The Citizens' Perception of Community and Local Capabilities for Disaster Management in Kawasaki-shi: Results of Web-Based Questionnaire Analysis

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Chapter 1: Introduction

The purpose of this study is primarily to quantitatively ascertain people's perception of community from the results of a web-based questionnaire of Kawasaki-shi citizens, while discussing the relationship between perception of community and social capital. In the following chapters, we will start to analyze the results of the "Survey on Disaster Management Activities and Citizens' Perception of Community in Kawasaki-shi" conducted by the authors with a focus on responses that relate to local community and summarize the citizens' perception of community in Kawasaki-shi. Next, we will focus on issues related to the fostering of perception of community and social capital among Kawasaki-shi citizens compared with previous studies.[1]

The second purpose of this study is to perform a path analysis of Kawasaki-shi citizens by means of a covariance structure analysis of the tabulated results of the web-based questionnaire, demonstrate that the three-factor structural model already analyzed in Shinjuku-ku can also be applied in Kawasaki-shi after partial modification, and examine whether social capital has any impact on local capabilities for disaster management.

Also note that the term *Social Capital* discussed in this study refers to "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions."[2]

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1 For information on the relationship between community research and social capital, please refer to the author's paper "Community Changes and Social Capital – Organizing Issues based on Previous Studies" which appeared in this journal, and "Community Research Based on Relationship with Historical Perspectives – Research Brief of Community Research Group," which appeared in *Annual Report No. 5*.

2 Robert Putnam (2000).

Chapter 2: Arranging Previous Studies

2 . 1 Previous Studies on Perception of Community and Social Capital

In terms of a regional society, a community refers to "a group-based society (collective) primarily made up of individual and families that maintains regional characteristics and cooperativity (feeling of solidarity, sense of belonging, cognition of mutual aid) while sharing various social and economic interests." There are various organizational forms and descriptions for the main groups that support communities, such as community associations, neighborhood associations and elderly persons' associations, and these activities include activities to foster regional bonds, community activities and the activities of community associations. These voluntary and independent social activities in which local residents play a central role are generally referred to collectively as "civil activities."

Against the backdrop of rapid social changes associated with economic growth, from the 1960s communities have been the subject of various studies and research. The Community Issues Subcommittee of the Quality of Life Council's Survey Group (1969) discussed the raison d'etre (function and role) of communities as the "strongholds of restoring humanity in modern civilized society," and as a "defense of life and safety net for providing welfare-related public (social) services."[3] However, the Research Group on the New Roles of Communities (2009) expressed concerns that in light of social and economic changes which have occurred in recent years, such as the dwindling birthrate and aging population, population decline and the tightening of local government finances, "a situation best described as the 'hollowing-out of regional cooperation' where there exist no basic mechanisms of regional cooperation to continuously, comprehensively and efficiently provide public services closely connected with people's everyday lives, will progress."

In light of these social and economic issues, the Cabinet Office's Social Policy Bureau has conducted the National Survey on Lifestyle Preferences themed on the "the links (in terms of family, region and workplace) with society."[4] As a result, the Social Policy Bureau (2007) indicated that the characteristics of people predisposed to maintaining neighborhood ties and the characteristics of people predisposed to taking part in regional civil activities are mostly the same. Specifically, factors such as "being in a higher age group, being married with a current spouse, having children and having lived in a location for at least five years" reduced the rate of non-participation in local activities, while factors such as "being gainfully employed (as a salaried or self-employed worker) and living in an apartment complex" raised the rate of non-participation in local activities. On the other hand, the National and Regional Planning Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (2005) cited characteristics such as "level of interaction with others living within walking distance," "age," "years of residence" and "population density of habitable areas" as factors that influence the

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3 Quality of Life Council (1969), pp.155-156, p.163.

4 Cabinet Office (2004) (2007) (2010).

degree of participation in civil activities. It was also made clear that people who feel their area of residence is "comfortable to live in" believe that the region is one in which residents trust one another even in times of emergency such as disasters and crime, have strong perception of mutual assistance and engage in active civil activities.

Considered from the perspective of the relationship between communities and social capital, from the 1990s onwards previous research in Japan has taken almost the same view, namely that the dilution of regional bonds has brought about a reduction in participation in activities oriented towards regional bonds, and that this has led to a decline in social capital. On the other hand, studies have also pointed out the emergence and expansion of new forms of social capital due to the advancement of new forms of civil activities such as volunteer initiatives and NPOs. Since there is a degree of correlation between the general level of trust, interaction and exchanges, and participation in civil activities, it is thought that those who take part in civil activities have the potential to help foster social capital.

According to the Cabinet Office's Social Policy Bureau (2003), since the constituent elements of social capital—social trust, norms of reciprocity (social participation) and networks (interaction, exchange)—are seen as having the potential to mutually influence and enhance one another in a cascading fashion, they are pointed out as having a positive feedback relationship with the revitalization of civil activities and fostering of social capital. In concrete terms, a relatively large number of participants in civil activities are generally highly trusted and actively pursue interaction and exchange. Conversely, a relatively large number of those who are highly trusted and actively pursue interaction and exchange engage in civil activities. As participants in civil activities voluntarily and actively involve themselves in a broad range of activities, it is possible that that can not only broaden the scope of their own exchanges and interactions but also help to foster social capital. On the other hand, the Cabinet Office Economic and Social Research Institute (2005) indicated that individual-level social capital fostered a sense of reassurance in everyday life and that positive assessments of the community in which one lives may enhance the sense of reassurance in everyday life. Specifically, people exhibiting characteristics such as being female, gainfully employed, having a long history of residence, being married, being highly-educated, having high income and owning their own home tended to have a lot of social capital. Further, with respect to the advancing dilution of relationships built on regional bonds, Nagatomi, Ishida, Koyabu and Inaba (2011) indicated that initiatives which seek to enhance both the cohesive form and bridge-building from of social capital in an integrated fashion are required.

2 . 2 Previous Studies on Community and Local Capabilities for Disaster Management

In the field of disaster management, since the Great Hanshin-Awaji Earthquake there have been calls for unity in self-help, mutual assistance and public assistance. During a large-scale natural disaster, the government response is limited and communities have no choice but to take over the government's original role in performing emergency measures to deal with the disaster. After the Great Hanshin-Awaji Earthquake the Disaster Countermeasures Basic Act was amended,

and as a result local governments (public assistance) were given the responsibility of enhancing voluntary organizations for disaster management (mutual assistance).

Meanwhile, in terms of the concept of social capital, in recent years studies have sought to analyze the actual conditions of local activities for disaster management. According the findings of a previous study, the factors which promote local capabilities for disaster management are (1) the presence of leaders willing to engage in disaster management; (2) the presence of social capital in the region; and (3) organizations and systems which foster social capital[5]. However, studies which involve performing a path analysis by means of a covariance structure analysis[6], in other words, studies that involve an in-depth examination of the interaction of latent variables that cannot be obtained from questionnaires, have been extremely rare.

In terms of previous studies on local capabilities for disaster management, there is little more than (1) Yasihiko Wada, Yasuhiro Heike, Nariaki Wada (2009) "Improvement Factors of Self-help Attitudes against Urban Floods, and Improvement of Self-help Attitudes by Covariance Structure Analysis," Japan Society for Disaster Information Studies, *Disaster Information Journal No. 7*, pp.53-61; (2) Roshan Bhakta Bhandari, Norio Okada, Muneta Yokomatsu, Hitoshi Ikeo (2010) "Building a Disaster Resilient Community through Ritual Based Social Capital: A Brief Analysis of Findings from the Case Study of Kishiwada," *Annuals of Disaster Prevention Research Institute*, Kyoto University, vol.53(B), pp.137-148; (3) Yuichi Marumo (2011) "Questionnaire Survey on Voluntary Disaster Prevention Activities in Shinjuku-ku Focusing on Social Capital" Senshu University Center for Social Capital Studies, *The Senshu Social Capital Review, No. 2* pp.49-78; (4) Yuichi Marumo (2012) "Questionnaire Survey on Local Capabilities for Disaster Management in Shinjuku-ku and Impact of the Great East Japan Earthquake: Model Construction by the Use of Structural Equation Modeling (SEM)" Senshu University Center for Social Capital Studies, *The Senshu Social Capital Review, No. 3* pp.21-60.

Chapter 3: Web-based Questionnaire in Kawasaki-shi

3 . 1 Survey Design of the Web-based Questionnaire

The Center for Social Capital Studies, Institute for the Development of Social Intelligence, Senshu University has adopted the concept of social capital in communities and regional societies as its research framework and conducted fact-finding surveys in various regions throughout East Asia. The "Survey on Disaster Management Activities and Citizens' Perception of Community in Kawasaki-shi" was conducted as a part of these survey activities. The purpose

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5 Junko Suzuki (2005), "The Role of Social Capital in Building Local Capabilities for Disaster Management," Hosei University Graduate School *Environmental Management Course 2004 Master's Thesis*

6 Covariance structure analysis is a statistical method that seeks to provide a visual understanding of various phenomena by deriving latent variables that cannot be directly observed from directly observed variables (observed variables) and formulating a hypothesis regarding the causal relationship between the observed variables and latent variables. Covariance structure analysis is also referred to as SEM (structural equation modeling).

of the survey was to analyze the ability to conduct disaster management activities, the ability to run local communities and the relationship of these qualities to social capital. Specifically, by ascertaining things such as local residents' perception of disaster management and the status of activities conducted by voluntary organizations for disaster management, and by gaining an understanding of local residents' perception of community, including sense of trust in the region and neighborhood interactions, as well as the ability to run local communities, we aim to focus on current status and issues relating to social capital in Kawasaki-shi and utilize the findings in the operation of future regional activities.

Design of the survey, including aspects such as the survey schedule, are as follows.

- Implementation Body: Center for Social Capital Studies, Institute for the Development of Social Intelligence, Senshu University
- Survey Contractor：Cross Marketing Inc.
- Survey Period: December 3, 2012 to December 6, 2012
- Persons Surveyed：Survey population was adult males and females residing in the Kawasaki-shi, Kanagawa Prefecture area
- Sample Size: 1,000 (Allocated according to population makeup based on the 2011 Kawasaki-shi population by age)
- Number of sample allocations: For persons aged 60 and older, the target was to allocate around 280 among males and females combined, taking into account the expected number of surveys it would be possible to collect. However, the allocations adhered to the population makeup (gender distribution) in Kawasaki-shi as much as possible.
- Survey Method: Web-based questionnaire
- Survey details: As outlined in the following table.

Survey Details	Number of Questions	Remarks
Ⅰ. Respondent attributes	10	Age, gender, years and type of residence, etc.
Ⅱ. Local capabilities for disaster management	11	State of local activities for disaster management, organizations relied on during a disaster, etc.
Ⅲ. Social trust	10	Degree of trust of society, degree of trust in regional community, etc.
Ⅳ. Operation and improvement of lifestyle	6	Level of life satisfaction, recognition of current situation, etc.

In many parts, the questionnaire questions are formed based on the Likert Scale Method. Likert Method responses are essentially an ordinal scale, but in the case of four-choice or five-choice methods, spacing between choices is regarded as equidistant and answers are generally treated like numerical data.[7]

7 In creating questions, care needed to be taken to ensure equidistant space of choices.

3 - 2 Survey Results

(1) Respondent profiles

Figure 1 shows the numbers allocated and percentages of total respondents by respondent age group and gender. This information is depicted in the form of pie charts in Figure 2 and Figure 3.

