

Nakamura, Tetsuya; Lloyd, Steven; Masuda, Satoru

Article

Resident evaluation of reconstruction challenges and lessons learned from the Great East Japan Earthquake: Recommendations for reconstruction and industrial policies 12 years after the disaster

Economies

Provided in Cooperation with:

MDPI – Multidisciplinary Digital Publishing Institute, Basel

Suggested Citation: Nakamura, Tetsuya; Lloyd, Steven; Masuda, Satoru (2024) : Resident evaluation of reconstruction challenges and lessons learned from the Great East Japan Earthquake: Recommendations for reconstruction and industrial policies 12 years after the disaster, *Economies*, ISSN 2227-7099, MDPI, Basel, Vol. 12, Iss. 7, pp. 1-25, <https://doi.org/10.3390/economies12070186>

This Version is available at:

<https://hdl.handle.net/10419/329112>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Article

Resident Evaluation of Reconstruction Challenges and Lessons Learned from the Great East Japan Earthquake: Recommendations for Reconstruction and Industrial Policies 12 Years after the Disaster

Tetsuya Nakamura ^{1,*} , Steven Lloyd ¹ and Satoru Masuda ² ¹ Faculty of International Business Management, Kyoei University, Kasukabe 344-0051, Japan; lloyd@kyoei.ac.jp² Department of Regional Economics, Teikyo University, Utsunomiya 320-8551, Japan; satoru.masuda.e5@tohoku.ac.jp

* Correspondence: t-nakamura@kyoei.ac.jp

Abstract: The year 2023 marks the 12th anniversary of the Great East Japan Earthquake (GEJE). Immediately after the disaster, the number of evacuees reached approximately 470,000, but by November 2022, the number had decreased to approximately 31,000. The reconstruction of housing, disposal of debris, public infrastructure development, and overall restoration and reconstruction has progressed steadily. However, a re-examination of the status of industrial restoration and reconstruction reveals that restoration and reconstruction have not progressed in some areas. This research statistically analyzes how the Japanese public perceives the issues around the recovery process and what memories and records they would like to learn from regarding the GEJE. The purpose of this study is to ask about reconstruction issues and lessons learned from the GEJE by conducting a web-based survey with 2000 respondents in Japan. The method of estimation is the use of ordinal logistic regression analysis to statistically estimate whether there are differences in recovery issues and lessons learned depending on individual attributes. The results suggest that those who are interested in, remember, and express anxiety about the recovery issues and lessons learned tend to be men, do not have children, are highly educated, and have a higher income. In sum, many of Japan's citizens are highly interested in the reconstruction of agriculture, forestry, fisheries, housing, urban development, living environment, industry, and livelihood in the affected areas. In the future, they will play a central role in modernizing, scaling up, and integrating the agriculture, forestry, and fisheries industries, as well as in rebuilding towns and livelihoods. In the affected areas, it will be necessary to draw on the lessons learned from the GEJE and create reconstruction plans for the future, and then, policymakers will need to formulate reconstruction policies that reflect the concerns of the Japanese people.

Keywords: TEPCO Fukushima Daiichi nuclear power plant accident; Great East Japan Earthquake; reconstruction policy; citizen survey; logistic regression analysis



Citation: Nakamura, Tetsuya, Steven Lloyd, and Satoru Masuda. 2024. Resident Evaluation of Reconstruction Challenges and Lessons Learned from the Great East Japan Earthquake: Recommendations for Reconstruction and Industrial Policies 12 Years after the Disaster. *Economics* 12: 186. <https://doi.org/10.3390/economics12070186>

Academic Editor: Tsutomu Harada

Received: 21 May 2024

Revised: 4 July 2024

Accepted: 11 July 2024

Published: 17 July 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In 2023, Japan marked the 12th anniversary of the Great East Japan Earthquake (GEJE). Immediately after the disaster (14 March 2011), the number of evacuees had reached approximately 470,000, but by November 2022, it had decreased to about 31,000 ([Reconstruction Agency of Japan 2023a](#)). Furthermore, progress has been made in rebuilding homes, leading to a decrease in the number of occupants in emergency temporary housing ([Reconstruction Agency of Japan 2023a](#)). The number of residents in prefabricated temporary housing in Fukushima Prefecture decreased from 10,893 in April 2018 to 4 in January 2023, and construction-type temporary housing supply in Miyagi and Iwate Prefectures ended in fiscal year 2020 ([Reconstruction Agency of Japan 2023a](#)). Additionally, in the

three disaster-affected prefectures of Iwate, Miyagi, and Fukushima, disaster waste had reached 19.64 million tons (Iwate: 4.39 million tons; Miyagi: 12.23 million tons; Fukushima: 3.02 million tons) and tsunami deposits reached 10.48 million tons (Iwate: 1.84 million tons; Miyagi: 7.28 million tons; Fukushima: 1.36 million tons) ([Reconstruction Agency of Japan 2023a](#)). However, by the target date of the end of March 2014, debris processing in Iwate and Miyagi was completed, and debris processing in Fukushima, excluding the countermeasure areas, was completed by the end of August 2017 ([Reconstruction Agency of Japan 2023a](#)). As of the end of September 2022, except for coastal measures (96%), coastal disaster prevention forests (95%), transportation networks in prefectures and municipalities (99%), school facilities, medical facilities, agricultural land, and fixed fishing grounds (99%), all public infrastructure had been completed ([Reconstruction Agency of Japan 2023a](#)). The construction of disaster public housing and the development of residential areas on high ground were completed by the end of 2020 ([Reconstruction Agency of Japan 2023a](#)). The GEJE caused various landslide disasters in northeastern Japan ([Miyagi et al. 2011](#)). Landslides are dynamic soil catastrophes that pose a serious threat to the lives and economic property of the surrounding population ([Liu et al. 2023](#)). However, the full extent of the landslide generated by this earthquake is still unknown ([Miyagi et al. 2011](#)). The actual tsunami height generated by this earthquake was also not estimated ([Suppasri et al. 2013](#)). Under these circumstances, reconstruction and recovery efforts, such as housing construction, debris processing, and public infrastructure development, have steadily progressed, leading to the recovery and reconstruction of disaster-affected areas.

However, upon the re-evaluation of the recovery and reconstruction of industries, areas where recovery and reconstruction have not progressed become apparent. The shipment value of manufactured goods in the three disaster-affected prefectures has generally recovered to pre-disaster levels, with the construction industry (66.4%) and transportation industry (50.5%) surpassing pre-disaster sales levels. On the other hand, sales in the lodging and hotel industry (20.1%) and the fisheries and food processing industry (27.5%) have declined compared to pre-disaster levels, especially with the tourism industry experiencing significant declines in sales due to the spread of COVID-19 since 2020. In agriculture in the six Tohoku prefectures, of the targeted farmland for recovery, excluding land converted from tsunami-damaged areas (19,660 hectares), farming has resumed on 18,640 hectares. In the three disaster-affected prefectures, efforts to consolidate farmland through extensive aggregation and land use rationalization using reconstruction subsidies are progressing. However, among seafood processing businesses, only 17% have recovered sales to pre-disaster levels, with 49% recovering more than 80%. In other words, while infrastructure, manufacturing, construction, and transportation have recovered after the disaster, recovery in industries such as tourism and seafood processing has stagnated, resulting in significant disparities in industrial recovery. Summarizing research on Fukushima's reconstruction and regeneration over time, the following leading studies are mentioned:

[Kawasaki \(2013\)](#) conducted a survey of residents regarding decontamination in the Fukushima City Oonami district one year after the disaster, highlighting the need for the reconsideration of decontamination and the establishment of systems to support living arrangements. [Maehara \(2014\)](#), 2 years and 8 months after the nuclear accident, pointed out that 150,000 people (96,000 in the prefecture and 54,000 outside the prefecture) were living in evacuation zones, with uncertainties in the restoration and reconstruction of not only the evacuation zones including the 30 km radius but also surrounding community areas. [Lee et al. \(2019\)](#), 8 years after the nuclear accident, emphasized that Fukushima's recovery primarily focused on infrastructure development, with a lack of soft infrastructure development addressing challenges from local communities and residents. [Nakano et al. \(2020\)](#), 9 years after the nuclear accident, pointed out a tendency in previous Fukushima recovery studies to prioritize scientific investigations and socioeconomic analyses, with discussions often predetermined. With the approach of the 10th anniversary of the disaster in 2021, research on Fukushima's recovery and regeneration has also been conducted. [Kawasaki \(2021\)](#) examined policies for long-term recovery in Fukushima from 2011 to 2020,

revealing ongoing challenges despite some progress, including the difficulty of returning to areas designated as difficult to return to, as well as addressing issues such as accident containment and radioactive contamination. [Yamakawa and Seto \(2018\)](#) discuss various aspects of Fukushima's recovery and reconstruction efforts after the earthquake, focusing on fundamental issues of support, the verification of the lives and situations of the affected people, the impact on industries, international trends, and disaster prevention education. Additionally, they present findings from research addressing Fukushima's recovery support, post-evacuation community building, and the process of reconstruction ten years after the nuclear accident ([Yamakawa and Hatsuzawa 2021](#)). This research highlights significant challenges in the recovery and reconstruction process, such as ongoing nuclear concerns, reputational issues affecting agricultural products, disparities in compensation between forced and voluntary evacuees, housing shortages for victims, and health issues among evacuees.

However, despite 11 years passing since the disaster, previous studies evaluating Fukushima's economic recovery and decontamination policies are often critical of national and prefectural policies. For instance, [Schreurs \(2021\)](#) notes that while the Tohoku region aims to become a global leader in tsunami disaster management, recovery, nuclear disaster recovery, and renewable energy development, many evacuees have not returned home due to the complex challenges associated with post-nuclear accident cleanup. [Fujimoto \(2016\)](#) highlights the complexities and political challenges in determining the scope and scale of radiation contamination in post-disaster Japan. [Nagamatsu et al. \(2020\)](#) discusses the possibility of recovery promotion expenses outweighing benefits if residents remain unresponsive to decontamination efforts in areas designated as restricted access zones. [Liu et al. \(2016\)](#) mention areas with high radiation levels where nuclear accident damages can only be confirmed through satellite imagery. These studies suggest that Japan's recovery from the nuclear disaster has yet to address complex issues adequately, with implications for the effectiveness of recovery budgets.

