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Value Chain Analysis of Park Volunteers between Their Assessment to the Activity and Consciousness to the Region

Akiko KOMATSU*, Koji ICHIMURA** and Shogo KANAOKA***

Abstract : This paper argues that park volunteer activities affect a sense of community of volunteers, based on covariance structure analysis. The adopted model shows that "scheme for interaction between volunteers" positively affects "overall satisfaction of volunteer activities" and "human interaction" of a sense of community. Because variables of volunteer activities ("Scheme for contact with plants" "scheme for obtaining the skill and knowledge" and "scheme for social contribution") have a chain reaction, volunteer activities improve social-capital consciousness of volunteers. This result indicates that park volunteer activities have ripple effects of both the expansion of human interaction with peers and the expansion of contribution to society, and have a potential to be a mean to trigger regional revitalization.

Key Words : park management, volunteer activities, regional revitalization, creating shared value, value chain

INTRODUCTION

As the view of the value of parks is changing dramatically, Tashiro (2014) suggested the necessity of proposing an image of parks that is different from conventional ones. Taking this a step further, Ikebe (2014) pointed out that it is necessary to describe parks as necessary spaces in communities that trigger regional regeneration and contribute to regional revitalization. In other words, there is a rising need for a new image of parks as contributants to regional revitalization.

Discussions on the new image of parks can be summarized as follows. Fujimoto and Nakase (2006) suggested that park management leads to community planning because it can strengthen regional cooperation and can be associated with functions that are closely involved with the lives of local residents. Also, Masuda (2006) pointed out that, as the expectations and the role of parks have become diversified, sophisticated, and complicated, parks are now expected to contribute to community planning. In addition, Ikebe (2014) listed the role of parks in communities as one of the new indicators for identifying the changes in the social value of parks.

A summary of discussions on the role of parks in communities follows. Toko and Saito (2008) and Akazawa et al. (2010) pointed out that local residents can contribute to the improvement and development of "trust, networks, and social norms" by engaging in the management and operation of parks as volunteers and thus contribute to the accumulation of social capital (SC) that serves. Also, Ichimura et al. (2014) suggested that facility management involving the participation of various local entities through volunteer activities becomes the driving force for the creation of New Public Commons[1]. They also suggested that it is essential to find new means of local management that can provide solutions to regional challenges and to manage facilities on the basis of structural analysis results for "changes in the consciousness (improvements in satisfaction)" of the entities involved in the facilities.

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As described, it has been found that the fostering of park volunteers through the maintenance, management, and operation of parks enhances SC, and that parks can potentially contribute to regional revitalization. Also, the necessity of the structural analysis of the consciousness of involved entities has been pointed out.

These findings were achieved through the fusion of expertise in the areas of business administration and landscape architecture. As Kaneko (2011) pointed out the necessity of using management and marketing theories to discuss the future prospects of park management, the fusion of expertise in the areas of business administration and landscape architecture will be further required.

Exploring the possibility of the further utilization of expertise in a consumer behavior study, which is an area of business administration, Ono (2010) pointed out the necessity of establishing a causal model of causes and effects in the purchase of services. He suggested that the examination of such a causal model provides strategic suggestions to service providers who are involved in operation and marketing and theoretically supports the establishment of management strategies. Therefore, the next tasks in the fusion of expertise in the areas of business administration and landscape architecture are to establish a causal model and, using that model, to analyze the contribution of parks to regional revitalization including community planning and regional regeneration.

Such an analysis will lead to the understanding of a value chain, a concept proposed by Michael Porter in his book "Competitive Advantage" (Porter, 1985). A value chain was proposed as a framework for the systematic analysis of the "correlation among company activities that are linked to each other and their effects on the final value", and it explains that the final value is created through a chain of various activities. Namely, in order to state that parks function as places to contribute to regional revitalization including community planning and regional regeneration, it is necessary to show that the values of various activities taking place in parks form a chain that is linked to the final goal of regional revitalization. The clarification of the linkage among various activities and the final goal, in other words, how the value of each activity affects those of other activities and how the value of each activity is in turn affected by other activities, will lead to the understanding of those activities, not as separate and independent systems but as activities dependent on each other. On the basis of the value chain concept, it will be possible to rebuild park activities by optimizing the linkage between various activities in order to achieve regional revitalization.

This study is aimed at clarifying the causal relationship (value chain) between participation in volunteer activities in parks and the consciousness of the participants toward regional communities through a covariance structure analysis that enables us to visualize the role of parks in regional revitalization, which has remained unclarified.

1. RESEARCH METHOD

1.1 Selection of survey subjects

Park volunteers in city parks[2] under Sapporo City Park Greening Association (hereafter, the Association) as the designated administrator were selected as the survey subjects because they had the possibility of functioning as the role of parks in regional revitalization. To determine the changes in the consciousness (value chain) of park volunteers who participated in these activities, data were collected using a questionnaire with the cooperation of the Association.