Age Group (Constituent Ratio)	Male (No. Allocated)	Male (No. of Respondents and Percentage of Total Respondents)	Female (No. Allocated)	Female (No. of Respondents and Percentage of Total Respondents)
20s (16.8%)	90	90 (9.0%)	78	78 (7.8%)
30s (21.7%)	114	114 (11.4%)	103	103 (10.3%)
40s (19.6%)	104	104 (10.4%)	92	92 (9.2%)
50s (13.4%)	70	70 (7.0%)	64	64 (6.4%)
60s and older (28.5%)	280 among males and females	174 (17.4%)	280 among males and females	111 (11.1%)
Total		552 (55.2%)		448 (44.8%)

Figure 1: Numbers Allocated and Percentages of Total Respondents by Age Group and Gender

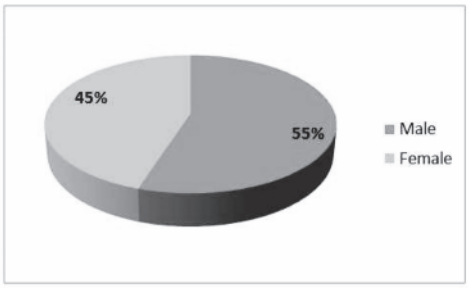

Figure 2: Gender

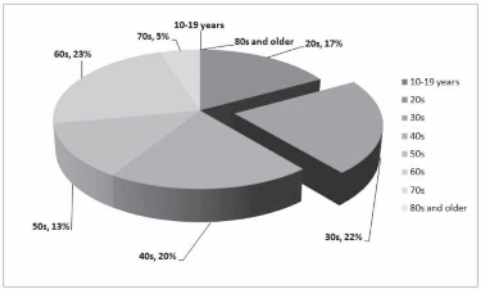

Figure 3: Age Group

In order of most common, respondent occupations were "full-time employee at a private company," "stay-at-home duties," "unemployed" and "temporary employee, temporary worker, part-time worker or casual worker" (Figure 4). Most respondents (64%) lived in their own homes (detached homes + apartments). 34% had lived in the location for less than ten years and 19% between 10 and 20 years, indicating a majority of respondents (53%) had lived in the location for less than 20 years (Figure 5, Figure 6).

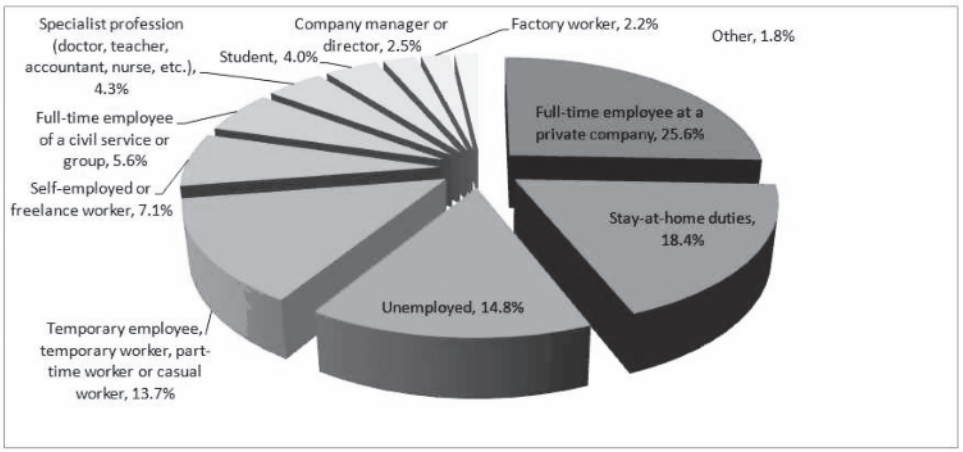

Figure 4: Occupation

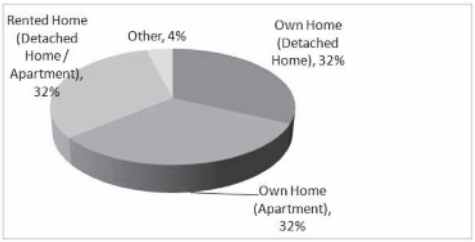

Figure 5: Type of Residence

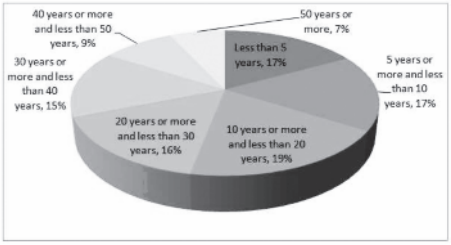

Figure 6: Years of Residence

In terms of residential intentions, most respondents (59%) said they "wish to continue living in Kawasaki-shi. When combined with the 6% who "wish to move house within Kawasaki-shi," 65% wish to live in Kawasaki-shi (Figure 7). With regard to the level of life satisfaction, when combining respondents who said they were "very satisfied" (11%) and "somewhat satisfied" (62%), the majority of respondents (73%) indicated they were satisfied (Figure 8).

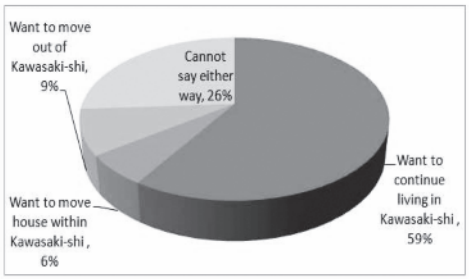

Figure 7: Residence Intentions

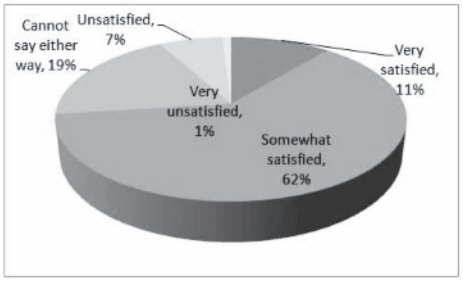

Figure 8: Level of Life Satisfaction

(2) Trust of society

1) General trust of society as a whole

Among responses indicating the social perception of respondents, looking at "general trust" of people, 40% said they could trust people ("can trust most people" + "can trust a lot of people"), while 34% responded that even while traveling, they could trust people ("can trust most people" + "can trust a lot of people") (Figure 9, Figure 10). Compared with surveys conducted by other investigative research organizations, these figures are extremely high.

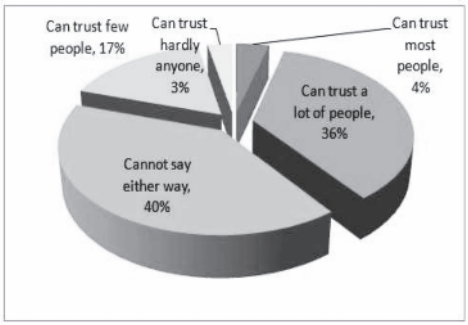

Figure 9: General Trust of Society

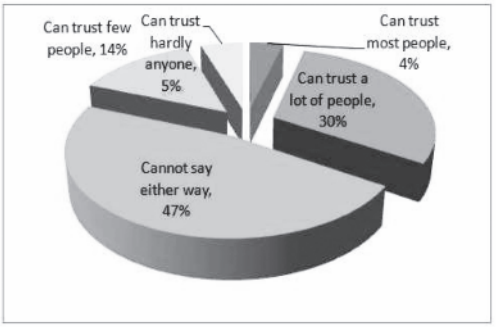

Figure 10: Trust While Traveling

2) Particularized trust (Figure 11)

Particularized trust is a concept that refers to the trust one has for a particular individual or organization, and in this survey applies to a "person or organization you can consult with over troubles or concerns in daily life." Here, particularized trust was highest for "Family members," followed by "Friends and acquaintances" and "Relatives." "Neighbors" and

"Neighborhood or community associations," which represent regional bonds, engendered lower levels of trust than "Schools or hospitals," "Police or fire departments" and "Workplace colleagues," and were rated by the majority of respondents as unreliable as "Religious organizations," "Political parties or politicians," "National government" and "Volunteer organizations, NPOs, etc."

	Reliable	Cannot say either way	Unreliable
(1) Family members	79.7%	11.6%	8.7%
(2) Neighbors	16.0%	32.2%	51.8%
(3) Relatives	32.6%	29.3%	38.1%
(4) Friends and acquaintances	57.0%	28.1%	14.9%
(5) Workplace colleagues	22.1%	41.2%	36.7%
(6) Neighborhood or community associations	9.0%	38.2%	52.8%
(7) Volunteer organizations, NPOs, etc.	11.1%	37.5%	51.4%
(8) Religious organizations	4.1%	20.7%	75.2%
(9) Police or fire departments	24.7%	37.0%	38.3%
(10) Schools or hospitals	26.0%	42.6%	31.4%
(11) Political parties or politicians	4.5%	27.0%	68.5%
(12) City hall or ward offices	21.3%	40.5%	38.2%
(13) Kanagawa Prefecture	15.2%	40.9%	43.9%
(14) National government	10.3%	36.6%	53.2%

• "Reliable": Total of "very reliable" and "somewhat reliable"
• "Unreliable": Total of "not very reliable" and "not reliable at all"

Figure 11: Person or organization you can consult with over troubles or concerns in daily life (%)

(3) Networks

1) Interaction

For "frequency of interaction with relatives," combining "interact daily," "interact somewhat frequently (around once a week)" and "interact sometimes (once a month to several times a year)" accounted for 53% of respondents, while combining "rarely interact (once a year to once every several years)" and "do not interact at all (have no relatives)" accounts for 47% of respondents (Figure 12).

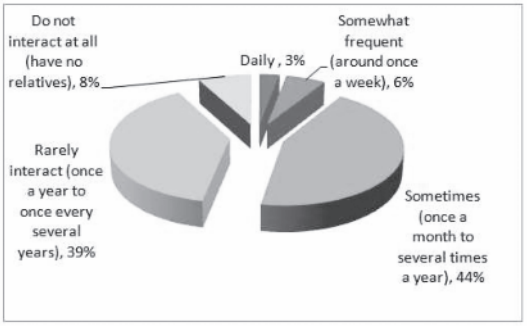

Figure 12: Frequency of Interaction with Relatives

Respondents who have a certain level of interaction with the relatives and those who do not can therefore be split into two. For the frequency of interaction with friends and acquaintances outside school or the workplace, as combining "interact daily," "interact somewhat frequently (around once a week)" and "interact sometimes (once a month to several times a year)" accounts for 73% of respondents, we can say that the majority of respondents interact with friends and acquaintances outside school or the workplace (Figure 13).

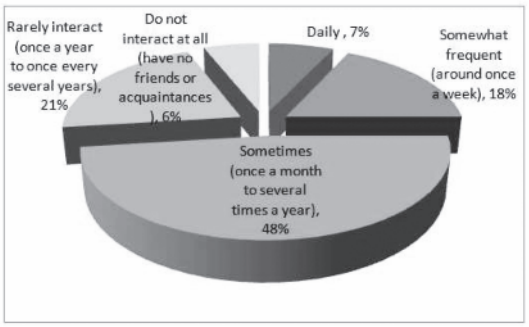

Figure 13: Frequency of Interaction with Friends and Acquaintances Outside School or the Workplace

For the "degree of interaction with neighbors," "minimum interaction on the level of greetings" was the most common response (46%), followed by "interaction on the level of standing around chatting daily" (27%) and "no interaction at all" (17%) (Figure 14). We can therefore say that the majority (63%) of respondents do not have close interaction with their neighbors. For the "proportion of interaction with neighbors," based the responses for "become acquainted with or have exchanges with very close neighbors" (44%), "do not know the names of neighbors" (23%) and "become acquainted with or have exchanges with around half of the neighbors" (21%), respondents are believed to become acquainted with or have exchanges with neighbors within an extremely narrow scope (Figure 15).

