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Corporate Contributions to Community Resilience after the Great East Japan Earthquake Disaster

Rui Fukumoto

Abstract

In the Great East Japan Earthquake of March 11, 2011, municipalities in the northeastern coastal area of Japan suffered serious damage from the disaster. During such a huge disaster, it is difficult that the municipalities lead the regional recovery, and in order for the regional society to recover autonomously and efficiently from natural disasters, it is important that the communities in the devastated areas have the resilience. This paper focused on “corporate contribution” because the corporations have various resources that can support disaster recovery. Questionnaire surveys were conducted by mail to 1020 corporations including various industries and various sizes of corporations located in Iwanuma City and Natori City, which had been damaged by the Great East Japan Earthquake, analysis of memorial collection of sentences in which the emotions of disaster victims could be grasped, analysis of corporate network contribution, and analysis of corporate behavior based on the continuous interviews in the long term. Based on the results, I will give you a new concept “Gyo-Jyo (corporate contribution to community resilience)” and the information about what are the characteristics of corporate contributions to community resilience after the Great East Japan Earthquake disaster.

Keywords: corporate contribution, community, resilience, earthquake, tsunami, the Great East Japan Earthquake

1. Introduction

This chapter reports the results of empirical research on corporate contributions that contributed to the resilience of local communities after the Great East Japan Earthquake that occurred in Japan in 2011. Among the self-help, mutual-help, and public-help based on the spirit of “San-Jyo” that has existed for a long time in Japan, the author focused on mutual-help and advocated “Gyo-Jyo” as mutual-help by corporations. In order to examine the structure of Gyo-Jyo and social implementation requirements, based on the analysis of data obtained through data surveys, questionnaire surveys, and interview surveys, the actual status of contributions is identified by corporations located in the affected areas to local community recovery. Section 2 describes the outline and damage of the Great East Japan Earthquake as basic information. Section 3 gives an overview of the concept of

mutual-help. Section 4 explains the concept of “Gyo-Jyo” that the author advocates. Section 5 reports on the role of corporations in regional mutual-help relationships based on material analysis. Section 6 reports on the actual state of the corporate contribution as community resilience targeting 1020 corporations located in Iwanuma City and Natori City. Section 7 reports on the identification of the actual conditions of the corporate contribution by the corporate network based on material analysis. Section 8 reports on trying to supplement important findings on corporate contribution that have contributed to community resilience, which may have been discarded using questionnaires and materials, from findings obtained through continuous interviews since 2012. Section 9 summarizes the role of “Gyo-Jo” based on the characteristics of corporate contribution to community resilience that has been identified.

2. Toward realization of a community that enables autonomous recovery from disaster

The Great East Japan Earthquake occurred at 14:46 on March 11, 2011, and the moment magnitude of the earthquake was 9.0. Moreover, the great tsunami occurred in accordance with the earthquake. Accordingly, municipalities in areas along the northeast coast of Japan were severely affected by the disaster. Nineteen thousand and six hundred sixty-seven people were killed, 2,666 people were



Figure 1.
Number of killed and missing people caused by the Great East Japan Earthquake.

missing, and 6,231 people were injured [1]. In addition, 121,783 houses were completely destroyed, 280,965 houses were partially destroyed, and 745,162 houses were damaged [1]. **Figure 1** shows the number of killed and missing people caused by the disaster. The victims were in a state of being confused because they were not able to accurately judge the situation immediately after the disaster, and since the damage was wide and severe from the viewpoint of local governments, the public-help against each victim did not function.

Therefore, it is important that local communities in Japan are required to have resilience in order to reduce the damage and to recover the damage autonomously and efficiently.

3. “Kyo-Jyo” as a structure to reduce damage and recover from the disaster

While Japan has many natural phenomena, it has a past where various natural disasters have occurred and has developed its own concept of disaster preparedness (**Table 1**). Some of them are the concept of “self-help: protect one’s own life,” “mutual-help: neighbors help each other,” and “public-help: administrative relief.” The above concepts are based on “spirit of San-Jyo: three help spirits,” which is advocated by Yozan Uesugi, who was the lord of Yonezawa, declared in 1767 as a basic policy, that is, “self-help: help themselves,” “mutual-help: neighboring communities help each other,” and “feudal clan-help: Yonezawa feudal clan’s relief” [2–4].

Regarding the concept of self-help, mutual-help, and public-help, it is not effective that discussion of which concept is the best, for the purpose of reducing damage at the time of disasters. However, it is important to discuss optimal combinations and disaster prevention and respond to disasters [5]. Regarding the operating actors, self-help is carried out by individuals, and public-help is carried out under the responsibility of the society such as the state and local governments. On the other hand, the concrete operating actors of mutual-help are unclear. Therefore, it has been considered difficult to establish a stable system for practicing mutual-help in previous studies [5, 6]. However, in the disasters that caused major damage such as the 1995 Great Hanshin-Awaji Earthquake, the 2004 Niigata Chuetsu Earthquake, and the 2011 Great East Japan Earthquake, the results and importance of mutual-help are often noted. So the importance of identifying the structure of mutual-help and preparing for the next disaster is obvious. When dealing with regional recovery from disaster, it can be considered that the operating actors of mutual-help are the local community; however, the previous researches focused on the residents and volunteers for mutual-help in the case of making the local society, and the findings have been accumulated. Regarding mutual-help between local

Three help spirits (1767)	Ji Jyo 自助 Self help	Go Jyo 互助 Mutual help	Fu Jyo 扶助 Feudal clan help
Operating Actor	Every individuals	Near neighbors	Yonezawa Feudal clan
Japanese concept of preparation against natural disaster (1995)	Ji Jyo 自助 Self help	Kyo Jyo 共助 Mutual help	Ko Jyo 公助 Public help
Operating Actor	Every individuals	Regional Society	Society including Government

Table 1.
Concept of disaster preparedness in Japan.

residents, if the condition of “live together in a shelter immediately after the disaster” or “to continue living with the residents in temporary housing after 3 to 6 months from the disaster occurred” is satisfied, relationships between local residents have been shown to be inherited to their lives after the disaster [7]. Regarding mutual-help between local residents and volunteers, it is indicated that the social welfare council has played a coordinating role in various supports. On the other hand, it is reported that there is “a situation where priority is not given to the action of helping nearby people but the action of evacuating a car with a family.” Therefore, it is implied that even if there is a community, as a case of mutual-help does not function, and there is concern over the loss of community cohesion [8]. Also, with regard to volunteers, there is a difference in the function of mutual-help among the affected areas, such as easy access to disaster areas with good access [9] and concentration in areas where volunteer support systems are in place [10]. Furthermore, in a dialogue with the author, Tamaura Junior High School’s principal said “There were two cities with big damage next to each other and there was little external support at the beginning of period after the earthquake” on June 28, 2011. Based on the above statement, it is possible that there are many issues in the uneven distribution of volunteers and the development of the support system in each area. On the other hand, it has been pointed out that in the local community, corporations that exist universally are actors that greatly affect the disaster prevention and mitigation power of the local area on a human scale and economic scale [11, 12]. Nevertheless, reporting on the actual state of corporate contribution to the recovery of regional society is insufficient, and the role and significance of corporations that contribute to community resilience are not positioned. The author has experience in emergency medical care and restoration support activities in Minami-Sanriku Town (Miyagi Prefecture) and Iwanuma City (Miyagi Prefecture) from the last part of March 2011. While the author engaged in such activities, the author saw the situation that corporate representatives engaged in various activities for the recovery of regional society as supplying materials and equipment that the corporation owns. For this reason, the author had started this research in that it might be possible to give an important suggestion to the community cooperation and resilience by focusing on the corporate contribution after the disaster.