The Association was established in 1984 with the aim of revitalizing communities through greening activities and promoting the creation of a pleasant living environment. In addition to the recruitment and registration of park volunteers who engage in the maintenance of parks and the provision of various types of support to volunteer activities, the Association operates the Sapporo School of Gardening to foster human resources that can revitalize the communities in Sapporo

City through greening activities. It is possible for the Association to foster not only park volunteers but also the supporters who will play an important role in regional revitalization.

The volunteer activities in the city parks administrated by the Association (as of November 2011, Table. 1) are roughly divided into the "maintenance of parks" and the "regional contribution through activities utilizing parks." The former includes the maintenance of flowerbeds (Odori Park) and the deadheading and pruning of plants such as lilacs (Soseigawa Park); the latter includes play guidance (Maeda Forest Park), environmental conservation activities, such as the survey of dragonflies and fish, child-friendly events (Nishioka Park), and community development activities. The "region"[3] in this study includes the parks where volunteer activities take place on a routine basis, and it is centered around the residences of the volunteers. It covers the residential areas approximately 2–3 km from the parks shown in Table. 1.

1.2 Outline of survey

A questionnaire was created after an interview with the Association, who cooperated with this survey, so that the questionnaire would be suitable for the actual states of park volunteer activities in Sapporo City (Table. 2).

Table. 2 Outline of survey items

Classification	Items
Outline of respondents	・Attributes of respondents ・Contents of park volunteer activities
Assessment of park volunteer activities	・Finding a sense of reward in park volunteer ・Satisfaction level of park volunteer activities (factor-specific satisfaction level and overall satisfaction level) ・Intention to continue park volunteer activities
SC-associated consciousness	・Ideas toward social norms (environmental conservation) ・Attachment to regional community and underlying ideas ・Interregional interaction, underlying ideas and the actual state of interaction ・Consciousness of regional community (SC)

The surveyed subjects who answered the questionnaire were registered as park volunteers of the Association at the time this survey was conducted (December 2011). The questionnaire was distributed and collected by postal mail. The number of questionnaires distributed was 165 and the number of valid responses was 91 (response rate, 55.2%).

1.3 Setting of variables

Questionnaire items were prepared by considering the variables to be used in an association model for finding linkages (value chain) among the assessment of the plan for park volunteer activities, the actual state of activities,

Table. 1 The volunteer activities in the city parks administrated by the Association

The park where volunteers are operating			Names of organizations	Contents of activities
Name of park	Type of park	Park area (ha)		
Yurigahara Park	Comprehensive	25.3	Rosehip	Cultivation and maintenance of roses in park
			Clover	Cultivation and maintenance of perennial plants in park
			Lily Club	Publication of bulletins / Tours of lilies
			Mimosa	Maintenance of greenhouse plants
Noushi Park	Sports	12.4	Petanque Club of Noushi Park	Maintaining the petanque court and giving training sessions
			Play Club of Noushi Park	Promoting outdoor activities for children and providing for their safety
Toyohira Park	Special	7.4	Herb Club of Toyohira Park	Cultivation and maintenance of flowerbeds in park
Hiraoka Arboriculture Center	Special	2.9	Environmental support "Sanjiro" Club	Assistance of park maintenance / Holding events
Maeda Forest Park	Comprehensive	59.7	"Dekoboko" Club of Maeda Forest Park	Play guidance / Cleaning / Maintenance of flowerbeds
Kawashimo Park	Comprehensive	19.5	Volunteer Club "Rirara" of Kawashimo Park	Deadheading of lilacs / Supporting volunteer activities
Odori Park	Special	7.9	Citizens applied for	Planting saplings in spring and summer
			Alba Rose	Maintenance of flowerbeds planned by West 6 Chome
			Lilac Club	Maintenance of flowerbeds planned by West 8 Chome
			West 12 Chome Rosebed	Maintenance of rosebeds
Hiraoka Park	Comprehensive	66.3	Hiraoka Acorn Forest	Reproduction of marsh and forests / Environmental education
			Hiraoka Kingfisher Club	Environmental conservation around ponds / Park cleaning
Moerenuma Park	Comprehensive	104	Volunteers for forest maintenance	Maintenance of cherry tree forests
(in Hokkaido Makomanai Park) Sapporo Salmon Museum	(Prifectural)	84.7	Volunteer Club of Sapporo Salmon Museum	Assisting events / Assisting rearing of animals
Nishioka Park	Special	41.0	Plant Survey Club of Nishioka Park	Preparing botanical specimens
			Water Front Survey Club of Nishioka Park	Survey of dragonflies and fish / Child-friendly events
			Tree Name Tag Studio	reparing and attaching tree name tags
			Young Squirrel Studio Volunteer Club	Planning and managing woodwork courses
Nishioka Chuo Park	Community	4.7	Committee Managing Multipurpose Square of Nishioka Chuo Park	Management of multipurpose squares and arrangement of slots for use
Soseigawa Park	Special	1.8	Plant Volunteer of Soseigawa Park	Deadheading of plants such as lilacs / Pruning
			Support Team of Soseigawa Park	Park cleaning / Assisting events
Nakajima park	Comprehensive	23.6	Flores 3B Club	Maintenance of plants in park
			Swiss Mountain Pine Club	Maintenance of plants in park

and the consciousness of park volunteers about the regions affected by the assessment and the actual state of activities.

