0 to 5 = 1; 6 to 20 = 2; 21 to 50 = 3; 51 to 100 = 4; 101 to 300 = 5; 301 and above = 6	2.35	1.00	6.00
Membership	Member of the Rice Flour Association	Japan Rice Flour Association member = 1; No = 0	0.25	0.00	1.00
	R10 support company	R10 support company = 1; No = 0	0.13	0.00	1.00
Effective altruism		Sum of A, B, C and D below A: There are social issues that can be solved through the rice flour-related business: Yes = 1 (even if multiple items are selected); No = 0 B: There are more effective methods than rice flour-related business: Yes = 1; No = 0 C: Applicable to niche market: Yes = 1; No = 0 D: There will be a problem in society if you do not engage in rice flour-related business: Yes (even if multiple items are selected) = 1; No = 0	2.07	0.00	4.00
Market potential	Potential demand	Rice flour products with functions for which potential demand is high (products with new textures; products with new deliciousness; products with new processing characteristics; products with new nutritional functions; products with new health features; others): 0-6	2.41	0.00	6.00
Organizational learning	Knowledge acquisition	Total scores for the implementation status of initiatives related to (1), (2), and (3) in Table 7: 0-15	8.77	3.00	15.00
	Knowledge diffusion	Total score for the implementation status of initiatives related to (4) and (5) in Table 7: 0-10	5.18	1.00	9.00
	Knowledge interpretation	Total score for implementation status of initiatives related to (6), (7) , and (8) in Table 7: 0-15	10.28	3.00	15.00
	Organizational memory	Total score for the implementation status of initiatives related to (9), (10), and (11) in Table 7: 0-15	8.52	2.00	15.00
Long tail	Head market (Overt)	Total number of selections for value (taste; price; convenience): 0-3	0.98	0.00	3.00
	Head market (Potential)	Total number of selected values (brand; health and nutrition; safe and secure food; environment): 0-4	1.28	0.00	4.00
	Tail market	Total number of selected values (enjoy the process of eating rice; discover new types of rice products; discover new ways to eat rice; rice cultivation, inheritance and rice culture): 0-4	0.68	0.00	4.00
Stakeholders	Proposals from stakeholders	Importance of ideas for new initiatives proposed by consumers, customers, and business partners (very important = 5; slightly important = 4; neither = 3; not very important = 2; not important at all = 1)	4.15	1.00	5.00
Innovation	Product innovation	New initiatives for rice flour-related business introduced in the past 3 years (launch of new products into the market; launch of new services into the market): 0-2	0.52	0.00	2.00
	Process innovation	New production processes; new delivery/distribution methods: 0-2	0.27	0.00	2.00
	Organizational innovation	New maintenance systems and activities; new work practices; new workplace organizations; new ways of relating to other stakeholders: 0-4	0.32	0.00	4.00
	Marketing innovation	New design of products/services; new sales promotion methods; new sales channels; new pricing methods: 0-4	0.77	0.00	4.00
Current performance	Performance	Total number of selections (highly profitable business; high business growth potential; generating synergies with other businesses; improving the company's reputation; others): 0-5	1.03	0.00	4.00
Future prospect (Same as in Table 10)	Higher profitability	Contribution to higher profitability (strongly agree = 5; somewhat agree = 4; neither agree nor disagree = 3; somewhat disagree 2; strongly disagree = 1)	3.28	1.00	5.00
	Solving social issues	Contribution to solving social issues (same as above)	3.50	1.00	5.00
	Better reputation	Contribution to better reputation (same as above)	3.70	1.00	5.00
	Efficient use of resources	Contribution to efficient use of resources (same as above)	3.59	1.00	5.00

Note: A non-response for organizational learning items is considered a score of zero.

bles, and effective altruism was used as a variable in the 1st layer. The variables of market potential (potential demand for rice flour), organizational learning (knowledge acquisition, knowledge diffusion, knowledge interpretation, organizational memory), business strategy (overt head market, potential head market, tail market), and stakeholder (emphasizing the proposals from stakeholders) were set in the 2nd layer and organizational learning was set as a latent variable. The variables of innovation (product, process, organization, marketing) were set in the 2.5th layer, and the variables of business performance (profitability, growth potential, synergy, reputation) were set in the 3rd layer. We assume the covariance of the error terms among the variables within each stratum. The model in this study is estimated by the maximum likelihood method including missing values.