4. “Gyo-Jyo”: corporate contribution to community resilience

Corporations essentially have the pursuit of profit as their basic nature; fulfill their responsibilities to the society, earning satisfaction and profits as their reward; and establish their survival and development. Therefore, if the society encounters an emergency, it is thought that the corporate responsibility to be fulfilled includes the contribution to the solution of the emergency. Then, as a corporation performs business activities, it requires registering the location of the head office and establishes sales bases. So, corporate local areas exist. Therefore, corporations are considered to be in a position to carry out the corporate responsibility for the solution when the local area where their corporation is located is in an emergency situation. Based on the above statements, local contribution and social contribution to community cooperation as well as corporate self-help can be regarded as one of the actions that corporations can choose. In this section, the concept of “Gyo-jyo (corporate contribution to community resilience)” is presented [13], with a view on “the formation of community based on mutual-help centered on corporations” (Table 2). From the next section, the author will examine the structure of “Gyo-Jyo” through “mutual-help in a local community,” “individual corporations,”

Autor's concept (2018)	Gyo Jyo 業助
	Corporate help
Corporate Contribution to Community Resilience	
Operating Actor	Regional Corporations

Table 2.
Concept of Gyo-Jyo.

“corporate network,” and “case study” in Miyagi Prefecture which was devastated the worst by the Great East Japan Earthquake.

5. Characteristics of corporate contributions in community mutual-help

There are various actors in the local area; however, what kind of characteristics of corporate contribution are there in mutual-help relationships among those actors? The author obtained a memorial text collection “tomoni (together)” organized by Tamaura Junior High School, Iwanuma City, through carrying out restoration and reconstruction support activities since March 2011. This memorial text collection was written by hand in the theme of “what you think from looking back on the disaster” from December 2011 to January 2012, with 143 students attending the Tamaura Junior High School where the school district is included in the tsunami-affected area. It is a 120-page text collection, in which candid impressions of victims have been exposed shortly after the Great East Japan Earthquake and the situation at that time is described. The author converted student’s sentences written by hand into text data and analyzed the description rate of each actor in Japanese original text. In addition, an analysis, after defining “conceptual word” (Table 3) which united the description showing each noun and verb, extracted the description about “who” and “what kind of help was received.” And the author calculated the description rates of “support provider” and “support contents” [13].

5.1 Descriptive statistics value

The sentences written by the students were 143 writings, accounting for 96.6% of the 148 students enrolled. The total number of characters for all writings was 108,538 (Japanese), and the average number of characters per person was about 759 (standard deviation, 324.3). The student who wrote the longest sentence was 2176 characters, and the student who wrote the shortest sentence was 119 characters. 84.6% of the sentences in each student’s sentence contained a description that could be read as “some support or help was received.”

5.2 Descriptive rate of the support provider

Figure 2 shows the proportions in which each student’s text contains the “description of the support provider,” organized by each actor. “Neighbors

Conceptual word	Existent word
Corporation	Company, corporation, Corp. Enterprise, XX mart (name of the shop), carpenters, father’s corporation, etc.

Table 3.
The example of a conceptual word.

(22.4%)” and “charity in Japan (21.0%)” are described in large numbers, then “unknown (19.6%)” and “charity overseas (14.7%)” are more frequently described, and “relatives” (12.6%), “Self-Defense Force (11.9%),” and “corporations (11.2%)” resulted in over 10%. Corporations were the sixth among the 21 entities, with a higher description rate than Iwanuma City and volunteers. At least from the view-point of elementary and junior high school students who have experience in affected areas, the corporate contribution is not small; it was suggested that the role of corporations in regional mutual-help relationships may exist as a reality.

5.3 Description rate of support contents

Next, **Figure 3** shows the proportions of “description of support contents” included in each student’s text, regarding the content of what kind of support each body provided. The red part shows the corporate contribution.

Regarding the description rates of the support contents for mutual-help in local community, support contents which show “encouragement (28.0%)” are described the most. And then “human resources (26.6%),” “daily commodities (25.2%),” and “water and food (23.1%)” have a high description rate of more than 20%. In

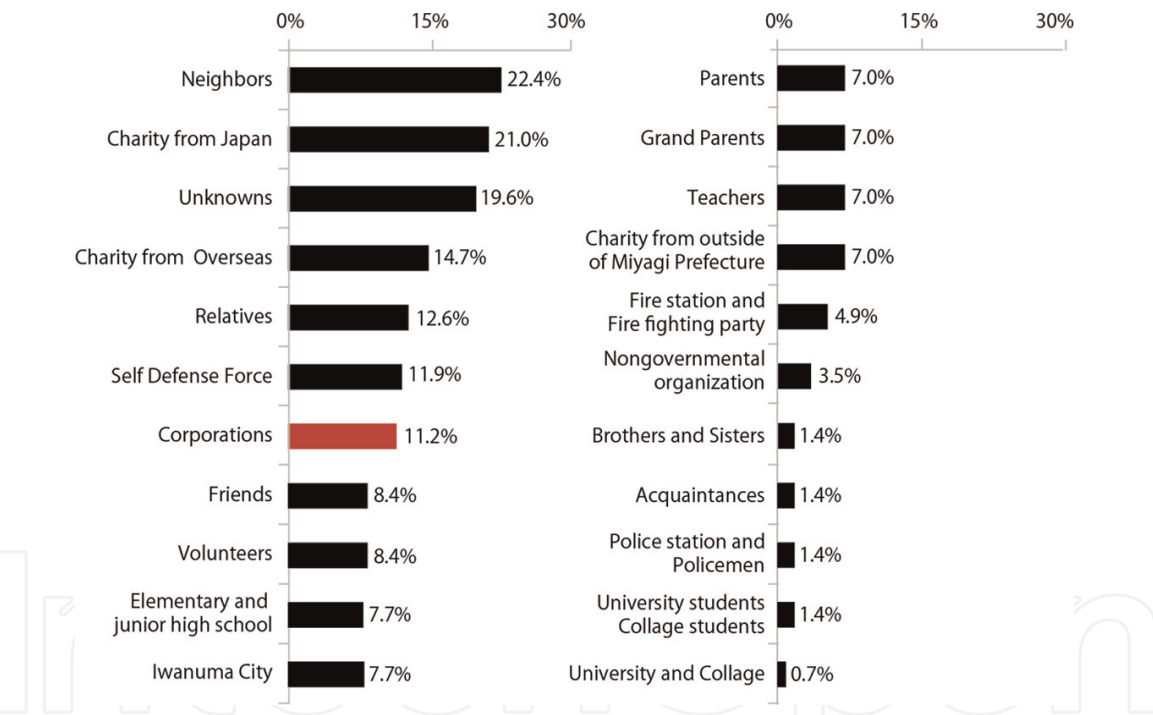


Figure 2.
Description rates of the support providers.

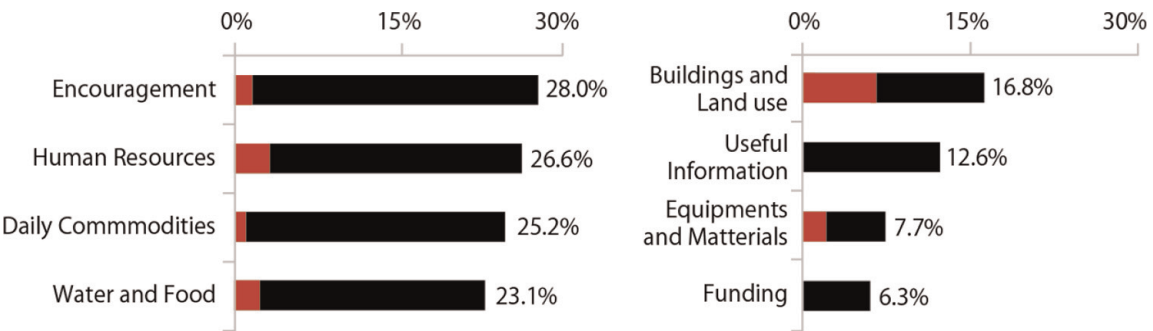


Figure 3.
Description rates of the support contents.

addition, the description rate of “temporary use of lands and buildings (16.8%)” and “useful information (12.6%)” was over 10%. On the other hand, the description rate of “equipment and materials (7.7%)” and “funds (6.3%)” was lower than the other support contents. The high contribution rates of corporations were “temporary use of lands and buildings,” “equipment and materials,” and “human resources.” In addition, it was a surprising result for the author that “encouragement” was mentioned most frequently as support content in mutual-help relationships. According to the experiences of the affected people, it is implied that “encouragement” is an important support content as evidence has been obtained that “In the confuse situation, I was able to recover calm by having someone talked to me and concerned.”

