A study on the network of disabled person rehabilitation using social network analysis: focus on the comparison between two governments

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This study compared the network of rehabilitation for the disabled during the Roh, Moo-hyun administration and the Lee, Myung-bak administration. Through such effort, how the public social activity related to rehabilitation for the disabled has changed through time was observed and the future network level of rehabilitation for the disabled was considered. The analysis was conducted using the social network analysis method and it was found that the Roh, Moo-hyun administration’s network showed better network density and centrality level compared to the Lee, Myung-bak administration, and also showed better balance between the government and the private sectors. Based on such results, this study was concluded by suggesting a community where the government and private sectors can regulate the network level together on the same grounds.

Keywords: Social network analysis, Disabled person rehabilitation, Comparison governments

INTRODUCTION

The rehabilitation for the disabled is one of the most important goals supported by the social welfare policy and it is an activity where support of diverse sectors is officially regulated by the Welfare of the Disabled Persons Act. The need for social intervention on rehabilitation for the disabled results from the value which the act of rehabilitation possesses. Rehabilitation motivates independence through providing multilateral mediation, assists revitalization of social interaction, and carries out functions for restoring the disabled to the former self by encompassing the detail areas of medicine, psychology, society, career, education, etc. (Yang et al., 2008).

Previously, the public-oriented activities related to rehabilitation for the disabled have consistently shown uniform and collective service supply form. However, decentralization has begun due to the effect of participatory government’s trend of localization promotion and has progressed over a certain extent (Na, 2006).

Such decentralization of local government has presented local governance as the new paradigm of executing public activities and is acting as a network structure as the basis of participation and cooperation of diverse social agents (Choi et al., 2006). Network represents the relationship between individuals or organizations with identical or similar purposes within a society. Also, it is a potential and horizontal pattern of exchange, interdependent resources flow and communication, and an assemblage of individuals interacting under the sharing of standards for valuable practices (Liebeskind et al., 1996). Network contributes to exploration of various social issues and its mutually complex connections, comprehension of empirical evidence, route confirmation between agents and more. Networks are appropriate for detecting the characteristics between agents and suggest grounds for construction of a detailed model (Vega-Redondo, 2007). The special features of networks are high flexibility and adaptability in various situations since the connection and route of each agents can be shown in intersections, lines and diagrams and expressed in mathematical

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ways like numerical parameters showing the degree of relationship (Freeman, 1992). Accordingly, analysis on specific network is useful for accurately understanding the public conduct of modern society which is built on the basis of liberalization and diversification, and allows observation of connection status in process of an act with flexible vision. Many previous studies indicate that the consideration on network construction and reinforcement is necessary in order to enhance the substantiability and efficiency of specific business or policy (Bang, 2002; Kim and Lim 2004; Lee et al., 2012; Song and Song, 2002). Thus it can be concluded that social activity directly related to rehabilitation for the disabled creates effectiveness based on networks and by confirming networks the effectiveness of the activities related to rehabilitation for the disabled can also be confirmed.

This study analyzes the network of rehabilitation for the disabled in Korea with the purpose of providing scientific evidence and information for promoting the effects of social activities related to rehabilitation for the disabled. To note the changes as time passes, networks during the Roh, Moo-hyun administration when regionalization of rehabilitation for the disabled began and the Lee, Myung-bak administration which was considered to be the most neglectful of regionalization were compared. There may be different views on the premise that the Lee, Myung-bak administration was passive in government decentralization because the Lee, Myung-bak administration once showed a political move by establishing the decentralization advancement committee and including decentralization in major government projects. However the critical remarks made by the Pyeongchang Winter Olympics Committee chairman Kim, Jin-sun stating “President Lee Myung-bak has operated the decentralization committee however its effect was invisible and he was generally uninterested in local governments.” during a lecture at Dongguk University in October 7, 2013 and Ahn, Hee-jung, the governor of Chungnam, saying that “although Lee, Myung-bak administration advertises that it has delegated massive state businesses to local governments, the actual percentage is less than 5% of the entire state businesses.” and Lee, Hoi-chang, governor of the Liberal Forward Party, stating “Lee, Myung-bak administration insisting modification or cancellation of the issue of Sejong city reveals its anti-decentralization nature.” on October 26, 2009, are evidences that the Lee, Myung-bak administration was passive in government decentralization. Through such comparative analysis procedure, the policy implications related to rehabilitation for the disabled were found and the network level of rehabilitation for the disabled which the future government should aim was considered. Further attempt has significance as continuous study on public social enforcement in the area of welfare for the disabled which is not vitalized and will have value as it provides scientific analysis and empirical data on rehabilitation for the disabled which is unprecedented.

