Social Network Analysis of Protest Movements in Eastern Thailand

Sanit Ritmontri
Faculty of Social Sciences, Kasetsart University, Thailand
E-mail: fgrasnr@ku.ac.th

Chairat Wongkitrungruang
Faculty of Social Sciences, Kasetsart University, Thailand
E-mail: wchairat@hotmail.com

Nantnadda Ritmontri
Ministry of Social Development and Human Security, Thailand
E-mail: nantnadda.r@gmail.com

Article History
Received: 31 August 2018 **Revised:** 18 March 2019 **Accepted:** 19 March 2019

Abstract
This article focuses on the social network analysis of 3 protest movements in eastern Thailand in order to investigate network structure, centrality, betweenness centrality, and network support. Social network data were collected in the form of survey questionnaires by a single-name generator. The data were analyzed by using UCINET and NetDraw Program for generating graphical representations of social networks. The research results reveal the structure of all protest movements are represented by a "Wheel/star structure". Furthermore, the results of degree centrality and betweenness centrality demonstrate the high centrality with low segmentation of the networks. Lastly, the leaders endeavor to mobilize and strengthening movements by using personal ties in gaining network support.
Keywords: Social Network Analysis, Protest Movements, Eastern Thailand

Introduction
Interest in social network analysis has grown rapidly in the social sciences over the past three decades (Scott, 2017). This includes the relationship between social network analysis and social movements that offers device not only for mapping out the linkages among individuals actors and the structure of the network as a whole, but also for interpreting the patterns of connections among the various actors (Tindall, 2015). The study of social movements in the past has often been applying social network concept in movement recruitment, the diffusion of frames and repertoires, and the longitudinal study of organizations (Caiani, 2014; Krinsky & Crossley, 2014). To date, few studies have seriously considered how the leader roles affect network structure and support network in order to mobilize and sustain social movements (Krinsky & Crossley, 2014). In this paper, the researchers examine the structure of social network by drawing on protest movements in eastern Thailand. These movements have been described as protest movement against development projects in response to increasing concerns about environmental, health, and social implications. Specifically, this paper focuses on the characteristics of three protest movement networks developed within the region such as network structure, actor centrality and betweenness, and network support.

Eastern Thailand is an important area for the study because Thai government has launched many large development projects since 1988, and houses five industrial estates, one deep-sea port, and 151 major factories, including petrochemical plants, oil refineries, coal-fired power stations, and iron and steel facilities. The decision to establish the eastern seaboard dates back to the late 1970s with the discovery of natural gas in the Gulf of Thailand. Economic benefits from this area are only one side of the whole picture. The major risks to human and environmental health and negative impact on pollution problems which could be harmful to the health of residents and the local environment lead to contention between communities, factories and government entities (Rhodes, 2017; Excell and Moses, 2019). Such impacts cause severely at least three problems; firstly, pollution problem from coal-fired power plant, secondly water conflict between industrial and agricultural sector, and lastly contamination problems from industrial plants. These problems caused protest movements to call on government to solve the problems. The first movement involves a protest against a proposed power plant in Bang Kla District, Chachoengsao Province (Anti-Power Plant Movement - APPM). The second movement embroils water conflicts in Eastern Seaboard Industrial Estates in Rayong Province (Anti-Water Allocation Movement -AWAM). Finally, the third movement involves the anti-industrial pollution protest against MapTa Phut Industrial Estate, which is the main industrial center of Eastern Sea Board in Rayong province (Anti-Industrial Pollution Movement -AIPM).

Research Objectives

This research aimed to examine the network structure of three protest movements and the roles of centrality and betweenness actors in mobilizing and sustaining protest movements, and lastly, to investigate the roles of movement leaders in pursuing support from outside networks.

Literature Review

In this study we use social network concept and social network analysis to examine the structures and patterns of protest movements. A social network is a relational structure comprising of a set of actors, where some of its participants are connected by a set of one or more relations (or ties) (Prell, 2012). Social network analysis is the theoretical framework developed to examine both the content and the pattern of relationships in order to understand the relations among actors (Scott, 2017). This paper uses social network analysis to study the protest movements by using centrality measures (the degree centrality and the betweenness centrality) and 2-mode network to report and analyze the relationship between protest movements and support networks. The degree centrality is measured the number of directed ties that involve a given actor. An actor with a larger degree is adjacent to many other actors. This actor should be recognized as a major channel of relational information by others. In this sense, the higher measure demonstrates the greater potential for activity (Faust and Wasserman,1994). Betweenness centrality assesses the frequency with which a node is a link in a chain of communication between any two actors in a network. If we consider the shortest paths (geodesics) to be the most likely channels for passing information, then a node that is located on the geodesics between many pairs of nodes will be important to the flow of information, ideas, and attitudes. These nodes will possess high betweenness centrality scores (Hanneman and Riddle, 2005).