5.4 Characteristics of corporate contribution in regional mutual-help relationships

Based on the collection of sentences, it was identified that “temporary use of lands and buildings,” “equipment and materials,” and “human resource” were mentioned as the content of the description regarding the support with high corporate contribution in regional mutual-help relationships. Specific descriptions of these support contents were the following: (1) repair of houses and (2) temporary evacuation shelter. Regarding the repair of houses, the local constructors carried out the repair of the meeting place in response to a request from the local community, and the carpenter dispatched by a colleague or superior of the workplace of the parents carried out the floor replacement. The above descriptions were described by the junior high school students, and it is suggested that some support in local community after the disaster may be provided by having a “network” that can share issues of affected people. Regarding the temporary evacuation shelters, lands and buildings were provided by corporations and were not recognized as shelters before the disaster occurred; however, the descriptions were described in a context that was unexpectedly used after the earthquake. Therefore, it is suggested that one of the conditions is continuous locating and operating corporations in the regional society.

In this section, based on the analysis of the sentence collection, it was suggested that the corporation might take an important responsibility in the area through the characteristics of corporate contribution in the regional mutual-help relationship. Next, are these support contents often found in corporations located in the affected area? The next section will answer this question.

6. Characteristics of corporate contribution to the recovery of regional society

In this section, the author explains about “how many corporations did provide some support to recovery in the local community after the Great East Japan Earthquake” and “what the characteristics of corporations are that have contributed to recovery in the local community.”

The author conducted a mail survey of 1020 companies (36.8% of the total 2941 corporations in the target area) located in Iwanuma City and Natori City, which were affected by the Great East Japan Earthquake and tsunami [14]. The location of the target corporations was shown in **Figure 4**. The target area was suitable for this investigation because corporations which were of various sizes and industry types were located around Sendai International Airport in the target area.

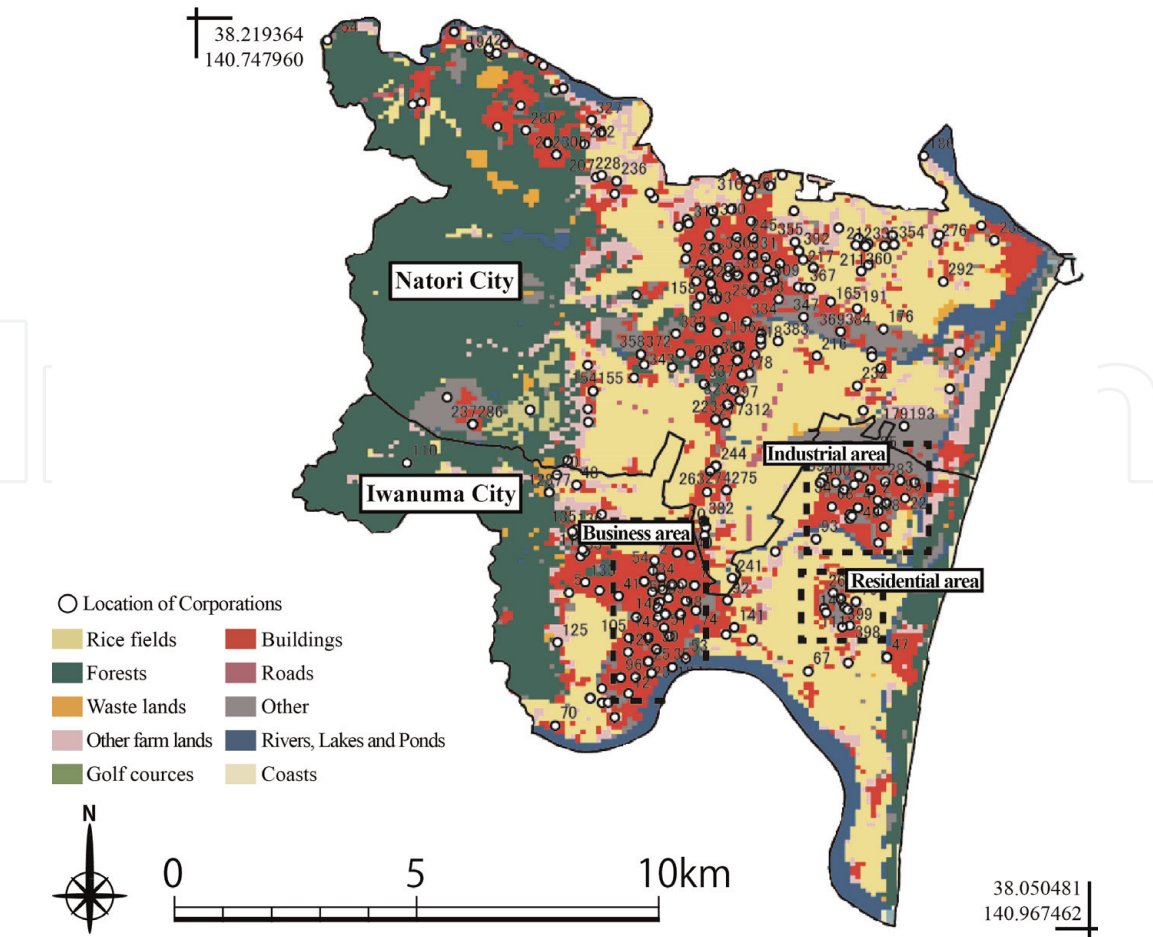


Figure 4.
Location of target corporations [13].

6.1 Attribute information of target corporations

6.1.1 Response rate

The author sent the questionnaire to 1020 corporations which were enrolled in Tokyo Teikoku Databank. Four hundred (39.2%) corporations responded to the questionnaire. The number of respondents by industry was high for “construction” (120 corporations), “wholesale and retail trade” (78 corporations), “manufacturing” (42 corporations), and “miscellaneous business services, n.e.c. (40 corporations).” **Table 4** shows the response rates by industry based on 1123 corporations including 103 corporations that were located in the target area and shut down from March 2011 to December 2014. Although the response rate for many industries exceeds 30.0%, it should be noted that the response rate for “finance and insurance” was 0%.

6.1.2 Percentage of companies by the number of employees of target companies

Figure 5 shows the ratio of the number of employees in the target corporations. The average number of employees was 32.2, with a median of 7, maximum of 3049, and minimum of 0. The target corporations were classified into the following categories based on the number of employees: “The number of employees is 0 (4.0%),” “micro corporation is more than 0 but fewer than 8 (46.5%),” “small corporation is more than 7 but fewer than 21 (29.5%),” “medium corporation is more than 20 but fewer than 101 (16.0%),” and “large corporation is more than

Industry type	Targets	Responded	RR (%)
Construction	351	120	34.2
Wholesale and retail trade	222	78	35.1
Miscellaneous business services, n.e.c.	120	40	36.7
Manufacturing	103	42	40.8
Medical, health care, and welfare	77	29	37.7
Transport and postal services	57	24	42.1
Real estate and goods rental and leasing	66	20	30.3
Living-related and personal services and amusement services	21	11	52.4
Electricity, gas, heat, and water supply	23	10	43.5
Accommodation, eating, and drinking services	23	8	34.8
Information and communications	11	4	36.4
Education, learning support	8	4	50.0
Scientific research, professional, and technical services	12	3	25.0
Agriculture, forestry, and fisheries	5	2	40.0
Mining and quarrying of stone	5	1	20.0
Finance and insurance	8	0	0.0

Table 4.
Response rate of each industry.