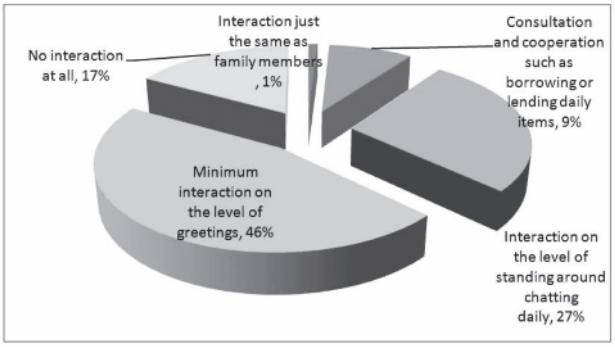

Figure 14: Degree of Interaction with Neighbors

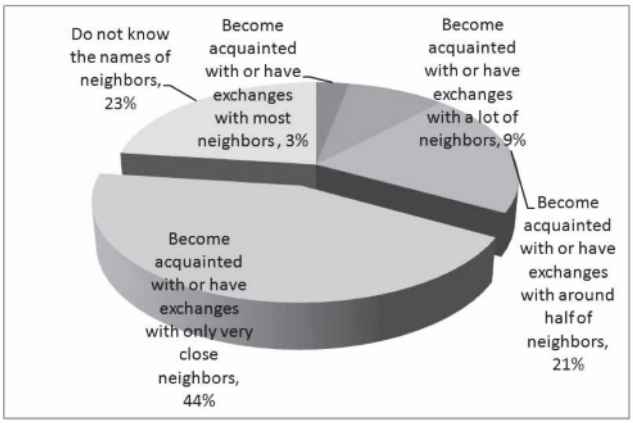

Figure 15: oportion of Interaction with Neighbors

2) Participation in the local community

Among activities oriented towards regional bonds, for voluntary organizations for disaster management respondents appear to be assigned to for community and neighborhood associations, and residents' associations of housing complexes and apartment buildings. However, those who "don't know of any assigned organizations" (36%) or "not conducted at all" (6%) accounted for almost half of all respondents (Figure 16). For the state of activities at voluntary organizations for disaster management, almost half (44%) of all respondents harbored negative views, as opposed to 22% with positive views (Figure 17.) The majority (90%) of respondents had no direct relationship with a voluntary organization for disaster management, and combining "do not take part at all" and "do not take part very much" accounts for 76% of all respondents for participation in voluntary activities for disaster management (Figure 18, Figure 19).

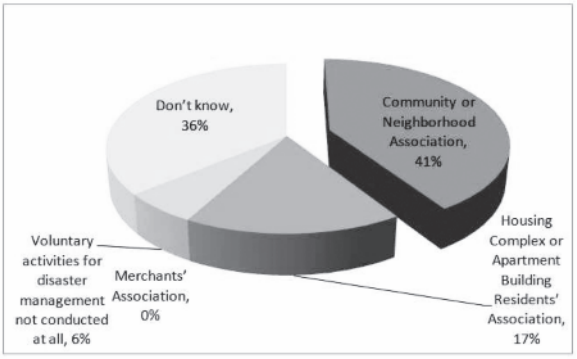

Figure 16: Assigned Voluntary Organization for Disaster Management

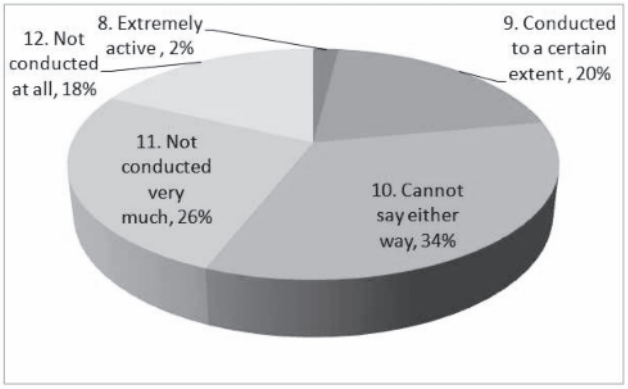

Figure 17: State of Activities at Voluntary Organizations for Disaster Management

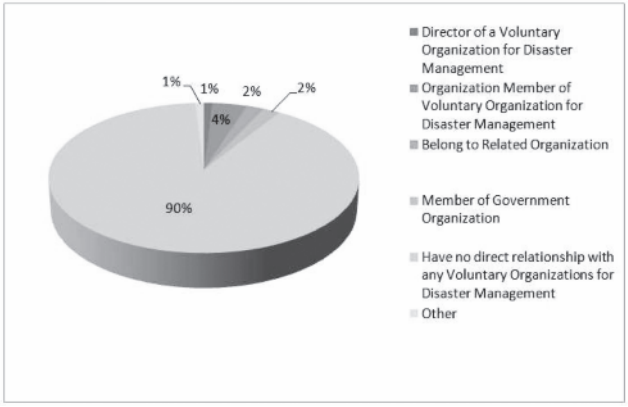

Figure 18: Relationship with Voluntary Organizations for Disaster Management

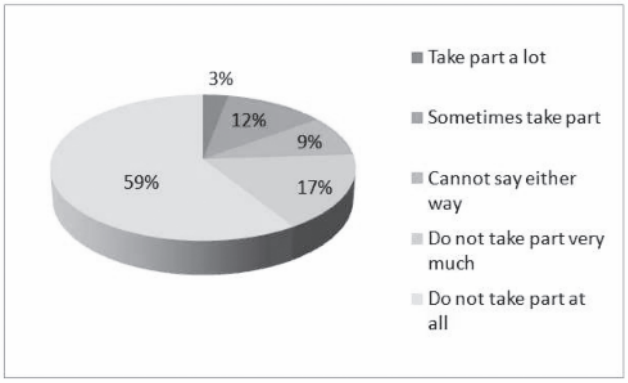

Figure 19: Participation in Voluntary Activities for Disaster Management

Even among regional bond-oriented activities, when asked about whether they belonged to a neighborhood or community association, more than half (54%) said they "do not belong" or were "not sure," suggesting that many respondents have a low identity of membership in such organizations (Figure 20). For the state of activities in regional bond-oriented groups, the positive views (33%) and negative views (31%) were roughly equal (Figure 21).

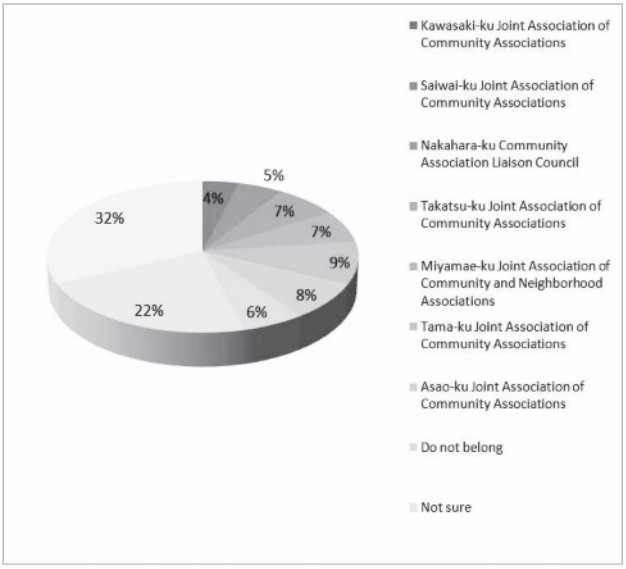

Figure 20: Neighborhood or Community Associations Joined

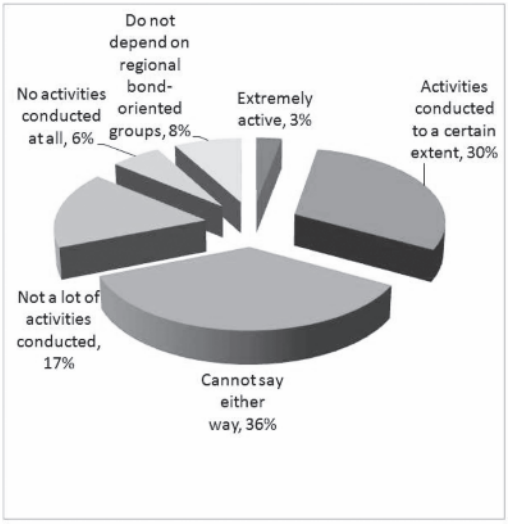

Figure 21: State of Activities in Regional Bond-Oriented Groups

In terms of activities in which people take part locally, 20.7% of respondents take part in regional bond-oriented activities (community associations, neighborhood associations, women's groups, elderly persons' associations, youth organizations, children's associations, etc.), and 18.1% take part in sport, hobby and leisure-oriented activities (various sports, art and culture-oriented activities, lifelong learning, etc.), both low figures. Further, on "things gained through local activities," as there were only between 3 and 6 respondents, we were not able to analyze the results. From this we can infer that most respondents have little interest in local activities (Figure 22). The above represents an outline of respondents' perception of community derived from simple statistics.

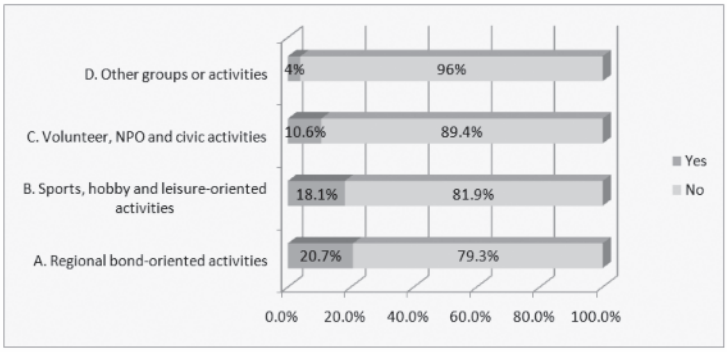

Figure 22: Local Participation in Activities

Chapter 4: Results of Perception of Community Analysis Using Multivariate Analysis

4 . 1 Cluster Analysis

As a result of performing a nonhierarchical cluster analysis based on the simple statistical data, four clusters were derived (Figure 23). The first cluster comprises 162 people, the second contains 259, the third contains 307 and the fourth contains 272. When a chi-squared test was performed to examine the deviation in comparative numbers of people a significant deviation in the proportion of people counts was observed ($\chi 2=46.23$, df=3, $p<.000$).

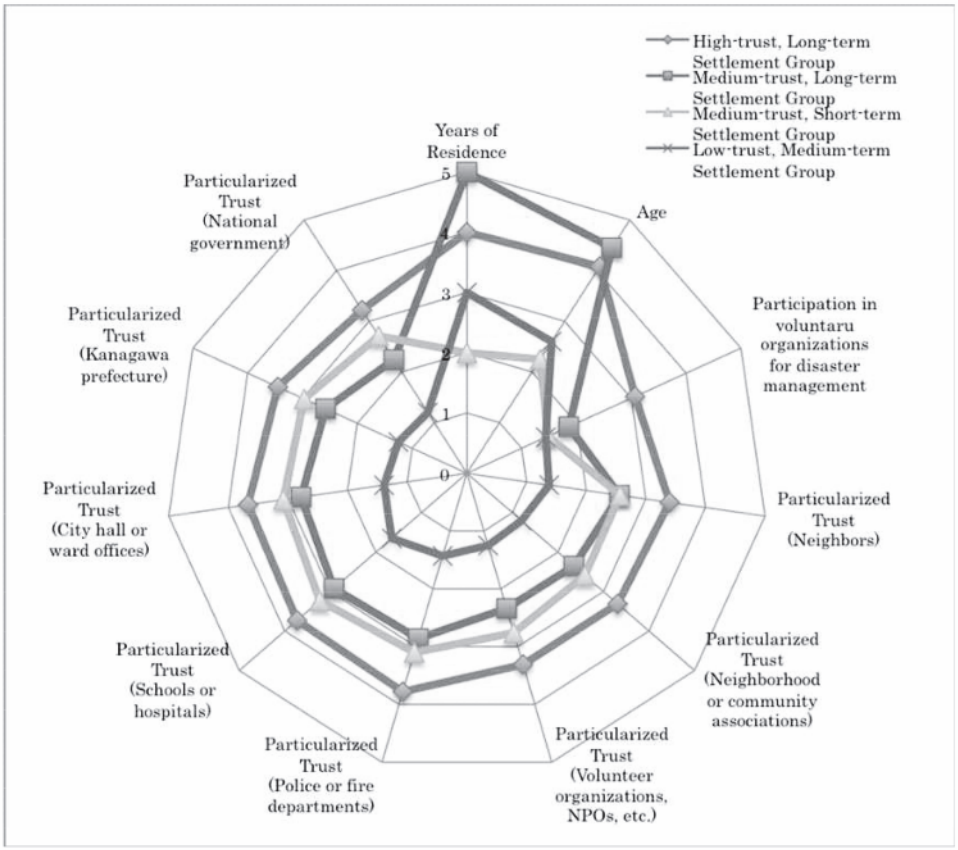

Figure23:Result of Cluster Analysis

As the first cluster comprised those with high particularized trust and a history of residence of between 20 and 30 years, it was designated as the “High-trust, Long-term Settlement Group” (Dashed line in Figure 23). As the second cluster featured average particularized trust and a history of residence of 30 years or longer, it was designated as the “Medium-trust, Long-term Settlement Group” (Dotted line in Figure 23). As the third cluster comprised average particularized trust and a history of residence of between 5 and 10 years, it was designated as the “Medium-trust, Short-term Settlement Group” (Continuous line in Figure 23). As the fourth cluster showed low particularized trust and a history of residence of between 10 and 20 years, it was designated as the “Low-trust, Medium-term Settlement Group (Dashed line in the center of Figure 23).