Method

This study explores network of protest movements and information was gathered about the relationship among protest actors in order to understand the general structures and relations

within the networks. While recognizing the dynamics of individual participate in protest movements, the focus here was on the network structure, centrality and betweenness actors, and network support. This was an attempt to understand the roles of network structure in mobilizing people to participate in protest movements and also the support network to sustain the protest movements. Thus, details about networks were gathered using a single-name generator that asks survey respondents to list up individuals who play important roles in framing protest issues in three protest movements (APPM, n = 32; AWAM, n = 31; and AIPM, n = 34). Results were analyzed by UCINET to complete an ego network analysis and generate values of centrality, betweenness centrality, and support network. NetDraw was used to depict network diagram within each protest movements.

Research Result

The Network Structure of Protest Movements

In the survey question, respondents in three protest movements were asked to list up individuals they got information and actors who play important roles in movements. These data were aggregated and the results are summarized visually in Figure 1-3 below.

Analysis of survey data generates a social network map made up of 32 individual (survey respondents and individuals they named) for APPM, 31 individuals for AWAM, and 34 individuals for AIPM. Base on the idealized network models for social movements (Diani, 2003; 306-313), Figure 1 depicts a social network with a "Wheel/star structure". Although it looks like a "Policephalous structure" as two actors are involved in more links than the others, it's not delegating important tasks to few central actors because information can reach nearly everyone in each group. It's actually centralized on two central positions (Diani, 2003; Ernstson et al., 2008). The figure 2 and 3 also show social network with a "Wheel/star structure" as one central position coordinating exchanges across the network and acting as a linking between peripheral components that are not directly related to each other (Diani, 2003).

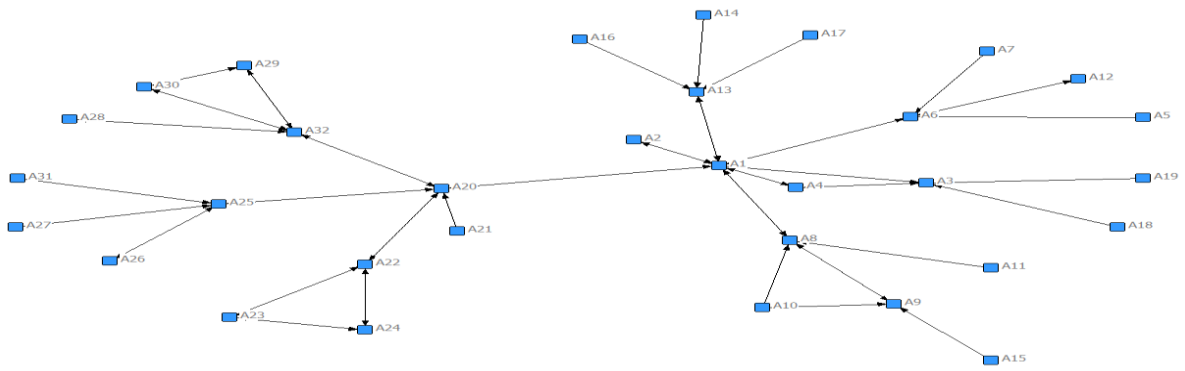

Figure 1. The social network map of Ant-Power Plant Movement (APPM)