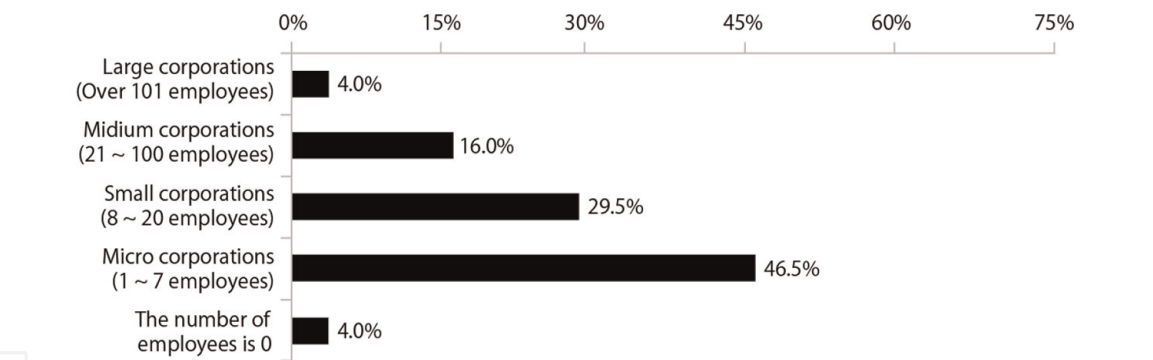


Figure 5.
Classification of the number of employees.

100 employees (4.0%).” Based on the economic census in Japan in 2009, the average number of employees of corporations located in the same target area is about 11, and the median is 7. The proportion of large enterprises in the target area was 1.1%, and the proportion of medium-sized enterprises was 10.1% based on the census, while the proportion of large enterprises in this survey was 4.0%, and the proportion of medium-sized enterprises was 16.0%. Therefore, it is judged that various corporations are included in the target corporations.

6.1.3 Damage suffered by target corporations

Figure 6 shows the ratio of damage to annual sales of target corporations. The average was 36.8%, the median was 29.4%, the maximum was 1500.0%, and the minimum was 0.0%. Only 6.3% of corporations responded that they did not suffer damage. Therefore, many of the target corporations are judged to have suffered some damage after the disaster.

Figure 7 shows the damage types that the target corporations received. Specifically, “equipment damage (59.3%)” was over half in the target corporations, and also “decreasing in sales (45.8%),” “decreasing in customers (29.8%),” and “inventory damage (26.5%)” had a relatively high proportion. “Increase in borrowing (16.0%),” “surging purchase (13.8%),” “surging outsourcing costs (13.3%),” and “surging personnel costs (9.5%)” had a relatively low proportion. In addition, 16.8% of the target corporations have an experience of temporarily stopping operations.

6.2 How many corporations contributed to the recovery of regional society after the disaster?

Based on the questionnaire survey, 32.8% of the target corporations provided some support for regional recovery after the disaster (**Figure 8**).

The contents of the support provided by the target corporations were shown in **Figure 9**. The contents were “human resources (59.5%),” “equipment and materials (45.8%),” “daily commodities (38.9%),” “useful information (15.3%),” “funding (13.7%),” and “temporary use of lands and buildings (11.5%).”

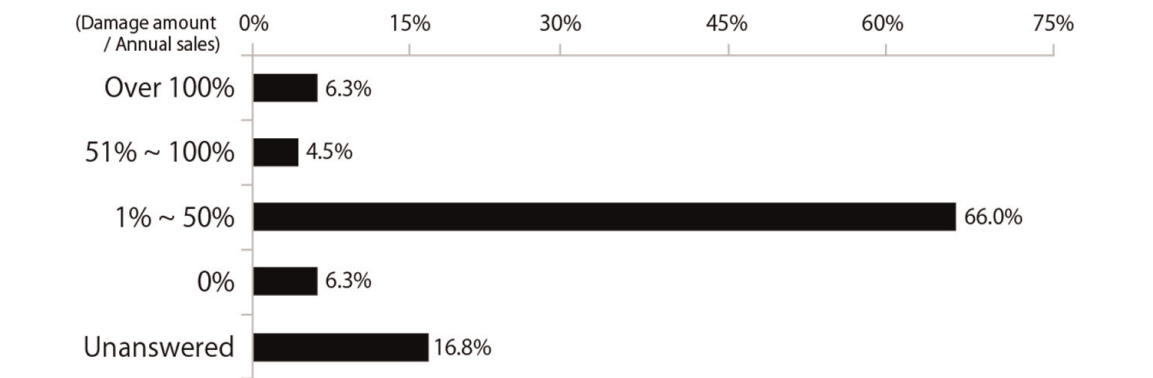


Figure 6.
Ratio of the damage amount to annual sales.

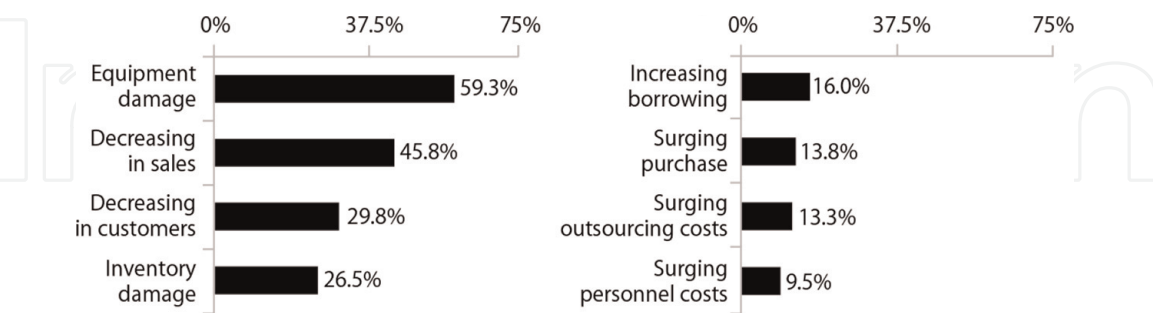


Figure 7.
Proportion of damage types.

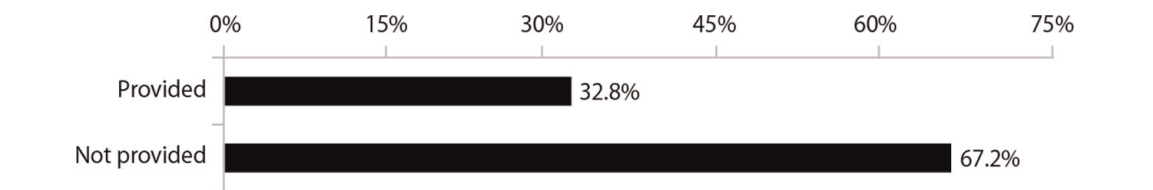


Figure 8.
Proportion of the type of damages.

6.3 Reason for the providing support

74.5% of corporations that provided some support had a social relationship with the support recipient before the disaster occurred (**Figure 10**).

50.4% of the corporations that provided some support and had a social relationship with the support recipient did not conduct some particular activities (**Figure 11**). 49.7% of the corporations conducted some activities.

In addition, based on an interview survey, the author obtained the reasons and motivations why corporations provided the support to recovery of regional society, and these were the following: (1) leading to the continual and long-term benefits of the corporations, (2) having attachments to the hometown, (3) being present at the scene and providing, (4) searching direction of their action, and (5) receiving some support from others and having thought about providing some support to return the favor.

6.4 Differences of corporate contribution between groups classified by corporate consciousness

Next, are there any relationships between corporate contribution and corporate consciousness? The author tabulated corporate contribution of each group classified by corporate consciousness (**Figure 12**).

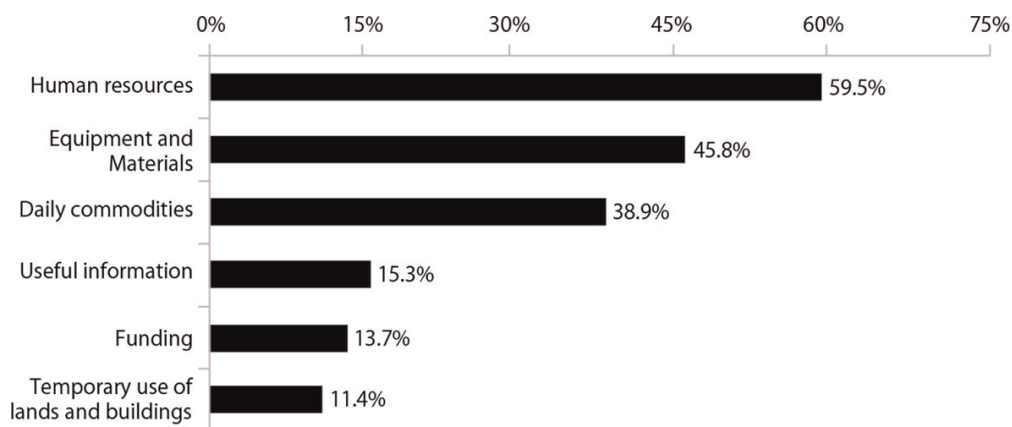


Figure 9.
The contents of the support provided by the target corporations.