The year 2021 marked 10 years since the GEJE. More than ten years have passed since the disaster, and many studies have been conducted on the reconstruction and revitalization of Fukushima. [Zhang et al. \(2019\)](#) stress the need for local adaptation and innovation in Fukushima's economic recovery, emphasizing the importance of creative and sustainable economic recovery strategies that capitalize on existing resources to turn disaster-related challenges into opportunities. [Nakamura et al. \(2023\)](#) conducted statistical analyses on recovery and regeneration efforts in Fukushima Prefecture, revealing low satisfaction among elderly and affected individuals with government recovery policies. [Yokemoto \(2023\)](#) notes that despite the lifting of evacuation orders in certain areas since April 2014, community rebuilding remains a new challenge in such regions.

The national and prefectural governments have implemented various policies to support Fukushima's recovery. [Hoshi \(2021\)](#) notes that macroeconomic indicators such as prefectural gross domestic product and mining industry production indices have returned to pre-disaster levels, with some signs of progress in areas such as the advancement of secondary industry and clustering of automobile-related industries. However, despite businesses reopening in the disaster-affected areas, there are still concerns about low sales leading to financial difficulties or bankruptcies among some businesses.

Numerous studies have addressed industrial clustering in Japan. For instance, [Shimizu and Matsubara \(2014\)](#) discuss the ongoing challenges in industrial recovery in heavily affected areas despite progress in relocating factories to distant locations. Furthermore, they emphasize the need for the regional reconstruction of manufacturing industries in the Tohoku region, considering both the heavily impacted coastal areas and the inland areas where new industrial locations are advancing. Regarding agricultural clustering, [Monma \(2013\)](#) mention the importance of new support organizations for agricultural recovery based on the evaluation of decontamination effects and monitoring of radioactive substances. [Owada and Kitamura \(2019\)](#) note the trend in agricultural land aggregation and dispersion in areas with significant population decline in the disaster-affected areas. Regarding seafood

processing industry clustering, Yamaguchi (2013) highlights the necessity of creating industry recovery visions, town planning considering industrial clustering reconstruction, and support for individual business strategy formulation, using the seafood processing industry in Kesennuma City, Miyagi Prefecture, as an example. Additionally, regarding commercial clustering, Nagasaka (2018) compares the restoration and reconstruction support for commercial clustering between the GEJE and the Hanshin-Awaji Earthquake, revealing the formation of commercial clusters with reduced economic burden for businesses in the disaster-affected areas. On the other hand, regarding tourism clustering, Kuchiki (2020) mentions the promotion of tourism through transportation infrastructure development, leading to the construction of segments promoting tourism after the completion of transportation infrastructure, resulting in the efficient clustering of tourism industries. However, Fukui (2020) notes that while tourism policies are effective in metropolitan areas, they may not be effective in all regions, potentially exacerbating regional disparities between metropolitan and rural areas. Furthermore, Igarashi and Kawasaki (2017) mention delays in the restoration of tourism resources in coastal areas of the disaster-affected regions, with most municipalities facing challenges in tourism recovery efforts and only half of them implementing inbound tourism policies. The importance of industrial clustering, including commercial, agricultural, and tourism clustering, is highlighted in the disaster-affected areas. Tsuji (2016) reveals an increase in public participation in reconstruction town meetings with age and education level. Additionally, Yamakawa (2016) position commercial base formation as essential for supporting the daily lives of victims and evacuees, emphasizing the need for community reconstruction and receiving overwhelming support from the national government for reconstruction efforts. Yamakawa (2018) compares the GEJE with the Kumamoto Earthquake, suggesting that lessons to be learned from the GEJE for Kumamoto's recovery include ensuring the regeneration of "hometown values" in reconstruction policies; otherwise, the reconstruction of disaster-stricken areas in a declining population and aging society may become cost-ineffective.

Since the Great East Japan Earthquake, there has been progress in the industrial concentration of agriculture, fisheries, and tourism. However, as Star Hoshi (2021) points out, the effects expected from the establishment of industrial concentration and research and development bases, such as increased productivity, industrial sophistication, and the creation of new industries, are still limited. Reconstruction from the GEJE has achieved significant success in most areas, including housing, industry, and agriculture. However, tourism and fisheries have not yet recovered to pre-disaster levels. How do the Japanese people evaluate policies related to housing, community development, living environment, industry, and livelihoods? Currently, there are few studies evaluating the reconstruction of industries and livelihoods twelve years after the earthquake.

According to the Reconstruction Agency of Japan (2021), "memory" (kioku) is defined as "remembering things without forgetting them and keeping them in mind". While records are written to be preserved, memories are stored in people's hearts, and memories are lost when people forget them. "Record" (kiroku) is defined as "writing down facts for later transmission, or the document itself". The "memory" of the disaster needs to be "recorded" in documents and other forms. However, if the "record" is not transmitted to people, it loses its meaning. "Lesson" (kyoukun) is defined as "teaching or instructing, or the words used for that purpose". People who do not know about the disaster learn "lessons" from the "records". "Tradition" (denshou) is defined as "hearing or learning something from others". People of future generations who have learned the "lessons" of the disaster need to "transmit" them to the next generation. The "transmission" of the GEJE will be evaluated by future generations, so it is necessary to reconsider what lessons the people of modern Japan want to derive from it.

Taking the above as the basis, this research statistically analyzes how the Japanese people, twelve years after the GEJE, perceive the challenges of reconstruction and what memories or records they want to derive lessons from. This research statistically analyzes the personal attributes of the survey respondents who tended to remember the earthquake,

take lessons from the written records from their memories, and have the will to pass them on. This study aims to conduct a web survey of 2000 individuals nationwide, asking about the challenges of reconstruction and lessons learned from the GEJE.

The structure of this paper is as follows:

Section 2 explains the survey design, target areas, methods of aggregation, and comparison methods.

Section 3 examines whether citizens feel that victims of the GEJE are being supported and evaluates how citizens assess aspects such as “housing and community development”, “living environment”, “industry and livelihoods”, “reconstruction projects”, and “memories or records of the disaster”. It also discusses how citizens prioritize the importance of post-disaster reconstruction and lessons. Furthermore, it grasps how individuals evaluate lessons such as “lessons learned in rebuilding agriculture, forestry, and fisheries in disaster-affected areas” and “lessons in inheriting memories or records of the disaster”, as well as “lessons in rebuilding industries, commercial facilities, and shopping districts in disaster-affected areas”.

Section 4 statistically estimates whether there are differences in individual attributes regarding reconstruction challenges and lessons from the GEJE using ordered logistic regression analysis.

Section 5 summarizes the residents’ attitudes toward reconstruction challenges and lessons from the GEJE.

2. Research Methodology

2.1. Hypotheses of This Paper

This research statistically examines the differences in the decision-making and thinking of local residents based on individual attributes such as gender, presence of children, age, education level, income level, etc.

Table 1 presents the hypotheses of this paper. From the table, consider whether hypotheses H_1 to H_3 are rejected.

Table 1. List of hypotheses.

No.	Hypothesis
H_1	There is no difference in lessons learned in the reconstruction of agriculture, forestry, and fisheries industries based on individual attributes.
H_2	There is no difference in lessons learned in passing on memories and records of the disaster by individual attributes.
H_3	There is no difference in the lessons learned from the reconstruction of industries, commercial facilities, and shopping streets in the disaster area by individual attributes.

The questions used to estimate the hypotheses employ a 5-point scale based on the Likert scale, i.e., a five-item scale. When estimating data using a five-item scale, ordered logistic regression analysis is applied. Ordered logistic regression analysis is used for regression analysis when the dependent variable is an ordinal variable with three or more categories in multivariate data. Although the logistic regression analysis model predicts values between 0 and 1, it is a nonlinear model, making the interpretation of the estimated parameters difficult. Therefore, in Chapter 4, we apply ordinal logistic regression analysis.

2.2. Survey Target Area

The survey was conducted throughout Japan, with questionnaires collected from each of the 47 prefectures. The survey instrument was distributed under the title “Resident Assessment of Reconstruction Lessons and Know-How in the Great East Japan Earthquake”. The [Reconstruction Agency of Japan \(2023b\)](#) has formulated the “Basic Policy for Reconstruction from the GEJE” into the following phases: I. Intensive Reconstruction Period (March 2011–March 2016); II. First Reconstruction and Revitalization Period (April

2016–March 2021); III. (April 2021–March 2026) continues the philosophy of Phase II. In Phase III, the government aims to (1) meticulously address the remaining issues in the earthquake- and tsunami-damaged areas and (2) continue to take the lead in addressing the remaining issues in the nuclear disaster-damaged areas in the medium- to long-term, with the national government taking the initiative. Finally, (3) the government aims to pass on memories and lessons to future generations by establishing state-run memorial and prayer facilities and by compiling effective reconstruction methods and initiatives, as well as private-sector know-how.

As described above, the current period is now under Phase III. The current period is the second phase of reconstruction and revitalization, and is a time to test the extent to which reconstruction measures are evaluated by the public. Therefore, in this paper, the survey is conducted in all regions of Japan, and the question is asked as to how the people evaluate the reconstruction measures.

2.3. Aggregation Methods

The survey targeted the entire country of Japan, collecting survey forms from all 47 prefectures.

The survey was conducted as a web survey using the Pollfish service. The survey received complete responses from 2000 individuals. Sample size was calculated using the following formula: $1.96\sqrt{0.5(1-0.5)/n} = 0.05$ (Kurihara and Tokeigaku 2021). Since the sample proportions are unknown because the survey was conducted before the survey, 0.5, which has the largest sample error, is included in this formula for the worst-case scenario (Kurihara and Tokeigaku 2021). This formula yields $\sqrt{n} = 19.6$, which means that if a sample of 384 ($n = 384$) is collected, a 95% confidence interval of the population ratio can be estimated with an error within $\pm 5\%$ (Kurihara and Tokeigaku 2021). In other words, in statistics, if the number of samples is about 400, the sample error can be estimated within $\pm 5\%$. There are a plethora of online sample size calculators that result in a minimum sample size of 385 given a confidence level of 95% and a tolerance rate of 5% (SurveyMonkey 2024).

