Dense networks within a group help bridging networks between groups: interchange of people between mountainous and urban areas.

Abstract

People embedded in dense social networks are likely to trust and cooperate with other members of their group. However, these individuals are also likely to turn inward and harbor strong hostility toward groups outside their network. Thus, it is important to establish bridging networks between groups. However, the effect of dense networks within a group on bridging networks between groups remains unclear.

To elucidate the relationships between dense and bridging networks within and between groups, this study interviewed residents of the village of Nishiawakura in a mountainous region of Okayama Prefecture, Japan. We asked participants about their networks within the village and with urban residents.

We found that established residents who had lived in the village for a long time maintained dense networks within the village to preserve their forests. Recently, however, these dense networks have not worked efficiently in a consistent manner. Returners (i.e., those who had returned from urban areas) were not embedded in the dense networks within the village and their forests had not been well preserved. However, they were more eager to form bridging networks with urban residents, hoping that urban residents would manage the abandoned forests in the village. On the other hand, established residents were skeptical about the effect of urban-mountain communications on the village.

In this context, the dense networks of the established residents might have inhibited the development of bridging networks between this population and urban residents. However, the staff of the Mokkun Company is now developing bridging networks between the two groups. These are possible, in part, because staff members acknowledge the importance of the dense networks within the village. Hence, dense networks within a group might also help in the establishment of bridging networks between groups under certain conditions.

1 Introduction

1.1 Social networks

One important task of sociology involves explaining social outcomes at the macro level in terms of the results of collective actions of individuals at the micro level. Social networks provide an effective connection between micro and macro levels and offer a perspective for understanding the relationships among individuals and the outcomes of collective behaviors. The concept of social networks holds a prominent position not only in sociology but also in other disciplines, ranging from the social to the natural sciences[1][2].

Within this substantial literature on social networks, the study conducted by Coleman [3] constitutes the most important investigation of the effects of social networks. Coleman assumed that dense networks among people produce social capital, which can be defined in terms of reciprocity and cooperation among the members. Social capital confers various benefits on people, such as education[3], economic development[20], social control[5], and biodiversity conservation[15]. Sobel[17] explained that dense networks act to create common knowledge and increase the quality and reliability of the third-party monitoring needed to enforce cooperation.

However, dense networks are also likely to result in negative consequences for some people[14]. For example, those who are embedded in dense networks tend to look inward and have strong out-group hostility. They also receive scant information from sources outside of their dense networks, thereby dramatically limiting their economic opportunities. In addition, those who try to form social relationships outside of the dense networks are often excluded from the group. These negative consequences are directly related to the impact of dense networks.

Sociologists have recently started to attend to networks operating between groups. During the 1970s, Granovetter[4] noted the importance of bridging networks, or "weak ties" according to his definition, operating between groups. People with weak ties to others can garner information from outside their group and are likely find better job opportunities. Indeed, Granovetter also suggested that weak ties might form the basis for uniting entire societies.

Putnam [16] defined two types of social capital that emerge from different types of networks. Dense networks within a group produce social capital in the form of bonding. As a result, people can trust one another within a group, but may find it difficult to cooperate with outsiders, or those outside their group. Bridging networks between different groups produce bridging social capital. As a result, people can gather information from outsiders, develop broader personal identities, and interact reciprocally with outsiders. The possibility that dense networks within a group might hinder the establishment and/or operation of bridging networks between groups constitutes

an important issue. Portes[14] suggested that people embedded in dense networks were not likely to access bridging networks. Yamagishi[21] also suggested that dense networks interfere with opportunities to meet various people in that members could not trust outsiders. In contrast, some studies have hypothesized that dense networks might help with the establishment and/or operation of bridging networks between groups[11]. The effect of dense networks within a group on bridging networks between groups remains unclear.

1.2 Interchanges of People in Japan

In order to elucidate how dense networks within a group affect bridging networks between groups, this paper considers interchanges between the residents of mountainous and urban areas in Japan.