Figures 2 and 3, and Tables 12 and 13 summarize the path diagram of the estimation results and estimated values. For SEM analysis, multiple models were estimated, and the model with the best fit index was adopted. The final model has CFI = 0. 954 and RMSEA = 0.049, and the fit is good as it satisfies the conditions of CFI $\geq$ 0.95 and RMSEA $\leq$ 0.05 (Hoshino *et al*. 2005). Here, we focus on those with significant path coefficients at the 1% level. As a result of the analysis, the following points were clarified. First, the performance of rice flour-related businesses is defined by innovation, market potential and organizational learning. Specifically, potential demand and product innovation have positive impacts on the current performance, future prospects for increased profitability, improved reputation and efficient use of resources while organizational learning and product innovation have a positive impact on the prospects for solving social issues. Secondly, business strategy induces innovation. In particular, potential head market has a positive impact on three types of innovation (product, organization and marketing) and tail market strategy has a positive impact on product innovation. Thirdly, the number of employees and membership in the Rice Flour Association have a positive impact on organizational learning and business strategy. In addition, compared to other companies, companies that are members of the Rice Flour Association carry out organizational learning, and adopt a strategy that emphasizes the pro-

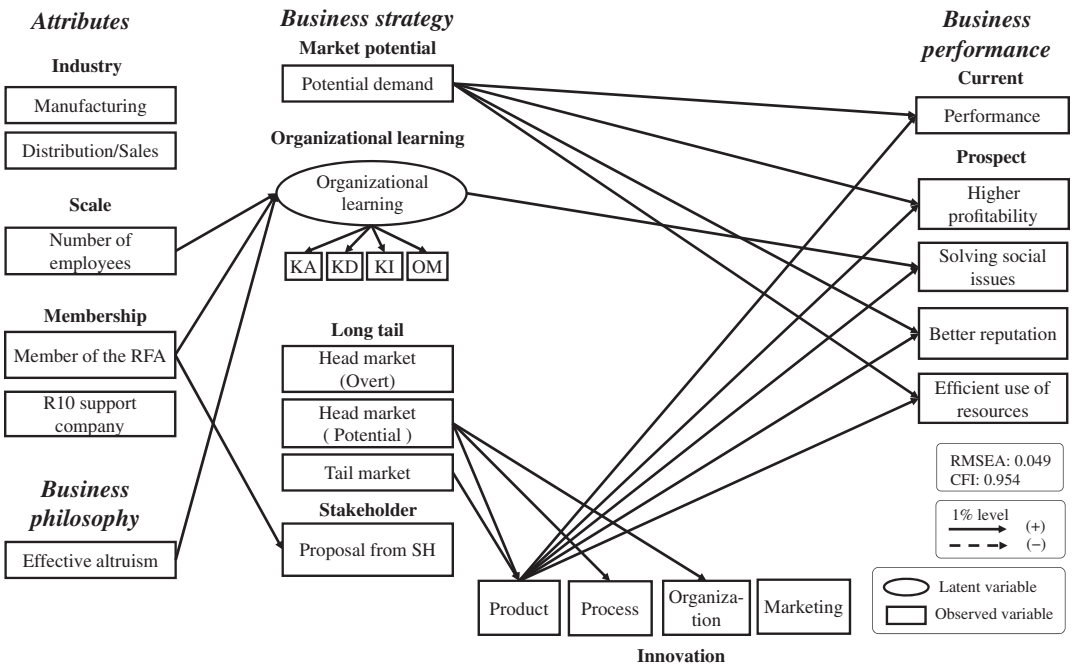

Figure 2. Path diagram of estimation results

Note: SH stands for stakeholder. RFA stands for the Rice Flour Association.
KA, KD, KI and OM stand for Knowledge acquisition, Knowledge diffusion, Knowledge interpretation and Organizational memory, respectively.

