

Article

Attitude Changes of Stakeholders towards Climate Change Adaptation Policies in Agricultural Sector by Online Deliberation

Kenshi Baba ^{1,*} , Eri Amanuma ² and Motoko Kosugi ³ ¹ Faculty of Environmental Studies, Tokyo City University, Kanagawa 224-8551, Japan² National Institute for Environmental Studies, Tsukuba, Ibaraki 305-8506, Japan; amanuma.eri@nies.go.jp³ Graduate School of Integrated Science and Technology, Shizuoka University, Hamamatsu 432-8561, Japan; kosugi.motoko@shizuoka.ac.jp

* Correspondence: kbaba@tcu.ac.jp



Citation: Baba, K.; Amanuma, E.; Kosugi, M. Attitude Changes of Stakeholders towards Climate Change Adaptation Policies in Agricultural Sector by Online Deliberation. *Climate* **2021**, *9*, 75. <https://doi.org/10.3390/cli9050075>

Academic Editor: Christopher R. Bryant

Received: 28 March 2021

Accepted: 29 April 2021

Published: 5 May 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 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/>).

Abstract: This study set up online virtual communities consisting of farmers and stakeholders involved in agriculture and nonfarmers living in rural areas interested in agricultural production. We conducted a deliberation within the communities for 14 days on identifying important climate change adaptation policies for 30 years later under climate change impacts with the relevant knowledge from experts. During the deliberation, after self-introduction took place including the realization of climate change impacts, the participants were provided with the expert knowledge on impacts of climate change, adaptation policies in agricultural sector and so on, then the following discussions covered issues such as the distribution of agricultural produce, insufficient successors, and support for farmers, such as impacts on crops during disasters concerning future scenarios. Attitude changes before and after deliberation were observed in terms of the pros and cons of climate change adaptation policies in agriculture and rural areas, but statistically significant differences were not observed. On the other hand, a statistically significant change was observed in some determinants of the pros and cons, such as the perceived effectiveness and goal intention. This structural change results from that the participants became aware of a different perspective through deliberation. Thus, the online deliberation process was effective to some extent in increasing knowledge and promoting deeper understanding among participants during inquiry and reasoning was deepened in the process as they listened to the opinions of others in a different position with a different idea as well as read and search for scientific findings and information provided by experts.

Keywords: climate change adaptation; risk perception; agriculture; online deliberation; structural equation modeling

1. Introduction

1.1. Background

The 5th assessment report [1] by the Intergovernmental Panel on Climate Change (IPCC) asserts that “There is no room for doubt for warming of the climate system”, and observed long-term data by the Japan Meteorological Agency shows that, in Japan, the average temperature is rising and the number of occurrences of severe rain over a short period and years with instances of extremely heavy rain or little rain is increasing [2,3]. With respect to future risks, the Ministry of Environment has published a report that assessed the effect of climate change adaptation policies on impact prediction and risk reduction due to climate change [4]. The Ministry of Agriculture, Forestry and Fisheries has been conducting an investigation of actual conditions on current impacts believed to be due to climate change, such as high-temperature injuries in agricultural production sites and adaptation policies for these impacts since FY2008, and published on the continuing trend of high temperature and an introduction of improved variety and cultivation technique as

climate change adaptation policies as a “Global Warming Impact Study Report” [5]. The latest report indicated that the annual mean temperature at the end of the 21st century in Japan is projected to increase by 3.3–4.9 degree Celsius from the present level, and also the frequency of heavy rain falling in torrents (50 mm or more per hour) at the end of 21st century is projected to increase throughout Japan if we continue to emit GHGs as currently do, and the quality of paddy rice is projected further deteriorate, while areas suitable for growing fruit trees would shift. However, these policies, such as the future projection and impact assessment for climate change by experts and administrations, countermeasures such emission reduction and absorption of greenhouse gas, reduction of impacts of climate change, and adaptation to changing climate conditions include a long-term point of view spanning 10, 30, and 100 years, in addition to highly specialized contents that includes various assumptions and models. Some level of understanding for this information is essential for the general public and stakeholders to compare and decide which climate change impacts should be reduced more and what policies are more desirable, but this is not an easy task for non-experts.

For problems for which decisions should be made by the society as a whole, such as measures against global warming and energy policies, studies on deliberation have been accumulating in recent years as one method of public participation in the policy formulation process and are starting to be applied in decision-making in actual societies. Examples include a consensus conference where experts and the general public or stakeholders aim for decision-making and proposals on policies for science and technology (Society for Techno-Innovation of Agriculture, Forestry and Fishery [6], Kobayashi [7], Wakamatsu [8]) and a debate-based public opinion survey in which randomly sampled citizens obtains information from experts and conducts questions and answers over the courses of discussion on a specific theme and policies changes in their opinion (Committee for public debate on choices for energy and environment [9], Fishkin [10], Sone et al. [11]). These methods emphasize the will and attitude expressed by citizens as well as the quality of decisions. Results obtained by a single questionnaire survey and voting may be greatly affected by variation in the volume and quality of knowledge among respondents as well as social conditions at the time of survey (e.g., events and accidents covered heavily in news media). On the other hand, in deliberation, the knowledge level of participants have evened out thanks to the information provided by experts, their understanding is deepened, and by comparing and considering opinions of each other in a concentrated discussion, well-thought-out decision-making and proposals are enabled (Fishkin et al. [12], Luskin et al. [13]).

It is difficult to assess the effect of deliberation against the result of deliberation on decision-making and proposals from the details of the results. The deliberation results are justified by the procedure rather than the process and contents of agreements among participants (Cohen [14]). For example, in a public debate, justification is applied to the results by strictly satisfying many requirements, such as representativeness of participants and their random sampling from a population (mini-publics), provision of sufficient knowledge, substantial balance for each choice, ensured diversity in terms of views, and equal treatment of opinions [10,11]. According to Takahashi [15], large changes in opinions rarely occur before and after, while changes based on learning are observed in terms of framing and thinking reasons thoroughly, even if the conclusions are almost always the same. Consensus conferences and planning cells have demonstrated that the availability of expert and neutral information to citizens as an effort to promote constructive discussions result in the development of a very high-quality one (Hendriks [16], Dryzek and Tucker [17]).

The Internet has offered opportunities to encourage discussions among citizens to interact with others and a new public space for climate change communication (Papacharissi [18]). There is a growing literature assessing the potential of online deliberation and e-participation focused on climate change adaptation. Schafer assessed the uses and effects of online climate communication and found it encourages various stakeholders to participate in the debates, while it does not necessarily lead to robust scientific findings

or better debates in the extensive literature review. Collins and Nerlich [19] argued the pros and cons of online discourse, referring to “cyber-optimists” and “cyber-pessimists” and stated that online discourse has the potential for participants to engage in dialog and increase deliberation about the discussed issue, while it discourages alternative viewpoints. Pina et al. [20] analyzed the expectations of environmental managers about the effect of e-participation in local government environmental programs regarding climate change adaptation in Austria, Germany, and Spain. They highlighted that e-participation only enables citizen engagement in participation processes, but integrating e-participation with offline tools is needed to overcome all the barriers. Bojovic et al. [21] developed an e-participation framework for farmers to survey the adaptive capacity of agriculture against climate change in Northern Italy and revealed that e-participation was efficient for data collection, and farmers were able to evaluate adaptation policy options. However, few studies have discussed the effects of citizen participation in online climate change communication (Schäfer [22]), and even fewer studied climate change adaptation.