1.3.1 Park volunteer activities (assessment and actual state of activities)

Twenty-two items concerning the plan for park volunteer activities were listed in the questionnaire and assessed by the subjects using a five-point scale (satisfied, somewhat satisfied, neither satisfied or dissatisfied, somewhat unsatisfied, and unsatisfied). Questions were prepared that included various concepts of values required in volunteer activities. The results of the assessment were subjected to a factor analysis.

1.3.2 Consciousness about region

It was assumed that participation in park volunteer activities led to an improvement in the consciousness of the participants about the region (58.2% of subjects lived "2 km or more" away from the parks). On the basis of this assumption and with reference to previous literature (Cabinet Office, 2007), four variables, namely, "environmental conservation", "attachment", "interaction", and "SC", were selected as the items that were likely to be improved in association with park volunteer activities.

Environmental conservation was selected because it was assumed that the consciousness about general activities for improving the regional environment would be increased by having opportunities to think of and experience the role of parks through volunteer activities in them, a part of the regional landscape and environment. With regard to this variable, four items concerning the interest in regional environmental conservation and the actual state of participation were included in the questionnaire.

Attachment was selected because it was assumed that a sense of belonging to their residential area would be increased when the participants engaged in the improvement of the regional landscape and environment through park volunteer activities and had the opportunity to recognize their relationship with their residential area. With regard to this variable, four items concerning attachment to their residential area, such as pride in that area and intention to continue living in that area, were included in the questionnaire.

Interaction was selected because it was assumed that the consciousness of the participants about general human interaction in their region would be increased when they experienced interaction through park volunteer activities and became aware of the fun and importance of interaction with people of various ages and professions. With regard to this variable, five items concerning their consciousness of the importance of participation in regional events and of interaction with local residents and the degree of participation in regional activities were included in the questionnaire.

According to the definition of Putnam, who has popularized this concept in recent years, SC is related to the "features of social organization such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions of people"(Putnum, 1993). SC has attracted attention as an important element in social development and has become the object of many experimental studies. Some researchers divide SC into two categories according to its characteristics, namely, structural SC (networks, roles in organizations, rules, and procedures) and cognitive SC (norms, sense of values, and beliefs) (Institute for International Cooperation, Japan International Cooperation Agency, 2002).

In this study, the consciousness of the subjects about SC was assessed in the questionnaire mainly from the cognitive viewpoint. Referring to the scale developed by Ichida et al.(2006) for an appropriate and easy assessment of SC and the questions proposed by Yamashita(2011) that incorporate specific project effects, nine items concerning the changes in the consciousness of park volunteers were included in the questionnaire to assess the "SC consciousness" of the volunteers.

The subjects of this questionnaire answered questions on a five-point scale (applicable, somewhat applicable, neither applicable nor inapplicable, somewhat inapplicable, and

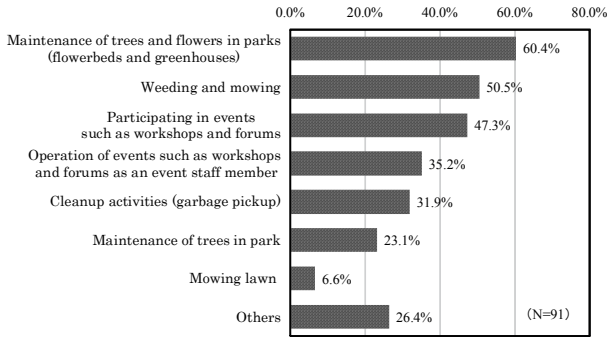


Fig.1 The details of park volunteer activities (multiple answers allowed)

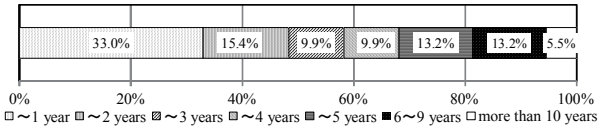


Fig.2 The number of years of continuous participation in park volunteer activities

inapplicable) regarding questions related to the four variables for assessing their consciousness about the region. The scores for each variable obtained in the assessment were simply summed.

Simple addition is a general method of calculating the scale values of variables (Haebara, 2001; Hatanaka, 2014). Latent variables may also be used to calculate the scale values on a scale consisting of multiple items. These methods of analysis are used interchangeably, although it is known that, when the variables (scales) obtained by simple addition are replaced by latent variables, the path coefficient between latent variables is larger than that between variables obtained by simple addition (dilution due to the use of a scale) (Iitsuka, 2003). However, the simple model was used in this study because the number of samples was limited. Also, if the model consisted of latent variables, the utilization of the data on variables in park management would be limited because of the difficulty in comparing the scale values with those in different regions and years.