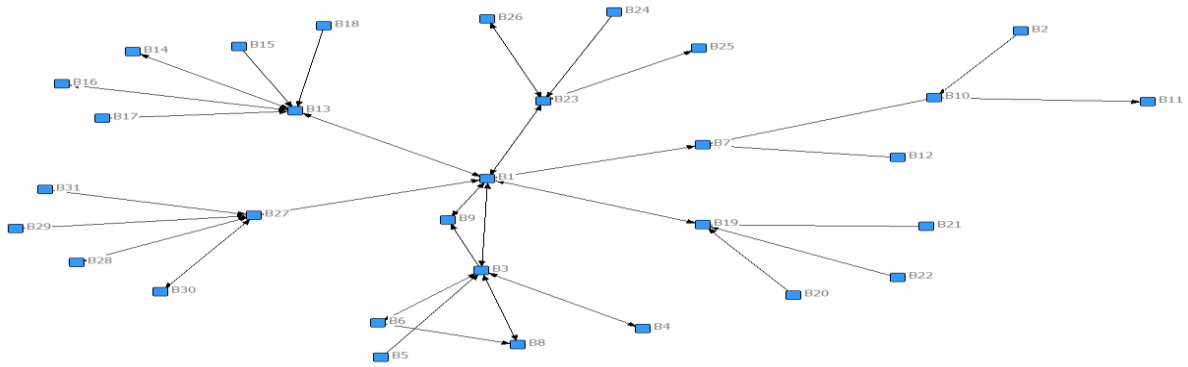

Figure 2. The social network map of Anti-Water Allocation Movement

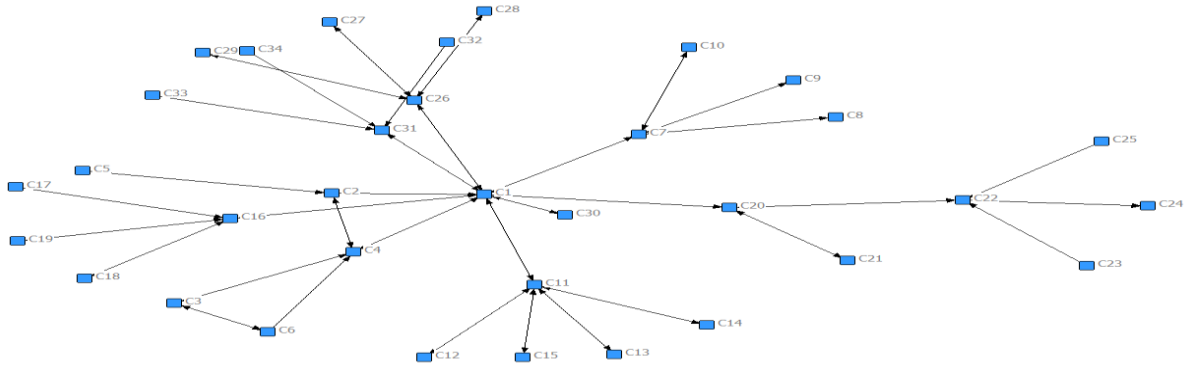

Figure 3. The social network map of Anti-Industrial Pollution Movement (AIPM)

Actor Measures: Centrality

With directed data it can be important to distinguish centrality based on in-degree from centrality based on out-degree. The in-degree of a node is the number of nodes that are adjacent to n, while the out-degree of a node is the number of nodes adjacent from n (Wasserman and Faust, 1994). If an actor receives many ties (i.e., in-degree), he/she is often said to be prominent, or to have high prestige. That is many actors seek to direct tie to him/her, and this may indicate one's importance. Actors who have an unusually high out-degree are actors who are able to exchange with many others, or make many other aware their views. Actors who display a high out-degree centrality are often said to be influential actors (Hanneman and Riddle, 2005).

The analysis of degree centrality of APPM shows that A1 clearly has the greatest out-degree, and might be the most influential in creating and disseminating frames (Table1). Actor1 also has the largest in-degree. Given A1's position in a network, she is very active in the movement and plays important roles in gathering and distributing information within a network. Actor A20 has the same in-degree and out-degree and is the second in the rank. He is a local politician and has a leader of a local political group. This demonstrates the utility of in-and-out centrality in specifying prestige and influence. Moreover, it is important to note that the structure of this network can be divided into 2 important groups and is also relatively centralized. There are some actors (A1 and a A20) are involved in more links than the other and therefore in the best position to control relational flow within the network. This can be implied that the network has 2 prominent actors.

The data in Table 1, also displayed degree centrality of AWAM, indicate that B1, who is a sub-district head, has the highest out-and-in degree centrality. That is, he named the number of actors as important in the network. He is able to share information and frames with others at greater rates. In short, he is seen as highly influential and much power, with many actors

seeking ties to him. Next, the degree centrality data of AIPM show that actor C1, who is a coordinator of a civic group called the People's Network of the Eastern Region, has the highest out-and-in degree values. This should be regarded as the most influent in the network. According to Hanneman and Riddle (2005), actors who have high degree centrality are actors who are able to exchange with many others or to have many others aware of their views and are often said to be influential actors. The structure of AWAM and AIPM's network is one central position coordinating information exchanges within the network and actors are at most just 2 links away from each other. This is also implied that the network is high centralization with low segmentation. As such, the power is dependent on a few leaders or core group members.