The response rate was 94.6%. The survey period was from February 22 (Wednesday) to February 23 (Thursday) in 2023, according to Japan Standard Time. The sample was collected using the Pollfish consumer research online survey service. Pollfish (2024) identifies inevitable data quality problems for consumer monitoring at an early stage, such as respondent “panel fatigue” and “unconsciously biased” responses. AI fraud detection is then applied to remove responses that do not meet quality criteria, and responses are randomly selected. Here, the authors also checked the sample but did not do any work to remove the sample because it was randomly selected.

It was possible to set quotas for various factors (sex, age, region) prior to publishing the survey. However, this was not carried out due to financial constraints, so it is inevitable that certain groups or regions will be over-represented. As participants were volunteers, there is the inevitable issue of self-selection bias. Participants were more likely to be interested in the topic than average citizens, and there is a high probability that many of them were motivated by opposition to government policy, resulting in a non-representative outcome. This is an unavoidable limitation of web surveys and should be taken into consideration.

2.4. Estimation Method

The following summarizes the estimation methodology used.

Tables 2–4 list the objective variables (OVs) used for estimation. OV101 to OV112 in Table 2 correspond to H_1 , OV201 to OV206 in Table 3 correspond to H_2 , and OV301 to OV312 in Table 4 correspond to H_3 . Ordinal logistic regression analysis estimates the objective variables ordered into five levels (disagree = 1, not so much disagree = 2, undecided = 3, somewhat agree = 4, agree = 5). The questions listed in Tables 2–4 were created by referring to the Reconstruction Agency’s “Lessons and Know-How Collection for Reconstruction from the Great East Japan Earthquake” (2021) and extracting relevant questions.

Table 5 lists the explanatory variables (EVs). Gender (EV1) is a dummy (male = 1, female = 0) explanatory variable. Age (EV2), number of children (EV3), and distance from Fukushima nuclear power plant (EV6) are continuous variables. Educational attainment (EV4) and income bracket (EV5) are discrete variables.

Long (1997) stated that in multiple regression analysis, the model is stable even with a relatively small number of samples, but in logistic regression analysis, at least 200 samples are necessary because the maximum likelihood method is used, and 20 samples should be added for each explanatory variable. The estimation in this paper has a maximum of six explanatory variables, resulting in $200 + (6 \text{ explanatory variables} \times 20) = 320$ samples, which satisfies the minimum sample size.

In general, when estimating ordinal logit models, the heterogeneity of residuals is tested, and robust standard errors are measured if the model is estimated to be heterogeneous. In the model of this paper, since heteroscedasticity is not assumed, normal standard errors are used.

Below, the “cut” in tables of Section 4 represents the threshold, where $\Pr(y = 1) = \Pr(\beta x < \text{cut1})$, and $\Pr(y = 2) = \Pr(\text{cut1} < \beta x < \text{cut2})$ correspond accordingly (y is the category of the dependent variable, x is the explanatory variable, and β is the parameter).

Table 2. List of objective variables for H_1 .

No.	Objective Variable	Question
OV101	Large parcels of farmland	Farmland and agricultural facilities should be restored as soon as possible in the affected areas, and large plots should be created to improve productivity.
OV102	Early resumption of farming	Farmers who have been operating in the affected areas should be provided with alternative land to resume farming as soon as possible.
OV103	Effective use of farmland	New farmers should be secured in the affected areas, and farmland should be distributed to them in order to make effective use of farmland.
OV104	Expansion of agricultural business	Farmers in the affected areas should resume farming in cooperation with companies outside the prefecture and work to expand their businesses.
OV105	Development of new sales channels for agriculture	In order to develop sales channels for the fisheries industry, new sales channels should be developed through the development of unique, high value-added products.
OV106	Introduction of advanced technology in agriculture	Agriculture in the affected areas should improve productivity by introducing advanced technologies such as ICT.
OV107	Creation of agricultural business models	Agriculture in the affected areas should collaborate with companies from other industries to create new business models.
OV108	Diversification of agriculture business	Agriculture in the affected areas should develop diversified businesses in cooperation with companies from different industries.
OV109	Creation of business opportunities in the fisheries industry	To develop sales channels for the fisheries industry, exhibitions and business meetings should be held and exhibited to create business opportunities with new businesses.
OV110	Development of new sales channels in the fisheries industry	Fisheries in the affected areas should develop new products using local resources, promote branding, and develop new sales channels.
OV111	Creation of business models for the fisheries industry	In order to upgrade and advance the fisheries industry, new technologies should be introduced to develop high value-added products and create new business models.
OV112	Development of management innovation in the fisheries industry	In order to advance and develop the fisheries industry, management innovation should be developed based on flexible ideas in response to changes in the market.

Table 3. List of objective variables for H₂.

No.	Objective Variable	Question
OV201	Disaster Prevention through Public-Private Partnership	The national government, local governments, universities, and private companies should work together to collect and preserve a wide range of disaster-related materials and promote their utilization for disaster prevention and mitigation.
OV202	Dissemination of know-how on lessons learned from the earthquake	Disseminate information on the recovery status and lessons learned and know-how from the earthquake both domestically and internationally to contribute to strengthening disaster prevention and recovery measures around the world, as well as to provide continuous support for the recovery of disaster-stricken areas.
OV203	Preservation of earthquake remains	The preservation of earthquake remains should be studied over a sufficient period of time and with the collection of diverse opinions.
OV204	Establishment of facilities for handing down lessons from the disaster	The public and private sectors should cooperate and collaborate to establish and maintain “facilities for handing down the legacy of the disaster.
OV205	Development of programs to pass on lessons	To prevent the tragic damage from the earthquake from happening again, we should establish a program for effective learning about the disaster.
OV206	Support for disaster education	Create opportunities for people to be involved in earthquake disaster education and handing down the lessons of the disaster, and provide support for the continuation of such activities.

Table 4. List of objective variables for H₃.

No.	Objective Variable	Question
OV301	Corporate financing support	Disaster-stricken companies should be provided with prompt and smooth cash management support.
OV302	Long-term business restructuring support	A system should be established to solve the problem of double debts of the affected companies, and the rehabilitation support councils, in cooperation with financial institutions, should provide long-term support for business rehabilitation.
OV303	Promotion of full-scale industrial recovery	Promote full-scale industrial recovery by strategically clustering next-generation growth industries.
OV304	Support for regional industrial clusters	Strengthen local industrial clusters and support their development.
OV305	New product development and sales channel development	New businesses should be established based on the experience of the disaster, new products should be developed, and new sales channels should be opened.
OV306	Product development through industry-academia collaboration	Promote joint industry-academia research and corporate collaboration to develop new products.
OV307	Cultivation of start-up companies	Local government-led initiatives should be utilized to create start-up companies and promote their development.
OV308	Secure employment for disaster victims	Unemployed disaster victims should be provided with jobs for recovery work to secure their employment.
OV309	Secure employment for young people and women	Provide a comfortable work environment, improve the image of the industry, and secure employment for young people and women.
OV310	Management reform and change of mindset	Increase opportunities for exchanges with advanced business people and promote awareness-raising that will change the conventional way of management.
OV311	Commercial concentration and planned development	Promote commercial concentration in the city center and systematically develop shopping streets.
OV312	Area management implementation	Area management should be implemented by city development companies, etc.

Table 5. List of explanatory variables.

No.	Personal Attributes
EV1	Male
EV2	Age
EV3	Number of children under 12 years old
EV4	Education level
EV5	Income level
EV6	Distance from Fukushima Daiichi NPP

3. Survey Overview

3.1. Sample Attributes

The sample attributes are given in Appendix A. Men comprised 52.5% and women 47.6% of the sample. The average age was 35.9 and the number of children was 1.586. The most common annual income level was JPY 8.36 million to JPY 11.15 million (20.2%), followed by JPY 2.8 million to JPY 5.58 million (18.9%) and JPY 5.58 to JPY 8.36 million (18.5%). Regarding educational level (educational background), the most common was high school or below (54.6%), followed by junior college/vocational school (21.6%) and university (21.1%). Regarding marital status, the majority of respondents were married (44.5%), followed by single (33.3%).

3.2. Support for Victims of the Great East Japan Earthquake

Nakamura et al. (2023) examined whether the residents of Fukushima Prefecture were satisfied with the support for disaster victims 10 years after the earthquake. The results showed that only 16.7% of Fukushima Prefecture residents were satisfied with the support provided to disaster victims. Although not directly comparable given the different sample areas, a comparison between these results and the results of the current research is possible.

Appendix B gives the results of the survey questions on victim support. The largest percentage of respondents (30.6%) believe that “the livelihood of evacuees is being supported”. Following this, a significant portion of respondents (29.3%) believe that “the connection between evacuees and the affected areas is being maintained”, while others (28.2%) think that “the revitalization of the affected areas is being promoted”. Approximately 30% of citizens still feel that victims have been supported in various ways, even 12 years after the earthquake. The percentage of respondents who believe that “none of the support for victims is satisfactory” has decreased to 6.8%.

More respondents feel that the disaster victims are being supported in the current survey than in the 2023 survey. However, between 69.4% and 75.0% of the Japanese respondents feel that the victims of the GEJE are still not being supported.

3.3. Development of Housing, Community Building, and Living Environment in the Affected Areas of the Great East Japan Earthquake

The 2023 survey found that 35.4% of Fukushima residents were satisfied with the reconstruction of their homes and towns, while 21.9% were not.

The current research asked a similar question (Appendix C), and the largest percentage of respondents (28.3%) believe that “the reconstruction or relocation projects of the affected towns are progressing”. This is followed by those (27.7%) who believe that “the direction of community building in the affected areas is being indicated”, and others (26.0%) who think that “coordination and support for the aggregation and resolution of emergency temporary housing are progressing”. Additionally, some respondents (26.0%) believe that “disaster public housing considering the elderly and local communities is being constructed”. Overall, there is a consensus that “housing, community building, and living environment have all been developed to some extent”, with only a small percentage (7.1%) believing that “none of these aspects have been developed”.