THEORETICAL BACKGROUND

Understanding of social network analysis

The social network analysis is a scientific attempt at explaining the characteristics of correlations of specific individuals, organizations and other various entities and the social act, interaction and relation structure of the connected entities (Kim and Kim, 2010; Mitchell, 1969). The subject of analysis is subdivided into categories of full connection network, ego-centric connection network and semi-connection network based on the nature of the data. In case of positional approach, it is possible to measure the equivalence of structure, form and role and the structural holes, and in case of relational approach the density, diversity, connection strength and duration, and the four types of centrality – degree, betweenness, closeness and prestige centralities - can be measured (Kim, 1995; Kim and Chang, 2010). Of these, the density and centrality measures are utilized the most. The density is the degree of network solidarity and the level of contact between participants within a network. Density measure has a score between 0 and 1 where 0 refers to complete irrelevance and 1 refers to complete connection. The centrality measure is an analysis index for finding which participant is relatively more important. Generally, three types of centrality are studied – the degree centrality is the degree of other participants which a specific participant is connected to and the betweenness centrality is the degree of a specific participant’s role as an intermediary among other participants in a relation structure. The closeness centrality is a minimum total distance of required to reach from one point of the connection network to another, and the distance decreases as it is placed in the center of the connection network and the closeness centrality increases (Kim, 1995; Koo and Lee, 2008).

Method of analysis

This study first selected network participants in order to investigate the network of rehabilitation for the disabled. Top 15 participants showing the highest significance and exposure frequency were selected to participate in rehabilitation for the disabled through searching related articles and finding keyword using a morphological analyzer ‘KrKwic’ on the Korea Press Foundation’s Mediagaon KINDS to eliminate any arbitrary voluntariness in se-
KINDS allows you to search all articles from 10 newspapers for the Seoul area (Donga News, Hangyeorae, etc.), 25 newspapers outside Seoul area, 9 economic newspapers, 4 TV news broadcasters, and 10 internet news sites. However, articles from two major newspapers, Chosun News and Joongang News, must be searched separately as they do not provide news articles to KINDS. Regardless, no separate searches were conducted considering that the rehabilitation for the disabled is a public social activity and the articles from these two newspapers will not differ much from those found in KINDS since. The search period was from February 25, 2003 to February 24, 2008 (Roh, Moo-hyun administration) and February 25, 2008 to February 24, 2013 (Lee, Myung-bak administration) and the search keyword was set as ‘rehabilitation for the disabled’. The analysis method grasped the density and centrality of the network formed by the 15 selected participants by the semi-connection network analysis method of artificially establishing relationship in case where there is no direct interaction relation between participants and future network development was discussed by raising the suggestive issues through comparing each government’s results. The schematization of all analysis and results used ‘UCINET6’ and ‘NetDraw’. The analysis framework arranging the above information is shown in Fig. 1.

Table 1. Frequency ranking of news about network actor expression in Roh, Moo-hyun government

| No | Network actor                  |
|----|--------------------------------|
| 1  | Seoul                          |
| 2  | Kyunggi-do                     |
| 3  | Ministry of Health and Welfare |
| 4  | Special Hospital of Rehabilitation |
| 5  | Jeju-do                        |
| 6  | Daejeon-si                     |
| 7  | the Red Cross                  |
| 8  | Daegu University               |
| 9  | Pohang-si                      |
| 10 | the Prume Foundation           |
| 11 | Social Welfare Corporation     |
| 12 | Association of Disabled Person |
| 13 | Center of Rehabilitation       |
| 14 | the Eden Welfare Foundation    |
| 15 | Goyang-si                      |

The relationship matrix data for fabric analysis was formed on the key network participants confirmed above based on the synchronicity between participants in sentence unit of news articles. The matrix data was disdifferentiated and symmeterized, and then it was attempted to find the characteristics of network structure through network sociogram and density and centrality analysis. The method of using the frequency data for synchronicity in sentence unit of news articles selected in this study allows analysis of density but the directionality is not considered since the disdifferentiation and symmeterization of data can only measure whether or not the network participants are related or unrelated.

First, the sociogram deduced from analysis of relationship matrix data on the network of rehabilitation for the disabled during the Roh, Moo-hyun administration is shown in Table 2.

Second, the density of the network of rehabilitation for the disabled during the Roh, Moo-hyun administration was 0.14 which makes it hard to conclude that the solidarity was strong. However, considering that the density and the group size are inversely pro-

Disability person rehabilitation network of Rho, Moo-hyun government

Network actor

The total of 294 articles was found under the keyword ‘rehabilitation for the disabled’ during the Roh, Moo-hyun administration period. The keyword and participant sorted out and organized in rankings using KrKwic are shown in Table 1.

Although the key participants in the networks of rehabilitation for the disabled during the Roh, Moo-hyun administration were composed relatively evenly of government sector including the central government, greater local government, basic local government and private sector including university and social organizations, the government sector including the city of Seoul, Gyeonggi province and the ministry of health and welfare occupied the upper rank of the network participants. Especially, the local governments played a pivotal role.