Many forests in mountainous areas are comprised of non-native trees, including species with narrow leaves such as cedar or cypress. Recently, artifical, or plantation, forests in many areas have been abandoned by owners, despite the fact that these forests require constant management. If not managed, these artificial forests fill up with thin trees that have too many branches, with the result that smaller plants cannot grow because sunlight is blocked by the branches of the trees. Furthermore, such tree species do not grow extensive root systems. Accordingly, these forests do not contain sufficient water during heavy rainfall, causing frequent flooding during typhoon season. Because native tree species rarely grow in abandoned plantation forests, wild mammals cannot find food in these areas and can be forced into attempting to find food near human settlements. Some owners fell all their trees but do not replace them by planting new seedlings. Natural forests do not necessarily grow on bare mountains, and beautiful scenery is being lost due to abandoned forests.

Recently, many urban residents have grown dissatisfied with their stressful lives in high-density areas, and have become interested in living in in mountainous areas and in the preservation of natural environments. In order to maintain the beauty of forests, many urban residents have been participating in activities associated with forest management by cutting weeds, culling surplus branches, logging forests, and planting new seedlings of broad-leaved species in abandoned forests. A total of 1568 groups were reported to be voluntarily managing forests in 2003[22]. The 2000 census showed that many owners managed their forests in areas that welcomed forestry volunteer groups[8]. Furthermore, an increasing number of migrants from urban areas have begun to work as foresters. Local municipalities as well as the forestry agencies of the central government have been employing urban residents as new foresters[6][18].

Establishing and maintaining cooperative relationships between people of different groups is not easy. Residents of urban and mountainous areas of-

ten differ in terms of their relationships with nature and such differences can lead to strong conflicts between the two groups. Indeed, volunteer forestry management groups have not established positive relationships with those small forest owners who paid more attention to life in their villages than to forestry management[19]. Many new foresters from urban areas have resigned and left mountainous areas because of the stress related to social relationships with local people [12]. Local people in mountainous areas have lived close to nature by cooperating with one another through their dense networks and these networks do not intersect well with the lifestyles of urban residents.

It is important to understand the value of dense networks operating among local people in mountainous areas. In such areas, local people confront a variety of difficulties. As a result of such dense networks, they are able to cooperate with each other when it comes to managing their forests. However, these dense networks could well be disappearing because of depopulation and the ageing of local populations in mountainous areas.

We should also consider the possibility of establishing bridging networks between the residents of mountainous and urban areas. Owing to the dense networks they have built up, those who reside in mountainous areas engage in mutually helpful relationships; urban residents, however, rarely settle in these areas. It is important to clarify how the dense networks operating among local residents can affect bridging networks with urban residents.

1.3   Nishiawakura-son

In this paper, we attempt to determine how dense networks have helped local people in mountainous areas, and to clarify how dense networks operating among local populations affect bridging networks with urban residents. This study was conducted in the village of Nishiawakura-son, which is located in a mountainous area in the north-eastern part of Okayama prefecture.

As a result of the events outlined below, artificial, or plantation, forests cover almost all of the mountainous areas in Nisiawakura-son During the 1960s, people stopped using wood for fuel and began using oil for this purpose. During this period, the village office sold its own forests to local people for relatively low prices, and many local people acquired or increased their forest holdings. These residents began to plant cedar and cypress seedlings because these woods could be sold at high prices, due to their appropriateness for use in building Japanese style houses, or houses with Japanese stylistic elements . Local people mowed grass, culled surplus branches, and logged forests.

Recently, however, many local people, particularly those owning small forests, have become unable to manage their forests. Two main factors have led to their abandonment of forestry management. First, the prices of cedar and cypress declined after the 1980s because cheaper woods were

imported from abroad. In this context, local people were unable to earn enough money, even when they managed their forests efficiently. Second, forest owners who had been managing their forests began to age, and their successors were not willing to assume management. Many local people had emigrated from the village since the 1960s seeking jobs or education in urban areas. As a result, few village residents now manage forests.