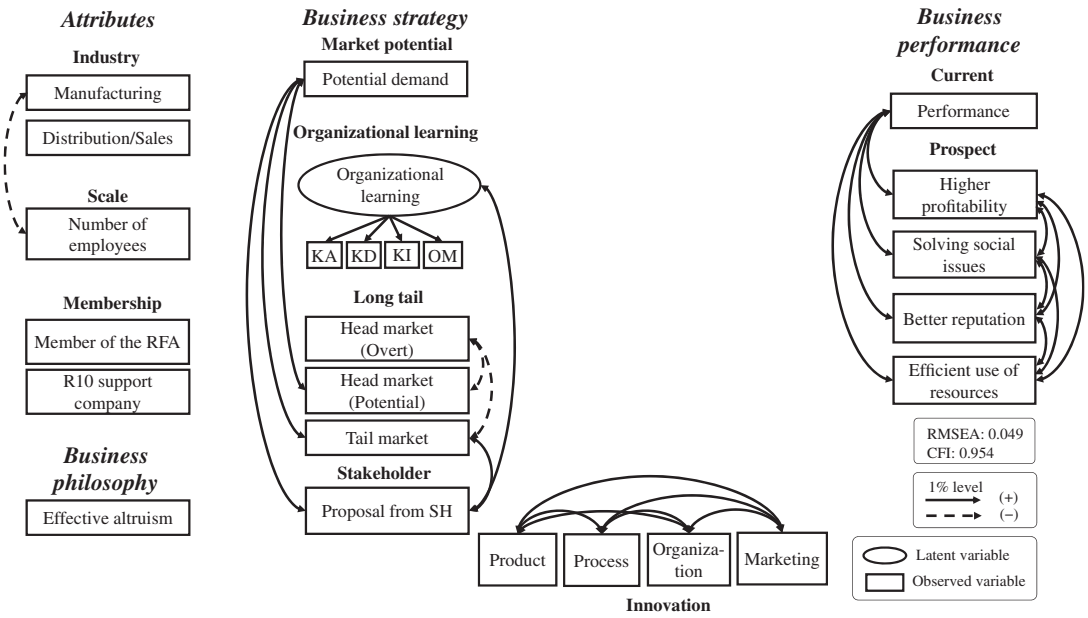

Figure 3. Path diagram of the covariance of the error term

Note: SH stands for stakeholder. RFA stands for the Rice Flour Association.
KA, KD, KI and OM stand for Knowledge acquisition, Knowledge diffusion, Knowledge interpretation and Organizational memory, respectively.

posals from stakeholders. Fourthly, it was also revealed that companies with effective altruism as their philosophy are more engaged in organizational learning.

However, as shown in Figure 3, there are positive correlations between the four types of innovation, and the strategies for overt head market have a negative correlation with strategies for potential head market, and tail market. In addition, it is confirmed that strategies for organizational learning and tail market have a positive correlation with the strategies for emphasizing the proposals from stakeholders. Furthermore, a positive correlation between the strategies for potential demand and tail market is also confirmed. From the above results, it was clarified that effective altruism, organizational learning, and a business strategy emphasizing the long-tail market will enhance business performance through induction of innovation in rice flour-related businesses. On the other hand, the head market strategy and the tail market strategy taken by rice flour manufacturers have different directions. The tail market strategy is thought to be oriented toward a CSV-type management model based on organizational learning and proposals from stakeholders.

4) Cognitive map analysis

Next, we conduct cognitive map analysis using the data from open-ended questions in the above questionnaire survey items. A co-occurrence network is a diagram in which relationships (co-occurrence relationships) in which words appear in common are represented by circles and lines. Here, we thought that it would be effective to analyze the co-occurrence relationship of keywords obtained by the free association method, and to structure the latent factors and concepts. Specifically, this was accomplished by using the data from Question 21-1 "Please list three or more keywords that you think are important in expanding the existing rice flour market" (hereafter referred to as "market expansion") and Question 21-2 "Please give three or more keywords that you think are important in creating a new market for rice flour" (hereafter referred to as "market creation"), and clarifying the recognition structure of companies involved in the rice flour business.