Compared to the 2023 survey, more respondents feel that housing, community development, and the living environment have been improved in the affected areas. However,

77.9% to 75.0% of the Japanese respondents feel that housing, community development, and the living environment have not been improved in the affected areas.

3.4. Support for Industries and Livelihoods in the Affected Areas of the GEJE

In the 2023 survey, 35.4% of Fukushima Prefecture residents were satisfied with the recovery of industry and livelihoods, compared to 24.7% of those who were satisfied with the recovery of industry and livelihoods.

In the current survey, participants were asked to rate the “industries and livelihoods being supported in the areas affected by the Great East Japan Earthquake” (Appendix D). The largest proportion of participants believe that “the attraction of businesses to the affected areas is progressing” (27.5%), followed by those who think that “information to attract tourists to the affected areas is being disseminated” (26.5%), “financial support for the reconstruction of affected businesses is being provided” (26.2%), and “farmland and agricultural facilities in the affected areas have been restored” (25.9%). Overall, a small percentage (6.1%) of citizens believe that “none of the industries and livelihoods are being supported”.

The number of respondents who feel that industries and livelihoods are being supported is slightly higher in the current survey. However, 72.5% to 77.1% of the Japanese respondents feel that the industries and livelihoods in the affected areas are not being supported.

3.5. Collaboration in Reconstruction Projects and Preservation of Memories and Records by NPOs, Private Companies, and Government Agencies

Respondents were asked to rate the public’s evaluation of the reconstruction projects and inherited memories and records that are being carried on by NPOs, private companies, and government agencies working together in cooperation (Appendix E). According to the results, the largest proportion of respondents (29.1%) believe that “lessons and know-how from the GEJE are incorporated into local disaster prevention plans”. This is followed by those who think that “lessons and know-how for reconstruction are disseminated through the Reconstruction Agency’s website, preserving memories and records” (27.4%) and those who believe that “the national and local governments collaborate with NPOs to provide reconstruction support” (26.5%). Additionally, some respondents (26.1%) think that “support for the monitoring of elderly and children’s lives has been realized”. Nearly 30% of citizens feel that lessons and know-how are being utilized. Overall, a small percentage (5.5%) of citizens believe that “collaboration is lacking, and memories and records are not being preserved”.

In summary, approximately 30% of citizens feel that victims have been supported, and over a quarter believe that community development, industries, and livelihoods have recovered in the affected areas, with lessons and know-how from the earthquake being preserved.

3.6. Importance of Post-Disaster Reconstruction and Lessons Learned

Figure 1 presents the ranking of the “importance of post-disaster reconstruction and lessons learned”. According to the results, “support for victims” (2.468) ranked the highest. Next, “reconstruction of housing and communities” (2.481) had the second-highest average rank, with 26.2% of respondents selecting it as their top priority. Following closely, “revival of industries and livelihoods” (2.505) had the third-highest average rank, with 26.2% of respondents selecting it as their second priority. “Collaboration and succession” (2.547) ranked fourth.

In summary, after the earthquake, the most important thing for the Japanese people was to support the victims, followed by the reconstruction of their homes and towns. Most people wanted to see the revival of industries and livelihoods as their lives became more viable, and people began to cooperate in the recovery efforts and eventually take over the process.

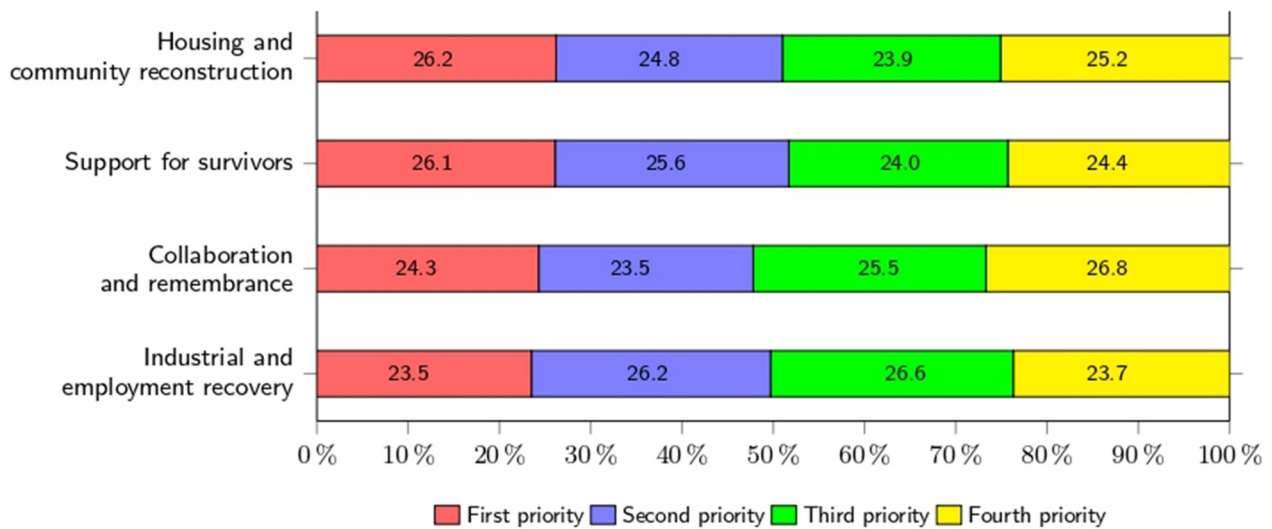


Figure 1. Post-disaster recovery and importance of lessons learned.

3.7. Lessons Learned for Rebuilding Agriculture, Forestry, and Fisheries in the Affected Areas

Figure 2 gives the results of responses regarding the evaluation of “lessons learned for rebuilding agriculture, forestry, and fisheries in the affected areas (H1)”. The highest-rated item was “creation of agricultural business models (OV107)” (46.3%). Following this were “consolidation of farmland (OV101)” (46.0%), “effective utilization of farmland (OV103)” (46.0%), and “creation of agricultural business models (OV107)” (45.5%). Around 40% of respondents indicated a desire to learn lessons for rebuilding agriculture, forestry, and fisheries in the affected areas, expressing expectations for the development of new agricultural and industrial clusters.



Figure 2. Lessons learned in rebuilding agriculture, forestry, and fisheries in the affected areas. Note: See Table 2 for the evaluation items for OV101 to OV112 in the figure.

3.8. Lessons Learned for Inheriting Memories and Records of the Earthquake

Figure 3 illustrates the evaluation of “lessons learned for inheriting memories and records of the earthquake (H2)”. The highest-rated items were “disaster prevention through public–private collaboration (OV201)” and “dissemination of earthquake lessons and know-how (OV202)” (both 46.4%). About 40% of respondents expressed a desire to learn lessons for inheriting memories and records of the earthquake.

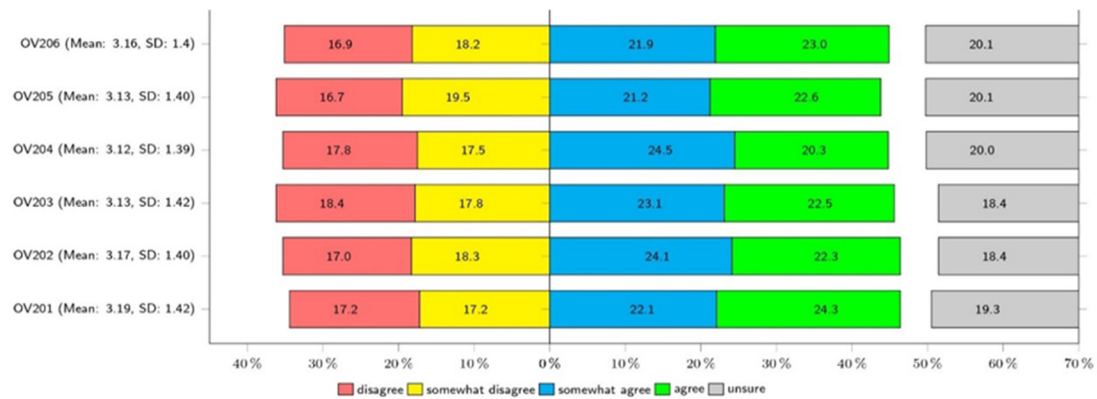


Figure 3. Lessons learned in passing on memories and records of the disaster. Note: See Table 3 for the evaluation items for OV201 to OV206 in the figure.

3.9. Lessons Learned for Rebuilding Industries, Commercial Facilities, and Shopping Districts in the Affected Areas

Figure 4 depicts the evaluation of “lessons learned for rebuilding industries, commercial facilities, and shopping districts in the affected areas (H3)”. The highest-rated items were “long-term business revival support (OV302)” (46.8%), “promotion of full-scale industrial recovery (OV303)” (45.0%), and “product development through industry-academia collaboration (OV306)” (44.6%). Approximately 40% of respondents indicated a desire to learn lessons for rebuilding industries, commercial facilities, and shopping districts in the affected areas.



Figure 4. Lessons learned in the reconstruction of industries, commercial facilities, and shopping areas in the affected areas. Note: See Table 4 for the evaluation items for OV301 to OV312 in the figure.

4. Estimation Results

4.1. Estimation Results for Lessons Learned in Rebuilding Agriculture, Forestry, and Fisheries in the Affected Areas

In the previous section, it was shown that the level of satisfaction with the support for disaster victims, urban development in the affected areas, and industry and livelihood was higher 12 years after the earthquake than 10 years after the earthquake, but many citizens were not satisfied with the support for disaster victims and reconstruction policies. Also, over 40% of respondents expressed a desire to adopt lessons for rebuilding agriculture, forestry, and fisheries; inheriting memories and records of the earthquake; and rebuilding industries, commercial facilities, and shopping districts in the affected areas. This section summarizes the ordinal logistic regression analysis that was applied to the data to determine the role individual attributes play in shaping satisfaction with the relief efforts and policies, and in how the lessons learnt should be implemented.