1.2. Objective

The objective of this study is to identify what ideal or acceptable policies and situations are when people in society understand future forecasts of impacts and effects of policies based on scientific knowledge for climate change, which is now an important social problem. The impact of climate change covers a wide range, but this study focused on the agriculture sector due to the severity of the impacts and ease of imagining. Online deliberation was utilized in this study as it helps participants have the “multilogue” (Shank [23]), which can elicit many responses and ideas that can be posted at any time once after the comment and, therefore, promotes high levels of interaction (Collins and Nerlich [19]). In addition, online deliberation fosters participants to take a different stance based on information provided by experts (Talpin and Wojcik [24]). Deliberation was conducted online to consider the feasibility of concentrated and continuous discussions by a greater number of participants without temporal and geographical restrictions (Janssen and Kies [25]). Compared to face-to-face discussions, deliberation processes on the Internet have been known to have problems, such as variation in active participation in discussions and dropouts (Wojcieszak et al. [26]), and to be less likely to result in consensus (Baek et al. [27]). However, it nonetheless forms a community that otherwise would be unlikely to be created in the real world due to temporal and spatial constraints as well as social positions and interests among participants and promotes deeper thinking and exchange of opinions by knowing expert knowledge and opinions of others (Baba et al. [28], Davies and Gangadharan [29], Harashina [30], Baba and Takatsu [31], Price Nir and Cappella [32], Wojcieszak et al. [25], Albrecht [33], Talpin and Wojcik [24], Chen and Zhang [34]).

This study identifies the changes in the people’s attitudes towards climate change adaptation policies in the agricultural sector once they gain some knowledge and understanding through the deliberation process based on responses to questionnaires conducted before and after deliberation. Online deliberation is used in this study to compare and considering different opinions and ideas mutually among participants and deepen their understandings and thoughts. This is because climate change is a problem that is socially and scientifically complex and multilayered with a high level of uncertainty (Schäfer [35]), and the problem requires discussions involving people in diverse positions with diverse values (Romsdahl [36], Hamada and Yagishita [37]). Therefore, this study constructs a deliberation community where diversity in positions and ideas in agriculture exists instead of the aforementioned mini-publics.

2. Methods

2.1. Setting a Deliberation Community

This study emphasizes a consideration in which participants access scientific findings and information from experts, listen to opinions of participants from various positions, and think on their own based on the information, and interaction in which participants express

their opinions and understand the response by others. Therefore, instead of random sampling of a general public, involvement in agriculture was used as the most important sampling criteria to ensure diversity of opinions on the issue.

Community participants were extracted by the following method (Table 1). First, responses were obtained from 520 individuals via a pre-survey for screening participants with some level of interest in climate change issues in agriculture using an Internet monitor of a polling company. Those who chose (i)–(iii) from question 1, which means farmer, the processor of agricultural products or distributor and/or sellers of agricultural products, were defined as agricultural stakeholders, and all of 61 individuals were included as candidates for participation. Those who selected (vii), “none of them applies”, were removed from consideration. From the rest of the respondents, who selected (iv)–(vi) from question 1, those who (1) live in eight prefectures whose annual average temperature is at or below 14 degree Celsius, which is the annual average temperature for Nagano Prefecture used as a case in the materials used in deliberations (question 2), and (2) selected any choice other than “not particularly interested” for the global environmental problem were selected, and those who did not fit either description were removed (question 3). Thus, a total of 209 individuals, including 61 individuals of agricultural stakeholders, were listed as candidate participants.

Table 1. Screening items and procedures.

Question 1: Involvement with agriculture	(i) Farmer (ii) Processor of agricultural products (iii) Distributor and/or sellers of agricultural products (iv) Consumer with a keen interest in agricultural produce (v) Having a home garden (vi) A neighbor, acquaintance, friend, family member, or relative is a farmer	(vii) None of them applies -> remove
	Lives in one of eight prefectures whose annual average temperature is at or below 14 degrees Celsius: Fukushima, Miyagi, Nagano, Akita, Yamagata, Iwate, Aomori, Hokkaido	Respondents, who selected (iv)–(vi) from question 1, but does not live in these eight prefectures -> remove
Question 3: Interest in global environmental problems	(ii) Has some level of interest due to news and newspaper articles (iii) Interested enough to research through books and the Internet (iv) Interested from a professional point of view (business or expert level)	(i) Not particularly interested -> remove

Next, the list of 209 candidates was sorted based on the degree of agreement for another two questions about their mindset for measures against impacts and damages by climate change and global warming on agriculture and rural areas. This question asks for the ratio of agreement in 5-point scale, ranging from “agree strongly” to “disagree strongly” for five climate change adaptation policies described below in detail. Specifically, the list of these questions was rearranged in the order of priority where question 1 was the first-priority item; question 2 was the second-priority item, etc. Starting from the top of this list, the first person was assigned to group 1, the second person to group 2, and the third person 3, and this assignment was repeated down to the last person in the list to group candidates into three groups. No significant differences in the average value of responses against 5 questions between groups were observed.

A request for participation in the deliberation was sent to each list of candidates in 3 groups. Requests were no longer sent after 30 people accepted from each group. Table 2 shows the participants in each community at the start of the online deliberation.

Table 2. Attributes of community participants.

	Participants (Agri Stakeholders)	Sex Ratio (M/F)	Average Age	Thoughts on Agricultural Policies
Community A	28 (14)	21/7	44.6	No significant difference was observed among communities in terms of the degree of agreement for all five questions
Community B	28 (10)	18/10	43.4	
Community C	28 (15)	21/7	44.5	

2.2. Progress of Online Deliberations

Online deliberations were conducted over 14 days. Table 3 shows the schedule. The moderator of the polling company moved the community deliberation forward over the course of 14 days, and each community progressed in the general order of (1) self-introduction among participants, (2) scientific findings and information provided by experts and deliberation, and (3) prioritizing policy options.

Table 3. Online deliberation schedule.

Date	Theme	Details
Day 1 (before deliberation starts)	-	Questionnaire survey
Day 1–3	Theme A: Self-introduction	Opening: every participant introduces himself/herself after the moderator self-introduction
Day 3–5	Theme B: Impacts of climate change in Japan	Materials by experts I: Present materials by experts on climate change overall, and discuss questions and opinions based on the materials
Day 5–8	Theme C: Japan 30 years later and affected by climate change	Materials by experts II: Present materials by experts on impacts of climate change on agriculture, and discuss questions and opinions based on the materials
Day 8–11	Theme D: Future scenarios	Materials by experts III: Present materials that reorganized material II into three types of scenarios, and discuss questions and opinions based on the materials
Day 11–13	Theme E: The most important option	Selection of policy options: Participants discuss what they believe is the most important policy option based on all materials considered thus far
Day 14	Theme F: Greetings of the ending	Ending: Moderator announces the end of deliberation and participants share their thoughts
Day 14 (after the end of deliberation)	-	Questionnaire survey

Deliberation took place over message boards, and a pair of message boards were open in parallel where one was designated for a “theme” in which participants and a moderator exchanged at all times, while the other board was for “answers by experts” in which additional information are provided, and opinions on them are shared. At each step, a moderator called for self-introduction from participants on a “theme” message board and requested to write into message boards on thoughts, opinions, and questions for materials developed by experts and presented on the board. Each participant was asked to write in at least once at each step based on the progress by the moderator.