The software KH Coder 3.Beta.04e (Higuchi, 2014) was used, and 231 samples (155 samples for market expansion, 128 samples for market creation) were used for analysis. Standardization of spelling variations (conversion of hiragana to kanji, etc.), specification of forced extraction of words ("rice flour," "gluten-free," "local production for local consumption," etc.) and designation of words not to be used ("none," "none in particular," "don't know," etc.) were performed. The total number of extracted words

Table 12. Estimation result of path coefficient

		Stand. coef.	*p*-value				Stand. coef.	*p*-value	
Current performance	Product innov.	0.217	0.001	***	Organ. Innov.	Potential demand	−0.020	0.780	
	Process innov.	0.145	0.032	**		Organ. Learning	0.116	0.120	
	Organ. innov.	0.048	0.449			Head market (Overt)	0.114	0.108	
	Marketing innov.	0.007	0.920			Head market (Potential)	0.199	0.006	***
	Potential demand	0.273	0.000	***		Tail market	0.139	0.049	**
	Organ. Learning	0.087	0.176			Proposal from SH	0.052	0.443	
	Head market (Overt)	−0.114	0.060	*	Marketing innov.	Potential demand	0.070	0.320	
	Head market (Potential)	0.068	0.282			Organ. Learning	0.092	0.207	
	Tail market	−0.025	0.684			Head market (Overt)	0.024	0.735	
	Proposal from SH	0.103	0.086	*		Head market (Potential)	0.180	0.010	**
Higher profitability	Product innov.	0.191	0.006	***		Tail market	0.140	0.042	**
	Process innov.	−0.049	0.492			Proposal from SH	0.154	0.020	**
	Organ. innov.	0.010	0.879		Potential demand	Manufacturing	0.049	0.474	
	Marketing innov.	0.083	0.256			Distribution/Sales	0.018	0.790	
	Potential demand	0.304	0.000	***		Number of employees	−0.069	0.295	
	Organ. Learning	0.162	0.016	**		Member of the RFA	0.069	0.308	
	Head market (Overt)	−0.090	0.161			R10 support company	−0.043	0.537	
	Head market (Potential)	0.051	0.444			Effective altruism	0.120	0.065	*
	Tail market	−0.106	0.103		Organ. Learning	Manufacturing	0.071	0.310	
	Proposal from SH	0.094	0.133			Distribution/Sales	0.029	0.669	
Solving social issues	Product innov.	0.192	0.006	***		Number of employees	0.277	0.000	***
	Process innov.	0.018	0.797			Member of the RFA	0.210	0.002	***
	Organ. innov.	−0.041	0.546			R10 support company	0.019	0.776	
	Marketing innov.	0.016	0.827			Effective altruism	0.243	0.000	***
	Potential demand	0.161	0.012	**	Head market (Overt)	Manufacturing	−0.007	0.918	
	Organ. Learning	0.209	0.002	***		Distribution/Sales	−0.038	0.572	
	Head market (Overt)	−0.151	0.018	**		Number of employees	0.161	0.014	**
	Head market (Potential)	0.108	0.110			Member of the RFA	0.036	0.589	
	Tail market	0.000	0.998			R10 support company	−0.033	0.617	
	Proposal from SH	0.138	0.028	**		Effective altruism	−0.038	0.560	
Better reputation	Product innov.	0.264	0.000	***	Head market (Potential)	Manufacturing	−0.055	0.409	
	Process innov.	−0.032	0.655			Distribution/Sales	0.163	0.011	**
	Organ. innov.	0.032	0.633			Number of employees	−0.049	0.453	
	Marketing innov.	0.004	0.955			Member of the RFA	0.132	0.045	**
	Potential demand	0.249	0.000	***		R10 support company	−0.049	0.458	
	Organ. Learning	0.164	0.014	**		Effective altruism	0.136	0.031	**
	Head market (Overt)	−0.146	0.020	**	Tail market	Manufacturing	0.048	0.482	
	Head market (Potential)	0.076	0.258			Distribution/Sales	−0.028	0.672	
	Tail market	−0.089	0.168			Number of employees	−0.041	0.534	
	Proposal from SH	0.101	0.107			Member of the RFA	−0.118	0.076	
Efficient use of resources	Product innov.	0.280	0.000	***		R10 support company	−0.048	0.469	
	Process innov.	−0.106	0.141			Effective altruism	0.130	0.044	**
	Organ. innov.	0.000	0.999		Proposal from SH	Manufacturing	−0.004	0.956	
	Marketing innov.	0.022	0.764			Distribution/Sales	−0.002	0.981	
	Potential demand	0.220	0.001	***		Number of employees	0.085	0.188	
	Organ. Learning	0.167	0.014	**		Member of the RFA	0.212	0.001	***
	Head market (Overt)	−0.106	0.097	*		R10 support company	0.000	0.997	
	Head market (Potential)	0.088	0.188			Effective altruism	0.160	0.011	**
	Tail market	−0.016	0.802		Latent variable				
	Proposal from SH	0.095	0.134		Organ. Learning	Knowl. acquisition	0.796	0.000	***
Product innov.	Potential demand	0.092	0.173			Knowl. diffusion	0.844	0.000	***
	Organ. Learning	0.129	0.067	*		Knowl. interpretation	0.579	0.000	***
	Head market (Overt)	0.089	0.185			Organ. memory	0.573	0.000	***
	Head market (Potential)	0.196	0.004	***					
	Tail market	0.199	0.003	***					
	Proposal from SH	0.159	0.013	**					
Process innov.	Potential demand	0.105	0.146						
	Organ. Learning	0.091	0.219						
	Head market (Overt)	0.139	0.047	**					
	Head market (Potential)	0.191	0.007	***					
	Tail market	0.140	0.045	**					
	Proposal from SH	0.039	0.561						