In this study, with the aim of utilizing the data in park management, the scores on multiple items under the four variables concerning the "consciousness about the region" and the five variables concerning "park volunteer activities", which will be described in Section 2.2, were simply summed to obtain scale values.

2. RESULTS

2.1 Outline of subjects

The following is an outline of the subjects (park volunteers). Males and females constituted 36.3% and 57.1% of the subjects, respectively; females accounted for over half of the subjects. The age distribution was as follows: 15.7% of the subjects were in their 20s to 40s, 16.9% in their 50s, and 67.4% in their 60s or older. Those in their 60s or older accounted for over half of the subjects. Also, those who lived "2 km or more" away from the parks accounted for over half of the subjects.

The details of park volunteer activities (multiple answers allowed) were as follows in descending order: 60.4% of the subjects were "taking care of trees and flowers in parks (flowerbeds and greenhouses)," 50.5% were engaged in "weeding and mowing," 47.3% were "participating in events such as workshops and forums," 35.2% were engaged in the "operation of events such as workshops and forums as an event staff member," and 31.9% were engaged in "cleanup activities (garbage pickup)" (Fig. 1).

The number of years of continuous participation in park volunteer activities was one year for 33.0% of the subjects, two years for 15.4%, and five years for 13.2%; 58.2% of the subjects had participated in park volunteer activities for three years or less (Fig. 2). Regarding their intention to continue park volunteer activities, 93.4% of the subjects chose "I want to continue the activities" while 3.3% chose "both yes and no", and 1.1% chose "I don't want to continue the activities". Most of the participants intended to continue park volunteer activities. Of those who chose "I want to continue the activities", 63.5% chose "I want to continue the same activities as before" and 32.9% chose "I want to try new activities" in the question about the details of their activities in the future.

2.2 Outline of variables

2.2.1 Park volunteer activities (assessment and actual state of activities)

A factor analysis using the least-squares method

Table.3 Factor analysis of factor-specific satisfaction level

		Factor1	Factor2	Factor3	Factor4	Factor5	Communality
22	Plan for informing the public of events and activities held in parks (transmission of information on events and public relations activities)	0.926	-0.023	0.107	-0.211	-0.004	0.717
21	Plan for utilizing one's skills in park and regional community (e.g., transmission of ideas and requests)	0.914	-0.114	0.070	0.202	-0.284	0.871
20	Plan for becoming involved in the activities of regional community other than parks and society (e.g., providing knowhow on the use of flowerbeds in planting zone)	0.777	0.041	0.014	-0.063	0.071	0.643
18	Plan for obtaining knowledge to strengthen the connection between activities and regional community and society (e.g., forum for urban development)	0.733	0.145	-0.151	0.037	0.088	0.673
17	Plan for improving the scenery and environment of parks and regional community (e.g., flowerbed contests)	0.601	-0.025	-0.320	0.042	0.318	0.499
19	Plan for widely conveying the attraction of nature in parks and regional community (e.g., making tree name tags and training guides)	0.500	-0.005	0.063	0.312	0.020	0.619
8	Plan for promoting interaction among different generations and people with different jobs (e.g., providing opportunities in which parents and children can participate)	-0.050	0.795	-0.176	0.098	-0.048	0.559
6	Plan for promoting daily interaction among volunteers (e.g., tea parties)	0.014	0.765	0.197	-0.143	0.002	0.649
5	Forum to trigger interaction among volunteers (e.g., interaction workshops)	-0.017	0.751	0.162	-0.180	0.115	0.605
9	Plan for promoting interaction among those who have common hobbies (e.g., meeting to exchange seeds and seedlings, and wreath making)	-0.117	0.582	-0.221	0.444	0.126	0.622
7	Plan for cooperation with volunteers toward a goal (e.g., flowerbed contests)	0.326	0.509	-0.119	-0.075	0.070	0.454
16	Plan for skill acquisition so that one can be involved in various activities (e.g., providing knowhow on the use of flowerbeds in planting zone)	0.142	0.354	0.274	0.239	0.040	0.682
3	Safety considerations and support system (support system in case of problems)	0.012	0.013	0.846	0.022	-0.046	0.732
1	Support related to tools and instruments required in the activities	-0.096	0.010	0.833	0.010	0.100	0.685
2	Financial support required for the activities	-0.047	-0.089	0.815	0.011	-0.105	0.553
4	Plan for recruiting volunteers (e.g., continuous information transmission to recruit volunteers)	0.178	0.077	0.385	-0.109	0.258	0.394
13	Plan for enhancing the technical knowledge related to management (e.g., workshops and forums for urban development)	-0.041	-0.269	-0.070	0.817	0.338	0.706
14	Plan for promoting the motivation toward activities and learning (e.g., workshops and events reflecting the requests of participants)	-0.036	0.300	0.043	0.785	-0.194	0.826
12	Plan for deepening the understanding of the park (e.g., training guides and making tree name tags)	0.152	-0.103	0.224	0.546	0.209	0.724
15	Plan for encouraging involvement in various activities (e.g., park events)	0.184	0.200	0.185	0.358	-0.053	0.533
10	Plan for enjoying the growth and harvest of plants (e.g., tea parties, cafe serving herbal teas)	-0.038	0.152	-0.071	0.089	0.736	0.635
11	Plan for providing chances to come into contact with various plants (e.g., provision of opportunities for various activities)	0.031	-0.068	0.362	0.139	0.532	0.634
	Factor correlation Factor1		0.564	0.522	0.657	0.463	
	Factor2			0.432	0.519	0.304	
	Factor3				0.462	0.292	
	Factor4					0.402	

note: the items are in the thick frame, if the factor loading of the items on one of the five factors was ≧0.500 and that on the other four factors was ≦0.400.