4 . 2 Factor Analysis

With respect to 20 items which serve as measures of general trust and networks, SPSS22.0 was used to perform a factor analysis through the major factor method and varimax rotation, identifying a six-factor structure with fixed values of at least 1 (Figure 24).

Factor	F1: Public Assistance	F2: Establishment	F3: Trust of Close People	F4: General Trust	F5: Evaluation of Mutual Assistance	F6: Life Satisfaction	Commonality
Particularized Trust (Kanagawa Prefecture)	**0.911**	0.072	0.114	0.079	0.036	0.095	0.864
Particularized Trust (City Hall / Ward Office)	**0.891**	0.114	0.101	0.097	0.060	0.093	0.839
Particularized Trust (Police / Fire Departments)	**0.835**	0.145	0.095	0.089	0.051	-0.005	0.737
Particularized Trust (National Government)	**0.828**	0.049	0.091	0.070	0.004	0.092	0.710
Particularized Trust (Schools / Hospitals)	**0.756**	0.098	0.200	0.065	0.052	0.045	0.631
Percentage who Interact with Neighbors	0.072	**0.753**	0.259	0.057	0.113	0.083	0.663
Degree of Interaction with Neighbors	0.099	**0.646**	0.336	0.065	0.092	0.088	0.560
Years of Residence	0.064	**0.567**	-0.167	0.066	0.080	-0.083	0.371
Type of Residence	0.072	**0.563**	-0.048	0.025	0.077	-0.002	0.332
Age	0.159	**0.493**	-0.245	0.195	0.132	-0.120	0.398
Particularized Trust (Friends and Acquaintances)	0.117	-0.053	**0.740**	0.120	0.097	0.050	0.590
Particularized Trust (Colleagues)	0.256	-0.154	**0.575**	0.066	0.018	0.063	0.429
Interaction with Friends and Acquaintances	0.034	0.080	**0.536**	0.132	0.058	0.070	0.321
Particularized Trust (Relatives)	0.332	0.166	**0.424**	0.095	0.082	-0.011	0.334
General Trust of Society as a Whole	0.152	0.132	0.204	**0.820**	0.119	0.084	0.776
Trust While Traveling	0.141	0.142	0.202	**0.760**	0.116	0.080	0.678
Evaluation of Regional Bond-oriented Groups	0.041	0.230	0.086	0.132	**0.736**	0.065	0.625
Evaluation of Voluntary Disaster Management	0.072	0.130	0.108	0.074	**0.716**	0.059	0.556
Living Standard Compared with Five Years Ago	0.079	0.009	0.037	0.046	0.067	**0.741**	0.563
Expected Living Standard in Five Years	0.103	-0.039	0.105	0.075	0.042	**0.718**	0.547
Factor Contribution	3.89	2.09	1.81	1.41	1.17	1.16	11.52
Rate of Contribution	19.42	10.43	9.05	7.05	5.84	5.81	57.60

Methods for identification of factors: Major factor method, Rotation method: Varimax method associated with Kaiser normalization

Figure 24: Results of Factor Analysis

The cumulative rate of contribution was 57.6%. For Factor 1, as the items indicating particularized trust towards public institutions such as Kanagawa Prefecture, city hall and ward offices showed a high positive load, it was designated as “Public Assistance.” For Factor 2, as items indicating relationships with neighbors and establishment in the region, such as level and proportion of interaction with neighborhood, years of residence and type of residence (high rate

of home ownership) showed a high positive load, it was designated as “Establishment.” Similarly below, Factor 3 was designated as “Trust of Close People” due to items relating to exchanges with familiar people, such as trust and interaction with friends and acquaintances. Factor 4 was designated as “General Trust.” Factor 5 was designated as “Evaluation of Mutual Assistance” due to items that evaluated regional bond-oriented groups and voluntary organizations for disaster management. Factor 6 was designated as “Life Satisfaction” due to items concerning living standard compared with five years ago and expected living standard in five years . The correlation coefficients for each factor are as shown in Figure 24. As the Cronbach’s coefficients for each factor are α=.936 for Factor 1, α=.711 for Factor 2, α=.700 for Factor 3, α=.844 for Factor 4, α=738 for Factor 5 and α=.718 for Factor 6, internal consistency is maintained.

The correlation distribution for the six factors is as shown in Figure 25. According to this, “Establishment” towards the region such as neighborhood interaction and years of residence and “Public Assistance” such as regional bond-oriented group activities are positively correlated, while we also see a positive correlation between “Exchanges with Close People” such as friends and acquaintances and “General Trust.”

	F1: Public Assistance	F2: Establishment	F3: Trust of Close People	F4: General Trust	F5: Evaluation of Mutual Assistance	F6: Life Satisfaction
F1: Public Assistance	1	0.022	0.036	0.014	0	0.025
F2: Establishment		1	0.018	0.035	**.087****	-0.013
F3: Trust of Close People			1	**.070***	0.04	0.048
F4: General Trust				1	0.049	0.025
F5: Evaluation of Mutual Assistance					1	0.035
F6: Life Satisfaction						1

Pearson correlation coefficient: ** depicts significance at the 1% level (both sides). * depicts significance at the 5% level (both sides), n=1000

Figure 25: Correlation Analysis of the Six Factors

4 . 3 Path Analysis

Conducting a path analysis using Amos18.0 based on the above six factors produced the results shown in Figure 26. The fit index is significant at the 0.1% level, with GFI of .983, AGFI of .969, RMR of .042 and RMSEA of .045, producing a model with an extremely high degree of fit ($\chi 2$=90.66, df=30, p<.000).

According to this, “General Trust” such as general trust of society and trust while traveling, and “Trust of Close People” such as friends, acquaintances, colleagues and relatives have a covariance relationship that exerts influence on one another, and is believed to form the basis for influencing “Evaluation of Mutual Assistance” and “Life Satisfaction.”

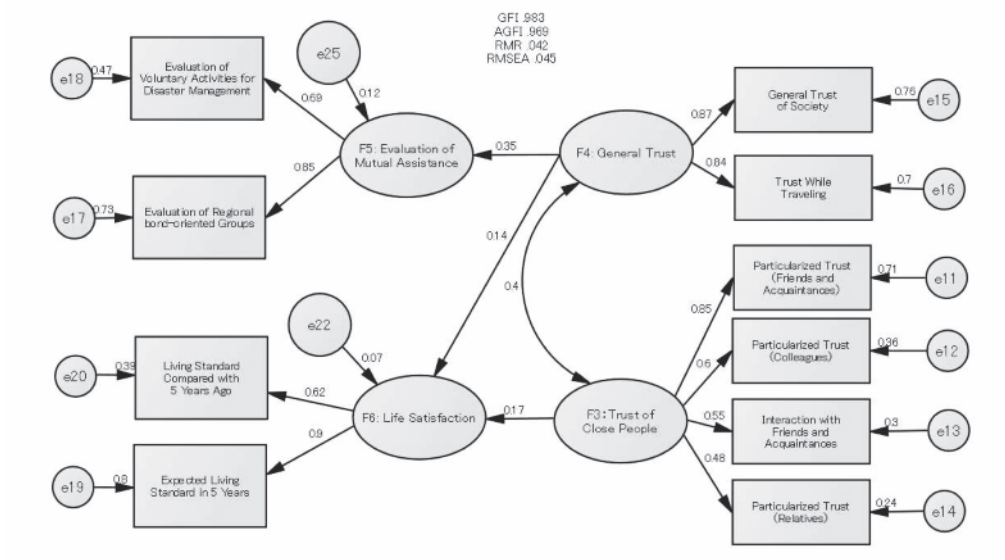

Figure 26: Path Diagram of the Six Factors

The degree of "General Trust" is directly linked with the degree of "Evaluation of Mutual Assistance," such as evaluation of voluntary activities for disaster management and evaluation of regional bond-oriented groups, and is also linked, albeit weakly, with "Life Satisfaction," including living standard compared with five years ago and expected living standard in five years. The degree of "Trust of Close People" is weakly related to "Life Satisfaction." Further, "General Trust" indirectly affects "Life Satisfaction" via "Trust of Close People." Conversely, "Trust of Close People" is believed to indirectly affect "Evaluation of Mutual Assistance" and "Life Satisfaction" via "General Trust."

4 . 4 Summary

In past studies on community and social capital, it has been shown that the characteristics of people predisposed to maintaining neighborhood ties and the characteristics of people predisposed to taking part in regional civil activities are mostly the same. On the other hand, in a web-based questionnaire of Kawasaki-shi citizens, we did not observe significant differences in respondent characteristics in terms of age, gender, occupation, number of cohabitant family members, type of residents (home ownership rate), district of residence, residence intentions or degree of life satisfaction. Further, we also did not see significant differences from perspectives such as degree or proportion of neighborhood interaction, participation in and contributions to voluntary activities for disaster management or the state of participation in regional civil activities. The dilution and alienation of neighborhood interaction and regional bond-oriented relationships could be put forth as one of the reasons for this. 63% of respondents did not have close interaction with neighbors ("only minimum interaction on the level of greetings" was 46%

and "no interaction at all" was 17%), 23% did not know their neighbors' names, while 44% only become acquainted with or have exchanges with very close neighbors. In addition, 54% of respondents had a low identity of membership in community and neighborhood associations, 76% did not take part in voluntary activities for disaster management and the regional bond-oriented activity participation rate was 20.7%.

In past studies, the possibility that the constituent elements of social capital—social trust, norms of reciprocity (social participation) and networks (interaction, exchange)— have the potential to mutually influence and enhance one another in a cascading fashion has been pointed out. This survey clarified that "General Trust" has a covariant relationship with "Trust of Close People" and also directly affects "Evaluation of Mutual Assistance." However, "Evaluation of Mutual Assistance" used here refers to positive or favorable evaluations of regional bond-oriented activities, and does not indicate active participation in or contribution to regional communities. In addition, "Trust of Close People" refers to close people such as friends, acquaintances, colleagues and relatives, and does not include trust towards or interaction with neighborhoods, neighborhood associations or community associations. Rather, trust towards neighbors, neighborhood associations and community associations is lower than that for schools and hospitals, police and fire departments and workplace colleagues, with the majority of respondents thinking of them as "Unreliable" to a similar extent as religious organizations, political parties and politicians, the national government, volunteer organizations, NPOs and so on (see data on particularized trust in Figure 11).

In other words, a "relationship of trust with close people" revolving around close friends, acquaintances and work colleagues forms the basis for respondents' lives, and it is believed that while this is co-variant with "General Trust," it is linked with "Evaluation of Mutual Assistance" and "Life Satisfaction." From this we can also make inferences about the dilution of regional bond-oriented relationships and the decline of social capital.