Participants not only wrote in their opinions and thoughts after reading through presented materials but also were encouraged to write in comments and thoughts on posts written by other participants and press the “like” button to express agreement and reaction to the contents. Participants were requested to do so for each theme in Table 3 within a few

days so that we judged 14 days in total were appropriated for the deliberation. Considering many cases of face-to-face deliberation have been conducted over a few days in total intensively, it is natural that spending a few days for one theme at their convenient time is enough to promote the changes in the participants' attitudes. If there are questions included in the communication and posts among participants, the moderator posted information on the message board for "answers by experts" as additional information, which was notified to everyone. The needs and contents of additional information were determined each time by authors by observing the progress of deliberations. To guarantee participants in every community the opportunity to access the added information, it was posted on the message board for "answers by experts" for all communities.

2.3. Materials by Experts

The participants were provided with the following three types of materials by experts. We set up a panel of three experts whose expertise in the climate model, agricultural technologies, and agricultural policies.

Material I: As the material on climate change in general, four presentation slides were developed from released scientific findings provided by the National Institute for Environmental Studies, the Japan Center for Climate Change Actions, and the Japan Meteorological Agency.

Material II: For the impacts of climate change on the agricultural sector and adaptation policies, five presentation slides were developed from released scientific findings provided by the Environmental Conservation Research Institute of Nagano Prefecture and the National Agriculture and Food Research Organization.

Material III: Focused on Nagano Prefecture as an example and provided narrative scenarios on climate change and social changes 30 years later and adaptation policies, which are grouped according to the phenomena "high summer temperature", "temperature rise in winter and spring", and "changes in rainfall", combination with others damages by wildlife, the northbound shift of suitable land for cultivation, and insufficient human resource that are likely to occur 30 years later judged by the experts and stakeholders in Nagano. Originally, this scenario was developed by the "integrated future scenario building method", which consists of stakeholder analysis, Delphi survey and scenario planning (For details, see Baba et al. [38]). We developed two presentation slides for each scenario consisting of the present situation, future projection, adaptation policy options.

2.4. Data in Deliberation

As mentioned above, we have a data set consisting of utterances (text data on the message boards) and questionnaire data for each participant. With regard to the data on utterances, we performed text mining and analyzed the deliberation process. The results were showed in Iwami et al. [39], and the summary is as follows: First, after self-introduction took place concerning the realization of climate change impacts, expert knowledge were shared, and the following discussions covered issues, such as the distribution of agricultural produce and insufficient successors as adaptation policies. Furthermore, support for farmers, such as impacts on agricultural crops during disasters, was discussed particularly in detail concerning future scenarios and selection of important policy options. The number of statements for each topic in a theme was nearly equal across three communities, and differences in references to topics due to a difference in contents of discussions were not observed.

With regard to questionnaire data, the surveys were conducted to measure the way of thinking and attitude among participants towards global warming (climate change) and its impacts on the agricultural sector, as well as ideal policies against such impacts before and after deliberation. To investigate changes in mindset and attitude before and after deliberation, questions used in each survey overlapped for the most part. We provided questions about the realization of the impact of climate change, perceived effectiveness of climate change adaptation policies, goal intention as farmer and as consumer to act on the impact of climate change (global warming), trust in the main actors, and the pros and cons of climate change adaptation policies based on the previous studies mentioned above and others (such as

Baba et al. [40]; Li et al. [41]; Taniguchi et al. [42]; Wynveen et al. [43]). We applied statistical tests (the paired *t*-tests) for these questions before and after deliberation to verify the changes in mindset and attitude and then clarify the determinants of climate change adaptation measure pros and cons in the agricultural sector by a covariance structural analysis. The details of these statistical methods are described in the next chapter with the results.

3. Results

Eighty-four participants were assigned to deliberation communities at the beginning, but some deserted over 14 days of deliberation period, and the number of individuals who answered the questionnaire after deliberation was 19 for community A, 23 for community B, and 18 for community C, for a total of 60 individuals. For this reason, an analysis of results was also performed for these 60 individuals.

3.1. Evaluation of Deliberation Process

Table 4 shows a 5-point scale evaluation (1 = strongly disagree–5 strongly agree) for online deliberation with several criteria. In terms of depth of discussion or the range covered by discussion, such as “Opinions of every participant were discussed equally ($m = 3.05$)” and “My opinions were discussed to a satisfying extent (3.12)” were not very high. The ratio of the agreement was high for “It was difficult to discuss prioritization of policy options with the community (3.93)”, which assessed selecting policy options, i.e., a challenge for online deliberation participants. On the other hand, sharing and understanding of opinions among participants were evaluated highly, i.e., “Participants were able to know the opinions of others in the community (4.22)”, “Participants were generally able to state their opinions and thoughts (3.88)”, and “Other participants listened to my opinions intently (3.80)”. Evaluation of deliberation did not vary by community.

Table 4. Evaluation of the online deliberation.

<i>Deliberation as a Whole</i>	<i>Mean of the Evaluation</i>
1. Active discussions took place among participants	3.68
2. Discussions moved forward with few individuals, who expressed their views frequently at the core	3.35
3. Participants were able to engage in discussions mutually	3.27
4. Opinions of every participant were discussed equally	3.05
<i>Participants' Own Status</i>	<i>Mean of the Evaluation</i>
5. Participants were generally able to state their opinions and thoughts	3.88
6. Participants were able to know the opinions of others in the community	4.22
7. Other participants listened to my opinions intently	3.8
8. My opinions were discussed to a satisfying extent	3.12
9. It was difficult to discuss the prioritization of policy options with the community	3.93
10. My opinions and thoughts changed through discussions in the community	3.18
<i>Participants Collecting Information (Multiple Answers)</i>	<i>N (% of Respondents)</i>
1. Casually searched on the Internet, etc.	74 (78.3)
2. Read books thoroughly	11 (18.3)
3. Discussed with families, friends, and acquaintances	15 (25.0)
4. Did nothing	9 (15.0)

In other words, the process of deepening discussions to a satisfactory level nor the process of deepening mutual interaction towards building a consensus on opinions was

insufficient in deliberations, but the deliberation process function sufficiently in terms of listening to diverse opinions of other participants and having his or her own opinions heard by others, which were rated highly. When asked about whether anyone gathered information on their own in addition to expert knowledge provided during online deliberation, 15% of participants claimed to have “did nothing”, while 85% of participants searched online and read relevant books in a voluntary manner. The results indicated that participation in the deliberation process has the effect of inspiring many participants to gather some form of information on their own.

3.2. Changes in Mindset and Attitudes before and after Deliberation

This section discusses how deliberation in each community affected the thoughts and attitude of participants by comparing responses to questionnaire surveys before and after deliberation.

3.2.1. Realization of Climate Change Impacts

Table 5 presents the results of inquiring to participants about the impact and damage of climate change on agriculture and rural areas on a scale of 0 to 100 (where 0 = not serious at all and 100 = extremely serious with no time to waste). The mean score of the evaluations before and after deliberation is displayed from the left, and it exhibits the paired *t*-test results for the scores before and after deliberation. The results indicate that participants were statistically significantly more likely to think that the climate change impact and damage to agriculture and rural areas are more serious after deliberation than before deliberation ($t(59) = 2.61, p < 0.05$). Especially in themes B and C, the scientific findings regarding impacts of climate change in Japan and in the agricultural sector were provided, and the participants discussed it in the early stage of the deliberation. Therefore, we can interpret that deliberation deepened the participants' awareness of the severity of the climate change impact on agricultural products.

Table 5. Realization of the climate change impacts.

	Before	After
The extent to which you consider global warming to be serious regarding the impact and damage to agriculture and rural areas (where 0 = not serious at all, and 100 = extremely serious with no time to waste for the implementation of countermeasures) *	70.0	74.5

Statistically significant at ** 1%, * 5%.