Structure characteristic of network

Fig. 1. Analysis framework of disabled person rehabilitation network.
$$Table 2. Frequency ranking of news about network actor expression in Lee, Myung-bak government$$

| No | Network actor                      |
|----|------------------------------------|
| 1  | Center of Rehabilitation           |
| 2  | Special Hospital of Rehabilitation |
| 3  | Community Welfare Center           |
| 4  | the Prume Foundation               |
| 5  | Kyunggi-do                         |
| 6  | Association of Disabled Person     |
| 7  | Kwangju-si                         |
| 8  | Ministry of Health and Welfare     |
| 9  | Inchon-si                          |
| 10 | Seoul                              |
| 11 | Daejeon-si                         |
| 12 | Social Welfare Corporation         |
| 13 | Daegu University                   |
| 14 | Daegu-si                           |
| 15 | Jeonju-si                          |

portional, the low density provides counterevidence claiming that the group size of network of rehabilitation for the disabled during the Roh, Moo-hyun administration was greater.

Third, the total degree centrality of the network of rehabilitation for the disabled during the Roh, Moo-hyun administration was 22.2%. As it is considered that the deviation in participants’ relationship formation activities is small when the value of degree centrality is smaller than 25.0%, it can be concluded that the relationship formation activities did not differ much between participants in the network of rehabilitation for the disabled during the Roh, Moo-hyun administration. The participants with high degree centrality, measured by inward degree, were city of Seoul, rehabilitation hospital, the Ministry of Health and Welfare, the distinct feature was that the degree centralities of the city of Seoul, which is a greater local government, and rehabilitation hospitals, which are non-governmental institutions, were greater than the Ministry of Health and Welfare which is a competent ministry of the central government in activities related to rehabilitation of the disabled. Considering that the higher degree centrality means greater popularity from other participants and larger activity in expanding connections (Kang and Lim, 2008), it can be concluded that such distinct phenomenon has resulted from the acceleration of government decentralization during this time. Next, the total betweenness centrality of the network was 22.6%. Since lower betweenness centrality means no specific participant has monopolized the mediating function within the network (Kang, 2002), it can be concluded that the participants within the network of the rehabilitation for the disabled during the Roh, Moo-hyun administration played the role of intermediaries relatively evenly. The participants with highest betweenness centrality, measured by standardized betweenness centrality, were rehabilitation hospitals (24.9%), city of Seoul (11.7%), Gyeonggi province (9.6%), and it is assumed that the reason for high betweenness centrality of rehabilitation hospitals is because the very foundation of rehabilitation for the disabled is medical rehabilitation and the intermediary role is inseparable. Lastly, the total closeness centrality of the network was found to be 55.3%. The closeness centrality refers to participants’ accessibility to a specific participant, Roh, Moo-hyun administration’s network of rehabilitation for the disabled can be considered as a network with high accessibility by the participants.

The participants with highest closeness centrality, measured by distance, were rehabilitation hospitals, city of Seoul, Gyeonggi province and the Ministry of Health and Welfare.

Disabled person rehabilitation network of Lee, Myung-bak government

**Network actor**

The total number of articles found in KINDS with the keyword ‘rehabilitation for the disabled’ during the Lee, Myung-bak administration period was 759. The keyword and participant sorted out and organized in rankings using KrKwic are shown in Fig. 2.

Unlike in Roh, Moo-hyun administration, the private sectors including rehabilitation centers and facilities, rehabilitation hospitals, and welfare center for the disabled occupied the upper ranks in the network of the rehabilitation for the disabled during the Lee, Myung-bak administration. This means that the activity on rehabilitation for the disabled by the private sector was more significant than the government sector.

**Structure characteristic of network**

Using the same method as above and grasping the structural network characteristics, first, the sociogram deduced from the relationship matrix data on network of rehabilitation for the disabled during the Lee, Myung-bak administration using the is shown in Fig. 3.

Second, the network density of the rehabilitation for the disabled was 0.13, which was lower than in the Roh, Moo-hyun administration. As you can see by comparing Figs. 2 and 3, the group size within the network has increased compared to the Roh, Moo-hyun administration.

Third, the degree centrality during the Lee, Myung-bak ad-
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Fig. 2. Sociogram of disabled person rehabilitation network in Roh, Moo-hyun government.