Although depopulation continues in the village, many people have begun to immigrate to Nishiawakura-son since 1980. Official reports for Okayama prefecture reported that Nishiawakura-son had 1061 immigrants and 1131 emigrants during the period from 1989 to 2008. During these 20 years, the number of immigrants exceeded the number of emigrants in eight of the years. Hence, three groups of people are included in the village population. Established residents are those who were born in the village and never or rarely left the village. Returners are those who were born in the village, emigrated, and then returned to the village. Immigrants are those who were born outside the village and immigrated to the village.

2 Methods: Qualitative Interviews

In order to elucidate the roles of local people in dense or bridging networks and to examine how they evaluated each type of network, we interviewed 26 residents who owned forests of fewer than 10 ha in the village. Interviews, conducted during two weeks in February 2007, addressed how participants managed their forests and lasted from 30 minutes to a few hours. We also asked about the participants' life experiences and their social relationships with other villagers and urban residents. All participants in this research were male and more than 50 years of age; Therefore, our report did not include the opinions of young or female residents. Table 1 summarizes the life experiences, forestry-management conditions, ages, and locations of their forests.

Almost all the common forests of the village were sold to residents during the 1960s. Therefore, 1970 is an appropriate point of demarcation for defining groups of residents and, therefore, we defined established residents and returners in terms of whether they had emigrated from the village since 1970. Of the 26 residents in this study, none were immigrants.

Six people in the village worked for the Mokkun company, managing forests on behalf of the owners and designing furniture made from culled wood to be sold at reasonable prices. The leader of this group was a returner, and the supervisor was an immigrant. We interviewed these two staff members about how they managed the forests and about their relationships with villagers and urban residents. These data are also presented in Table 1.

The next section introduces the results of our interviews with local people

and Mokkun staff. Each participant is represented in the text by his number in Table 1.

3 Results

3.1 Dense networks

We found that established residents were embedded in dense networks consisting of other established residents. Owing to these dense networks, established residents were able to manage their forests efficiently before conditions changed.

Many of the established residents acquired or increased their forests only after the 1960s. Before the 1960s, most did not know how to manage plantation forests. Nishiawakura-son, like most villages in mountainous areas of Japan, is geographically isolated. Networks among local people are therefore dense, closed, and characterized by cooperation in the service of managing forests. Even after the 1960s, forests were managed as if they had remained the common property [13] of the village rather than the private property of residents. Residents (2), (10), and (15) remembered how they had learned the techniques of forestry management by working with family members and friends. Resident (7) said,

> "Forestry officials advised me that cedar species were the best seedlings for this region. But my friend had told me that Nishiawakura-son was too cold in the winter for that species. Therefore, I did not follow the advice of forestry officials but planted the species that my friend had advised. The seedlings were good, and grew well in my forest."

Established residents were not always able to manage their forests because they held other jobs, including jobs related to agriculture or office jobs in the village. Resident (10) entrusted the managing of his forests to his relatives or to friends while he was involved in other jobs. In this way, he was able to maintain control of his forest. On the other hand, residents (1) and (9) had been entrusted by other residents to manage forests. As professional foresters, they improved techniques and knowledge related to forest management.

Dense networks among established residents contributed not only to forestry management but also to friendship development. Resident (10) happily talked about times in his youth during which he had enjoyed various activities such as journeys and festivals in the company of friends. Until two years ago, resident (17) had been helping a lonely elderly widow by delivering boxed meals. Thus, residents helped each other survive in the severe environment of the mountainous area.

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However, dense networks became less advantageous when villagers began to age and the population started to decline. Established residents experienced great difficulty in finding villagers whom they could trust with the management of their forests. Resident (3) said,

> "An increasing number of the individuals in the forestry cooperative in this village do not have skills appropriate for forestry management. I don't want to entrust them with my forests."

The successors of nearly all residents were not interested in managing the family forests. Therefore, established residents have been unable to use their dense networks in the service of forest management in recent years.