3.2.2. Perceived Effectiveness of Climate Change Adaptation Policies

Table 6 shows the result of grading effects of climate change adaptation policies on a 5-point scale (1 = not effective–5 = very effective). “4. Secure water resources, such as measures against drought and using water recycled from sewage, rainwater, etc.”, was most highly evaluated both before and after. A statistically significant difference was observed in evaluation for “2. Development of an economic system that compensates by an insurance (including both public and private) in case there was an impact due to global warming ($t(59) = 3.71, p < 0.001$)” and “3. Ensure food production through the transfer of cultivation areas for crops to appropriate areas, crop breeding, etc. ($t(59) = 2.97, p < 0.01$)”. In this way, a comparison of the mean score before and after deliberation shows that the evaluation improved after deliberation in almost every item, and the results show a tendency in which participation in deliberation raises evaluating effects of various policies. In theme C, information on climate change adaptation policy options was provided, and the participants discussed it towards the final stage of the deliberation. The discussion is considered to be reflected on some items of the improved evaluation.

Table 6. Perceived effectiveness of climate change adaptation policies.

	Before	After
1. Monitoring and provision of information for areas identified as prone to the impacts of global warming	3.63	3.85
2. Development of an economic system that compensates by insurance (including both public and private) in case there was an impact due to global warming **	3.03	3.63
3. Ensure food production through the transfer of cultivation areas for crops to appropriate areas, crop breeding, etc. *	3.52	3.88
4. Secure water resources, such as measures against drought and using water recycled from sewage, rainwater, etc.	3.80	4.02
5. Health measures, such as preventive measures for heat strokes, development of vaccines and new therapeutic drugs for infections, and measures against mosquitoes carrying diseases	3.57	3.75
6. Measures for disaster prevention, such as conservation of coasts, construction of levees, and sediment management	3.50	3.77

Statistically significant at ** 1%, * 5%.

3.2.3. Goal Intention of Climate Change Impacts and Damages in the Agriculture and Rural Areas

Table 7 shows the mean score for goal intention as farmer in cases where climate change impacts and damages appear in the agriculture and rural areas (nonfarmers were also asked to answer by farmers' point of view) and as consumers (1 = disagrees strongly–5 = agrees strongly). Comparison of the mean score before and after deliberation shows that the evaluation improved after deliberation in almost every item though the results of paired *t*-tests for before and after deliberation, a statistically significant difference was observed only in evaluation for “4. I welcome crops and varieties that fit the environment and not persist on previous crops I grew if the agricultural environment changed due to global warming ($t(59) = 2.11, p < 0.05$)” as a “farmer”. The last item (No. 4), which was a kind of adaptive measure, was most highly evaluated both before and after.

With respect to goal intention as consumers, the results of paired *t*-tests for before and after deliberation shows that evaluation was significantly higher after deliberation for willingness to purchase in spite of “worsened color, size, and shape (item 1) ($t(59) = 2.01, p < 0.01$)”, “raised prices (item 3) ($t(59) = 2.71, p < 0.01$)”, “limited varieties (item 4) ($t(59) = 3.35, p < 0.01$)”, “new varieties (item 5) ($t(59) = 2.53, p < 0.05$)”, and “changes in production areas (item 6) ($t(59) = 2.54, p < 0.05$).” The item No. 1, 5, and 6 were highly evaluated both before and after.

These two types of goal intention are assumed to inseparably linked to the pros and cons of policies and other factors mentioned above. In themes D and E, narrative scenarios on climate change and social changes 30 years later and adaptation policies options were provided, and the participants discussed the future in total as the final stage of the deliberation. The discussion is considered to be reflected on some items of the improved evaluation, especially as a consumer.

Table 7. Goal intention of the climate change impacts and damages in the agriculture and rural areas.

<i>Goal Intention as a “Farmer” on the Following</i>	Before	After
1. I want to keep growing same crops and varieties as I do now, even if color, size, and shape of the crops worsen due to global warming	2.87	3.03
2. I want to keep growing same crops and varieties as I do now, even if the taste and texture of the crops worsen due to global warming	2.43	2.47
3. I want to keep growing same crops and varieties as I do now, even if the yield of crops decline due to global warming	2.55	2.68
4. I welcome crops and varieties that fit the environment and not persist on previous crops I grew if agricultural environment changed due to global warming *	3.93	4.13
5. I want to quit agriculture if I can no longer produce crops as I have done in the past (quality, yield, taste, etc.) because of global warming	3.03	2.97
<i>Goal Intention as a “Consumer” on the Following</i>	Before	After
1. I want to keep purchasing crops without minding worsened color, size, and shape of the crops as a result of global warming *	3.70	3.97
2. I want to keep purchasing crops without minding worsened taste and texture of the crops as a result of global warming	2.82	2.97
3. I want to keep purchasing crops even if price goes up due to global warming **	2.85	3.18
4. I want to keep purchasing crops even if varieties become limited due to global warming **	3.33	3.72
5. I want to keep purchasing crops even if a new variety is offered as a result of global warming *	3.62	3.95
6. I want to keep purchasing crops even if production areas for the crops change due to global warming *	3.67	4.02

Statistically significant at ** 1%, * 5%.

3.2.4. Pros and Cons of Climate Change Adaptation Policies in Agriculture and Rural Areas

Table 8 shows the average score on ideal mindset towards (that is, pros and cons of) climate change adaptation policies in agriculture and rural areas (1 = disagree strongly–5 = agree strongly). Mean score on pros and cons of policies showed that “2. Adjusting to local conditions (adaptive measures)” was most highly evaluated both before and after, and evaluation tended to improve after deliberation only for “4. Compensation should be made via insurance or mutual aid system just in case”.

Concerning, “1. Sufficiently building infrastructures (precautionary measures)”, “2. Adjusting to local conditions (adaptive measures)”, and, “3. Move or retreat to areas more suitable than current farmlands (transformative measures)”, mean score before and after deliberation tended to be equal or decreased, but statistically significant differences were not observed.

This may mean that there was an infiltration of the mindset that transferring risk via insurance or a mutual aid system is more effective than implementing specific climate change adaption policies due to an improved understanding of the high degree of uncertainty concerning climate change projections by acquiring expert knowledge through deliberation, while awareness increased regarding the necessity of climate change adaption policies generally.

Table 8. Pros and cons of climate change adaptation policies in agriculture and rural areas.

	Before	After
1. Current form of agriculture should be protected by sufficiently building infrastructures, such as water and agricultural facilities to prevent impacts and damages in agriculture	3.68	3.43
2. Measures and efforts should be implemented, such as conversion of varieties and items, by adjusting to local conditions to reduce impacts and damages in agriculture in our lives	4.03	4.00
3. Areas in which impacts and damages in agriculture occurs frequently should consider move or retreat to areas more suitable than current farmlands	3.37	3.37
4. There is no way to know the level of impacts and damages to agriculture or when they may occur, and compensation should be made via insurance or mutual aid system, just in case	2.97	3.17
5. There is no need to implement any measures because we do not know when and to what extent there are impacts and damages to agriculture	2.15	1.87

Statistically significant at ** 1%, * 5%.

3.3. Other Factors Prompt Changes in Mindset and Attitudes: Trust in Each Actor

Trust in each of the relevant actors is usually a critical factor to determine people's behavior and decision-making. The evaluated trust in the effort each actor is making in climate change adaptation policies in the agricultural sector and in usual agricultural policies are assumed to be related to participants' trust in the information source related to climate risk and policy acceptance. Table 9 displays the participants' responses on a five-point scale (from 1 = I completely disagree to 5 = I completely agree), after dividing the sense of trust in each actor into ability, integrity, and general trust. Based on the results, the participants exhibited a high degree of trust in the ability of local government officials, officials in charge of agricultural policy, and agricultural and fruit tree experiment station staff. There was a higher degree of trust in the integrity of Japan Agricultural Cooperatives (JA) staff concerning their ability, and there was a tendency for a high level of general trust in individual farmers. The fact that some aspects of trust in JA was high as same as or higher than local governments indicates that one of the traditional NGOs in Japanese rural area still keeps its significance for existence and shows potential for playing a key role in climate change adaptation.