and promax rotation was performed on the results of 22 items regarding park volunteer activities. The results of the analysis were examined and five factors were determined using the scree criterion and Guttman criterion (Table. 3).

Factor 1 was referred to as the "plan for social contribution" because the items gathered under this factor addressed the plan for widely disseminating the achievements and skills of park volunteer activities to regional communities and promoting cooperation with regional communities by expanding the activities outside volunteer organizations.

Factor 2 was referred to as the "plan for interaction between volunteers" because the items gathered under this factor involved the plan for deepening the interaction between park volunteers through volunteer activities.

Factor 3 was referred to as "basic support" because the items gathered under this factor addressed the issues of the essential support required of the Association, the administrator of park volunteer activities, such as the preparation of tools and instruments, financial support required in the activities, and the assurance of security.

Factor 4 was referred to as the "plan for obtaining skills and knowledge" because the items gathered under this factor addressed the plan for obtaining the skills and knowledge required in park volunteer activities through workshops.

Factor 5 was referred to as the "plan for contact with plants" because the items gathered under this factor were those that addressed the plan to promote the experience of contact with plants, the fun of observing their growth, and the joy of harvest; these plans are unique to park volunteers who participate in greening activities.

The items used to compose the scales (in the thick frame in Table. 3) were extracted so that the

Table.4 Scales of plan for park volunteer activities

		average	SD	α
Plan for social contribution	22 Plan for informing the public of events and activities held in parks	3.43	0.884	0.90
	21 Plan for utilizing one's skills in park and regional community	3.42	0.870	
	20 Plan for becoming involved in the activities of regional community other than parks and society	3.18	0.769	
	18 Plan for obtaining knowledge to strengthen the connection between activities and regional community and society	3.43	0.791	
	17 Plan for improving the scenery and environment of parks and regional community	3.57	0.845	
	19 Plan for widely conveying the attraction of nature in parks and regional community	3.69	1.019	
Plan for interaction between volunteers	8 Plan for promoting interaction among different generations and people with different jobs	3.45	0.958	0.81
	6 Plan for promoting daily interaction among volunteers	3.62	0.940	
	5 Forum to trigger interaction among volunteers	3.73	0.857	
	7 Plan for promoting interaction among those who have common hobbies	3.52	0.848	
Basic Support	3 Safety considerations and support system	3.87	0.897	0.84
	1 Support related to tools and instruments required in the activities	4.08	0.922	
	2 Financial support required for the activities	3.52	1.079	
Plan for obtaining skills and knowledge	13 Plan for enhancing the technical knowledge related to management	3.66	0.897	0.82
	14 Plan for promoting the motivation toward activities and learning	3.56	0.846	
	12 Plan for deepening the understanding of the park	3.73	1.023	
Plan for contact with plants	10 Plan for enjoying the growth and harvest of plants	3.42	0.908	0.72
	11 Plan for providing chances to come into contact with various plants	3.89	0.948	

Table.5 Scales of consciousness about region

		average	SD	α
Environmental conservation	I'm interested in environmental conservation.	4.56	0.562	0.71
	I'm constantly involved in some activities related to environmental conservation.	3.77	0.883	
	I'm interested in and collecting information on the events in the regional community and society.	3.85	0.906	
	I'm currently involved in activities in the regional community and society by sharing a common goal with other people.	3.58	1.146	
Attachment	I'm proud of the regional community where I live.	3.92	0.991	0.88
	I have an attachment to the regional community where I live and wish to reside here permanently.	4.18	1.028	
	I feel happy when others praise the regional community where I live.	4.29	0.779	
	I think that festivals and events in the regional community where I live are important.	4.26	0.828	
Interaction	I think that the interaction with the regional community and the people in the regional community are important.	4.41	0.699	0.77
	I have a strong connection with my neighborhood.	3.57	1.066	
	I often participate in regional activities (e.g., neighborhood community association, women's association, and elderly people's association)	2.95	1.345	
	I think that the interaction among different generations and people with different jobs is strong in the regional community.	3.30	1.269	
	I meet volunteer peers outside the activities of park management.	3.45	1.500	
Social capital consciousness	Everyone in the regional community greets one another.	4.33	0.684	0.83
	I feel I'm a member of the regional community.	4.00	0.882	
	I can trust residents in the regional community.	3.73	0.817	
	I think that someone in the regional community will bring my purse to me even if I drop it.	3.33	0.955	
	I think that people in the community will help me if I'm in need after disasters such as earthquakes.	3.96	0.788	
	I wish to improve my regional community.	4.52	0.603	
	I think we can solve the problems in the regional community by ourselves.	3.02	0.977	
	I do not mind spending my time on activities that improve the regional community even if I'm not interested in the activities.	3.88	0.917	
	I think that volunteer activities are important to improve the unity of people living in the regional community.	4.27	0.817	