Under circumstances like these, the High-trust, Long-term Settlement Group and Medium-trust, Long-term Settlement Group clarified in the cluster analysis would require mechanisms to allow them to be actively involved in regional civil activities. Fostering bridge-building social capital capable of linking high and medium-trust long-term settlement residents who are negative about neighborhood interaction and local activities with existing local activities and expanding from that to the Medium-trust, Short-term Settlement Group and Low-trust, Medium-term Settlement Group is regarded as an effective measure. Investigating past cases of developing those specific mechanisms and then abstracting and generalizing them could be a topic for a future study.

Chapter 5: Local Capabilities for Disaster Management and Social Capital in Kawasaki-shi

5 . 1 Methods of Analysis

Factor analysis is a means of deriving the latent common factors from the observed variables . To do so, one must create a set of strongly correlated observed variables. Observed variables with a factor loading of less than 0.4 are often deleted. Typical methods for factor analysis in-

clude the principal factor method and maximum likelihood method. To determine the internal consistency of multiple factors, a coefficient known as Cronbach's alpha is used. Generally speaking, a coefficient of at least 0.7 or 0.8 is regarded as preferable. To interpret the factor matrix, factor rotation is performed. In this study, a form of oblique rotation known as promax rotation was employed.

Ultimately, a path diagram is created through covariance structure analysis to build a causal model between factors. Covariance structure analysis is a statistical method for analyzing many observed variables at the same time to investigate the properties of observed variables and the latent variables (concepts) that exist in the background. Features of the method include (1) being able to also measure variables that are difficult to directly observe by dealing with latent variables; (2) being able to quantify the strength of relationships between variables; (3) being able to find out the descriptive ability of a variable that serves as the starting point of a path; and (4) being able to assess the degree of fit between data and models [8]. In short, if a path diagram can be plotted through covariance structure analysis, the causal relationships between factors can be ascertained [9]. As a rule of thumb, in principle there are three observed variables for each latent variable.

In covariance structure analysis, indicators of the degree of compatibility are used to assess the degree of fit between the data and model. In terms of indicators of the degree of compatibility, (1) GFI (goodness of fit index); (2) AGFI (adjusted goodness of fit index); and (3) RMSEA (root mean square error of approximation) are often used. The GFI is a value between 0 and 1. A value of 0.95 or more is regarded as a very good model, 0.9 or more a valid model, and less than 0.9 a bad model. AGFI is an indicator which takes the degree of freedom of the GFI model into account and the judgment criteria are the same. RMSEA is used for complicated models. The smaller the value, the better the model is determined to be. A value of 0.05 or less is a very good model, 0.08 or less is a valid model, a value of more than 0.08 and up to 0.1 is a grey zone, while a value of 0.1 or higher indicates the model should not be adopted [10]. The *p* value is used to verify path coefficients. A value of 0.05 or less is required for statistical significance.

5 . 2 Three-Factor Structural Model in Shinjuku-ku

In our 2011 study titled "Questionnaire on Voluntary Activities for Disaster Management in Shinjuku-ku : Focusing on Social Capital," covariance structure analysis was used to present a causal model with a three-factor structure comprising cognition for disaster preparedness,

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8 http://www.macromill.com/method/c04.html (Accessed 2014.10.01)

9 In a factor analysis, the correlation between factors is output, but it is not possible to ascertain causal relationships with correlation coefficients.

10 Nobuo Oishi, Hiroo Tsuzuku (2009), "*Learning Investigative Data Analysis with Amos*" Tokyo Shoseki, pp. 196-198

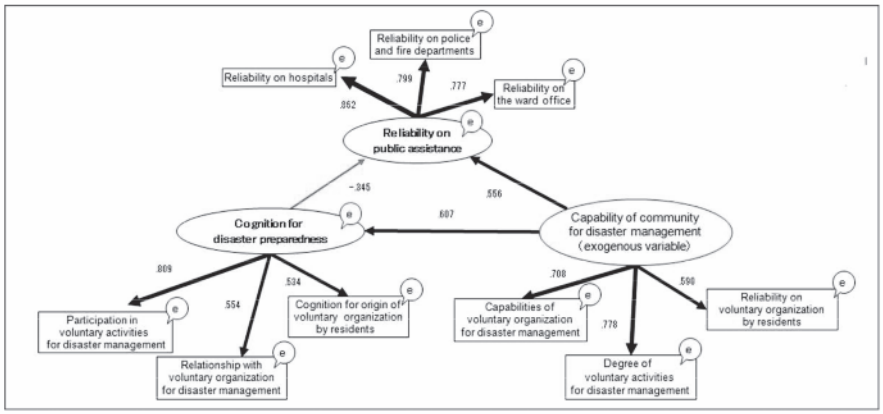
capability of community for disaster management and reliability on public assistance. The factor analysis on which this was predicated is given in the following table. Excel Statistics 2012 was used as the software (hereinafter the same).

			Maximum Likelihood Method, Promax (Oblique) Rotation		
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	Reliability on public assistance	Reliability on hospitals	0.842	-0.037	0.013
		Reliability on police and fire departments	0.820	-0.079	-0.017
		Reliability on the ward office	0.782	0.094	0.003
Factor 2	Cognition for disaster preparedness	Participation in voluntary activities for disaster management	-0.009	0.876	-0.032
		Relationship with voluntary organization for disaster management	-0.012	0.517	0.029
		Cognition for origin of voluntary organization by residents	0.006	0.468	0.082
Factor 3	Capability of community for disaster management	Capabilities of voluntary organization for disaster management	-0.042	-0.070	0.837
		Degree of voluntary activities for disaster management	-0.014	0.186	0.654
		Reliability on voluntary organization by residents	0.278	0.113	0.408
		Correlation between Factors	1.000		
			0.019	1.000	
			0.322	0.503	1.000

n = 502, Cronbach's Alpha = 0.715

Factor 1 comprised (1) reliability on hospitals; (2) reliability on police and fire departments; and (3) reliability on the ward office. Factor 2 was made up of (1) participation in voluntary activities for disaster management; (2) relationship with voluntary organization for disaster management; and (3) cognition for origin of voluntary organization by residents. Factor 3 comprised (1) capabilities of voluntary organization for disaster management; (2) degree of voluntary activities for disaster management; and (3) reliability on voluntary organization by residents. Factors 1, 2 and 3 were named "reliability on public assistance," "cognition for disaster preparedness" and "capability of community for disaster management," respectively.

Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 1.



Path Diagram 1: 2010 Shinjuku-ku Three-Factor Structural Model, n=502

Three latent variables and nine observed variables are used in this model. “Capability of community for disaster management” was an exogenous variable. The software used was the Excel-based SEM on the CD-ROM included with *Learn Covariance Structure Analysis Graphical Modeling with Excel* (Takaya Kojima (2003), Ohmsha), which uses the maximum likelihood method (hereinafter the same).

In terms of causal relationships, the exogenous variable “Capability of community for disaster management” has (1) a medium-level effect of 0.607 on the latent variable “Cognition for disaster preparedness,” and (2) a medium-level effect of 0.556 on the latent variable of “Reliability on public assistance.” The latent variable “Cognition for disaster preparedness” has a weak negative effect of -0.345 on the latent variable “Reliability on public assistance.”

In Diagram 1, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.955, AGFI=0.916 and RMSEA=0.084. Of the compatibility indicators, GFI and AGFI suggest a good model, while RMSEA indicates a grey zone [11].

5 . 3 Applying the Shinjuku-ku Model to Kawasaki-shi (After the Great East Japan Earthquake)

From the tabulated results of the Kawasaki web-based questionnaire, we extracted the same nine observed variables as the Shinjuku-ku study, and performed a factor analysis with a three-factor structure. The results are given in the following table [12].

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11 In 2011, we conducted a questionnaire in the remaining areas of Shinjuku-ku. When we performed a covariance structure analysis of the entire Shinjuku-ku area by combining tabulated data from 2010 and 2011, the sample size exceeded 1,000, significantly improving compatibility indicators.

12 In this table, “Cognition for origin of voluntary organization by residents (revised)” represents the 19% of respondents who selected “Housing Complex or Apartment Building Residents’ Association” when questioned about organizations responsible for voluntary activities for disaster management (SA: single answer), a percentage which cannot be ignored. Therefore, when performing the factor analysis, we gave four points to responses that selected “community associations and neighborhood associations” or “Housing Complex or Apartment Building Residents’ Association,” three points to responses that selected “merchants’ association,” two points to responses that selected “voluntary activities for disaster management not conducted at all” and one point to responses that selected “don’t know.”

			Principal Factor Method, Promax (Oblique) Rotation		
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.902	-0.034	0.002
		Reliability on hospitals (after earthquake)	0.886	-0.045	-0.022
		Reliability on city hall and ward offices (after earthquake)	0.824	0.020	-0.030
		Reliability on voluntary organizations for disaster management	0.469	0.322	0.122
Factor 2	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.084	0.836	0.040
		Capabilities of voluntary organization for disaster management	0.047	0.715	-0.027
Factor 3	Cognition for disaster preparedness	Cognition for origin of voluntary organization by residents (revised)	0.095	0.268	0.296
		Participation in voluntary activities for disaster management	-0.015	0.005	0.900
		Relationship with voluntary organization for disaster management	-0.028	0.008	0.530
		Correlation between Factors	1.000		
			0.341	1.000	
			0.186	0.555	1.000

n = 1,000, Cronbach's Alpha = 0.800

"Cognition for origin of voluntary organization by residents (revised)," which had a factor loading of less than 0.4, was deleted from the observed variables, and a factor analysis with a three-factor structure was performed. The results of the analysis are given in the following table.

			Principal Factor Method, Promax (Oblique) Rotation		
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.902	-0.037	-0.002
		Reliability on hospitals (after earthquake)	0.886	-0.047	-0.023
		Reliability on city hall and ward offices (after earthquake)	0.825	0.021	-0.021
		Reliability on voluntary organization by residents (after earthquake)	0.476	0.315	0.111
Factor 2	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.059	0.785	0.065
		Capabilities of voluntary organization for disaster management	0.044	0.758	-0.044
Factor 3	Participation in community for disaster management	Participation in voluntary activities for disaster management	0.005	0.003	0.908
		Relationship with voluntary organization for disaster management	-0.017	0.015	0.523
		Correlation between Factors	1.000		
			0.331	1.000	
			0.165	0.544	1.000

n = 1,000, Cronbach's Alpha = 0.794

Due to the fact that (1) the factor loading of Factor 1 and factor loading of Factor 2 approximate one another, and (2) reliability on voluntary organizations by residents (after earthquake) should have been identified as "reliability on community for disaster management," the observed variable "reliability on voluntary organization by residents (after earthquake)" was deleted from the observed variables, and a factor analysis with a three-factor structure was performed [13]. The results of the analysis are given in the following table.

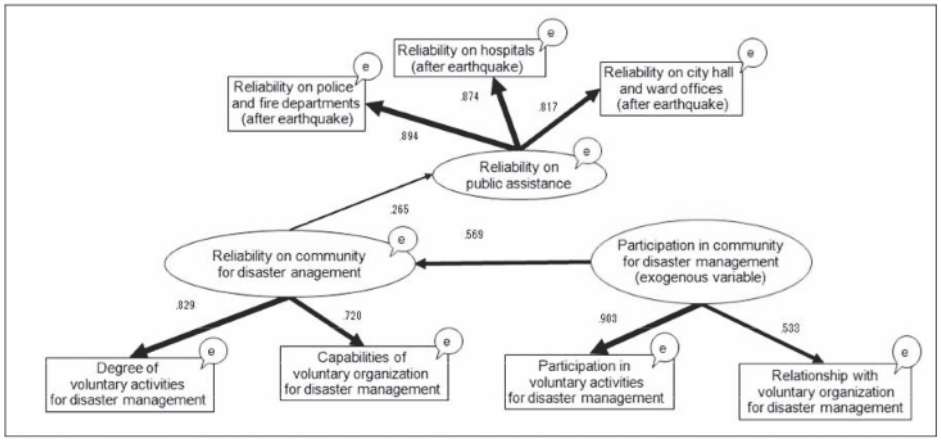
[13] In the analysis of the questionnaires conducted among community associations and neighborhood associations in Shinjuku-ku, "reliability on voluntary organization by residents" was identified as "capability of community for disaster management."