Table 9. Trust in primary actors involved in agricultural policy and climate change adaptation policies in agriculture and rural areas.

	Local Government Officials	Local Officials in Charge of Agricultural Policy and Staff at Agricultural and Fruit Tree Experiment Stations	Local JA Officials	Individual Farmers
Can perform duties and tasks	3.05	3.15	2.83	2.83
Work diligently to perform duties	2.88	2.98	2.92	2.82
Reliable	2.60	2.88	2.83	3.03
Trustworthy	2.72	2.92	2.73	3.07

3.4. Model Analysis

A covariance structural analysis was conducted to clarify the determinants of climate change adaptation measure pros and cons in the agricultural sector. We constructed the

model with the latent variables shown in Tables 5–9. The “no measures” option was excluded from the question of the pros and cons of adaptation policies, and each of the questions on precautionary measures, adaptive measures, transformative measures, and transferring risk were analyzed. The questions comprising each variable were selected for analysis to ensure that Cronbach’s α coefficient was 0.8 or higher. Apart from Table 7, all the questions were analyzed; the only questions used in the analysis from Table 7 were questions 1–3, which were related to the statement “I want to keep growing same crops and varieties as I do now”, concerning goal intention as a farmer.

Due to the small study sample size ($N = 60$), we constructed before and after models for the precautionary measures, adaptive measures, transformative measures, and transferring risk using all samples (Figure 1). There are various views about sample size and statistics. Some point out that a sample size greater than 200 is needed to get stable results as a rough indication (e.g., Kline [44]). Though all the estimated standardized path coefficients were statistically significant, as shown in Table 10, it is extremely difficult to obtain high goodness-of-fit results with these few samples. Thus, certain result, such as “Adaptive measures (after)” is only for reference. With these restrictions in mind, the following findings can be determined by interpreting the standardized path coefficient trends: First, perceived effectiveness was adopted in all models and was potentially critical as a determinant of the pros and cons of climate change adaptation policies. Second, apart from the transformative measures, there were changes in the determinants before and after deliberation; thus, deliberation may have facilitated structural changes in the determinants. Third, on the other hand, there was a possibility of no changes in the determinants before and after deliberation for transformative measures, suggesting that structural changes in the perception of transformative measures are likely more difficult to facilitate than those in other climate change adaptation policies.

Table 10. Goodness-of-fit indicators and standardized path coefficients for covariance structure model analysis results.

	AGFI	CFI	RMSEA	I	II	III	IV
Precautionary measures (before)	0.824	0.922	0.097	0.515 **			
Precautionary measures (after)	0.719	0.883	0.149	0.387 **			0.306 *
Adaptive measures (before)	0.834	0.961	0.079	0.495 **			
Adaptive measures (after)	0.665	0.879	0.127	0.470 **	0.307 *		−0.423 **
Transformative measures (before)	0.792	0.931	0.109	0.563 **			
Transformative measures (after)	0.741	0.921	0.166	0.498 **			
Transferring risk (before)	0.723	0.880	0.121	0.371 **	0.436 **		
Transferring risk (after)	0.805	0.977	0.069	0.507 **		0.233 *	

Statistically significant at ** 1%, * 5%.

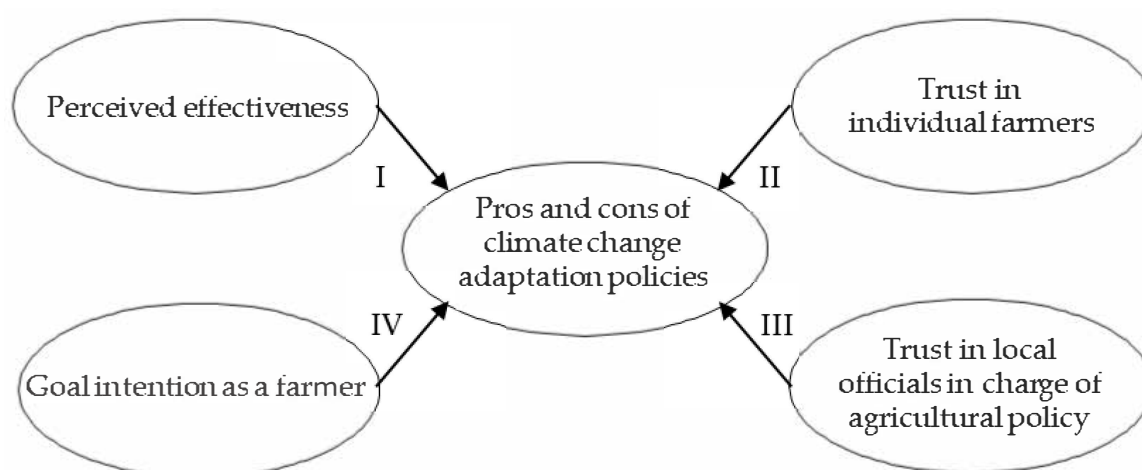


Figure 1. Determinants to pros and cons of climate change adaptation policies.

4. Discussions

4.1. Changes of Determinants of Preference for Policy through Deliberation

The determinant of perceived effectiveness strongly influenced the pros and cons of the climate change adaptation policies before and after deliberation, regardless of the type of adaptative measure. This result reinforces that this determinant is crucial to the pros and cons of adaptation policies, as partially similar results were observed in an online deliberation on climate change adaptation policies in the disaster prevention sector, where a similar experiment was conducted during the same period (Baba et al. [45]). Truelove et al. [46] also found that efficacy beliefs were strong predictors than other psychological factors when they developed the psychological model of agricultural adaptation behavior of Sri Lankan rice paddy farmers.

The determinants of precautionary measures, adaptive measures, and transferring risk were added after deliberation, suggesting that the deliberation influenced the psychological factors of the participant views on the pros and cons of adaptation policies.

Before deliberation, only perceived effectiveness was a determinant for precautionary measures, while goal intention as a farmer was added after deliberation. As mentioned previously, the goal intention as a farmer-only uses questions that support the idea that “I want to keep growing the same crops and varieties as I do now”, even if impacted by climate change, which is consistent with the precautionary measure that the “current form of agriculture should be protected”, and therefore, it is a determinant that reinforces the pros and cons of precautionary measures. Looking at the utterances (text data on the message boards) during deliberation, “The difficulty of living by farming when implementing transformative measures, such as relocation of agricultural land under climate change” was shared between farmers and non-farmers as an issue. The following perceptions were linked with goal intention as a farmer, which may have reinforced the determinants of the pros and cons of precautionary measures: “Transformative measures are not realistic, so we should try to continue with the current form of agriculture on the land as long as possible”, “Agriculture is not something that can be achieved overnight, and once it is lost (due to land relocation) it would be very difficult to recover”, and “It’s the same as earthquakes. If it is difficult to stop (climate change), shouldn’t we make proper preparations to minimize the damage?”