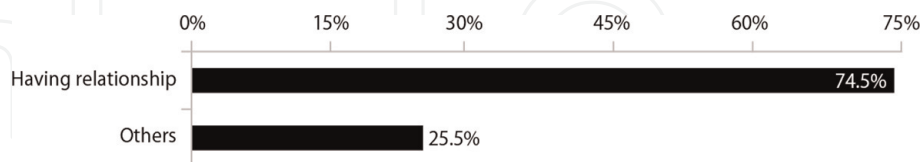


Figure 10.
Relationship between the corporation and the support recipient.

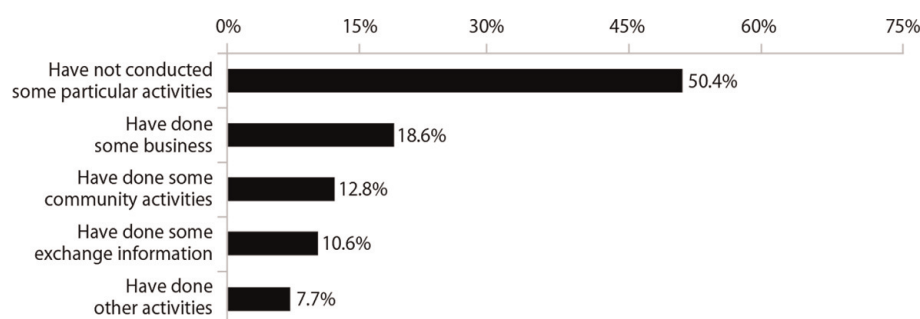


Figure 11.
Contents of social relationship between the corporation and the support recipient.

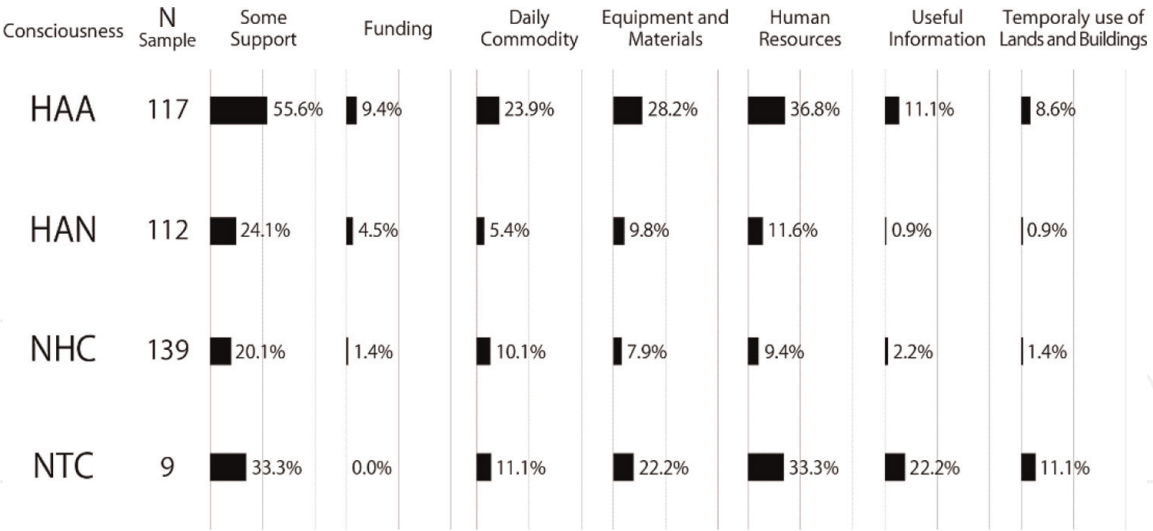


Figure 12. Providing support between groups classified by corporate consciousness for contributions before the occurrence of the disaster [13]. HAA, having awareness of contributions to the recovery of regional society and having already conducted related activities; HAN, having awareness of contributions to the recovery of regional society but having conducted no related activities earlier; NHC, not having the capacity to contribute; NTC, having never thought about making contributions.

It obviously differed between “having awareness of contributions to the recovery of regional society and having already conducted related activities (HAA: 55.6%)” and the other answers.

And also, in 229 corporations (57.3%) that have a consciousness of the contributions, 92 corporations (40.2%) provided some supports.

It was important that not only having the awareness but also conducting related activities before the disaster for conducting the corporate contribution.

6.5 Characteristics of corporate contribution to recovery of regional society in Iwanuma City and Natori City after the Great East Japan Earthquake

Based on the analysis of the characteristics of corporations that contributed to the recovery of the regional society, it is identified that there are common characteristics of all support types and characteristics of each support. The results are shown in Table 5 [14].

6.6 Common characteristics of all support types

As characteristics to increase the probability of providing some supports to recovery of regional society, it has identified that it is important the corporate consciousness to contribution to the recovery of regional society but also the having conducted related activities before the occurrence of the disaster.

6.7 Characteristics of each support

It was identified that the characteristics of each support type differ depending on the conditions such as the industry type, the location, and the number of employees. Specifically, “support for temporary use of land and buildings” and “located in a large-scale semi-destruction area” had an impact. Regarding “support for equipment and materials,” “medium corporations” and “construction industry” had an impact. Regarding “support for daily commodities,” the effects of “accommodation, eating, and drinking services” and “manufacturing” were significant.

Support type	Consciousness	Number of employees	Industry type	Location of the main customers	Surrounding land use	Damage caused by the tsunami
Some of the support	HAA ***					
Funding	HAA **					
Daily commodities	HAA ***		ACCO*** MANU*	ISCL *		
Equipment and materials	HAA ***	Medium corporations*	CONS**		Rice-field area*	
Human resources	HAA ***			ISCL *	Building area**	TDND*
Useful information	HAA **		REAL***		Building area*	
Temporary use of lands and buildings	HAA **					LPDA*

***0 is not included in 99.9% Wald confidence interval.
**0 is not included in 99% Wald confidence interval.
*0 is not included in 95% Wald confidence interval.
CONS, construction; MANU, manufacturing; ACCO, accommodation, eating, and drinking services; REAL, real estate and goods rental and leasing; HAA, having awareness of contributions to the recovery of regional society and having already conducted related activities before the occurrence of disaster; ISCL, inside the same city limits; TDND, districts without tsunami damage near the devastated area; LPDA, large-scale partially destroyed area.

Table 5.
Summary of the characteristics of the corporations that provided support [13].

Regarding “support for useful information,” the effect of “real estate and goods rental and leasing” had an impact.

In this section, the author explained about “how many corporations provided the support to the recovery of the regional society after the Great East Japan Earthquake” and “what the characteristics of the corporations are” through the case study in Iwanuma City and Natori City, Miyagi Prefecture, Japan, which had the highest damages from the Great East Japan Earthquake.

The target of the above explanation was a single corporation. However, in fact, there was a case that some supports were provided through a corporate network because some corporations could not afford to provide individual support. In the next section, the author is going to explain about the results of surveys and analyzes targeting corporate networks.

7. Characteristics of corporate network contribution to the recovery of regional society

In this section, the author tries to explain about the actual situation of the supports which were provided by some corporate network. The conditions of selecting the targets were the following: (1) corporate networks and organizations having bases in Iwanuma City, (2) the networks and organizations defining its contribution to regional society as their primary or secondary activities, (3) widely deployed nationwide, (4) composed of different industries, and (5) activities being recorded.