Table 6 presents the estimation results for lessons learned in rebuilding agriculture, forestry, and fisheries in the affected areas (H_1). Due to space constraints, only coefficients that were significant at the 1% to 5% significance level will be statistically interpreted.

For OV101, OV103, and OV107, the coefficients for EV4 (0.143, 0.167, and 0.076, respectively) and EV5 (0.090, 0.050, 0.076 respectively) are positive. This indicates that individuals with higher education levels and higher incomes believe that the large-scale consolidation of farmland, the effective utilization of farmland, and collaboration with other industries to create new business models should be pursued in the affected agricultural areas.

Regarding OV102, the coefficients for EV2 (0.001) and EV4 (0.091) are positive. This suggests that elderly individuals and those with higher education levels believe that the early resumption of farming activities by affected farmers should be realized.

For OV104, the coefficient of EV4 (0.114) is positive, indicating that high-income earners believe that agriculture in disaster-affected areas should collaborate with companies from other prefectures to resume farming and expand operations.

For OV105, OV106, and OV110, the coefficients of EV3 (each -0.134 , -0.070 , and -0.128) are negative, while those of EV4 (each 0.167, 0.092, and 0.071) and EV5 (each 0.050, 0.070, and 0.049) are positive. This suggests that individuals without children, those with higher education levels, and high-income earners believe that in the disaster-affected agriculture sector, (1) efforts should be made to develop new products and brands using local resources to explore new markets, (2) productivity should be improved by adopting advanced technologies like ICT, and (3) new sales channels should be developed through the creation of high-value-added products with distinctive features in the fisheries industry.

For OV108 and OV109, the coefficients of EV3 (each -0.137 and -0.097) are negative, while those of EV2 (each 0.013 and 0.007), EV4 (each 0.157 and 0.127), and EV5 (each 0.067 and 0.047) are positive. This indicates that individuals without children, the elderly, those with higher education levels, and high-income earners believe that (1) the agriculture sector in disaster-affected areas should engage in diverse businesses through collaboration with other industries and (2) to expand the sales channels in the fisheries industry, trade opportunities with new businesses should be created through hosting trade fairs and exhibitions.

For OV111, the coefficients of EV1 (0.183) and EV5 (0.106) are positive, while that of EV3 (-0.074) is negative. This suggests that males, individuals without children, and high-income earners believe that to advance and modernize the fisheries industry, new business models should be created.

For OV112, the coefficient of EV4 (0.119) is positive, indicating that individuals with higher education levels believe that for the advancement of the fisheries industry, management innovation should be pursued.

Table 6. Estimation results on lessons learned in restoring agriculture, forestry, and fisheries in the affected areas (ordinal logistic regression analysis estimation results).

OV/EV		EV ₁	EV ₂	EV ₃	EV ₄	EV ₅	EV ₆	cut1	cut2	cut3	cut4	LR	AIC	χ^2	pseudoR ²
OV101	Coef.	0.135	−0.053	0.002	0.143 ***	0.090 ***	0.000	0.757	−0.235	−0.970	−2.107	5619.5 ***	5639.5	46.5	0.008
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.178)	(0.175)	(0.176)	(0.182)				
OV102	Coef.	0.150 *	−0.045 ***	0.001 ***	0.091	0.063	0.000	0.901	−0.053	−0.780	−1.958	5641.5 ***	5661.5	23.7	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.186)	(0.184)	(0.184)	(0.190)				
OV103	Coef.	−0.133	−0.052	0.001	0.167 ***	0.050 **	0.000	0.969	0.000	−0.765	−1.854	5634.8 ***	5654.8	36.2	0.006
	SE	(0.085)	(0.034)	(0.003)	(0.034)	(0.024)	(0.000)	(0.164)	(0.160)	(0.161)	(0.167)				
OV104	Coef.	0.153 *	−0.042	0.000	0.114 ***	0.041 *	0.000	0.971	−0.030	−0.841	−1.921	5656.5 ***	5676.5	24.1	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.177)	(0.174)	(0.176)	(0.181)				
OV105	Coef.	−0.001	−0.134 ***	0.005 *	0.161 ***	0.053 **	0.000 *	0.703	−0.169	−1.060	−2.157	5619.3 ***	5639.3	49.4	0.009
	SE	(0.085)	(0.033)	(0.003)	(0.033)	(0.023)	(0.000)	(0.153)	(0.149)	(0.150)	(0.157)				
OV106	Coef.	0.053	−0.059 **	0.002	0.076 ***	0.076 ***	0.000	1.197	0.101	−0.769	−1.808	5647.6 ***	5667.6	23.0	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.184)	(0.180)	(0.181)	(0.185)				
OV107	Coef.	0.053	−0.059 *	0.002	0.076 **	0.076 ***	0.000	1.197	0.101	−0.769	−1.808	5647.6 ***	5667.6	23.0	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.184)	(0.180)	(0.181)	(0.185)				
OV108	Coef.	0.077	−0.137 ***	0.013 ***	0.157 ***	0.067 ***	0.000	0.597	−0.383	−1.197	−2.292	5617.6 ***	5637.6	60.9	0.011
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.162)	(0.159)	(0.161)	(0.168)				
OV109	Coef.	−0.066	−0.097 ***	0.007 **	0.127 ***	0.047 **	0.000	0.908	−0.062	−0.845	−1.936	5647.3 ***	5667.3	30.0	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.033)	(0.023)	(0.000)	(0.164)	(0.160)	(0.162)	(0.168)				
OV110	Coef.	−0.066	−0.097 ***	0.007	0.127 **	0.047 **	0.000	0.908	−0.062	−0.845	−1.936	5647.3 ***	5667.3	30.0	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.033)	(0.023)	(0.000)	(0.164)	(0.160)	(0.162)	(0.168)				
OV111	Coef.	0.183 **	−0.074 **	0.004	0.055 ***	0.106	0.000	0.912	0.029	−0.815	−1.935	5630.6 ***	5650.6	38.5	0.007
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.204)	(0.202)	(0.203)	(0.207)				

Table 6. Cont.

OV/EV		EV ₁	EV ₂	EV ₃	EV ₄	EV ₅	EV ₆	cut1	cut2	cut3	cut4	LR	AIC	χ ²	pseudoR ²
OV112	Coef.	0.102	0.014 ***	0.001	0.119	0.039	0.000	0.846	−0.128	−0.957	−1.982	5662.6 ***	5682.6	20.7	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.181)	(0.178)	(0.179)	(0.184)				

Note: (1) ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels. (2) cut refers to threshold values, where cut1 represents the threshold between “disagree” and “not so much agree,” cut2 represents the threshold between “not so much agree” and “neither agree nor disagree,” cut3 represents the threshold between “neither agree nor disagree” and “somewhat agree,” and cut4 represents the threshold between “somewhat agree” and “agree” (Tables 7 and 8 are also similar). (3) See Table 5 for EV1 to EV6 (Tables 7 and 8 are also similar). (4) For OV101 to OV112, see Table 2.

4.2. Estimation Results for Lessons Learned in Inheriting Memories and Records of the Disaster

Table 7 presents the estimation results for lessons learned in inheriting memories and records of the disaster (H_2).

For OV201 and OV205, the coefficients of EV4 (0.154 for both) and EV5 (0.109 and 0.076, respectively) are positive. This indicates that individuals with higher education levels and higher incomes believe that collaboration between the government and the private sector should be promoted to utilize disaster prevention and mitigation efforts effectively, and effective programs for learning from disasters should be established.

For OV202, the coefficient of EV3 (−0.083) is negative, while those of EV2 (0.010) and EV4 (0.123) and EV5 (0.065) are positive. This suggests that individuals without children, the elderly, those with higher education levels, and high-income earners believe that disseminating information about the recovery status and lessons learned from the disaster domestically and internationally can contribute to continued support for the recovery of affected areas.

For OV203, the coefficient of EV3 (−0.068) is negative, while those of EV4 (0.133) and EV5 (0.094) are positive. This implies that individuals without children, those with higher education levels, and high-income earners believe that preserving the remains of the disaster should involve collecting diverse opinions over a sufficient period for consideration.

For OV204, the coefficient of EV5 (0.056) is positive, while that of EV6 (−0.00035) is negative. This indicates that high-income earners and those living closer to the Fukushima Daiichi Nuclear power plant believe that collaboration between the government and the private sector is necessary to establish and maintain “disaster heritage facilities”.

For OV206, the coefficients of EV1 (0.198) and EV4 (0.112) are positive. This suggests that males and individuals with higher education levels believe that opportunities related to disaster heritage and disaster prevention education should be created, and support should be provided for continued activities.

Table 7. Estimation results on lessons learned in passing on memories and records of the disaster (ordinal logistic regression analysis estimation results).

OV/EV		EV ₁	EV ₂	EV ₃	EV ₄	EV ₅	EV ₆	cut1	cut2	cut3	cut4	LR	AIC	χ^2	pseudoR ²
OV201	Coef.	−0.044	−0.012	0.006 *	0.154 ***	0.109 ***	0.000	0.535	−0.423	−1.240	−2.251	5613.1 ***	5633.1	52.51	0.009
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.176)	(0.174)	(0.175)	(0.181)				
OV202	Coef.	−0.001	−0.083 **	0.010 ***	0.123 ***	0.065 ***	0.000	0.688	−0.296	−1.066	−2.167	5628.4 ***	5648.4	35.44	0.006
	SE	(0.084)	(0.034)	(0.003)	(0.034)	(0.024)	(0.000)	(0.168)	(0.164)	(0.166)	(0.173)				
OV203	Coef.	−0.002	−0.068 **	0.005	0.133 ***	0.094 ***	0.000	0.634	−0.303	−1.078	−2.152	5629.5 ***	5649.5	42.13	0.007
	SE	(0.084)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.166)	(0.163)	(0.164)	(0.170)				
OV204	Coef.	0.134	0.004	−0.004	0.059 *	0.056 **	0.000 **	1.379	0.450	−0.405	−1.552	5646.6 ***	5666.6	21.73	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.036)	(0.024)	(0.000)	(0.211)	(0.209)	(0.208)	(0.211)				
OV205	Coef.	−0.109	−0.060 *	0.001	0.115 ***	0.076 ***	0.000	1.182	0.122	−0.730	−1.722	5644.7 ***	5664.7	31.28	0.006
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.168)	(0.163)	(0.164)	(0.168)				
OV206	Coef.	0.198 **	−0.032	0.000	0.112 ***	0.052	0.000	1.021	0.023	−0.809	−1.810	5647.7 ***	5667.7	27.85	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.188)	(0.185)	(0.186)	(0.190)				

Note: (1) ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels. (2) See Table 3 for OV201 to OV206.