Before deliberation, only perceived effectiveness was a determinant for adaptive measures, while after deliberation, trust in farmers and goal intention as a farmer were also determinants. However, goal intention as a farmer was a negative determinant. Dialogues were held between farmers and non-farmers, including discussions on, “the vulnerability of farmers and damage already suffered by farmers” and “the adaptive measures and proactive attitudes already adopted by farmers” for climate change. These utterances

suggest that goal intention as a farmer was added as a negative determinant due to the shared sense of danger that farmers who continue to grow the same crops and varieties will further exacerbate the damage they have already suffered. Furthermore, sharing the adaptive measures and proactive attitudes already adopted by farmers to mitigate the damage is assumed to have resulted in an increased sense of trust in farmers. Therefore, it is assumed that two determinants, a sense of trust in farmers and the goal intention as a farmer, affected participant affinity toward adaptive measures, such as converting varieties. The specific content of the utterances included comments by farmers describing damage they had already experienced, such as, “The impact of typhoons and wildlife is causing serious damage”, and “There have been continuous long periods of rain from the end of August to the middle of September for the past three years. The rice fields were flooded, and rice could not be harvested. When I looked at the rice fields, there was widespread disease due to the high temperature and humidity”. In contrast, the utterances by farmers suggesting their positive initiatives to adapt to climate change, such as “The old mulberry field is now an apple orchard, and the younger generation is adopting overseas cultivation methods and trying new varieties”, “Now that farmers can use the Internet, they’re exchanging information about climate change with farmers all over Japan and even overseas”, “I think that climate change will happen 30 years from now, but we have the ability to respond to change, so I’m not worried. If the climate changes, we just need to consider farming methods that take advantage of the new climate and adopt measures accordingly. I think it is necessary to face up to climate change without looking away. If we can predict what may happen to a certain extent, in 10, 20, or 30 years, we should be able to adopt measures early”.

The evaluation before deliberation was comprised of two determinants for transferring risk, perceived effectiveness and trust in farmers, but after deliberation, the composition changed to the perceived effectiveness and trust in officials in charge of agricultural policy determinants. The utterances during deliberation included numerous mentions of the necessity of insurance and relief systems. As the discussion progressed, there were comments from farmers, including, “In 30 years, we will not be able to produce crops with conventional cultivation techniques, and some food will not be available. The damage caused by wind and flood causes the most serious damage to agricultural production, and when I think about recovering from disaster, I find it very difficult to find the motivation to continue farming.” Comments from non-farmers included, “From the standpoint of farmers, climate change is directly related to income, and I presume that the situation is more complicated and serious.” This demonstrates that there has been a deepening of the perceptions shared between the participants concerning the high degree of uncertainty and magnitude of the damage caused by climate change and the gravity of agricultural production under climate change. At the beginning of the deliberation, there were comments, including, “If it is difficult to stop (climate change), should not individuals make proper preparations to minimize the damage?” In contrast, in the latter half of the deliberation, there were comments, such as “The most important policy is to increase input of tax revenue for farmers. There are many cases where the government can assist, such as compensation, river improvement, and environmental improvement. If the corporate tax is reduced for companies, it’s okay to reduce taxes on farmers”, indicating a shift in the opinions of non-farmers towards the standpoint of farmers. Based on this discussion flow, the perception may have shifted from that it is the responsibility of individual farmers to join insurance and relief systems to that it is the government’s responsibility, including the need for an expansion of the insurance and relief system and support of farmers.

Finally, before deliberation, only perceived effectiveness was a determinant for transformative measures, and that remained unchanged after deliberation. This result suggests that it may be difficult to facilitate structural changes in the perception of transformative measures, which were not well-received initially, with only two weeks of deliberation. The utterances during deliberation included many comments on the difficulty of transformative measures. For example, negative comments included, “If production is no longer possible

on farmland that has been handed down from generation to generation, even more people will stop farming. Relocation is certainly a disaster countermeasure, but the government should present policies to support improvement and design of agricultural land to make the current land resistant to disasters, rather than relocating”, and “Relocation may be ideal, but it is not realistic because the Japanese have long been indigenous inhabitants of the land”. Therefore, it is necessary to conduct longer-term discussions after the sufficient implementation of precautionary and adaptive measures to increase the acceptability of transformative measures.

The results have implications for policymakers on promoting adaptation measures depending on the types of measures in the agricultural sector. The finding shows climate change belief is not a significant psychological factor. In contrast, an earlier study (van Valkengoed and Steg [47]) found the five studies that analyzed policy support reported positive relationships with climate change belief. This suggests that studies assessing psychological factors of policy support are understudied, and the significant factors may vary in case of application in a specific sector. There is a scant study investigating farmer and non-farmer perceptions of policy support to the best of our knowledge in the agricultural sector. Therefore, our results provide important insights for policymakers to develop climate change adaptation strategies in the agricultural context.

4.2. Effect of the Deliberation Process

The deliberation process first shared scientific findings and information on impacts of climate change and global warming as well as administrative actions, followed by a discussion on issues, such as distribution of agricultural produce and lack of successors as adaptation policies. A discussion on support towards farmers, such as impacts on crops during disasters based on a scenario for 30 years later in the future by experts was particularly active, and another discussion took place over administrative support, distribution of agricultural produce, and support for new farmers concerning the selection of important policy options. While the depth of discussion for each topic varied among communities, no significant difference was observed in terms of the general flow of discussions.

Participants valued the online deliberation process for the fact that they were able to listen to diverse opinions from other participants while having their opinions heard, and given that over 80% of participants collected information voluntarily during the deliberation period, there was a certain level of effect towards deepened understanding and increased knowledge among participants and promote careful considerations among each individual.

Changes in mean score before and after deliberation were observed in terms of the pros and cons of climate change adaptation policies in agriculture and rural areas, but statistically significant differences were not observed. On the other hand, a statistically significant change was observed in some determinants of the pros and cons, such as the perceived effectiveness and goal intention. This change may result from that participants became aware of a different perspective through deliberation. Sanderson [48] highlights that deliberation is especially important to understand how psychological factors influence decision-making in the context of climate change adaptation since most people are not likely to be aware of how their factors shape their perceptions and vice versa.

Thus, the online deliberation process was effective to some extent in increasing knowledge and promoting deeper understanding among participants during inquiry and reasoning was deepened in the process as they listened to the opinions of others in a different position with a different idea as well as read and search for scientific findings and information provided by experts.

4.3. Future Challenges for Online Deliberation

While online deliberation enables a continuous dialog for participants, who may otherwise be unable to participate due to geographical and/or situational constraints via face-to-face, the process is also challenged by the fact that participants merely express

their own views and mutual interactions are unlikely to occur. The layout was designed to place “like” button and place comment threads underneath a parent post during the design stage, but dialogues took place sequentially as a one-on-one between the utterer and the other participant, who commented or the utterer and the moderator, which could not be considered a discussion by all the participants. Though face-to-face deliberation limits the participants in terms of geographical and/or situational constraint than online deliberation, mutual interactions and careful considerations among participants will be more promoted. However, online deliberation participants do not necessarily share the same time nor space, and responsiveness against posted comments is slow in deliberation in a virtual space. For this reason, rules for moving forward and intervention by moderators for summarizing opinions and building consensus among multiple participants are needed, and evaluation of whether opinions are being summarized or consensus-building should also be considered. In doing so, online deliberation can be a good assessment tool for face-to-face deliberation.

The results obtained in this paper focused on climate change adaptation policies in agriculture and rural areas. In terms of climate change adaptation, stakeholders’ policy needs and interests are different in each sector (Baba et al. [49]). As mentioned before, partially similar results were observed in an online deliberation on climate change adaptation policies in the disaster prevention sector, but the structure of determinants of the pros and cons of the policies were different from the agriculture sector naturally. We can accumulate knowledge about stakeholders’ policy needs and interests in each sector by online deliberation in this way.