Note: *, ** and *** indicate statistically significant differences at 10 %, 5 % and 1 %, respectively.

SH stands for stakeholder. RFA stands for the Rice Flour Association.

Table 13. Estimation results of the covariance of the error term

		Stand. coef.	*p*-value				Stand. coef.	*p*-value	
Current performance	Higher profitability	0.286	0.000	***	Head market (Overt)	Head market (Potential)	−0.238	0.000	***
	Solving social issues	0.207	0.001	***		Tail market	−0.227	0.000	***
	Better reputation	0.290	0.000	***		Proposal from SH	0.080	0.220	
	Efficient use of resources	0.191	0.003	***	Head market (Potential)	Tail market	−0.099	0.129	
Higher profitability	Solving social issues	0.509	0.000	***		Proposal from SH	0.020	0.758	
	Better reputation	0.463	0.000	***	Tail market	Proposal from SH	0.200	0.002	***
	Efficient use of resources	0.472	0.000	***	Manufacturing	Distribution/Sales	0.101	0.126	
Solving social issues	Better reputation	0.436	0.000	***		Number of employees	−0.187	0.003	***
	Efficient use of resources	0.650	0.000	***		Member of the RFA	0.161	0.014	**
Better reputation	Efficient use of resources	0.474	0.000	***		R10 support company	0.006	0.932	
Product innov.	Process innov.	0.332	0.000	***		Effective altruism	0.030	0.646	
	Organ. innov.	0.212	0.001	***	Distribution/Sales	Number of employees	−0.039	0.554	
	Marketing innov.	0.388	0.000	***		Member of the RFA	0.031	0.641	
Process innov.	Organ. innov.	0.412	0.000	***		R10 support company	−0.049	0.469	
	Marketing innov.	0.454	0.000	***		Effective altruism	0.047	0.479	
Organ. innov.	Marketing innov.	0.404	0.000	***	Number of employees	Member of the RFA	−0.027	0.692	
Potential demand	Organ. Learning	0.145	0.045	**		R10 support company	0.102	0.127	
	Head market (Overt)	0.085	0.198			Effective altruism	−0.009	0.890	
	Head market (Potential)	0.248	0.000	***	Member of the RFA	R10 support company	−0.045	0.503	
	Tail market	0.229	0.000	***		Effective altruism	0.067	0.312	
	Proposal from SH	0.187	0.005	***	R10 support company	Effective altruism	0.061	0.361	
Organ. Learning	Head market (Overt)	0.014	0.849						
	Head market (Potential)	0.121	0.095	*					
	Tail market	0.149	0.038	**					
	Proposal from SH	0.200	0.005	***					

Note: *, ** and *** indicate statistically significant differences at 10 %, 5 % and 1 %, respectively.
SH stands for stakeholder. RFA stands for the Rice Flour Association.