			Principal Factor Method, Promax (Oblique) Rotation		
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.894	-0.008	0.012
		Reliability on hospitals (after earthquake)	0.882	-0.019	-0.009
		Reliability on city hall and ward offices (after earthquake)	0.805	0.042	-0.005
Factor 2	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.045	0.794	0.066
		Capabilities of voluntary organization for disaster management	0.064	0.728	-0.020
Factor 3	Participation in community for disaster management	Participation in voluntary activities for disaster management	0.011	0.022	0.881
		Relationship with voluntary organization for disaster management	-0.012	0.011	0.534
		Correlation between Factors	1.000		
			0.275	1.000	
			0.124	0.525	1.000

n = 1,000, Cronbach's Alpha = 0.746

Factor 1 comprised (1) reliability on police and fire departments (after earthquake); (2) reliability on hospitals (after earthquake); and (3) reliability on city hall and ward offices (after earthquake). Factor 2 was made up of (1) degree of voluntary activities for disaster management and (2) capabilities of voluntary organization for disaster management. Factor 3 comprised (1) participation in voluntary activities for disaster management and (2) relationship with voluntary organization for disaster management. Factors 1, 2 and 3 were named "reliability on public assistance," "reliability on community for disaster management" and "participation in community for disaster management," respectively. We observed a medium-level correlation of 0.525 between Factor 2 and Factor 3. A weak correlation of 0.275 was observed between Factor 1 and Factor 2. At 0.124, almost no correlation was seen between Factor 1 and Factor 3. For the factor analysis, the Cronbach's alpha was 0.746, with good internal consistency.

Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 2. Unlike the Shinjuku-ku study, "participation in community for disaster management" was an exogenous variable in this model.



Path Diagram 2: Kawasaki-shi Three-Factor Structural Model (after the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable "participation in community for disaster management" has a medium-level effect of 0.569 on the latent variable "reliability on community for disaster management." The latent variable "reliability on community for disaster management" has a weak effect of 0.265 on the latent variable "reliability on public assistance." In Path Diagram 2, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.992, AGFI=0.982 and RMSEA=0.036. All three compatibility indicators indicate a very good model.

We therefore demonstrated that after partial modification involving the deletion of two observed variables in Kawasaki-shi, the Shinjuku-ku Three-Factor Structural Model was applicable. In Shinjuku-ku, "capability of community for disaster management" was an exogenous variable in the three-factor structure model, but in Kawasaki-shi, "participation in community for disaster management" was an exogenous variable in the three-factor structure model, positioning "participation in community for disaster management" at the base of Kawasaki-shi residents' recognition.

5 . 4 Kawasaki-shi Three-Factor Structural Model (before the Great East Japan Earthquake)

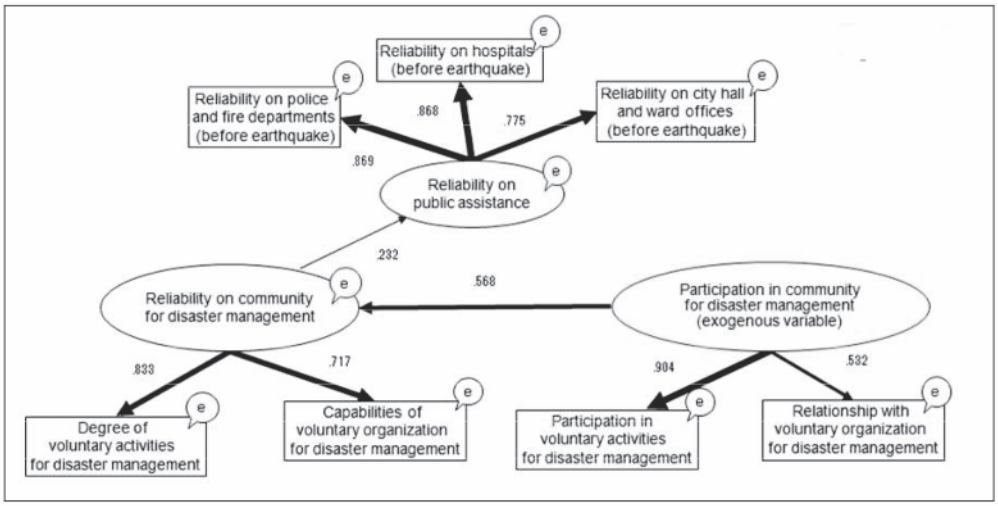
In the questionnaire, respondents were asked what kinds of people or organizations they would rely on in the event of a large-scale natural disaster in terms of their perception before the Great East Japan Earthquake (January 2011). This data was added and a factor analysis with a three-factor structure was performed. The results of the analysis are given in the following table.

			Maximum Likelihood Method, Promax (Oblique) Rotation		
	Factor Name	Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	Reliability on public assistance	Reliability on police and fire departments (before earthquake)	0.874	-0.013	-0.008
		Reliability on hospitals (before earthquake)	0.868	-0.002	0.000
		Reliability on city hall and ward offices (before earthquake)	0.763	0.056	-0.011
Factor 2	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.050	1.013	-0.009
		Capabilities of voluntary organization for disaster management	0.126	0.532	0.102
Factor 3	Participation in community for disaster management	Participation in voluntary activities for disaster management	0.004	0.024	0.920
		Relationship with voluntary organization for disaster management	-0.030	0.043	0.499
		Correlation between Factors	1.000		
			0.199	1.000	
			0.111	0.460	1.000

n = 1,000, Cronbach's Alpha = 0.728

When this factor analysis is compared with the factor analysis performed after the earthquake, (1) there are seven observed variables, the same as after the earthquake; (2) the naming of the identified factors is also the same as after the earthquake; and (3) the values indicating the correlation between Factor 2 and Factor 3 and the correlation between Factor 1 and Factor 2 are slightly lower than after the earthquake.

Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 3. In this model, "participation in community for disaster management" was an exogenous variable.



Path Diagram 3: Kawasaki-shi Three-Factor Structural Model (before the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable “participation in community for disaster management” has a medium-level effect of 0.568 on the latent variable “reliability on community for disaster management.” The latent variable "reliability on community for disaster management” has a weak effect of 0.232 on the latent variable “reliability on public assistance.” In Path Diagram 3, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.992, AGFI=0.981 and RMSEA=0.037. All three compatibility indicators indicate a very good model.

The shape of the path diagram is the same as the path diagram after the earthquake. As far as differences go, the path coefficient from “reliability on community for disaster management” to “reliability on public assistance” was 0.265 after the earthquake and 0.232 before the earthquake. Compatibility indicators were also within one thousandth of one another. Thus, there is almost no difference in the structure of the Kawasaki-shi Three-Factor Structural Model before and after the Great East Japan Earthquake.

5 . 5 Further Development of the Model (Addition of SC Factors)

A Cabinet Office questionnaire conducted in 2003 looked at social capital (SC) from the perspectives of (1) trust, (2) interaction and exchange, and (3) social participation, as depicted in the following table.

Perspective Looking at SC	Constituent Elements	Questionnaire Questions
Trust	General Trust	General level of trust
	Mutual Trust / Mutual Aid	Level of reliance on people in the neighborhood
		Level of reliance on friends and acquaintances
		Level of reliance on relatives
Interaction and Exchange	Neighborhood Interaction	Degree of neighborhood interaction
		Number of people interacted with neighborhood
	Social Exchange	Frequency of interaction with friends and acquaintances outside the workplace
		Frequency of interaction with relatives
		State of participation in sports, hobbies and leisure activities
Social Participation	Social Participation	State of participation in activities for territorial groups State of participation in volunteer activities, NPOs and civil activities

(Source) Japan Research Institute (2008), "Japan's Social Capital and Government Policies," p. 16

While the web-based questionnaire of our study dealt with Social Participation with the question on "participation in voluntary activities for disaster management," it was already incorporated as a lower-level factor of "participation in community for disaster management." Therefore, the Web-based questionnaire questions on Trust and Interaction and Exchange could produce new observed variables following the addition of SC factors.

The variables considered as candidates for new observed variables include (1) trust of society and (2) trust while traveling in terms of "General Trust" in the above table. In terms of "Mutual Trust / Mutual Aid," candidates include (1) degree to which neighborhood people are trusted with troubles (shortened to "reliance on neighbors (troubles)" hereafter), (2) degree to which friends and acquaintances are trusted with troubles (shortened to "reliance on friends and acquaintances (troubles)" hereafter), and (3) degree to which relatives are trusted with troubles (shorted to "reliance on relatives (troubles)" hereafter). In terms of "Neighborhood Interaction," candidates include (1) degree of neighborhood interaction and (2) proportion of neighborhood interaction. In terms of "Social Exchange," candidates include (1) frequency of interaction with friends and acquaintances (shortened to "interaction with friends and acquaintances" hereafter) and (2) frequency of interaction with relatives (shortened to "interaction with relatives" hereafter).

Performing a factor analysis with a four-factor structure using these nine observed variables produces the following table.

			Maximum Likelihood Method, Promax (Oblique) Rotation			
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	SC in neighborhood	Degree of neighborhood interaction	0.899	-0.029	-0.014	0.032
		Proportion of neighborhood interaction	0.784	0.021	-0.029	-0.008
		Reliance on neighbors (troubles)	0.488	0.031	0.343	-0.081
Factor 2	SC in general	Trust of society	-0.002	0.890	-0.011	-0.002
		Trust while traveling	0.015	0.815	-0.001	0.016
Factor 3	Exchange with relatives	Reliance on relatives (troubles)	-0.021	-0.042	1.017	0.013
		Interaction with relatives	0.188	0.064	0.371	0.194
Factor 4	Exchange with friends and acquaintances	Interaction with friends and acquaintances	0.015	-0.031	-0.028	1.011
		Reliance on friends and acquaintances (troubles)	-0.060	0.100	0.287	0.417
		Correlation between Factors	1.000			
			0.345	1.000		
			0.378	0.321	1.000	
			0.284	0.305	0.245	1.000

n = 1,000, Cronbach's Alpha = 0.802

As "interaction with relatives" had a factor loading of less than 0.4, it was deleted along with "reliance on relatives (troubles)" [14]. Performing a factor analysis with a three-factor structure using seven observed variables produced the following table.

			Maximum Likelihood Method, Promax (Oblique) Rotation		
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1	SC in neighborhood	Degree of neighborhood interaction	0.902	-0.044	0.028
		Proportion of neighborhood interaction	0.777	0.017	-0.031
		Reliance on neighbors (troubles)	0.575	0.078	0.004
Factor 2	SC in general	Trust of society	0.002	0.916	-0.003
		Trust while traveling	0.036	0.774	0.031
Factor 3	Exchange with friends and acquaintances	Interaction with friends and acquaintances	0.021	-0.038	0.797
		Reliance on friends and acquaintances (troubles)	-0.022	0.080	0.599
		Correlation between Factors	1.000		
			0.336	1.000	
			0.347	0.367	1.000

n = 1,000, Cronbach's Alpha = 0.757

Factor 1 comprised (1) degree of neighborhood interaction; (2) proportion of neighborhood interaction; and (3) reliance on neighbors (troubles). Factor 2 was made up of (1) trust of society; and (2) trust while traveling. Factor 3 comprised (1) interaction with friends and acquaintances; and (2) reliance on friends and acquaintances (troubles). Factors 1, 2 and 3 were named "SC in neighborhood," "SC in general" and "Exchange with friends and acquaintances," respectively. We observed weak correlations between each factor. There was a correlation of 0.336 between Factor 1 and Factor 2, a correlation of 0.347 between Factor 1 and Factor 3, and a correlation of 0.367 between Factor 2 and Factor 3. For the factor analysis, the Cronbach's alpha was 0.757, with good internal consistency.