Table 8. Estimation Results on Lessons Learned in Reconstructing Agriculture, Forestry, and Fisheries in the Affected Areas (Ordinal Logistic Regression Analysis Estimation Results).

OV/EV		EV ₁	EV ₂	EV ₃	EV ₄	EV ₅	EV ₆	cut1	cut2	cut3	cut4	LR	AIC	χ^2	pseudoR ²
OV301	Coef.	−0.085	−0.073 **	0.006 *	0.113 ***	0.117 ***	0.000 *	0.630	−0.347	−1.216	−2.270	5631.0 ***	5651.0	49.1	0.009
	SE	(0.085)	(0.033)	(0.003)	(0.033)	(0.024)	(0.000)	(0.162)	(0.158)	(0.160)	(0.167)				
OV302	Coef.	0.018	−0.021	−0.004	0.152 ***	0.034	0.000	1.006	0.150	−0.618	−1.799	5624.0 ***	5644.0	27.3	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.170)	(0.166)	(0.167)	(0.173)				
OV303	Coef.	0.045	−0.033	0.007 **	0.173 ***	0.093 ***	0.000	0.373	−0.603	−1.394	−2.374	5624.5 ***	5644.5	53.4	0.009
	SE	(0.085)	(0.034)	(0.003)	(0.034)	(0.024)	(0.000)	(0.168)	(0.166)	(0.168)	(0.174)				
OV304	Coef.	0.072	−0.006	−0.004	0.068 **	0.063 ***	0.000	1.394	0.314	−0.546	−1.628	5637.3 ***	5657.3	16.5	0.003
	SE	(0.085)	(0.034)	(0.003)	(0.034)	(0.024)	(0.000)	(0.189)	(0.184)	(0.185)	(0.189)				
OV305	Coef.	−0.035	−0.040	0.009 ***	0.125 ***	0.032	0.000	0.597	−0.297	−1.189	−2.230	5657.1 ***	5677.1	26.1	0.005
	SE	(0.084)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.162)	(0.160)	(0.162)	(0.168)				
OV306	Coef.	0.130	−0.046	0.005	0.060	0.060 *	0.000 **	1.021	0.060	−0.797	−1.871	5658.4 ***	5678.4	18.5	0.003
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.193)	(0.191)	(0.193)	(0.197)				
OV307	Coef.	0.020	0.022	−0.006 *	0.148 ***	0.036	0.000	1.009	−0.025	−0.854	−1.911	5656.1 ***	5676.1	27.5	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.166)	(0.162)	(0.164)	(0.169)				
OV308	Coef.	0.053	−0.071 **	0.004	0.086 **	0.035	0.000	1.028	0.068	−0.750	−1.768	5665.9 ***	5685.9	16.0	0.003
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.023)	(0.000)	(0.173)	(0.170)	(0.171)	(0.176)				
OV309	Coef.	0.025	−0.075 **	0.005	0.166 ***	0.074 ***	0.000	0.673	−0.316	−1.104	−2.208	5637.1 ***	5657.1	46.2	0.008
	SE	0.084	0.033	0.003	0.034 ***	0.024 **	0.000	0.166	0.162	0.164	0.170				
OV310	Coef.	0.098	0.008	0.004	0.118	0.055	0.000	0.706	−0.228	−1.076	−2.202	5652.0 ***	5672.0	25.9	0.005
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.184)	(0.182)	(0.183)	(0.189)				
OV311	Coef.	0.081	−0.032	−0.002	0.037	0.085 ***	0.000	1.156	0.179	−0.656	−1.736	5664.9 ***	5684.9	20.7	0.004
	SE	(0.085)	(0.033)	(0.003)	(0.035)	(0.024)	(0.000)	(0.200)	(0.198)	(0.199)	(0.203)				
OV312	Coef.	0.077	−0.020	0.004	0.105 ***	0.039	0.000	1.000	−0.023	−0.852	−1.945	5662.1 ***	5682.1	18.5	0.003
	SE	(0.085)	(0.033)	(0.003)	(0.034)	(0.024)	(0.000)	(0.183)	(0.181)	(0.182)	(0.186)				

Note: (1) ***, **, and * indicate statistically significant at the 1%, 5%, and 10% levels. (2) See Table 4 for OV301 to OV312.

4.3. Estimation Results for Lessons Learned in Rebuilding Industries, Commercial Facilities, and Shopping Streets in Disaster-Affected Areas

Table 8 presents the estimation results for lessons learned in rebuilding industries, commercial facilities, and shopping streets in disaster-affected areas (H₃).

For OV301 and OV309, the coefficients of EV3 (−0.073 and −0.075, respectively) are negative, while those of EV4 (0.113 and 0.117, respectively) and EV5 (0.166 and 0.074, respectively) are positive. This indicates that individuals without children, those with higher education levels, and high-income earners believe that (1) quick and smooth support should be provided to financially support affected companies and (2) providing a comfortable working environment and improving the image of industries are essential for securing employment for young people and women.

For OV302, the coefficient of EV4 (0.152) is positive, indicating that individuals with higher education levels believe that creating systems to solve the double indebtedness issue of affected companies and providing long-term support for business recovery are necessary.

For OV303, the coefficients of EV2 (0.007), EV4 (0.173), and EV5 (0.093) are positive. This suggests that the elderly, individuals with higher education levels, and high-income

earners believe that strategically concentrating next-generation growth industries can promote comprehensive industrial revival.

For OV304 and OV310, the coefficients of EV4 (0.068 and 0.118, respectively) and EV5 (0.063 and 0.055, respectively) are positive. This indicates that individuals with higher education levels and high-income earners believe that (1) strengthening industrial clustering in the region can support development and (2) increasing opportunities for interaction with innovative businesspeople can lead to a transformation in traditional management practices.

For OV305, the coefficients of EV2 (0.009) and EV4 (0.125) are positive. This suggests that the elderly and individuals with higher education levels believe that launching new businesses based on disaster experiences, developing new products, and exploring new sales channels are necessary.

For OV306 and OV311, the coefficients of EV5 (0.060 and 0.085, respectively) are positive. This indicates that high-income earners believe that (1) promoting joint research between academia and industry and developing new products are necessary and (2) planning and developing shopping streets in downtown areas should be carried out systematically.

For OV307 and OV312, the coefficients of EV4 (0.148 and 0.105, respectively) are positive. This suggests that individuals with higher education levels believe that (1) creating and nurturing startup companies through initiatives led by local governments is important and (2) urban management should be implemented by companies specializing in community development.

For OV308, the coefficient of EV3 (−0.071) is negative, while that of EV4 (0.086) is positive. Those who do not have children and those who are highly educated believe that unemployed disaster victims should be provided with jobs in restoration work to ensure their employment.

4.4. Hypothesis Verification

Before discussing the results, let us verify the three hypotheses (H_1 to H_3) based on the estimation results of the ordinal logistic regression analysis. The results of the verification showed that explanatory variables related to individual attributes such as gender, parenthood status, education level, and income were significant, leading to the rejection of the null hypothesis. This indicates that statistically significant differences exist among individuals in Japan regarding their interest, memory, and concerns related to reconstruction issues and lessons learned from disasters. As previously mentioned, [Tsuji \(2016\)](#) has shown that participation in community meetings on post-disaster reconstruction increases with age and education level. This study observed a similar trend.

5. Discussion

This study conducted a survey of residents' attitudes toward reconstruction issues and lessons learned from the GEJE, analyzed them statistically, and provided insights. The following points were revealed:

Firstly, around 30% of respondents felt that support was being provided to victims of the GEJE, and few respondents felt that none of the support measures were effective. Furthermore, over 20% of respondents felt that housing, community development, living environments, and industries and livelihoods in the affected areas were being supported. Similarly, over 20% of respondents felt that lessons and know-how were being utilized in collaborative reconstruction projects involving NGOs, private companies, and government agencies.

Secondly, when asked to prioritize the importance of post-disaster reconstruction and lessons learned, "support for victims" ranked first, followed by "reconstruction of housing and communities", "revival of industries and livelihoods", and "collaboration and inheritance". Over 40% of respondents in disaster-prone Japan expressed a desire to incorporate these lessons into future endeavors, including lessons learned from rebuilding agricultural, forestry, and fisheries industries in disaster-affected areas; inheriting memories

and records of the disaster; and lessons learned from rebuilding industries, commercial facilities, and shopping streets in disaster-affected areas.

The results of the ordinal logistic regression analysis revealed that males, individuals without children, the elderly, those with higher education levels, and high-income earners had a strong intention, statistically speaking, to incorporate lessons from rebuilding agricultural, forestry, and fisheries industries in disaster-affected areas. Similarly, males, the elderly, those with higher education levels, and high-income earners showed a strong intention to inherit memories and records of the disaster, while those living closer to the Fukushima Daiichi Nuclear power plant expressed a desire for the establishment of disaster heritage facilities. Furthermore, males, individuals without children, the elderly, those with higher education levels, and high-income earners showed a strong intention to incorporate lessons from rebuilding industries, commercial facilities, and shopping streets in disaster-affected areas.

Going forward, Japan's disaster-affected areas must continue to pursue reconstruction policies that focus on the revitalization of agriculture, forestry, fisheries, and industry and livelihoods. The Japanese government also needs to reconsider its disaster prevention plan based on the lessons learned from the GEJE and pass on the lessons of the disaster to the people of Japan.