(total number of all words included in the analysis target) for Market Expansion was 3,915, and the total number of extracted words for Market Creation was 3,241 (Appendix Table 1 and 2).

From the results of co-occurrence network analysis, the cognitive structure of rice flour for Market Expansion is divided into (1) substitutability (rice flour, wheat flour, price, substitution, etc.); (2) functionality (delicious, product, cheap, processing, etc.); (3) sociality (self-sufficiency, improvement, etc.); and (4) safety and health (gluten-free, allergy, safety, health, etc.) (Figure 4-a). In terms of the cognitive structure of rice flour for Market Creation, it can be organized into three categories: (1) novelty (product, new, development, market); (2) functionality, safety and health (delicious, price, safety, allergy); (3) production and supply capacity (supply, stability, farmers, etc.) (Figure 4-b).

5. Concluding Remarks and Policy Implication

Based on the above-mentioned analysis, we obtained the following results. First, the results of SEM analysis clarified that management philosophy (Effective Altruism, and member of the Rice Flour Associa-

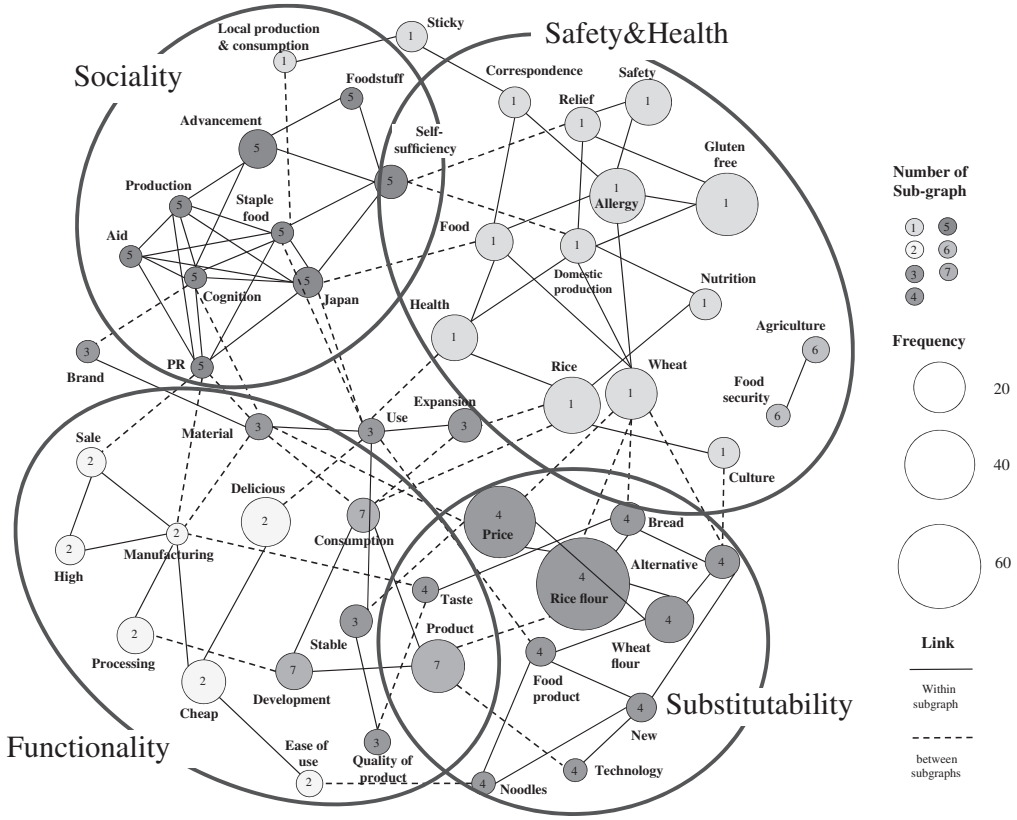

Figure 4-a. Co-occurrence network analysis of market expansion

Note: Extraction of top 100 co-occurrence relations.

tion) and number of employees of rice flour related businesses influence their corporate business strategies (potential head market, tail market, organizational learning and proposals from stakeholders) which determine their business performance (innovation, current performance and future prospects). Secondly, the results of cognitive map analysis clarified that the performance of rice-flour related businesses reflects the expectations for the rice flour market, and influences the direction of market development: market expansion (functionality-substitutability; sociality-safety & health) and market creation (production & supply capacity; novelty; functionality, safety & health). Therefore, our two hypotheses are verified.