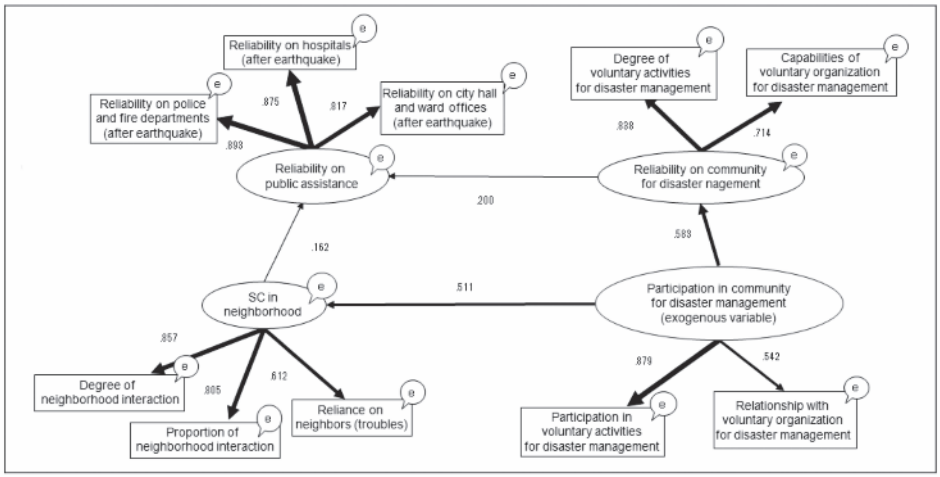
Adding "SC in neighborhood" as a new factor to the Three-Factor Structural Model factors (after the Great East Japan Earthquake) and performing a factor analysis with a four-factor structure produced the following table.

14 Although the option of not deleting "reliance on relatives (troubles)" was also considered, it did not yield favorable results.

Factor Name		Observed Variables	Maximum Likelihood Method, Promax (Oblique) Rotation			
			Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.896	-0.024	0.006	0.013
		Reliability on hospitals (after earthquake)	0.880	0.019	-0.031	0.004
		Reliability on city hall and ward offices (after earthquake)	0.802	0.023	0.040	-0.011
Factor 2	SC in neighborhood	Degree of neighborhood interaction	-0.029	0.930	-0.057	-0.024
		Proportion of neighborhood interaction	0.014	0.737	-0.026	0.110
		Reliance on neighbors (troubles)	0.042	0.601	0.112	-0.094
Factor 3	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.049	-0.012	0.871	0.015
		Capabilities of voluntary organization for disaster management	0.078	0.019	0.678	-0.017
Factor 4	Participation in community for disaster management	Relationship with voluntary organization for disaster management	0.013	-0.064	-0.053	0.806
		Participation in voluntary activities for disaster management	-0.016	0.163	0.229	0.492
		Correlation between Factors	1.000			
			0.234	1.000		
			0.263	0.348	1.000	
			0.085	0.419	0.457	1.000

n = 1,000, Cronbach's Alpha = 0.791

Factors 1, 2, 3 and 4 became "Reliability on public assistance," "SC in neighborhood," "Reliability on community for disaster management" and "Participation in community for disaster management," respectively. Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 4. "Participation in community for disaster management" was an exogenous variable in this model.



Path Diagram 4: Four-Factor Structural Model (after the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable "Participation in community for disaster management" has (1) a medium-level effect of 0.583 on the latent variable "Reliability on community for disaster management," and (2) a medium-level effect of 0.511 on the latent variable "SC in neighborhood." The latent variable "Reliability on community for disaster management" has a weak effect of 0.200 on the latent variable "Reliability on public assistance."

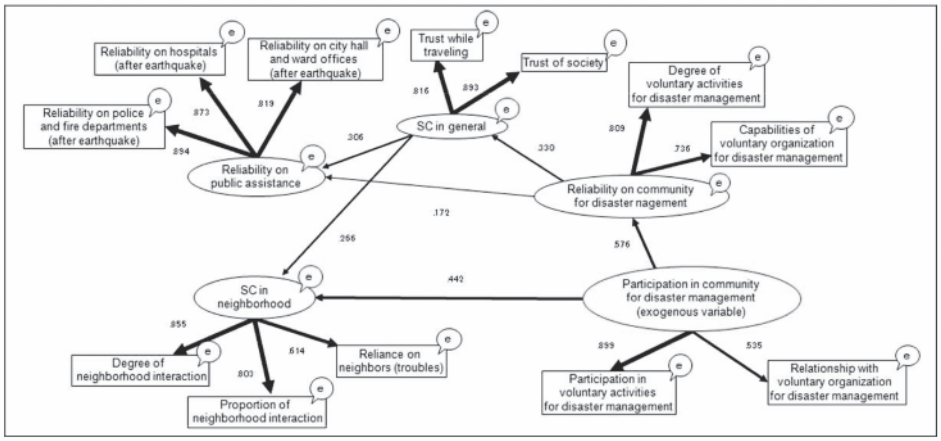
The path coefficient from the latent variable “SC in neighborhood” to the latent variable “Reliability on public assistance” is 0.162, a small yet statistically significant value. In Path Diagram 4, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.982, AGFI=0.968 and RMSEA=0.044. All three compatibility indicators indicate a very good model.

Adding “SC in neighborhood” and “SC in general” as new factors to the Three-Factor Structural Model factors (after the Great East Japan Earthquake) and performing a factor analysis with a five-factor structure produced the following table.

			Maximum Likelihood Method, Promax (Oblique) Rotation				
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.895	-0.023	0.001	0.008	0.008
		Reliability on hospitals (after earthquake)	0.889	0.025	-0.031	-0.026	0.004
		Reliability on city hall and ward offices (after earthquake)	0.794	0.013	0.035	0.033	-0.009
Factor 2	SC in neighborhood	Degree of neighborhood interaction	-0.023	0.935	-0.015	-0.056	-0.027
		Proportion of neighborhood interaction	0.014	0.738	0.003	-0.024	0.104
		Reliance on neighbors (troubles)	0.033	0.588	0.046	0.101	-0.092
Factor 3	SC in general	Trust of society	0.023	-0.008	0.892	-0.008	0.019
		Trust while traveling	-0.017	0.034	0.805	0.015	-0.012
Factor 4	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.040	-0.009	-0.031	0.888	0.007
		Capabilities of voluntary organization for disaster management	0.069	0.005	0.049	0.665	-0.014
Factor 5	Participation in community for disaster management	Relationship with voluntary organization for disaster management	0.009	-0.062	0.011	-0.051	0.825
		Participation in voluntary activities for disaster management	-0.015	0.179	-0.014	0.245	0.465
		Correlation between Factors	1.000				
			0.232	1.000			
			0.349	0.345	1.000		
			0.261	0.353	0.306	1.000	
			0.083	0.405	0.155	0.445	1.000

n = 1,000, Cronbach's Alpha = 0.815

Factors 1, 2, 3, 4 and 5 became “Reliability on public assistance,” “SC in neighborhood,” “SC in general,” “Reliability on community for disaster management” and “Participation in community for disaster management,” respectively. Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 5. “Participation in community for disaster management” was an exogenous variable in this model.



Path Diagram 5: Five-Factor Structural Model (after the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable "Participation in community for disaster management" has (1) a medium-level effect of 0.576 on the latent variable "Reliability on community for disaster management" and (2) a medium-level effect of 0.442 on the latent variable " SC in neighborhood." The latent variable "Reliability on community for disaster management" has a weak effect of 0.330 on the latent variable "SC in general." The path coefficient from the latent variable "Reliability on community for disaster management" to the latent variable "Reliability on public assistance" is 0.172, a small yet statistically significant value. The latent variable "SC in general" has (1) a weak effect of 0.306 on the latent variable "Reliability on public assistance" and (2) a weak effect of 0.266 on the latent variable "SC in neighborhood." In Path Diagram 5, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.982, AGFI=0.971 and RMSEA=0.036. All three compatibility indicators indicate a very good model.

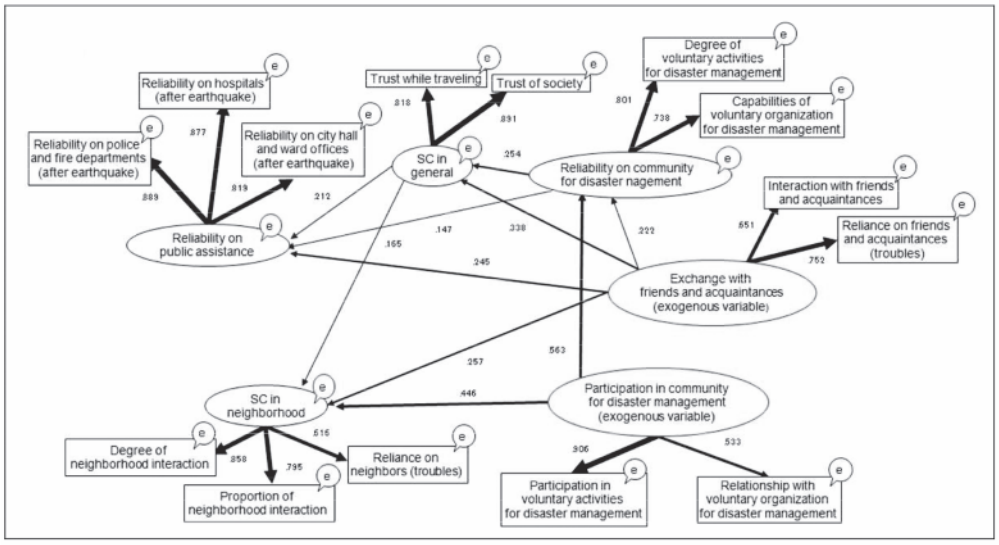
Adding "SC in neighborhood," "SC in general" and "Exchange with friends and acquaintances" as new factors to the Three-Factor Structural Model factors (after the Great East Japan Earthquake) and performing a factor analysis with a six-factor structure produced the following table. In other words, this represents a case where all three of the SC factors based on analysis of the items of the Cabinet Office questionnaire are added to the Three-Factor Structural Model factors (after the Great East Japan Earthquake).

			Maximum Likelihood Method, Promax (Oblique) Rotation					
Factor Name		Observed Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	Reliability on public assistance	Reliability on police and fire departments (after earthquake)	0.903	-0.019	0.015	-0.003	-0.048	0.022
		Reliability on hospitals (after earthquake)	0.887	0.003	-0.046	-0.035	0.066	0.018
		Reliability on city hall and ward offices (after earthquake)	0.792	0.023	0.032	0.031	-0.003	-0.011
Factor 2	SC in neighborhood	Degree of neighborhood interaction	-0.031	0.909	-0.023	-0.069	0.043	0.003
		Proportion of neighborhood interaction	0.019	0.723	0.005	-0.045	-0.011	0.132
		Reliance on neighbors (troubles)	0.028	0.620	0.040	0.125	-0.020	-0.133
Factor 3	SC in general	Trust while traveling	0.028	-0.008	0.878	-0.011	0.001	0.022
		Trust of society	-0.025	0.024	0.819	0.002	0.017	-0.001
Factor 4	Reliability on community for disaster management	Degree of voluntary activities for disaster management	-0.049	-0.008	-0.036	0.839	0.013	0.055
		Capabilities of voluntary organization for disaster management	0.051	-0.006	0.032	0.686	0.025	-0.001
Factor 5	Exchange with friends and acquaintances	Interaction with friends and acquaintances	-0.037	-0.024	-0.010	-0.052	0.886	0.101
		Reliance on friends and acquaintances (troubles)	0.100	0.058	0.047	0.133	0.509	-0.173
Factor 6	Participation in community for disaster management	Relationship with voluntary organization for disaster management	0.023	-0.060	0.015	-0.052	0.019	0.741
		Participation in voluntary activities for disaster management	0.002	0.168	0.005	0.238	-0.052	0.508
		Correlation between Factors	1.000					
			0.239	1.000				
			0.353	0.352	1.000			
			0.284	0.352	0.325	1.000		
			0.283	0.319	0.343	0.186	1.000	
			0.050	0.409	0.137	0.413	0.017	1.000

n = 1,000, Cronbach's Alpha = 0.818

Factors 1, 2, 3, 4, 5 and 6 became "Reliability on public assistance," "SC in neighborhood," "SC in general," "Reliability on community for disaster management," "Exchange with friends and acquaintances" and "Participation in community for disaster management," respectively. Based on this factor analysis, plotting a path diagram through covariance structure analysis produced Path Diagram 6. "Participation in community for disaster management" and "Exchange with friends and acquaintances" were exogenous variables in this model. In other words, it became clear that "Participation in community for disaster

management" and "Exchange with friends and acquaintances" are positioned at the base of Kawasaki-shi residents' recognition.