6. Conclusions

In summary, the differences in individual attributes were clearly reflected in attitudes toward post-disaster reconstruction issues and lessons learned from the GEJE. Those who intend to recover from the disaster, remember it, and inherit its records tend to be males, the elderly, those with higher education levels, and high-income earners. These leading members of Japanese society have a strong interest in rebuilding agricultural, forestry, and fisheries industries, as well as housing and community development, living environments, industries, and livelihoods. The results of this research show that the strong willingness of residents to pass on memories and records of the earthquake to the nucleus of the community, and to pass on lessons learned in the reconstruction process, can be expressed as statistically significant results. They are likely to take the lead in promoting the modernization, large-scale development, and clustering of agricultural, forestry, and fisheries industries, as well as in rebuilding communities and livelihoods. However, as [Yamakawa \(2018\)](#) points out, despite the promotion of compact community development in disaster-affected areas, the reality is that urban development centered around large stores is progressing, resulting in commercial clustering different from traditional shopping streets. In Fukushima Prefecture, for example, the population is predicted to halve by 2060 compared to 2010 ([Fukushima Prefecture Reconstruction and Comprehensive Planning Division 2019](#)). Therefore, reconstruction policies focusing on downsizing for a shrinking population should be recommended in disaster-affected areas. Moreover, reconstruction policies and industrial policies under the shock doctrine (radical market-oriented reforms implemented in the wake of major disasters) should not be implemented in disaster-affected areas. Instead, policymakers should develop reconstruction policies tailored to the differences among Japanese citizens, taking into account the lessons learned from the GEJE and planning for the future.

7. Future Challenges

Finally, although this study statistically analyzed post-disaster reconstruction issues and lessons learned from the GEJE, it is important to address future challenges. The survey in this paper was conducted among residents who are highly interested in various issues related to the nuclear power plant accident in Fukushima. In a survey dealing with the nuclear accident, if only those who agree with the reconstruction policy are surveyed, the number of respondents who agree with the policy will increase. On the other hand, if only those who oppose the reconstruction policy are surveyed, the number of respondents who oppose the policy will increase. Therefore, this paper takes a neutral position without

advocating for or against the reconstruction policy. The estimation results of this study showed that approximately 25% of people feel that support for disaster-affected areas, housing and community development, living environments, and lessons and know-how are being effectively utilized. However, looking at these results in reverse, approximately 75% of people may feel that reconstruction support and lessons are not being effectively utilized. As mentioned above in Section 2.3 (tabulation method), self-selection bias may have been caused by the inclusion of the intention to oppose the reconstruction policy of the Japanese government. Yamakawa (2018) mentioned that post-disaster reconstruction policies implemented after the GEJE were heavily skewed toward infrastructure development in disaster areas, resulting in insufficient guarantees for the livelihoods of disaster victims. It cannot be determined from the estimation results of this study alone whether Japanese citizens feel that their country's reconstruction support measures and lessons learned are not being utilized or if they are simply indifferent. Future research would include a web survey of Fukushima and Miyagi Prefectures to statistically analyze how GEJE survivors evaluate Japan's reconstruction support measures and lessons learned. Additional research would examine memorializing and recording the GEJE. When continuing the study, we would like to develop a questionnaire to further reduce self-selection bias.

Finally, in recent years, the perspective of enhancing the quality of society, such as comfort, natural environment, safety, and security, has also become important, and project evaluation methods need to respond accordingly. Until now, no measurement method has been established for the benefits related to ensuring the safety and security of society against disasters. In this paper, we have not yet developed a method to evaluate the benefits related to the uncertainty of disasters. We would like to study this issue at another time in the future.

Author Contributions: Conceptualization, methodology, investigation, writing, T.N.; formal analysis, T.N. and S.M.; translation and draft preparation, S.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by a JSPS Grant-in-Aid for Scientific Research (22H02447 and 21H01449, 21K12378).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Sample attributes (n = 2000).

Personal Attributes		Freq.	%
Sex	male	1049	52.5%
	female	951	47.6%
Income	lower_i (under 2.8 million yen)	327	16.4%
	lower_ii (2.8–5.58 million yen)	377	18.9%
	middle_i (5.58–8.36 million yen)	369	18.5%
	middle_ii (8.36–11.15 million yen)	404	20.2%
	high_i (11.15–13.94 million yen)	114	5.7%
	high_ii (11.15–16.73 million yen)	124	6.2%
	high_iii (16.73 million yen or more)	181	9.1%
	prefer_not_to_say	104	5.2%

Table A1. Cont.

Personal Attributes		Freq.	%
Education	high_school	1091	54.6%
	vocational_technical_college	431	21.6%
	university	422	21.1%
	postgraduate	56	2.8%
Marital Status	single	666	33.3%
	married	889	44.5%
	living_with_partner	130	6.5%
	divorced/separated	81	4.1%
	widowed	34	1.7%
	prefer_not_to_say	200	10.0%
Personal Attributes		Average	SD
Age (years)		35.9	15.0
Number of children		1.586	1.509
Distance from Fukushima Daiichi NPP(km)		438.4	288.0
Source: prepared from survey results by Pollfish.			

Appendix B. Evaluation of Support for Victims of the Great East Japan Earthquake (Multiple Responses)

Assessment Item	Freq.	%
Livelihoods of evacuees are being supported.	612	30.6%
Links between evacuees and the affected area are being maintained.	586	29.3%
Revitalization of the affected area is being promoted	564	28.2%
Livelihoods of the affected people are being rebuilt	562	28.1%
Support for those who rebuild their lives by themselves is being provided.	560	28.0%
Education on reconstruction and disaster prevention is being promoted at schools after the disaster	550	27.5%
Mental and physical care is being provided to those who are engaged in disaster relief work	547	27.4%
Culture in the affected area is being restored.	526	26.3%
Communities are being formed in the areas where the disaster victims have moved or relocated.	499	25.0%
None of the support for disaster victims can be evaluated	136	6.8%
Other	446	22.3%

Appendix C. Housing, Community Development, and Living Environment in the Areas Affected by the Great East Japan Earthquake (Multiple Responses)

Evaluation Items	Freq.	%
Rebuilding and relocation projects in the affected communities are in progress	565	28.3%
Direction of community development in the affected areas is being provided.	553	27.7%

Evaluation Items	Freq.	%
Progress is being made in coordinating and supporting the consolidation and elimination of emergency temporary housing.	519	26.0%
Disaster public housing is being constructed with consideration for the elderly and the local community.	519	26.0%
The central city area, which was destroyed by the earthquake, is being restored and rebuilt.	513	25.7%
Temporary housing buildings are being maintained and managed.	513	25.7%
Railroads, ports, and airports have been restored and reconstructed	504	25.2%
An adequate number of public disaster housing units have been established	499	25.0%
Road networks have been restored/reconstructed	465	23.3%
Coastal levees, etc. are restored/reconstructed	459	23.0%
Relocation sites purchased by municipalities are efficiently utilized	456	22.8%
Disaster public housing is efficiently maintained and managed	442	22.1%
None of the housing, community development, or living environment has been improved.	141	7.1%
Other	411	20.6%

Appendix D. Industries and Livelihoods Supported in Areas Affected by the Great East Japan Earthquake (Multiple Responses)

Evaluation Items	Freq.	%
Progress is being made in attracting businesses to the affected areas	550	27.5%
Information is being disseminated to attract tourists to the affected areas	529	26.5%
Financing is being provided to support the recovery of businesses affected by the disaster	523	26.2%
Farmland and agricultural facilities in the affected areas are being restored	518	25.9%
New industries are being created in the affected areas	514	25.7%
Progress is being made in securing industrial human resources in the affected areas	512	25.6%
Advancement of the agriculture and forestry industries in the affected areas	510	25.5%
Progress in developing sales channels for the fisheries industry in the disaster area	510	25.5%
	508	25.4%
Progress is being made in developing sales channels for the agriculture and forestry industries in the disaster area	493	24.7%
Progress is being made in the sophistication and development of the fishery industry in the disaster area.	485	24.3%
New tourism demand, such as foreign tourists, is being created in the disaster area.	457	22.9%
None of the industries and livelihoods are being supported	122	6.1%
Other	402	20.1%

Appendix E. Reconstruction Projects in Which NPOs, Private Companies, and Government Agencies Cooperate with Each Other, and Memories and Records That Have Been Handed Down (Multiple Responses)

Evaluation Items	Freq.	%
Lessons learned and know-how from the Great East Japan Earthquake are utilized in local disaster prevention plans.	581	29.1%
Recovery lessons and know-how are published on the website of the Reconstruction Agency, and memories and records are being passed on.	548	27.4%
Reconstruction assistance is provided in cooperation and collaboration with the national government, local governments, and NPOs.	530	26.5%
Support for the elderly and children is being realized.	522	26.1%
Support is being provided for the revitalization of local communities where people have strong ties with each other.	509	25.5%
Intermediary support organizations at the prefectural level are coordinating and supporting the activities of NPOs, etc.	505	25.3%
Records of the disaster are being preserved, and lessons learned from the disaster and the recovery process are being disseminated.	502	25.1%
Affected local governments are able to secure support staff on a long-term and continuous basis.	497	24.9%
Preservation of earthquake remains and establishment of a base for handing down the lessons of the disaster	495	24.8%
The affected local governments are prepared to receive support staff.	492	24.6%
Memories, records, and experiences of the disaster are being passed on.	482	24.1%
Public-private partnerships have been established	476	23.8%
None of the above are collaborated, and the memories and records are not inherited.	109	5.5%
Other	445	22.3%