As a result of examining the above conditions, Iwanuma Chamber of Commerce and Industry, Iwanuma Rinku Industrial Park, Iwanuma Rotary Club, and Abukuma Youth Council were selected as survey targets. We collected and analyzed the records and documents of the activities in the corporate networks and organizations and grasped the actual situation through identifying the support types, support destinations, and collaboration partners that were addressed during the recovery period from the Great East Japan Earthquake. **Table 6** showed a list of collected data.

7.1 Actual situation of the project of contribution to recovery of the regional society from the disaster by corporate networks and organizations

Analyzing based on the data in **Table 6**, support project names, support destinations, support types, support content, and collaboration actors were identified. It can be understood that the support projects of each corporate network are diverse. There were a large amount of funding, human resources, and support for equipment and materials. In addition, there was a little funding support for the survey based on individual corporations in the previous section. It is thought that the single corporation could not afford to provide some supports; however, they could provide the supports through a corporate network (**Table 7**).

Regarding the actual situation of the project of contribution by corporate networks and organizations, it can be read that the number of the projects is small from March to May 2011 and the number of the projects is concentrated from June to December 2011. Of the projects related to regional restoration, 85.0% were

Literature material	Publisher	Period of time
NEWS LETTER Wing's	Cooperative Association with Natori City and Iwanuma City Chamber of Commerce	From Jan. 2011 to Oct. 2014
Annual report	Iwanuma City Chamber of Commerce	From Jan. 2012 to Dec. 2014
A list of members	Iwanuma City Chamber of Commerce	From Mar. 2011 to Dec. 2011
Weekly report	Iwanuma Rotary Club	From Mar. 2011 to Sep. 2014
Activity plan	Iwanuma Rotary Club	From Jan. 2011 to Jun. 2015
Inspection report of corporate preparation for disaster prevention	Iwanuma Industrial Park	From Sep. 2011 to Oct. 2011
Reconstruction of headquarters in response to the Great East Japan Earthquake in Iwanuma Industrial Park	Iwanuma Industrial Park	From Mar. 2011 to Sep. 2011
Inspection report of recovery in Iwanuma Industrial Park from the Great East Japan Earthquake	Iwanuma Industrial Park	Mar. 2011
Corporate report "Bridge"	Tohoku Electric Power Co., Inc.	Mar. 2012
Movie report of the festival "Ganbarou Miyagi" in Abukuma	Abukuma Junior Chamber	Sep. 2011

Table 6.
Material for survey analysis.

Network	Year/ month	Project name	Support destination	Contents of support						Cooperate actors					
				EC	HR	FD	DC	UI	EM	LB	C	N	Np	Ed	Go
IRC	2011/3	Installation of shelter box	Disaster sufferers		○				○			○			
IRC	2011/5	Planting green near the temporary house	Residents who lived in temporary housing		○				○						
IRC	2011/6	Tomato for revitalization	Affected farmers		○			○			○		○	○	
IRC	2011/6	Providing cold patch	Affected farmers				○				○				
IRC	2011/6	Providing donation	Disaster sufferers			○						○			
ICC	2011/6	Consulting counter for emergency recovery	Affected corporations					○							
ICC	2011/6	Providing daily commodities	Disaster sufferers				○					○			
ICC	2011/6	Providing donation	Iwanuma City			○						○			
IRC	2011/7	Providing digital blackboard and PC	Affected junior high school						○						
IRC	2011/7	Providing fire vehicle pump (middle size)	Iwanuma City						○			○			
IRC	2011/7	Providing fire vehicle pump (small size)	Iwanuma City						○			○			
ICC	2011/8	Selling charity goods	Disaster sufferers			○						○			
ICC	2011/8	Organizing Iwanuma summer festival for revitalization	Disaster sufferers		○									○	
IIP	2011/8	Cleaning activities in Iwanuma Industrial Park	Local residents		○						○				
IRC	2011/9	Fund-raising campaign	Affected corporations			○									
IRC	2011/9	Providing project fund	Affected farmers			○						○			
IRC	2011/9	Providing temporary use of parking space	AJC							○	○				
AJC	2011/9	Organizing the festival Ganbarou Miyagi	Local residents		○	○			○			○			
IRC	2011/10	Providing quilt works	Affected elementary school	○											○
IRC	2011/10	Selling tomato for revitalization	IRC		○	○						○			
ICC	2011/11	Organizing marketplace for revitalization	Disaster sufferers		○						○				

Network	Year/ month	Project name	Support destination	Contents of support						Cooperate actors					
				EC	HR	FD	DC	UI	EM	LB	C	N	Np	Ed	Go
IRC	2011/12	Providing fund for cultivating melon	Affected farmers			○							○		
IRC	2011/12	Providing donation for children	Affected kindergartens			○							○		
IRC	2011/12	Providing fund for constructing plastic greenhouse	Affected farmers			○							○		
IRC	2011/12	Providing boots	Disaster sufferers				○						○		
ICC	2012/1	Consulting grant application for the subsidy	Affected corporations		○	○		○							○
IRC	2012/4	Organizing charity concert	Local residents		○	○							○		
IRC	2012/4	Providing three small generators	Iwanuma City						○				○		
IRC	2012/5	Providing patient transfer vehicle	Affected hospital						○				○		
IRC	2012/6	Providing opportunity to participate in a summer camp	Affected junior high school		○	○							○		
IRC	2012/6	Supporting to make an application for “recovery of the tower clock”	Iwanuma City					○							
IRC	2012/6	Supporting to make an application for “recovery of the power tiller to cultivate cucumber”	Affected farmers					○							
ICC	2012/7	Establishing support project to revitalize the local community	Affected corporations			○									
IRC	2012/8	Providing machine for soil improvement	Affected farmers						○				○		
IRC	2012/12	Providing 600 books	Affected library				○						○		
IRC	2012/12	Providing UAV for “taking photos of recovery process by residents”	Disaster sufferers						○		○	○	○	○	
ICC	2013/1	Establishing support project to recovery of facilities for small and medium corporations	Affected corporations			○									○
ICC	2013/11	Conducting event “Iwanuma city shops stamp rally” to promote sales	Local residents			○					○				

IRC, Iwanuma Rotary Club; ICC, Iwanuma City Chamber of Commerce; AJC, Abukuma Junior Chamber; IIP, Iwanuma Industrial Park; EC, encouragement; HR, human resources; FD, funding; DC, daily commodities; UI, useful information; EM, equipment and materials; LB, temporary use of lands and buildings; C, a corporation; n, corporate networks; Np, nonprofit organizations; Ed, an educational institution; Go, government.

Table 7.
The recovery project provided by the corporate network based on the material analysis.

implemented in cooperation with other corporations, corporate networks, and organizations.

7.2 Actual situations of corporate contribution by corporate networks and organizations to recovery of the regional society from the disaster

It was identified that the targeted corporate networks and organizations had provided some supports for the recovery of the regional society. First of all, the support provided by the Iwanuma Rotary Club varied in the type and destination of support and was based on a highly effective spillover effect that provided clear targets and details of support. The contents of these activities were mentioned in the sentence collection “tomoni (together)” of Iwanuma City Tamaura Junior High School, which was dealt with in the previous section, and gratitude was expressed. Therefore, these supports were considered to be an effective support in the regional mutual-help relationship. Second, the support provided by the Abukuma Junior Chamber was limited to one project as a group; however, the target was not clearly limited, and it was possible to brighten the awareness of the affected people widely from the mood that was not lively. The project was designed with the aim of brightening the atmosphere and was implemented as a support project that works directly on the area of Iwanuma City. Third, the support provided by the Iwanuma City Chamber of Commerce was also implemented for the recovery festival and projects aimed at helping the affected residents in Iwanuma City such as “Fukkou-ichi (market for affected people to be happy).” In addition, the Iwanuma City Chamber of Commerce also established and conducted the financial support for the continuation of corporations including corporations that contributed to recovery of regional society after the disaster. This support may be considered as the implementation of indirect support for the recovery of the regional society. Fourth, the Iwanuma Rinku Industrial Park Council did not provide specific support but only cleaned the entire industrial park with the affected people from the disaster. However, the recovery of distribution bases and maintenance/creation of employment were regarded as supporting the recovery of regional society in the medium to long term. In addition, they were contributed to recovery of the infrastructure for the destroyed electricity supply in 61 days after the disaster occurred. As mentioned above, “implementation of support based on high public interest ripple effects” by the corporate networks and organizations, “implementation of support projects that directly work on the area of Iwanuma city,” “financial support for corporations that contribute to recovery of regional society from the disaster,” and “recovery of infrastructure and maintenance and creation of long-term employment” were identified as different characters of corporate contribution by the corporate networks and organizations.