5. Conclusions

This study set up online virtual communities consisting of farmers and stakeholders involved in agriculture and nonfarmers living in rural areas with interest in agricultural production and conducted a deliberation within the communities for 14 days on identifying important climate change adaptation policies for 30 years later under climate change impacts with the relevant knowledge from experts. During the deliberation, after self-introduction took place including the realization of climate change impacts, the participants were provided with the expert knowledge on impacts of climate change, adaptation policies in agricultural sector and so on, then the following discussions covered issues such as the distribution of agricultural produce, insufficient successors, and support for farmers, such as impacts on crops during disasters concerning future scenarios.

Attitude changes before and after deliberation were observed in terms of the pros and cons of climate change adaptation policies in agriculture and rural areas, but statistically significant differences were not observed. On the other hand, a statistically significant change was observed in some determinants of the pros and cons, such as the perceived effectiveness and goal intention. This structural change results from that farmers and non-farmers became aware of a different perspective through deliberation. In particular, first, perceived effectiveness was potentially critical as a determinant of the pros and cons of climate change adaptation policies. Second, apart from the transformative measures, there were changes in the determinants before and after deliberation; thus, deliberation may have facilitated structural changes in the determinants. Third, on the other hand, there was a possibility of no changes in the determinants before and after deliberation for transformative measures, suggesting that structural changes in the perception of transformative measures are likely more difficult to facilitate than those in other climate change adaptation policies.

Thus, the online deliberation process was effective to some extent in increasing knowledge and promoting deeper understanding among participants during inquiry and reasoning was deepened in the process as they listened to the opinions of others in a different position with a different idea as well as read and search for scientific findings and information provided by experts. While online deliberation enables a continuous dialog for participants, who may otherwise be unable to participate due to geographical and/or situa-

tional constraints via face-to-face, the process is also challenged by the fact that participants merely express their views and mutual interactions are unlikely to occur. Web conferencing systems, which have become a common feature of daily life due to the COVID-19 pandemic, are solutions to these issues. There is a need to consider approaches capable of guiding attention and recognizing participants in a virtual space, such as visualizing the flow of discussion and facilitation supported by AI. These tools in the DX age will also play a useful role in the new normal lifestyle post-COVID-19.

Author Contributions: Conceptualization, K.B.; methodology, K.B.; software, M.K. and E.A.; validation, M.K. and E.A.; formal analysis, M.K. and E.A.; investigation, K.B. and M.K.; resources, K.B.; data curation, M.K. and E.A.; writing—original draft preparation, K.B., M.K., and E.A.; writing—review and editing, K.B., M.K., and E.A.; visualization, K.B., M.K., and E.A.; supervision, K.B.; project administration, K.B.; funding acquisition, K.B. All authors have read and agreed to the published version of the manuscript.

Funding: This study was supported by the Social Implementation Program on Climate Change Adaptation Technology (SI-CAT) of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan, Grant No. JPMXD0715667201 and also supported by the Japan Science and Technology Agency (JST) and the Research Institute of Science and Technology for Society (RISTEX), Japan, Grant No. JPMJRX20A1.

Data Availability Statement: The data are not publicly available due to privacy issues.

Acknowledgments: The authors would like to express our sincere gratitude to the participants and experts, who supported the online deliberation, and to Asako Iwami (Kumamoto prefecture University), who provided the results of the text mining analysis.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

1. Pachauri, R.K.; Allen, M.R.; Barros, V.R.; Broome, J.; Cramer, W.; Christ, R.; Church, J.A.; Clarke, L.; Dahe, Q.; van Ypserle, J.P.; et al. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; IPCC (The Intergovernmental Panel on Climate Change): Geneva, Switzerland, 2014.
2. Climate Variability in Japan. Japan Meteorological Agency. Available online: http://www.data.jma.go.jp/cpdinfo/chishiki_ondanka/p08 (accessed on 27 March 2021). (In Japanese)
3. Changes in Heavy Rains and Extreme Hot Days. Japan Meteorological Agency. Available online: http://www.data.jma.go.jp/cpdinfo/extreme/extreme_p.html (accessed on 27 March 2021). (In Japanese)
4. Extreme Weather Risk Map. Japan Meteorological Agency. Available online: http://www.data.jma.go.jp/cpdinfo/riskmap/sfc_wetdry.html (accessed on 27 March 2021). (In Japanese)
5. *Climate Change Impact Survey Report FY2019*; Agricultural Production Bureau, Ministry of Agriculture, Forestry and Fisheries: Tokyo, Japan, 2020. Available online: <https://www.maff.go.jp/j/seisan/kankyo/ondanka/attach/pdf/index-96.pdf>. (In Japanese)
6. *The Consensus Conference Report on Genetically Modified Crops (Reprint)*; Japan Association for Techno-innovation in Agriculture, Forestry and Fisheries: Tokyo, Japan, 2001. (In Japanese)
7. Kobayashi, T. *Who Thinks about Science and Technology? An Experiment Called a Consensus Conference*; The University of Nagoya Press: Nagoya, Japan, 2004. (In Japanese)
8. Wakamatsu, Y. Consensus Conference on Genetically Modified Crops—to Create a Framework for Thinking about Problems. *Agric. Econ.* **2001**, *7*, 31–39. (In Japanese)
9. *Results of Deliberative Polling®Energy and Environmental Policy Options in Japan*; Stanford University: Stanford, CA, USA, 2012.
10. Fishkin, J.S. *When the People Speak: Deliberative Democracy and Public Consultation*; Oxford University Press: New York, NY, USA, 2011.
11. Sone, Y.; Yanase, N.; Uekihara, H.; Shimada, K. “Learn, Think, Talk” *Deliberative Poll-A New Mechanism of Discussion*; Kirakusha: Tokyo, Japan, 2013. (In Japanese)
12. Fishkin, J.S.; He, B.; Luskin, R.C.; Siu, A. Deliberative Democracy in an Unlikely Place: Deliberative Polling in China. *Br. J. Political Sci.* **2010**, *40*, 1–14. [CrossRef]
13. Luskin, R.C.; Fishkin, J.S.; Jowell, R. Considered Opinions: Deliberative Polling in Britain. *Br. J. Political Sci.* **2002**, *32*, 455–487. [CrossRef]