factor loading of the items on one of the five factors was ≥0.500 and that on the other four factors was ≤0.400. The scores were simply summed for each factor to create the scale of each plan for park volunteer activities that composed the model (Table. 4). These scales were adopted because the coefficient α[4)] for each of the five scales was >0.7, indicating that these scales had a certain degree of internal consistency.

The following variables were added to explain the park volunteer activities: 1) the overall satisfaction in park volunteer activities (five-point scale: satisfied, somewhat satisfied, neither satisfied nor dissatisfied, somewhat unsatisfied, and unsatisfied) as the variable indicating the overall assessment of park volunteer activities and 2) the number of years of continuous participation (real number value) and the number of volunteer peers (6 grades: 0, 1 or 2, 3 to 5, 6 to 10, 10 to 15, and ≥16) as the variables indicating the effects of park volunteer activities.

2.2.2 Consciousness about region

The coefficient α for each of variables that constitute the four scales of consciousness about the region, namely, environmental conservation, interaction, attachment, and SC, was >0.7. These

scales were adopted because they had a certain degree of internal consistency (Table. 5).

2.3 Assessment of model

In this study, an association model (hypothesis) with substantial scientific significance that can be used at the site of park management was tested by covariance structure analysis.

The findings regarding the content of park volunteer activities and the findings obtained in previous studies on the role of park volunteers in community planning have led to the following insights: park volunteer activities contribute to the enhancement and accumulation of SC; fulfilling human interaction and a well-arranged system of activities contribute to the overall satisfaction in park volunteer activities; and park volunteer activities raise consciousness about solutions to social challenges (Toko and Saito, 2008; Akazawa, Fujimoto, and Nakase, 2010; Ichimura et al., 2014).

On the basis of these substantial scientific findings revealed in the studies on park volunteers and similar activities, a hypothesis was established that park volunteer activities (the assessment and actual state of activities) affect the consciousness about a region. To test this hypothesis quantitatively and comprehensively while focusing on the consciousness of participants, an association model was constructed using the eight variables regarding park volunteer activities listed in Section 2.2.1 and the four variables regarding the consciousness about the region listed in Section 2.2.2; the model was subjected to a covariance structure analysis[5].

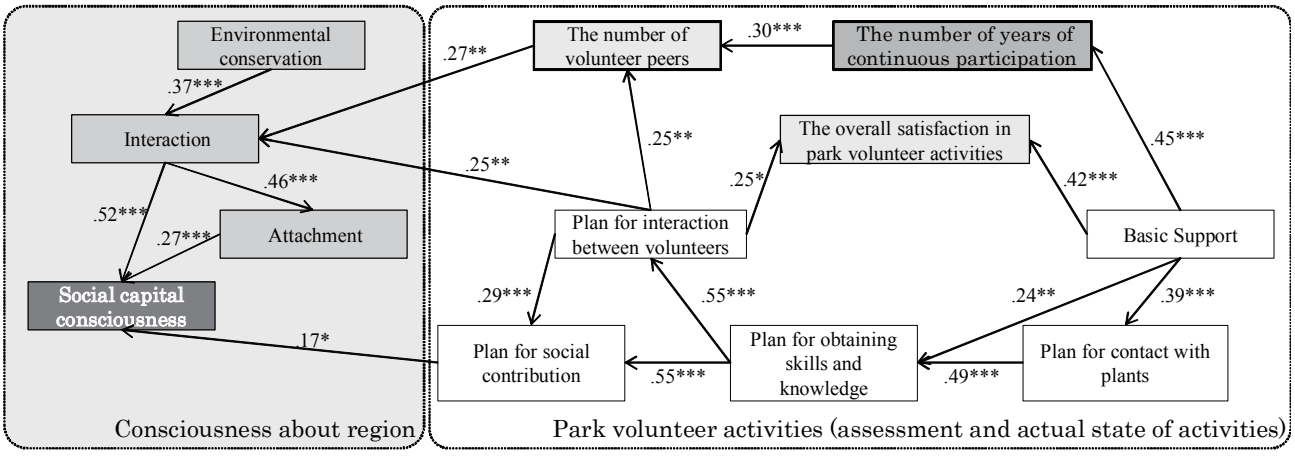
Figure 3 shows the causal model adopted in consideration of the model fit and the significance of the path coefficients. The path coefficients are standardized solutions, and the magnitude of the path coefficients indicates the strength of the relative relationship. All path coefficients are statistically significant[6]. Also, the chi-square value (degree of freedom) was 52.737 (48), the p-value was 0.296[7], GFI was 0.916[8], AGFI was 0.864[9], and RMSEA was 0.033[10] in the adopted association model. Generally, the model constructed in this study was considered to meet the required criteria for model fitting.