7.3 Characteristics of corporate networks and organizations that contributed to the recovery of the regional society

Through the support for recovery of the regional society after the disaster by corporate networks and organizations, it was implied that the characteristics of the contribution were the following: (1) implementing large-scale supports that each corporation and other actors had a difficulty to provide, (2) playing a role of intermediate support, and (3) continuously providing the support and the evidence of small visible recovery as a piece of revitalization from the disaster. Based on these points, the author considered the characteristics of corporate networks and organizations that have contributed to the recovery of regional society. First of all, based on “each corporation that achieved a difficult scale of support through cooperation

with other actors” and “intermediate support role,” it was considered that corporate networks and organizations played the role of the base where the support from all over the world could be collected. In actuality, in the case of Iwanuma Rotary Club, the structure of Rotary International’s corporate network and organization was functioning, and “the fact that they regularly interact with various bases in the regional society and build trust relationships” provides access to the support destination. It is possible that it can be mentioned that “the network and organization with common philosophy being organized and interactive in Japan and abroad” is the fact that the support implementation system can be prepared. Second, based on “the evidence of small visible recovery that was gained continuously,” the corporate networks and organizations steadily worked on projects with a view on medium- to long-term reconstruction and revitalization of the regional society, such as agricultural recovery support, involving various actors, and creating a forum and information transmission. In addition, one of the characteristics was providing occasions that have “overlap width for relationship building” in that new entrants can be involved. It is thought that the existence of the occasions has the potential to boost the reconstruction and revitalization of the entire regional society, as it is a content that arouses various people’s sympathies and is easily taken up by the media.

8. Characteristics of corporate contribution based on continuous interview survey

The findings obtained up to the previous section are considered to have certain significance because the findings include the results obtained by the quantitative approach. However, due to the limited degree of freedom of responses through questionnaire surveys and limited material surveys, there may be a problem that essential findings may be discarded or reduced. In order to solve this problem, the author focuses on corporate behavior for corporations that have received continuous research cooperation from April 2012 to September 2018, examines the effects (phenomena) of corporate behavior, and understands the context (concepts) that leads to it; it will be a foothold of the argument on the structure of corporate contribution.

The corporation selected as the case study was based in Iwanuma City, a corporation whose main business was agriculture and affected by the tsunami caused by the Great East Japan Earthquake (hereinafter referred to as target farmers).

The behaviors of the target farmers had been selected “corporate recovery response (maximization of personal benefits),” “regional recovery response (maximization of public benefits),” and “leading regional reconstruction and revitalization (maximization of public benefits)” in time-sequentially.

“Corporate recovery response” is one of the preconditions for corporate behavior aimed at “regional recovery response” and “leading regional reconstruction and revitalization.” Mr. F who was a managing director and center of the target farmers said in April 2012 that “No regional recovery is possible until corporate recovery is complete. Everything can be considered after the corporate recovery and living recovery.” Target farmers achieved corporate recovery in September 2012 because the corporate recovery was promoted by the flow of public funds and external corporate funds into the area, such as East Japan grants, public funds of Miyagi Prefecture, and funds of major food manufacturing corporations.

The behavior of the target farmers who achieved the corporate recovery was changed from “corporate recovery response” to “undertaking of the affected farmland,” “creating employment of affected farmers and victims,” and “developing

communities for affected farmers and residents.” It has been changed into “behavior of maximizing public benefit” from “maximization of personal benefits.”

The target farmer was entrusted with farmers who cannot restart the farmland for various reasons, the target farmer takes on the farmland which had not been resumed, and the scale of the cultivated area of the rice field was 20 ha before the earthquake and expanded to 177 ha as of September 2018. In addition, the target farmer hires affected farmers and victims who cannot reopen farmland for various reasons, contributes to the recovery of employment and life in the affected areas, and revitalizes the fields through agriculture. The target farmer made the occasion to connect with the affected farmers and victims.

Regarding “leading regional reconstruction and revitalization (maximization of public benefits),” it contributed to “preserving green landscape like an extensive rice field and prevention of the decline in regional agriculture” and recovery of 16.9% “affected farmland (rice field)” as a result of continuing the above “regional recovery response” for 6 years from September 2012 to September 2018. The estimated affected farmland of Iwanuma City is 1206 ha, of which 1068 ha is identified to be the affected rice fields. In September 2018, the target farmer has recovered 16.9% of the rice fields. In terms of planning theory, corporate recovery of the target farmers was the key to regional recovery, and it is thought that the target farmer contributed to the recovery of regional agriculture in the affected area and the preserving green landscape like an extensive rice field in Iwanuma City. In addition, one of the factors of the recovery was promoting the recovery caused by the flow of public and external funds from the support of corporations and corporate networks and organizations into the regional society. Therefore, corporate behaviors related to “applications of subsidies” that have brought “utility of the flow of public and external funds into the regional society” can be positioned as one of the factors of the recovery.

8.1 The context leading to the corporate behavior of the target farmer

In order to understand the context leading to a series of corporate behaviors that bring about the abovementioned effects, the author will focus on Mr. F’s behaviors and consider it from the theoretical framework of social dilemma [16]. Social dilemmas are well-defined in various research fields; however, this research adopted the definition of “social situation that has to choose either maximization of personal benefits or maximization of public benefits” [17]. Regarding the behavior of corporations after the Great East Japan Earthquake dealt with in this research, any of the “corporate recovery response,” “regional recovery response,” and “leading regional reconstruction and revitalization” can be set as the purpose. Based on the definition [17], it is possible to consider corporate behaviors on two axes: escape behavior (maximizing personal benefits) and cooperative behavior (maximizing public benefits). Furthermore, the state of the corporation can be regarded as the result of repeatedly selecting any of the above actions. An approach to finding an answer that solves the social dilemma set up above is a “psychological strategy” [17]. A “psychological strategy” is defined as “inducing voluntary cooperative behavior by acting on psychological factors such as belief, attitude, and sense of responsibility, trust, morality, and knowledge that prescribes individual behavior” [17–20].

Based on these theoretical frameworks, the author tries to consider the corporate behavior of the target farmers.

Next, the author tries to consider understanding the context leading to the selection of corporate behavior of the target farmer shown in **Figure 13**, the

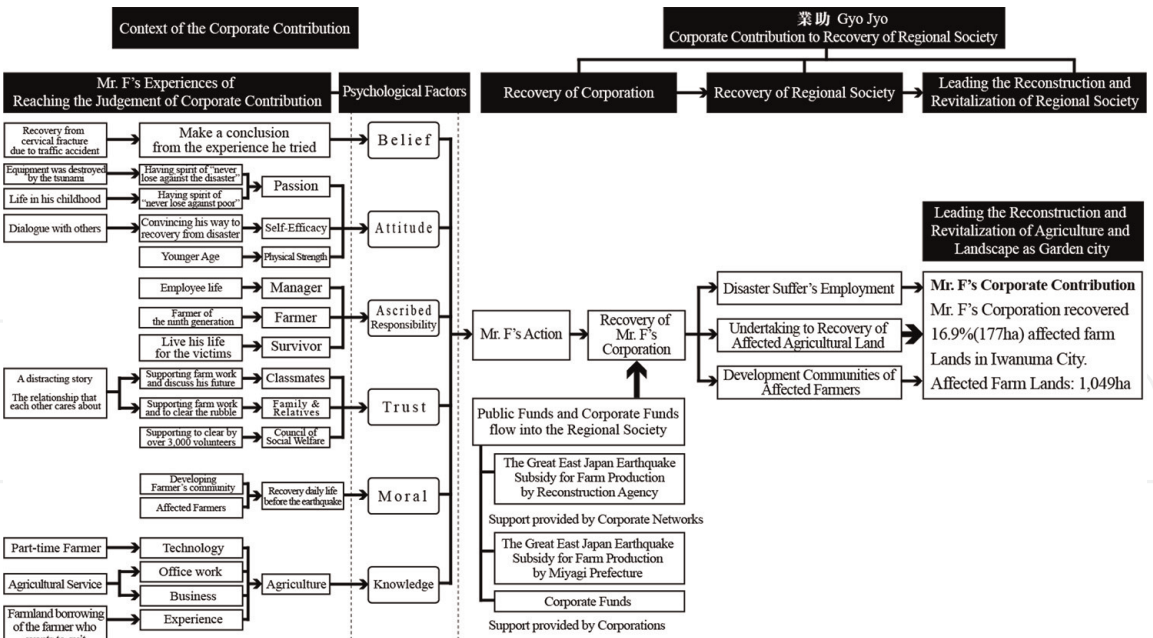


Figure 13.
The context leading to the corporate behavior of the target farmer.

corporation that maximizes the public benefit based on the narrative of Mr. F for each factor of the psychological strategy against social dilemmas.