In contrast, many of the returners were not embedded in the dense networks that had connected established residents in terms of forest management. They had not efficiently managed their forests and had less interest in forest management than did established residents. Resident (19) noted that he had never managed his forest, nor did he want to entrust management of his forest to a cooperative. He said,

> "I want to sell my forests to anyone who will buy them. If the forestry government of Japan wanted to try and change plantation or artificial forests into natural ones, I would willingly give my forest to the government."

Resident (20) had been employed in various jobs in the village after he had returned and, therefore, had some social relationships with established residents. In terms of forestry management, however, he had no relationships with established residents. Although returners were not embedded in the dense networks consisting of established residents, they did not seem to have serious problems with forest management. Because they had not efficiently managed their forests in their youth, they did not experience significant loss due to the decline in the price of wood. Resident (21) said,

> "I do not feel concerned about the price decrease in wood. I don't economically depend on my forests."

In contrast, some returners managed their forests relatively efficiently. Resident (26) started to manage his forest after he reached the age of 65, and was involved with planting new seedlings of broad-leaved tree species. Resident (24) formed a volunteer group with other returners to manage the abandoned forests of other owners. They were planting seedlings of broad-leaved tree species by including people from urban areas in their activities. Neither of these returners were embedded in dense networks of established residents.

All of the returners and some of the established residents regretted that too many natural trees had been cut and too many non-native trees had been

planted. They agreed that abandoned plantation forests should be changed into natural forests comprised of broad-leaved tree species. Resident (19) said,

> "In my youth, no bears appeared near human settlements. I think that wild bears have recently started appearing near human settlements because the foods of the natural forests were lost."

Resident (7) said,

> "Lower altitude areas of mountains should be managed by humans. However, upper altitude areas should be kept natural for wild mammals. Then, wild bears will not appear near human settlements."

Some established residents, however, did not sympathize with changing abandoned plantation forests into natural ones. Resident (15) believed that mammals would continue to raid crops even if plantation forests were changed into natural ones, saying,

> "Some people say that plantation forests cause mammal raids on crops. However, even in my youth when such forests did not grow in the mountains, there were no natural foods for wild mammals."

Resident (1) could not understand why plantation forests should be changed into natural ones, saying,

> "Some people are now making natural forests. I'm wondering why, in that natural forests have no economic value."

Established residents had treated plantation, or artificial, forests as wealth. The project to develop natural forests was received by some as dismissing the previous efforts of established residents who had managed artificial forests. Thus, established residents and returners might experience conflict with each other about the creation of natural forests.

3.2 Bridging networks

Some returners accessed bridging networks involving urban residents. As described in the previous section, resident (24) and his circle welcomed urban residents into their project of voluntary forestry management. They hoped that managing the artificial and natural forests would maintain enough water to avoid flooding. Such forests were also expected to supply sufficient food for preventing wild mammals from raiding crops. He and his fellows said,

> "The Japanese government and villagers followed the wrong forestry policies. Only volunteers like us do the right things in making natural forests."

Resident (23) harbored a positive impression of the urban residents who had moved near his home and hoped that the number of immigrants living in the village would increase.

Resident (27), the leader of Mokkun, is a returner. After his return, he had launched the efforts associated with this company with other members of the forestry co-operative in the village. They logged abandoned forests on behalf of forest owners. Using logged woods, they produced furniture and sold these products themselves. He said,

> "Many owners have efficiently managed their forests in this village. Nonetheless, they have recently become unable to continue to do so because wood prices have declined too much. Our company procures wood, produces furniture, and sells it. Because we thereby reduce intermediate costs, we can pay substantial fees to the owners and sell products at reasonable prices."

Resident (28), the supervisor of Mokkun, had worked as furniture designer for 45 years. After retirement, he moved to the village. He said,

> "Many artificial forests have been abandoned in Japan, while Japanese companies are culling natural forests in many areas of South-east Asia. A furniture designer in South-east Asia once told me, 'The Japanese are sly because they are not culling their own forests while culling our forests.' That is the reason that I'm now producing furniture by using Japanese logged woods."