References

- Fujimoto, Noritsugu. 2016. Decontamination-intensive reconstruction policy in Fukushima under governmental budget constraint. In *Unravelling the Fukushima Disaster*. London: Routledge, pp. 124–37. Available online: <https://www.taylorfrancis.com/chapters/edit/10.4324/9781315639130-15/decontamination-intensive-reconstruction-policy-fukushima-governmental-budget-constraint-noritsugu-fujimoto> (accessed on 10 July 2024).
- Fukui, Kazuki. 2020. Regional Disparities in the Economic Effects of Tourism in Japan's Prefectures: Reproduction of Disparities by the Tourism Policy and COVID-19. *E-Journal GE* 15: 397–418. Available online: https://www.jstage.jst.go.jp/article/ejgeo/15/2/15_397/_pdf/-char/ja (accessed on 10 July 2024).
- Fukushima Prefecture Reconstruction and Comprehensive Planning Division. 2019. Fukushima Prefecture Population Vision. Available online: <https://www.pref.fukushima.lg.jp/uploaded/attachment/528464.pdf> (accessed on 10 July 2024).
- Hoshi, Takako. 2021. Current Status and Challenges of Industrial Reconstruction in the Areas Affected by the Great East Japan Earthquake: Toward self-sustaining economic growth. *JRI Review* 5: 124–46. Available online: <https://www.jri.co.jp/MediaLibrary/file/report/jrireview/pdf/12541.pdf> (accessed on 10 July 2024).
- Igarashi, Yuki, and Kota Kawasaki. 2017. Actual state and Issues of tourism revival in Tsunami affected municipalities by the Great East Japan Earthquake. *Journal of City Planning Institute of Japan* 15: 359–66. [CrossRef] [PubMed]
- Kawasaki, Kota. 2013. The Process of Decontamination and Residents' Consciousness about Decontamination in Onami District of Fukushima City after the Fukushima Daiichi Nuclear Power Plant Accident: Issues of Decontamination and Revitalization of Fukushima Prefecture. *Journal of the City Planning Institute of Japan* 48: 705–10. [CrossRef]
- Kawasaki, Kota. 2021. *Fukushima Reconstruction 10 Years Verification: Long-term Challenges for Reconstruction from Nuclear Disaster*. Tokyo: Maruzen, p. 248.
- Kuchiki, Akifumi. 2020. Econometric Analyses on the Existence of 'Economies of Sequence' in Building the Segments of Industrial Agglomerations -Fact Findings in the Tourism Industry. *Journal of Agricultural Development Studies* 30: 16–25. Available online: <https://agriknowledge.affrc.go.jp/RN/2010931725> (accessed on 10 July 2024).
- Kurihara, Shinichi, and Nyumon Tokeigaku. 2021. *Introductory Statistics*. Tokyo: Ohmsha.

- Lee, Kwangho, Yuji Nagai, and Shunji Matsuoka. 2019. The Practice of Platform Management for Regional Problem Solving: Case study of Academy and Fun Society of Fukushima Studies. Paper presented at the International Association of P2M, Waseda University, Tokyo, May 18; Berlin/Heidelberg: Springer, vol. 2019, pp. 64–76. [CrossRef]
- Liu, Wen, Fumio Yamazaki, and Tadashi Sasagawa. 2016. Monitoring of the recovery process of the Fukushima Daiichi nuclear power plant from VHR SAR images. *Journal of Disaster Research* 11: 236–45. [CrossRef]
- Liu, Yong, Xuejian Chen, and Miao Hu. 2023. Three-dimensional large deformation modeling of landslides in spatially variable and strain-softening soils subjected to seismic loads. *Canadian Geotechnical Journal* 60: 426–37. [CrossRef]
- Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: Sage.
- Maehara, Kazuhira. 2014. Fukushima on a Long Road to Recovery From Earthquake Devastation. *Journal of the Japanese Association of Rural Medicine* 62: 853–58. [CrossRef]
- Miyagi, Toyohiko, Daisuke Higaki, Hiroshi Yagi, Shoji Doshida, Noriyuki Chiba, Jun Umemura, and Go Satoh. 2011. Reconnaissance report on landslide disasters in northeast Japan following the M 9 Tōhoku earthquake. *Landslides* 8: 339–42. Available online: <https://link.springer.com/article/10.1007/s10346-011-0281-9> (accessed on 10 July 2024). [CrossRef]
- Monma, Toshiyuki. 2013. Disaster Recovery and the Future of Agricultural Management-New Areas of Public Agricultural Management. *The Farm Management Society of Japan* 51: 1–11. [CrossRef]
- Nagamatsu, Shingo, Adam Rose, and Jonathan Eyer. 2020. Return migration and decontamination after the 2011 Fukushima nuclear power plant disaster. *Risk Analysis* 40: 800–17. Available online: <https://onlinelibrary.wiley.com/doi/10.1111/risa.13432> (accessed on 10 July 2024). [CrossRef] [PubMed]
- Nagasaka, Yasuyuki. 2018. A study on both Great Japan Earthquake and Great Hanshin-Awaji Earthquake to define difference of the plans for commercial accumulation's restoration and revival assistance. *Journal of City Planning Institute of Japan* 53: 815–22. [CrossRef]
- Nakamura, Tetsuya, Steven Lloyd, Atsushi Maruyama, and Satoru Masuda. 2023. Public Evaluation of the Reconstruction and Regeneration of Fukushima 10 Years After the Earthquake. *Journal of Disaster Research* 18: 162–77. [CrossRef]
- Nakano, Kentaro, Kwangho Lee, Yuji Nagai, Hiroshi Onoda, and Shunji Matsuoka. 2020. Implementation and Analysis of Multi-Generation Co-Creation Project Management in Fukushima Reconstruction. Paper presented at the International Association of P2M, Chiba, Japan, April 25; Berlin/Heidelberg: Springer, vol. 2020, pp. 161–70. [CrossRef]
- Owada, Tatsuki, and Koji Kitamura. 2019. Situation of Farmland Accumulation and Directionality of Agriculture Promotion Overviewing a Revival District from the Great Earthquake Disaster. *The Japanese Society of Irrigation, Drainage and Rural Engineering* 87: 729–32. [CrossRef]
- Pollfish. 2024. Buy Survey Responses Straight from the Source. Available online: <https://www.pollfish.com/survey-target-audience/> (accessed on 10 July 2024).
- Reconstruction Agency of Japan. 2021. *Great East Japan Earthquake Lessons Learned & Know-How Gained*. Hyogo: The Hyogo Earthquake Memorial 21st Century Research Institute. Available online: <https://www.reconstruction.go.jp/311kyoukun/pdf/kyokun/kyokun-en.pdf> (accessed on 10 July 2024).
- Reconstruction Agency of Japan. 2023a. Current Status of Reconstruction. Available online: https://www.reconstruction.go.jp/topics/main-cat1/sub-cat1-1/20230227_genjou.pdf (accessed on 10 July 2024).
- Reconstruction Agency of Japan. 2023b. Current Status of Reconstruction and Future Efforts. Available online: https://www.reconstruction.go.jp/topics/main-cat1/sub-cat1-1/202312_genjoutorikumi.pdf (accessed on 10 July 2024).
- Schreurs, Miranda A. 2021. Reconstruction and revitalization in Fukushima a decade after the “triple disaster” struck: Striving for sustainability and a new future vision. *International Journal of Disaster Risk Reduction* 53: 102006. Available online: <https://www.sciencedirect.com/science/article/pii/S2212420920315089> (accessed on 10 July 2024). [CrossRef]
- Shimizu, Kiyoko, and Hiroshi Matsubara. 2014. Tohoku's Industrial Recovery and Industrial Location Policies after the Great East Japan Earthquake. *E-Journal GEO* 9: 118–34. Available online: https://www.jstage.jst.go.jp/article/ejgeo/9/2/9_118/_pdf/-char/ja (accessed on 10 July 2024).
- Suppasri, Anawat, Nobuo Shuto, Fumihiko Imamura, Shunichi Koshimura, Erick Mas, and Ahmet Cevdet Yalciner. 2013. Lessons Learned from the 2011 Great East Japan Tsunami: Performance of Tsunami Countermeasures, Coastal Buildings, and Tsunami Evacuation in Japan. *Pure and Applied Geophysics* 170: 993–1018. Available online: <https://link.springer.com/article/10.1007/s00024-012-0511-7> (accessed on 10 July 2024). [CrossRef]
- SurveyMonkey. 2024. Sample Size Calculator. Available online: <https://www.surveymonkey.com/mp/sample-size-calculator/> (accessed on 10 July 2024).
- Tsuji, Takeshi. 2016. Determinants of Residents Participation in the Disaster Revitalization Process: Result and Analyze of the Questionnaire Survey in Onagawa-town, Miyagi prefecture after the Great East Japan Earthquake. *Japan Society for Disaster Recovery and Revitalization* 9: 1–10. [CrossRef]
- Yamaguchi, Junya. 2013. Local Economic Recovery from the Great East Japan Earthquake Issues in the Seafood Processing Industry: A Case Study of Kesennuma City, Miyagi Prefecture. *Annual Review of Economics Nagasaki University* 29: 13–28. Available online: https://nagasaki-u.repo.nii.ac.jp/record/6331/files/keinen29_13.pdf (accessed on 10 July 2024).
- Yamakawa, Mitsuo. 2016. Fukushima-ken Commerce Community Development Regulation and Earthquake Disaster Shock Doctrine. *The Japan Association of Economic Geographers* 62: 130–40. [CrossRef]

- Yamakawa, Mitsuo. 2018. East Great Earthquake Disaster and Socio-economic Reconstruction Paradigm: Putting the Kumamoto Earthquake in Range. *The Japan Association of Economic Geographers* 64: 129–37. [CrossRef]
- Yamakawa, Mitsuo, and Masayuki Seto. 2018. *Fukushima Reconstruction Studies Toward Reconstruction of Disaster Areas and Reconstruction of Victims' Lives*. Tokyo: Hassaku-sha, p. 298.
- Yamakawa, Mitsuo, and Toshio Hatsuzawa. 2021. *Fukushima Reconstruction Studies II: Asking 10 Years after the Nuclear Accident*. Tokyo: Hassaku-sha, p. 488.
- Yokemoto, Masafumi. 2023. Damage Relief, Reconstruction Policy in the Wake of the Fukushima Nuclear Accident. In *Environmental Pollution and Community Rebuilding in Modern Japan*. Singapore: Springer Nature, pp. 115–27. Available online: https://link.springer.com/chapter/10.1007/978-981-99-3239-9_8 (accessed on 10 July 2024).
- Zhang, Hui, Chris Dolan, Si Meng Jing, Justine Uyimleshi, and Peter Dodd. 2019. Bounce forward: Economic recovery in post-disaster Fukushima. *Sustainability* 11: 6736. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.