Regarding “belief,” the belief found in Mr. F’s narrative was “concluding from the tried without giving up.” The reason for the formation of this belief comes from the experience that Mr. F fractured the cervical spine in a traffic accident when he was a high school student, was hospitalized for 6 months, and recovered miraculously through rehabilitation.

Regarding “attitude,” it is composed of a plurality of components such as “passion [21],” “action [21],” and “confidence [22].” Based on the above, it was defined in this research that the components that make up the attitude in this research were “passion,” “self-efficacy,” and “physical strength (required for action).” As for “passion,” “having the spirit of never losing against the disaster” and “having the spirit of never losing against the poor” could be seen. The reason that these passions were formed was that the former was due to “the experience of the corporate equipment being completely destroyed by the tsunami” and the latter was because “when he was a child, he could not live a good life.” Regarding “self-efficacy,” the target farmer had obtained it through “self-identification of his own style in agricultural business.”

The trigger of the formation of his self-efficacy was that “he has the confidence in his own agricultural style through various responses to agricultural efforts in dialogue with others.”

Regarding “physical strength (required for action),” youngness was important. Mr. F said, “I think I could not continue farming if I were ten years older.”

“Ascribed responsibility,” based on Mr. F’s narrative, can be raised from three perspectives: “manager,” “farmer,” and “survivor.” According to Mr. F’s narrative, it was confirmed that “It is necessary to maintain the employment of a trusted employee,” as the ascribed responsibility in the view of the “manager.” According to Mr. F’s narrative, it was confirmed that “I want to revive affected farmland” and “Farmer is a farmer” as his testimony and “he is the ninth generation farmer.” Therefore, it was considered that the above testimonies and facts were ascribed responsibility as the “farmer.” According to Mr. F’s narrative, it was confirmed that “I want to live and survive for the people who died in the disaster” as his testimony.

Therefore, it was considered that the above testimony was ascribed responsibility as the “survivor.”

The “trust,” based on Mr. F’s narratives, includes the perspectives of “family, relatives,” “classmates,” and “social welfare council.” As for “family, relatives,” and “classmate friends,” Mr. F said, “A relationship that we spend a long time. We know each other about pain, itching and tickling well.” While farming, they remember the image of the daily scene before the disaster little by little, and they could confirm the trust in the recovery of daily life. About “social welfare meeting,” approximately 3000 volunteer staff engaged in removal and cleaning work of rubble in the area of target farmer from April 2011 to November 2011 when the prospect of corporate recovery was not at a standstill. Mr. F testified to this fact, “I am really thankful for them,” as a testimony showing trust.

The “moral,” based on Mr. F’s narrative, includes “recovery of daily life.” Ka-chan Plaza (local market) was restarted by Mr. F for “farmers who shipped to Ka-chan Plaza (local market)” and “affected farmers who cannot restart on their own farmlands” as a place to support “face-to-face meeting opportunities, resumption of agriculture, and sales agricultural products.”

The “knowledge,” based on Mr. F’s narrative, was about agriculture. The details of the knowledge were on “technology,” “office work,” “sales,” and “experience.”

As for “technology,” Mr. F has been engaged in agriculture as a part-time farmer for a long time, and since the target farmer is a generation-long farmer, they have cultivated their own agricultural technology. As for “office work,” Mr. F was familiar with the office work related to agricultural business because he was engaged in the preparation of documents related to agricultural business, office work, and support work when he was working in a nonprofit incorporated association related to the agricultural business. With regard to “sales,” from the experience of Mr. F serving as a team leader for promoting the consumption of rice in Miyagi Prefecture nationwide while working for the association, he gained the knowledge of consumer behavior and sales methods regarding purchasing including personal relationships and public relations. As for “experience,” Mr. F expanded the area of rice cultivation and took business difficulties when the tomato price collapsed caused by O-157 which occurred in 1996. At that time, they had experience of renting farmland and farming from a farmer who wanted to go out of business, and they were familiar with negotiations and procedures.

8.2 Understanding the context leading to corporate behavior that maximizes public interest based on Mr. F’s narrative

It is suggested that each psychological factor mentioned above influenced Mr. F’s behavior, and it can be understood as a context leading to the corporate behavior of the target farmer.

While the target farmer was aiming for their own corporate recovery, corporate networks, administrations, and volunteers provided support in response to the recovery, and that support promoted the recovery of the target farmers, and the large-scale public funds flew into the recovery of regional society.

After that, the target farmer has the prospect of restoration in mind; they decided to “undertake the recovery of affected farmlands” in the affected areas where there was a concern for the abandonment of cultivated land and continue to assume large-scale acreage by 2018.

“Small recovery” by target farmer was accumulated by “corporate recovery response” and “regional recovery response,” creating an opportunity for the inflow of public funds, preventing the abandonment of cultivated land in the area, and driving the recovery of the agricultural industry in the area. One of the agricultural

corporations could be organized and played a role of “preserving green landscape like an extensive rice field and prevention of the decline in regional agriculture” as “leading regional reconstruction and revitalization.” Therefore, “Gyo-Jyo (corporate contribution to the recovery of regional society)” is extremely important after the disaster for the community resilience.

9. Conclusion: the role of “Gyo-Jyo”

In this chapter, in order to understand “Gyo-Jyo” advocated by the author, identifying characteristics of corporate contributions based on the study, the author focused on corporate behavior as the structure of “corporate contribution” and tried to understand its effect and the context leading to the behavior from the following viewpoints: (1) focusing on corporate behavior in the mutual-help relationship, (2) focusing on single corporate behavior of 1020 corporations located in the affected area, (3) focusing on the behavior of corporate networks and organizations located in the affected area, and (4) focusing on corporate behavior of corporations that have received continuous research cooperation from April 2012 to September 2018.

The structure of corporate contribution was considered to consist of “corporate recovery response,” “regional recovery response,” and “leading regional reconstruction and revitalization” In addition, after the corporate recovery was achieved, leading regional reconstruction and revitalization could be a small local recovery that was accumulated by the corporations and other actors and showed the flow which realizes the reconstruction of the area by having them cooperate with one flow.

About the flow in this chapter, in the case of an agricultural corporation, achievement the recovery of 16.9% of the affected farmlands in Iwanuma City by continuously repeating the practice of preventing the abandonment of local farming areas and involved the affected farmers.

It was implied that “Gyo-Jyo (corporate contribution to community resilience)” played a role of preserving the rich rural space and green landscape, playing a central role in the regional reconstruction and revitalization.

At the current stage, it is possible that the research will focus on individual small business owners closer to the residents and the effects of corporate contribution will differ depending on the industry types, and there will be issues to identify them. However, it is implied that the contribution of corporate contribution to the community resilience “Gyo-Jyo” was extremely large, and having presented the possibility and importance of that role, these findings make sense for the region to prepare for disasters in the future.

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Conflict of interest

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Author details

Rui Fukumoto
Department of Architecture and Environmental Design, Nagaoka Institute of
Design, Nagaoka, Japan

*Address all correspondence to: rfukumoto@nagaoka-id.ac.jp

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