Four other people worked for Mokkun as designers, foresters, or sellers. All were young, in their 20s. Resident (28) proudly said about one worker,

> "At first, he didn't know how to work as a forester. After being trained by the eldest forest owner in this village, he became an excellent forester. "

Mokkun promoted the exchange of people between urban and mountainous areas and welcomed college students wanting to make furniture. Trial products were given to nursery schools for free and successful trial products were purchased by Mokkun. Resident (27) hoped that some of the students might immigrate to the village. Mokkun also planned to present the history of each piece of furniture on its price tag, including how each piece was produced, the story of the forest owner, and how the trees had been grown. This project tries to connect consumers and forest owners.

Many returners favored this project. Resident (19) stressed that the entire village should support the project organized by Mokkun.

In contrast, many established residents were pessimistic or critical about the possibility of returners or immigrants managing forests. Resident (17) said,

> "Urban residents might think rural lives are good when they are still young. For aged people, rural lives are never good. In rural areas, everyone needs his or her own car to go shopping or to get to hospitals. Old people are likely to be of deprived of their drivers' licenses by their children for their own safety."

One resident expressed antipathy for the volunteer forest-managment group to which resident (24) belonged, saying,

> "The leader of that group is an outsider, who does not own his own forest. He nevertheless owns a big house in this village, because he earned so much money when he worked in a company in an urban area. He is now higher-ranked than we are. What an irony!"

Another resident talked about one immigrant who lived near his house.

> "He cannot communicate well with us as neighbors. In rural areas, it is important to communicate well with neighbors."

He was also anxious about the project undertaken by Mokkun, saying,

> "It is difficult for them to work as foresters, as they have to do a number of difficult tasks in the mountains. I'm anxious about the future of Mokkun, although at present I am simply observing their activities."

4 Discussion

Established residents in the village of Nishiawakura-son were embedded in dense networks. Owing to these networks, they could have managed their forests efficiently. However, due to the decreased price of wood, as well as the depopulation and ageing of the village, they have recently become unable to efficiently manage their forests, even with the help of these dense networks. Bridging networks that include people of mountainous and urban areas are required to manage the forests in the village. Established residents, however, have been critical and pessimistic about the possibility of urban residents managing forests. Established residents have also expressed criticism about returners promoting interchanges between those from mountainous and urban areas. Because established residents have been embedded in dense networks, they appear unable to trust outsiders. These results might be interpreted as supporting findings that dense networks within a group prevent bridging networks between groups[14][21].

However, the present results also suggest that dense networks within a group might help bridging networks between groups. The staff members of Mokkun, some of whom were urban residents, were managing abandoned forests on behalf of established residents. Some returners welcomed urban residents to the volunteer group organized to manage abandoned artificial forests.

We should examine the conditions under which bridging networks between established and urban residents are feasible. To that end, we first consider why established residents were critical and pessimistic about urban residents. We then consider the conditions under which established residents might form bridging networks with urban residents.

Previous field studies have reported that residents of mountainous areas were critical of outsiders, particularly urban residents[9]. Established residents of Nishiawakura-son were very familiar with the difficulties involved in forest management. They were therefore critical of urban residents who probably held naive images about forestry and living in mountainous areas close to nature. Furthermore, established residents valued their dense networks. Urban residents, in contrast, usually valued independence and were, therefore, likely to isolate themselves from the dense networks of established residents, thereby reinforcing the critical attitudes held by established residents towards urban residents.

It is clear, however, that urban residents hoping to live in mountainous areas should be equipped to live in these areas. They should be trained to live in the mountains and educated about the severity of this lifestyle. Some established residents should communicate with such trained urban residents, who could then learn the value of dense networks for facilitating the management of forests by local people. Established residents would then welcome such trained urban residents.

The Mokkun company offered opportunities for urban residents to grow accustomed to living in mountainous areas. These urban residents were trained by Mokkum to live in mountainous areas and communicate with established residents. The leader, resident (27), played an important role in establishing a bridge between the two groups and was familiar with the conditions of both established and urban residents. Urban residents require their own dense networks through which they can acquire the appropriate training. Coordinators familiar with both groups can subsequently form bridges[7].