Fig. 3. Sociogram of disabled person rehabilitation network in Lee, Myung-bak government.
administration was 26.1%. As the centrality value exceeds 25.0%, the deviation of centrality between participants is considered to be high and this means that the relationship expansion effort is concentrated to specific participants. The participants with highest degree centrality were mostly the private sector, including the associations of the disabled, rehabilitation centers, rehabilitation hospitals and more. In other words, as the degree centrality of private sector increased and the degree centrality of government sector fell, the deviation in total degree centrality appeared. It is assumed that the reason for high degree centrality of private sector is due to increased activity by the private sector at the time, but also, there was a lack of activities related to rehabilitation for the disabled by the government sector during the Lee, Myung-bak administration. As the results of this study, considering that the total sum of degree centrality of private sector was 1,066 and the government sector was 716, which is only 67% of the private sector, it coherently showed poor degree centrality of government sector. Considering the level of resources and authority, this can only mean that the government has put in less effort in the area of rehabilitation for the disabled. Even in previous studies, the distortion of perception towards the disabled and lack of interests in disabilities policies and budget allocations in the Lee, Myung-bak administration have been criticized (Cho, 2012). Next, the betweenness centrality was 0.41%, and even when it was not compared to the Roh, Moo-hyun administration, showed very low level. Accordingly, it is evident that the intermediary function of specific participant is almost inexistent within the network. The participants with high betweenness centrality were rehabilitation centers, rehabilitation hospitals, welfare center for the disabled and they all showed standardized betweenness centrality of 1.0%. Since the value of standardized betweenness centrality is very weak, it is difficult to imply a meaning. Such characteristic can also be seen as a result of government negligence. It is because various information and resources are required in order to fulfil the intermediary duty among participants, and the government is the most conforming participant for such conditions. Lastly, the total closeness centrality of the network was 15.9% and the participants with highest closeness centrality were rehabilitation centers, rehabilitation hospitals, welfare center for the disabled and all showed minimum distance of 14. Such closeness centrality of the Lee, Myung-bak administration fell behind the 55.3% of Roh, Moo-hyun administration and the accessibility was also poor like the other centralities mentioned above. The reason could possibly be that the group size has increased compared to the past, but the low total closeness centrality in spite of short private sector distance can be explained by the relatively longer government distance.

In analyzing the networks on public social activities related to rehabilitation for the disabled in both Roh, Moo-hyun and Lee, Myung-bak administration, it was found that the Roh, Moo-hyun administration’s characteristics were low network density, large network group size, significance of the government sector, even intermediary function of participants within the network, high accessibility between participants and more. On the other hand, the Lee, Myung-bak administration was characterized by even lower density, larger network group size, lack of intermediary function of participants within the network, poor accessibility between participants and more.

To sum up, the Roh, Moo-hyun administration’s network of rehabilitation for the disabled showed open network structure with easier accessibility under the leadership of the local government, the network of rehabilitation for the disabled during the Lee, Myung-bak administration showed closed network structure with passive government sector activities and poor accessibility. Thus as time passed from the Roh, Moo-hyun administration to Lee, Myung-bak administration, the activities related to rehabilitation for the disabled have weakened and the activity result was also evaluated negatively (Cho, 2012; Eun, 2010).

CONCLUSIONS

Based on the above results, the agenda for discussing future network of the rehabilitation for the disabled is on the deliberate and reasonable level of public social network of rehabilitation for the disabled. Although the density and centrality of network of rehabilitation for the disabled during the Roh, Moo-hyun administration are high compared to the Lee, Myung-bak administration, it is not a high value in absolute terms. In other words, the connection and activity level of participants within the network cannot be seen as precise. The most important reason for structuralizing specific network is because it is the result of very practical and strategic decision for maximizing usefulness and activity of problem solution in enforcing policies or relational social activities (Lee, 2013).

Thus the network of rehabilitation for the disabled with low density is likely to decrease the solution of related problems and affectiveness of activity. Therefore it is necessary to expand the network by building the strong network governance through adding more social participants in the network and expanding mutual correlation. However, the reckless increase of private sector activities and network expansion must be rejected in such process. Since the
network replaces the reduction of government role (Choi, 2006), the expansion of the network means the reduction of government function. As the government is a participant leading substantive creation of almost all network governance, it must non-coercively fulfill its duties as a mediator with resources and authority which can overpower other participants (Hanf and O'Toole, 2003; Lee et al., 2008; Meier and O'Toole, 2003). Too much network expansion, or the over-reduction of government function, can actually be a strong factor which hinders the network governance creation and management outcome. Thus, while increasing participation of the private sector under government-oriented horizontal relationship settings, the network regulation must be implemented at a socially appropriate level by hearing public opinion and constituting a council between participants in the private sector. Also, the effectiveness of network management must be secured during such process, through legal and institutional regularization.

Although this study has resolved the problems of arbitrary selection of the variable and the arbitrariness of interpretation through social network analysis method, there are still limits resulting from the extensivity of network analysis. It is difficult to conclude that the real network characteristics are fully analyzed due to the lack of consideration of the practical interaction or other environmental factors within the network. Also, the judgment of network analysis could be somewhat biased. A higher quality study in the area of welfare for the disabled is promised in the future by overcoming the fundamental limit of network studies through more in-depth examination and consideration.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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