The current rice flour policy implements a push policy in the production stage in which the main focus is a uniform domestic production guidance through subsidies for new demand rice, and a pull policy to some extent in the distribution/processing and consumption aspects. There is a lack of consistency between the policies. Essentially, it is necessary to introduce a pull policy at the production stage as well. Therefore, by facing the issues that have been neglected in the food system such as social needs and social values, we can build a shared vision that will transform the existing food system into a new one through organizational learning crossing boundaries. In other words, there is a need for policy innovation[4] that strengthens effective altruism and creates shared value through organizational learning of stakeholders in rice flour-related businesses. Furthermore, what is important is a policy or strategy for changing the cultural belief, a common prior expectation as mutual knowledge of social, economic, and technological characteristics (Aoki, 2011).

As for our future research, it is possible to use other analytical methods in a complementary manner. For

4) Policy innovation is defined as novel processes, tools, and practices used for policy design and development that result in better problem solvinng of complex issues (Brookfield Institute 2018).

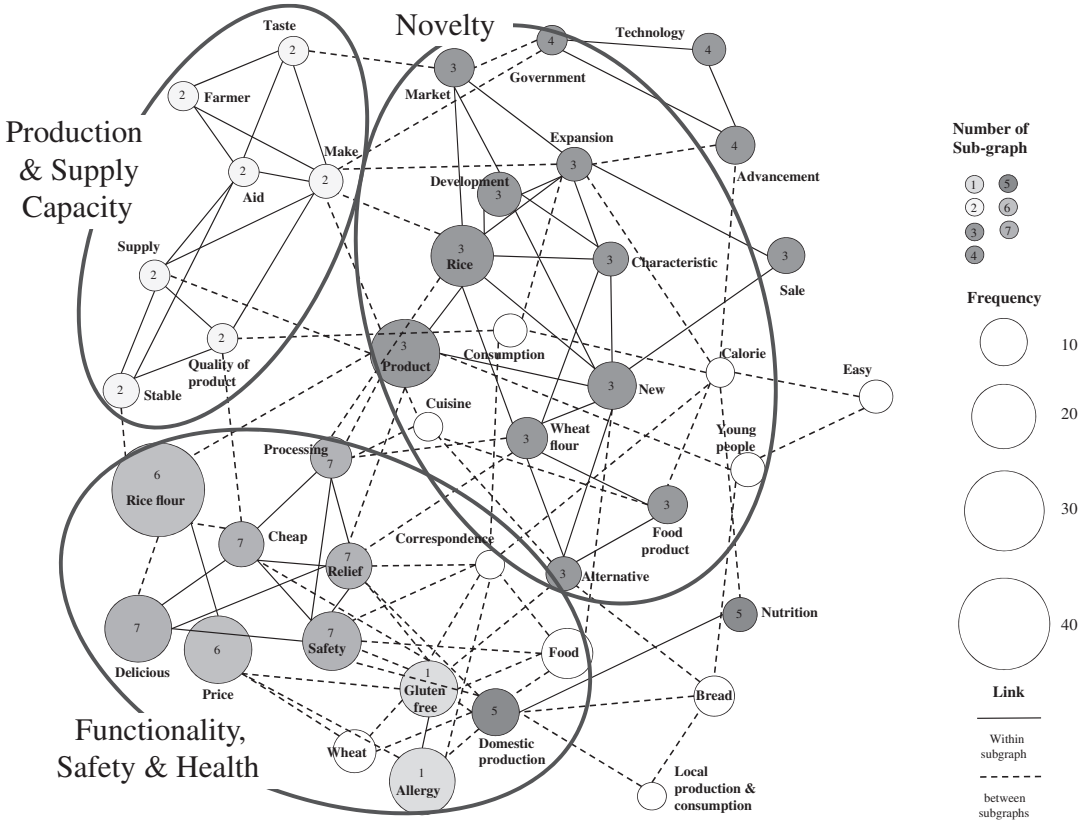

Figure 4-b. Co-occurrence network analysis of market creation

Note: Extraction of top 100 co-occurrence relations.

example, after extracting CSV management companies by LCA (latent class analysis), it is possible to apply qualitative comparative analysis (QCA) for clarifying the conditions for realizing CSV management.