Some established residents were antagonistic toward returners who favored forestry management by urban residents. This attitude might derive, in part, from the great differences in the life experiences of the groups. The principal problem, however, concerned differences in wealth. After wood prices declined, established residents lost their money. Returners, in contrast, had earned enough money working for urban companies to retire and could also rely on pensions, which were available to few established resi-

dents. Established residents might also have felt that returners who were welcoming urban residents and favoring the creation of natural forests were denying the value of the dense networks of established residents that had enabled management of the plantation or artificial forests.

The establishment of bridge networks between established and urban residents via returners requires that the former be helped to lose their sense of inferiority. Established residents felt inferior partly because they had less wealth to show for their forestry experience and partly because they had become unable to manage their forests. Returners should invite established residents to serve in roles such as lecturers at events welcoming urban residents. As a result, established residents could earn fees for teaching urban residents. Returners should also respect the value of the dense networks of established residents. In this way, an increasing number of established residents might participate in interchanges between the residents of urban and mountainous areas.

The staff of Mokkun tried to facilitate positive and friendly relationships between established and urban residents. Their efforts to sell products included information about how the wood was grown by established residents, thereby educating urban residents about the dignity of rural life. They also tried to increase the fees paid to the owners for their logged woods. In this way, Mokkun was helping to reduce the sense of inferiority that established residents might experience in relation to returners and urban residents.

On this basis, we conclude that bridging networks between urban and established residents rely on certain conditions for success. Urban residents should form dense networks and train themselves to live in the harsh environments of mountainous areas. Returners should bridge the dense networks consisting of established and urban residents. Established residents should feel respected in their communications with urban residents.

However, in a somewhat contradictory manner, the existence of dense networks among established residents constitutes the most important condition for the successful establishment of bridging networks between established and urban residents. Although the dense networks of established residents had inhibited the formation of bridging networks between urban and established residents, Resident (27) nonetheless expressed respect for certain established residents who had been managing their forests by means of their dense networks, saying,

> "Some owners have managed their forests for a long time. They have strong interests in their forests. I love their forests, they are good places."

Only the established residents who had maintained their dense networks and managed their forests efficiently could educate urban residents about the value of dense networks in mountainous areas. It was on the basis of such dense networks that established residents had managed their forests thus far,

thereby rendering the formation of bridging networks between established and urban residents possible[11].

Bridging networks between groups might also enable members to value their own networks. Some studies have suggested that local people embedded in dense networks valued their networks after they communicated with urban outsiders[7][10]. It is important to conduct new and review extant fieldwork to elucidate the interactive effects of dense and bridging networks.

Acknowledgments

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Table 1. Forest owners and Mokkun staff.

Number	Life experiences [1]	Forestry management[2]	Age	Area of forest
1	Established	A	60s	7ha
2	Established	A	70s	2ha
3	Established	A	70s	4ha
4	Established	B	60s	2ha
5	Established	B	60s	4ha
6	Established	B	60s	5ha
7	Established	B	60s	7ha
8	Established	B	60s	8ha
9	Established	B	70s	1ha
10	Established	B	70s	5ha
11	Established	B	70s	6ha
12	Established	B	70s	7ha
13	Established	B	70s	8ha
14	Established	B	70s	9ha
15	Established	B	80s	4ha
16	Established	B	80s	7ha
17	Established	B	80s	7ha
18	Established	C	80s	6ha
19	Returner	C	50s	1ha
20	Returner	C	60s	3ha
21	Returner	C	60s	4ha
22	Returner	C	60s	7ha
23	Returner	C	70s	8ha
24	Returner	D	60s	1ha
25	Returner	D	60s	2ha
26	Returner	D	70s	5ha
27	Returner	-	30s	-
28	Immigrant	-	60s	-

1. Established residents: residents who had not moved from the village since 1970. Returners: residents who had returned from urban areas after 1970. Immigrants: residents of urban areas who had recently immigrated to the village

2. A: the owner managed the forest. B: the owner had managed the forest but did not currently manage the forest. C: the owner never managed the forest. D: the owner had recently begun to manage the forest.