14. Cohen, J. Deliberation and Democratic Legitimacy. In *Debates in Contemporary Political Philosophy: An Anthology*; Matavers, D., Pike, J., Eds.; Routledge: London, UK, 2003; pp. 342–360.
15. Takahashi, K. Public Service Reform and Public Dialogue: Toward Public Administration Considering the Study of Discussion and Deliberation. *Himeji Law Rev.* **2015**, *56*, 119–183. (In Japanese)
16. Hendriks, C.M. Lay Citizen Deliberations: Consensus Conferences and Planning Cells. In *The Deliberative Democracy Handbook: Strategies for Effective Civic Engagement in the 21st Century*; Gastil, J., Levine, P., Eds.; Jossey-Bass: San Francisco, CA, USA, 2005; pp. 80–110.
17. Dryzek, J.; Tucker, A. Deliberative Innovation to Different Effect: Consensus Conferences in Denmark, France, and the United States. *Public Adm. Rev.* **2008**, *68*, 864–876. [\[CrossRef\]](#)
18. Papacharissi, Z. The Virtual Sphere: The Internet as a Public Sphere. *New Media Soc.* **2002**, *4*, 9–27. [\[CrossRef\]](#)
19. Collins, L.; Nerlich, B. Examining User Comments for Deliberative Democracy: A Corpus-driven Analysis of the Climate Change Debate Online. *Environ. Commun.* **2014**, *9*, 189–207. [\[CrossRef\]](#)
20. Pina, V.; Torres, L.; Royo, S. Comparing Online with Offline Citizen Engagement for Climate Change: Findings from Austria, Germany and Spain. *Gov. Inf. Q.* **2017**, *34*, 26–36. [\[CrossRef\]](#)
21. Bojovic, D.; Bonzanigo, L.; Giupponi, C.; Maziotis, A. On-line Participation in Climate Change Adaptation: A Case Study of Agricultural Adaptation Measures in Northern Italy. *J. Environ. Manag.* **2015**, *157*, 8–19. [\[CrossRef\]](#) [\[PubMed\]](#)
22. Schäfer, M.S. Online Communication on Climate Change and Climate Politics: A Literature Review. *Wires Clim. Change* **2012**, *3*, 527–543. [\[CrossRef\]](#)
23. Shank, G. Abductive Multiloguing: The Semiotic Dynamics of Navigating the Net. *Arachnet Electron. J. Virtual Cult.* **1993**, *1*, 1–13.
24. Talpin, J.; Wojcik, S. Deliberating Environmental Policy Issues: Comparing the Learning Potential of Online and Face-to-face Discussions on Climate Change. *Policy Int.* **2010**, *2*, 61–93. [\[CrossRef\]](#)
25. Janssen, D.; Kies, R. Online Forums and Deliberative Democracy. *Acta Política* **2005**, *40*, 317–335. [\[CrossRef\]](#)
26. Wojcieszak, M. Deliberation and Attitude Polarization. *J. Commun.* **2011**, *61*, 596–617. [\[CrossRef\]](#)
27. Baek, Y.M.; Wojcieszak, M.; Delli Carpini, M.X. Online vs. Face-to-face Deliberation: Who? Why? What? With What Effects? *N. Media Soc.* **2012**, *14*, 363–383. [\[CrossRef\]](#)
28. Baba, K.; Kito, M.; Takatsu, H.; Matsuura, M. Stakeholders' Attitudes Change on Wood Biomass Utilization by Online Deliberation. *J. JSCE* **2015**, *71*, 235–246. (In Japanese)
29. Davies, T.; Gangadharan, S.P. *Online Deliberation: Design, Research and Practice*; CSLI Publications/University of Chicago Press: Chicago, IL, USA, 2009.
30. Harashina, T. The Problems and Possibilities of Online Based-Deliberative Forums: The Consideration about Applying Video-Chatting Technology to Deliberation. *Proc. Soc. Socio Inform.* **2013**, 95–100. (In Japanese)
31. Baba, K.; Takatsu, H. Stakeholders' Attitude Change on Resource Trade-off between Geothermal Generation and Hot Spring by Online Deliberative Experiment. *J. Sociotechnology* **2017**, *14*, 58–72. (In Japanese)
32. Price, V.; Nir, L.; Cappella, J.N. Normative and Informational Influences in Online Political Discussions. *Commun. Theory* **2006**, *16*, 47–74. [\[CrossRef\]](#)
33. Albrecht, S. Whose Voice is Heard in Online Deliberation? A Study of Participation and Representation in Political Debates on the Internet. *Inf. Commun. Soc.* **2006**, *9*, 62–82. [\[CrossRef\]](#)
34. Chen, Z.; Zhang, W. Bracketing or Reinforcing? Socio-economic Status, Network Power, and Online Deliberation. *Telemat. Inform.* **2020**, *52*. [\[CrossRef\]](#)
35. Schäfer, A. Deliberation in Representative Institutions: An Analytical Framework for a Systemic Approach. *Aust. J. Political Sci.* **2017**, *52*, 419–435. [\[CrossRef\]](#)
36. Romsdahl, R.J. Deliberative Framing: Opening up Discussions for Local-level Public Engagement on Climate Change. *Clim. Chang.* **2020**, *162*, 145–163. [\[CrossRef\]](#)
37. Hamada, S.; Yagishita, M. Consideration on Deliberation in Stakeholders' Dialogue—Through the practical of “EST Stakeholders Conference”. *Sociotechnica* **2011**, *8*, 170–181. (In Japanese) [\[CrossRef\]](#)
38. Baba, K.; Doi, M.; Tanaka, M. Developing Future Scenarios for Climate Change Adaptation Policy: Case Study of Farming Community in Japan. In *Handbook of Climate Change Management*; Filho, W.F., Luetz, J.M., Ayal, D.Y., Eds.; Springer International Publishing: New York, NY, USA, 2021; forthcoming.
39. Iwami, A.; Kimura, M.; Matsui, T.; Baba, K. Visualization of Relationship between Topics Discussed in Online Deliberation about Climate Change Adaptation. *J. Environ. Inf. Sci.* **2016**, *30*, 311–316. (In Japanese)
40. Baba, K.; Sugimoto, T.; Kubota, H.; Hijioka, Y.; Tanaka, M. Factors to Determine Risk Perception of Climate Change, and Attitude toward Adaptation Policy of the Public. *J. JSCE* **2011**, *67*, 405–413. (In Japanese) [\[CrossRef\]](#)
41. Li, D.; Zhao, L.; Ma, S.; Shao, S.; Zhang, L. What Influences an Individual's Pro-environmental Behavior? A Literature Review. *Resour. Conserv. Recycl.* **2019**, *146*, 28–34. [\[CrossRef\]](#)
42. Taniguchi, H.; Marshall, G.A. Trust, Political Orientation, and Environmental Behavior. *Environ. Politics* **2018**, *27*, 385–410. [\[CrossRef\]](#)
43. Wynveen, C.J.; Sutton, S.G. Engaging the Public in Climate Change-related Pro-environmental Behaviors to Protect Coral Reefs: The Role of Public Trust in the Management Agency. *Marine Policy* **2015**, *53*, 131–140. [\[CrossRef\]](#)

-
44. Kline, R.B. Methodology in the Social Sciences. In *Principles and Practice of Structural Equation Modeling*, 2nd ed.; Guilford Press: New York, NY, USA, 2005.
 45. Baba, K.; Iwami, A.; Amanuma, E. Analysis on Attitudes and Behaviors of Stakeholders for Climate Change Adaptation Policy in Disaster Risk Reduction by Online Deliberation Experiment. *J. JSCE* **2019**, *75*, 151–159. (In Japanese)
 46. Truelove, H.B.; Carrico, A.R.; Thabrew, L. A Socio-psychological Model for Analyzing Climate Change Adaptation: A Case Study of Sri Lankan Paddy Farmers. *Glob. Environ. Change* **2015**, *31*, 85–97. [[CrossRef](#)]
 47. Van Valkengoed, A.M.; Steg, L. Meta-analyses of Factors Motivating Climate Change Adaptation Behaviour. *Nat. Clim. Change* **2019**, *9*, 158–163. [[CrossRef](#)]
 48. Sanderson, M.R.; Bergtold, J.S.; Heier Stamm, J.L.H.; Caldas, M.M.; Ramsey, S.M.; Aistrup, J. Climate Change Beliefs in an Agricultural Context: What is the Role of Values Held by Farming and Non-farming Groups? *Clim. Change* **2018**, *150*, 259–272. [[CrossRef](#)]
 49. Baba, K.; Matsuura, M.; Kudo, T.; Watanabe, S.; Kawakubo, S.; Chujo, A.; Tanaka, H.; Tanaka, M. Climate Change Adaptation Strategies of Local Governments in Japan: A Survey. *Oxf. Res. Encycl. Clim. Sci.* **2017**, 1–27. [[CrossRef](#)]