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(Received April 11, 2023; accepted November 1, 2023)

Appendix Table 1. Frequent extracted words (100) for Market Expansion

Extracted word	Frequency	Extracted word	Frequency
Rice flour	72	Noodles	4
Price	42	Up	3
Gluten free	33	Gluten	3
Rice	26	Support	3
Allergy	24	Function	3
Product	23	Supply	3
Wheat	21	Inheritance	3
Delicious	20	Country	3
Safety	18	Serve	3
Health	18	Application	3
Wheat flour	18	Feel	3
Cheap	16	Increase	3
Advancement	12	Eat	3
Processing	11	Diverse	3
Development	11	Measures	3
Food	11	Characteristic	3
Relief	10	Pesticide	3
Domestic production	10	Dispatch	3
Bread	9	Breeding	3
Expansion	9	Diffusion	3
Self-sufficiency	9	Change	3
Consumption	9	Method	3
Alternative	9	Import	3
Sticky	8	Usage	3
Stable	8	Suppression	3
Correspondence	8	Appeal	2
Culture	8	Calorie	2
Nutrition	7	Vegan	2
High	7	Consciousness	2
New	7	Training	2
Japan	7	Lower	2
Sale	7	Improvement	2
Material	6	Overseas	2
Food product	6	Reclamation	2
Agriculture	6	School lunch	2
Ease of use	5	Environment	2
Quality of product	5	Scale	2
Taste	5	Economy	2
Use	5	Light	2
PR	4	Research	2
Brand	4	Produced in prefecture	2
Technology	4	Brown rice	2
Foodstuff	4	Think	2
Food security	4	Market	2
Staple food	4	Quality	2
Production	4	Easy	2
Manufacturing	4	Fullness	2
Local production & consumption	4	Important	2
Cognition	4	Information	2
Aid	4	Novelty	2

Appendix Table 2. Frequent extracted words (100) of 〈Market Creation〉

Extracted word	Frequency	Extracted word	Frequency
Rice flour	42	High	3
Price	22	Country	3
Product	22	Ease of use	3
Delicious	21	Self-sufficiency	3
Allergy	20	Diet staple	3
Rice	18	Milling	3
Safety	16	Diverse	3
Gluten free	15	Cooking	3
Health	12	Addition	3
Food	12	Agriculture	3
New	11	Noodles	3
Cheap	10	Import	3
Relief	10	*Washoku*	3
Domestic production	10	Amylose	2
Development	9	Image	2
Wheat	9	Food mileage	2
Processing	8	Free	2
Wheat flour	8	Pet Food	2
Bread	7	Recipe	2
Advancement	7	Consciousness	2
Market	7	Support	2
Food product	7	Possible	2
Stable	6	School	2
Sale	6	Convenience	2
Nutrition	5	Machine	2
Expansion	5	Function	2
Technology	5	Competition	2
Make	5	Prefecture	2
Young people	5	Origin	2
Easy	5	Material	2
Consumption	5	Efficiency	2
Alternative	5	Usage method	2
Characteristic	5	Society	2
Calorie	4	Demand	2
Supply	4	Eat	2
Government	4	Cooking ingredient	2
One's company	4	Foodstuff	2
Correspondence	4	Novelty	2
Local production & consumption	4	Make use of	2
Farmer	4	Production	2
Quality of product	4	Manufacturing	2
Aid	4	Advertisement	2
Taste	4	Body	2
Cuisine	4	Measures	2
PR	3	Offer	2
Value	3	Japan	2
Overseas	3	Discover	2
Cooperation	3	Need	2
Research	3	Diffusion	2
Brown rice	3	Method	2