2.4 Park volunteer activities (assessment and actual state of activities)

It seems that the overall satisfaction of participants in their activities is important for maintaining park volunteer activities. In this study, the variables directly contributing to the overall satisfaction were basic support and the plan for interaction between volunteers, and the variables indirectly contributing to the overall satisfaction through the plan for interaction between volunteers were the plan for contact with plants and the plan for obtaining skills and knowledge. Basic support not only had direct positive effects on overall satisfaction but also had indirect positive effects on overall satisfaction through the plan for contact with plants and the plan for obtaining skills and knowledge. Basic support had the largest standardized total effect on overall satisfaction (0.463)[11]. This result suggested that overall satisfaction in park volunteer activities was most significantly affected by the appropriate basic environment and conditions including the provision of support by park administrators with regard to the funding of volunteer activities and safety management.

The plan for interaction between volunteers was one of the variables directly contributing to overall satisfaction and showed the important value that participants expected from park volunteer activities. Also, the plan for interaction between volunteers had direct positive effects on the number of volunteer peers, which indicated the actual state of interaction with volunteers. In addition, the number of years of continuous participation in volunteer activities positively affected the number of volunteer peers, indicating that the number of volunteer peers increased as the participants continued volunteer activities for a longer period. Moreover, basic support positively affected the number of years of continuous participation and turned out to be an important factor in sustaining the continuity of volunteer activities.

As for greening activities that were unique to park volunteers, the plan for contact with plants



note1：error terms are omitted in the figure.
note2：symbols for statistical significance are as follows.
* for p<.05, ** for p<.01, *** for p<.001

χ^2 (48)=52.737, p=.296 / GFI=.916, AGFI=.864, CFI=.986, RMSEA=.033 / n=91

Fig.3 The association model for park volunteer activities and consciousness about region

positively affected the plan for obtaining skills and knowledge, and the plan for obtaining skills and knowledge positively affected the plan for interaction between volunteers. Also, the plan for obtaining skills and knowledge positively affected the plan for social contribution through the plan for interaction between volunteers. Namely, the satisfaction derived from contact with plants was linked to the satisfaction derived from obtaining skills and knowledge about park management and plants in park management workshops, park guide training, or activities such as the preparation of tree name tags. In addition, the satisfaction in obtaining skills and knowledge was linked to the satisfaction in the interaction with volunteers. Furthermore, both the satisfaction in obtaining skills and knowledge and the satisfaction in the interaction with volunteers were linked to the satisfaction derived from making a social contribution, including the promotion of park events or greening activities and the holding of flowerbed contests outside the parks, which connect the parks to the wider society. These results can be interpreted as suggesting that, in the value chain of park volunteers, the specific consciousness about the activities for maintaining the parks is linked to the abstract consciousness about the region.

2.5 Consciousness about region

Attachment and interaction had direct positive effects on SC consciousness, and both led to an increased level of SC consciousness. Also, interaction positively affected attachment and thus indirectly contributed to an increased level of SC consciousness. Environmental conservation positively affected interaction, suggesting that the sense of purpose derived from contributing to environmental conservation in the region is related to the increased level of consciousness about human interactions in that region.

2.6 Relationship between park volunteer activities and consciousness about region

Links were identified between the park volunteer activities (the assessment and actual state of activities shown in the right panel in Fig. 3) and consciousness about the region (left panel in Fig. 3). The plan for interaction between volunteers and the number of volunteer peers in park volunteer activities positively affected the interaction, which was related to consciousness about the region. Therefore, it was considered that the active interaction with volunteers through park volunteer activities was related to the expansion of the human network in the region and the increased consciousness about the importance of the human network, which then led to an increased level of SC consciousness. Through the participation in park volunteer activities, the participants came to place more emphasis on the human network in the region and to have an increased level of social consciousness, which is identified as SC. This seemed to enhance the

foundation of the social development. Also, the plan for social contribution had direct positive effects on SC consciousness, although the coefficient was smaller than those between other variables.

As described, a value chain started with the satisfaction of the participants themselves and led to their consciousness about regional communities through the interaction with volunteers and the accumulation of knowledge and experiences in park volunteer activities. These activities then broadened the perspective of participants and promoted their cooperation in society.

3. DISCUSSION

3.1 Possibility of park management from the viewpoint of the value chain of park volunteer activities

In a study conducted by Ichimura et al. (2014), there was a limitation in accurately understanding the entire picture of a value chain because the contribution between variables was assessed on the basis of correlation coefficients. In this study, however, the limitation in the previous study was overcome, and the entire picture of a value chain was clarified by constructing a multivariate model and analyzing it by covariance structure analysis while controlling the effects between variables.

As a result, it was found that basic support promoted the activities inside the parks, such as the contact with plants and the acquisition of the skills and knowledge required in volunteer activities. At the same time, combined with the effects of the plan for interaction between volunteers, basic support led to the expansion of the perspective of participants and made them become conscious of their social contribution.