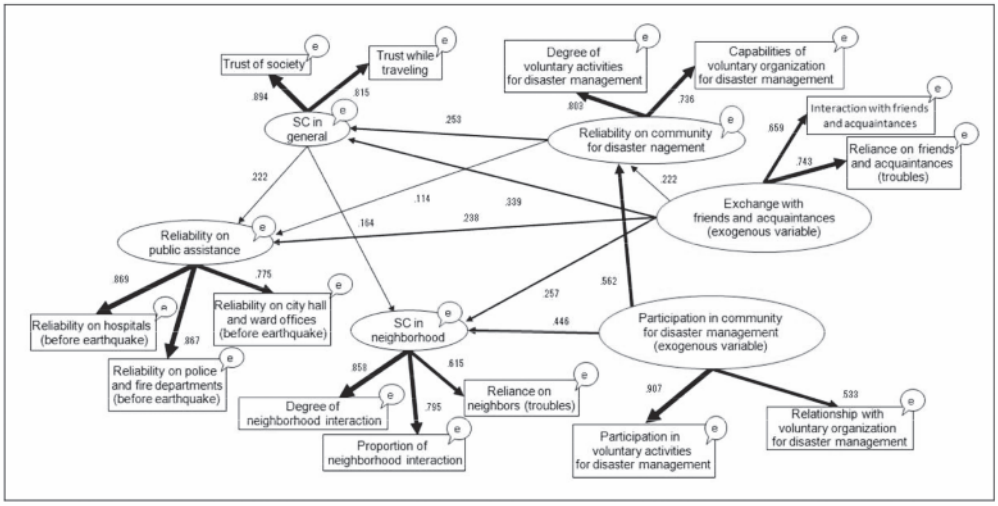


Path Diagram 6: Six-Factor Structural Model (after the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable "Participation in community for disaster management" has (1) a medium-level effect of 0.563 on the latent variable "Reliability on community for disaster management" and (2) a medium-level effect of 0.446 on the latent variable "SC in neighborhood." The exogenous variable "Exchange with friends and acquaintances" has (1) a weak effect of 0.338 on the latent variable "SC in general," (2) a weak effect of 0.257 on the latent variable "SC in neighborhood," (3) a weak effect of 0.245 on the latent variable "Reliability on public assistance," and (4) a weak effect of 0.222 on the latent variable of "Reliability on community for disaster management." The latent variable "Reliability on community for disaster management" has a weak effect of 0.254 on the latent variable "SC in general." The path coefficient from the latent variable "Reliability on community for disaster management" to the latent variable "Reliability on public assistance" is 0.147, a small yet statistically significant value. The latent variable "SC in general" has a weak effect of 0.212 on the latent variable "Reliability on public assistance." The path coefficient from the latent variable "SC in general" to the latent variable "SC in neighborhood" is 0.165, a small yet statistically significant value. In Path Diagram 6, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.971, AGFI=0.955 and RMSEA=0.045. All three compatibility indicators indicate a very good model.

In the questionnaire, respondents were asked what kinds of people or organizations they would rely on in the event of a large-scale natural disaster in terms of their perception before the Great East Japan Earthquake (January 2011). Adding this data and plotting a path diagram

through covariance structure analysis with a six-factor structure produced Path Diagram 7. "Participation in community for disaster management" and "Exchange with friends and acquaintances" were exogenous variables in this model.



Path Diagram 7: Six-Factor Structural Model (before the Great East Japan Earthquake), n=1,000

In terms of causal relationships, the exogenous variable "Participation in community for disaster management" has (1) a medium-level effect of 0.562 on the latent variable "Reliability on community for disaster management" and (2) a medium-level effect of 0.446 on the latent variable "SC in neighborhood." The exogenous variable "Exchange with friends and acquaintances" has (1) a weak effect of 0.339 on the latent variable "SC in general," (2) a weak effect of 0.257 on the latent variable "SC in neighborhood," (3) a weak effect of 0.238 on the latent variable "Reliability on public assistance" and (4) a weak effect of 0.222 on the latent variable "Reliability on community for disaster management." The latent variable "Reliability on community for disaster management" has a weak effect of 0.253 on the latent variable "SC in general." The path coefficient from the latent variable "Reliability on community for disaster management" to the latent variable "Reliability on public assistance" is 0.114, a small yet statistically significant value. The latent variable "SC in general" has a weak effect of 0.222 on the latent variable "Reliability on public assistance."

The path coefficient from the latent variable "SC in general" to the latent variable "SC in neighborhood" is 0.164, a small yet statistically significant value. In path Diagram 7, all of the path coefficients are statistically significant. In terms of indicators of the degree of compatibility, GFI=0.971, AGFI=0.954 and RMSEA=0.046. All three compatibility indicators indicate a very good model. The shape of the path diagram is the same as the Path diagram after the earthquake. Compatibility indicators were also within one thousandth of one another. Thus, there is almost no difference in the structure of the six-factor structural model before and after the Great East

Japan Earthquake. It became clear that “Participation in community for disaster management” and “Exchange with friends and acquaintances” are positioned at the base of Kawasaki-shi residents’ recognition before and after the Great East Japan Earthquake.

5 . 6 Summary

We demonstrated that after partial modification, the Shinjuku-ku Three-Factor Structural Model was applicable in Kawasaki-shi after the Great East Japan Earthquake.

In Shinjuku-ku, “Capability of community for disaster management” was an exogenous variable in the three-factor structure model, but in Kawasaki-shi, “Participation in community for disaster management” was an exogenous variable in the three-factor structure model, positioning “Participation in community for disaster management” at the base of Kawasaki-shi residents’ recognition. Moreover, when a path diagram of before the Great East Japan Earthquake is created, its shape is the same as the shape of a path diagram of after the earthquake. Therefore, there is almost no difference in the three-factor structure before and after the Great East Japan Earthquake.

In addition, SC factors based on the 2003 questionnaire conducted by the Cabinet Office were added. For the six-factor structure, a case in which all of the SC factors were added, “Participation in community for disaster management” and “Exchange with friends and acquaintances” were exogenous variables. Moreover, when a path diagram of before the Great East Japan Earthquake is created, its shape is the same as the shape of a path diagram of after the earthquake. Therefore, there is almost no difference in the six-factor structure before and after the Great East Japan Earthquake. Thus we clarified that “Participation in community for disaster management” and “Exchange with friends and acquaintances” were positioned at the base of Kawasaki-shi residents’ perception before and after the Great East Japan Earthquake.

Division of Authorship

Chapters 1 and 2: Co-authored
Chapters 3 and 4: Authored by Kambara
Chapter 5: Authored by Marumo

References

(Perception of community and social capital-related)

- Ministry of Land, Infrastructure, Transport and Tourism(2005) *Regenerate of the community in the metropolitan area*.
  http://www.mlit.go.jp/kisha/kisha05/02/020801_.html (Accessed 2013.09.01)
- Cabinet Office, The Community Issues Subcommittee of the Quality of Life Council’s Survey Group(1965) *Community*.
  http://www.ipss.go.jp/publication/j/shiryou/no.13/data/shiryou/syakaifukushi/32.pdf (Accessed 2013.09.01)
- Ministry of Internal Affairs and Communications(2009) *the Research Group on the New Roles of Communities*.

http://www.soumu.go.jp/main_sosiki/kenkyu/new_community/18520.html (Accessed 2013.09.01)

- Cabinet Office, Economic and Social Research Institute(2005) *Regenerate of Community and Social Capital*. http://www.esri.go.jp/jp/prj/hou/hou015/hou015.html (Accessed 2013.09.01)
- Cabinet Office, Social policy Bureau (2003) Social Capital(Sosharu kyapitaru: yutakana ningen kankei to shimin katsudo no kojunkan wo motomete), National Printing Bureau.
- Cabinet Office(2004) National Survey of Lifestyle Preferences 2003. http://www5.cao.go.jp/seikatsu/senkoudo/senkoudo.html, 2004 (Accessed 2013.09.01)
- Cabinet Office(2007) *National Survey of Lifestyle Preferences 2006*. http://www5.cao.go.jp/seikatsu/senkoudo/senkoudo.html, 2007 (Accessed 2013.09.01)
- Cabinet Office(2010) *National Survey of Lifestyle Preference 2009*. http://www5.cao.go.jp/seikatsu/senkoudo.html, 2011(Accessed 2013.09.01)
- Satoshi Nagatomi, Yu Ishida, Akio Koyabu and Yoji Inaba "Quantitative Analysis of Factor to Promote Participation in Community-based Activities" in *The Nonprofit Review*, 2011, Vol. 11, No. 1, pp. 11-20.
- Norman Uphoff (2000) "Understanding Social Capital: Learning from the Analysis and Experience of Participation" in P. Dasgupta and I. Serageldin, (eds.) *Social Capital: A Multifaceted Perspective*, Washington D.C.: The World Bank, 2000. pp. 215-249.
- Robert D. Putnam (2000) *Bowling Alone: The Collapse and Revival of American Community*. Simon & Schuster (Translation: Yasufumi Shibanai. Kashiwashobo, 2006).

(Community and local capability for disaster management-related)

- Yasihiko Wada, Yasuhiro Heike, Nariaki Wada (2009) "Improvement Factors of Self-help Attitudes against Urban Floods, and Improvement of Self-help Attitudes by Covariance Structure Analysis," Japan Society for Disaster Information Studies, *Disaster Information Journal No. 7*, pp.53-61, in Japanese.
- Yutaka Tsujinaka, Robert Pekkanen and Hidehiro Yamamoto (2009) *Neighborhood Associations and Governance in Japan: Self-governance, Social Capital, Social Network, and Local Governance based on The First National Survey of Thirty Thousand Associations*, Tokyo, Bokutakusha, in Japanese.
- Roshan Bhakta Bhandari, Norio Okada, Muneta Yokomatsu, Hitoshi Ikeo (2010) "Building a Disaster Resilient Community through Ritual Based Social Capital: A Brief Analysis of Findings from the Case Study of Kishiwada," *Annuals of Disaster Prevention Research Institute*, Kyoto University, vol. 53(B), pp. 137-148.
- Kazushiro Yoshimori, Eiichi Itoigawa and Michitaka Umemoto (2011) "Study on Disaster Flexibility Performance in Super High-rise Residential Apartment Buildings : Factors affecting on Disaster Prevention Actions in Daily Life point of view," *Journal of Institute of Social Safety Science* Vol.14, pp.111-121, in Japanese.
- Yuichi Marumo (2011) "Questionnaire Survey on Voluntary Disaster Prevention Activities in Shinjuku-ku Focusing on Social Capital," Senshu University Center for Social Capital Studies, *The Senshu Social Capital Review*, No. 2 pp.49-78, in Japanese.
- Yuichi Marumo (2012) "Questionnaire Survey on Local Capabilities on Disaster Management in Shinjuku-ku and Impact of the Great East Japan Earthquake: Model Construction by the Use of Structural Equation Modeling (SEM)," Senshu University Center for Social Capital Studies, *The Senshu Social Capital*

Review No.3, pp.21-60, in Japanese.