Considering the value chain of park volunteer activities, there is the possibility that human resources taking the initiative in the revitalization of regional communities were developed in the parks. Namely, the "value chain of park volunteer activities" observed in Section 2.4 (in the right panel of the model in Fig. 3) clarified the priority of expectations that the participants had of the administrators of volunteer activities and how these values are linked with each other. Therefore, if the designated administrators are aware of the priority of expectations and manage parks in a way that promotes the value chain, it may be possible to create park volunteer activities that contribute to the fostering of human resources that will play an important role in regional revitalization.

3.2 Possibility of use of parks as places to trigger regional revitalization by fostering park volunteers

In the value chain regarding the consciousness about a region described in Section 2.5 (in the left panel of the model in Fig. 3), the interaction led to the formation of attachments and resulted in the fostering of SC consciousness.

This means not only that the fostering of park volunteers promotes the contact with plants but also that "city parks can contribute to the formation of regional communities and trigger regional revitalization", the idea proposed by Ikebe (2014) as a new indicator of changes in the social value of parks.

For city parks to trigger regional revitalization, they must be managed in a way that improves the satisfaction of park volunteers in the factors linking the value chain in the right and left panels of the model shown in Fig. 3 (the plan for interaction between volunteers and the plan for social contribution) and strengthens the value chain.

Concretely, the services provided regarding the plan for interaction between volunteers are the "opportunities for interaction between volunteers (such as the interaction workshops)" and the "plan for cooperation with volunteers toward a goal (such as the flowerbed contests)", which are listed as the items under the plan for interaction between volunteers (Table. 4). The services provided regarding the plan for social contribution are the "plan for obtaining the knowledge that enhances the involvement in regional communities and society (such as the services provided through Sapporo School of Gardening described previously)", which is listed as an item under the

plan for social contribution.

As described above, if the final goal of future park management is to utilize parks as places to trigger regional revitalization, it is necessary to review, adjust, and rebuild park volunteer activities, namely, to coordinate (optimize) park volunteer activities so that their values are linked together to form a value chain. In the area of business administration, Porter et al. (2011) called such a process "creating shared value (CSV) through optimization and coordination of a value chain".

The results of this study suggest that it is possible for various stakeholders to be involved in rebuilding the value chain for regional revitalization by sharing a "common goal", as proposed by Umemoto (2011), of the utilization of parks as places to trigger regional revitalization through park management and by combining expertise in the areas of business administration and landscape architecture.

CONCLUSIONS

The following are the issues to be addressed in future studies. As described in Section 3, the next challenge is to develop specific park management strategies on the basis of a value chain and to analyze actual cases in many regions. To this end, it is necessary to clarify the value chain for the role of parks in regional revitalization in regions with different population sizes and geographical characteristics and to analyze findings about the value chain that can address different regional challenges. The method described in this study will be helpful in these processes.

Also, it is necessary to conduct the interview survey to the residents' association to clarify the spread of the regional activities of the park volunteer activities.

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NOTES

1) The Ministry of Land, Infrastructure, Transport and Tourism (http://www.mlit.go.jp/common/001034410.pdf) proposed that "New Public Commons" is almost equivalent to "community planning by cooperation among various entities" or "planning of a society sustained through mutual assistance" in the development of the improvement project for supporting new community planning in FY2014. In accordance with this definition, we use "New Public Commons" as an attitude of new community planning.

2) The survey subjects in this study were only large-scale city parks, because the parks managed by the association cooperated in this study were only large-scale city parks.

3) Note that the size of the living area is not uniformly defined by a distance because regional consciousness and the interaction range through volunteer activities vary between individuals.

4) Cronbach's α is a measure how the items included in a scale show similar tendencies. In the case of psychometric scales, the reliability of a psychometric test is generally considered to be high for α of ≥0.8, moderate for ≥0.7, and low for <0.7. However, these criteria are not absolute: α decreases as the number of items included in a scale decreases.

5) For covariance structure analysis, IBM SPSS Amos 22.0.0 was used.

6) We confirmed that we cannot conclude that there is no substantive effect from the confidence interval of each path coefficient.

7) A chi-square test is carried out assuming that the model of the null hypothesis is correct. It is judged whether the model can be correct when the hypothesis is adopted.

8) The goodness-of-fit index (GFI) takes a value in the range of 0 to 1. The goodness of fit increases as GFI approaches 1, and GFI of ≥0.9 is a criterion for selecting the model.

9) Adjusted GFI (AGFI) is an index in which the effect of the degree of freedom of GFI is excluded. AGFI of ≥0.9 is also used as a criterion for selecting the model.

10) The goodness of fit increases as the root mean square error of approximation (RMSEA) approaches 0. RMSEA of ≤0.5 is considered to be a good fit.

11) The standardized total effect is the total effect calculated using a standardizing coefficient. The total effect is calculated by adding a direct effect (an effect of directly linked variables) and an indirect effect (an effect of indirectly linked variables).

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