Table 1 Degree Centrality of APPM, AWAM, AIPM

Degree Centrality of APPM			**Degree Centrality of AWAM**			**Degree Centrality of AIPM**		
Alter	**OutDegree**	**InDegree**	**Alter**	**OutDegree**	**InDegree**	**Alter**	**OutDegree**	**InDegree**
A1	7	7	B1	7	7	C1	9	9
A20	4	5	B3	5	5	C11	5	5
A32	4	4	B13	3	6	C26	4	4
A22	3	3	B27	3	5	C7	4	4

Degree centrality is a useful measure that gives us insight into who are the key players and how connected is the network. From degree centrality the researchers are able to confirm projected position of several actors. Therefore, the centrality value clearly shows who is centrally or marginalized positioned with a protest network. For example, the most important positions of 3 movements come from a few central positions. This reflects the characteristics of a homogenous group. Ties to a central actor are easy access to the rest of the network through a minimal number of intermediate steps. The low level of horizontal exchanges at the periphery, and the low number of ties connected suggest a low level of investment in building of the network as a whole.

Actor Measures: Betweenness Centrality

When examining the betweenness centrality of APPM in Table 2, actor A1 has the highest betweenness, followed by A20, and A32. This means that A1 is in the favored position to the extent that the actor falls on the geodesic paths between the other pairs of actors in the network. Thus, the more people depend on this actor to make connections with other people, the more power he has. For the AWAM, actor B1 has the highest betweenness, followed by B20, and B32. It is clear that in order for information and frames to move from one segment of the network to the other it must move mainly through B1, B20, and B32. Lastly, Table 2 indicates that actor C1 has the highest betweenness, followed by C11, and C20. This shows that they are, because of their influential position of sitting on network paths between many others, in a good position to connect different parts, or components, of network together, and have greater possibility to control the flow of information.

Table 2 Betweenness centrality of APPM, AWAM, AIPM

Betweenness Centrality of APPM		**Betweenness Centrality of AWAM**		**Betweenness Centrality of AIPM**	
Alter	**Betweenness**	**Alter**	**Betweenness**	**Alter**	**Betweenness**
A1	397	B1	385	C1	740
A20	354	B3	135	C11	216
A32	133	B13	126	C20	205

Support Network

One of the key features of the protest related to the nature of individuals or organization support networks that existed within the protest movements in eastern Thailand and how it has contributed to sustaining the protest over time. Basically, movement leaders try to seek support outside network to strengthen their movements. This support can take many forms, including contribution of resources such as financial donation, provision of advice and expertise such as legal advice for court action. In this study, the researchers focus on the frame support or information that helps to increase credibility of frames (Snow and Benford, 2000). For example, information and experiences from protest movements in other regions could be demonstrated their adverse impacts from development projects. This information will make people to understand more about the existing of the problems from other areas. This kind of frame is called experiential commensurability as movement framing consistent with the personal, everyday experiences of the people of a protest movement (Snow and Benford, 2000). Moreover, advice and information supported from NGOs and academic can also increase a credit of frame makers by proposing a reliable study or scientific data to a protest movement. To understand the network support outside movements, the actors were asked to nominate groups or people that provide information and frames to support protest movements so as to facilitate a deeper insight into the roles of frame in the protest. In the Figure 4, 5, and 6 present two-mode digraphs of actors' nomination of their frame supports outside movements.

Figure 4 shows a number of connections between members of APPM and organizations, communities, and individuals created to support and strengthen a protest movement. A1 has the highest number of ties, mostly concerns among NGO, academics, and media. A6 and A3 have a connection with many anti-power plant movements. Figure 5 depicts the groups and organization that have an involvement in supporting frames and information to AWAM. B1, B19, and B19 have a connection with many communities. That is not surprising because their position as sub-district head and village heads have to work closely with many nearby communities. B3, a former NGO membership, has a connection related to a group of academics, media, and political parties. Lastly, Figure 6 details the network support of AIPM. C1 has the highest number of ties. He is a center of connection to many individuals and organization and has a pivotal role to many support networks. In sum, through the social ties of the network actors in all movements, the protest movements in eastern Thailand are ties to a broad and diverse range of issues and organizations. Particularly, the connection ties to other communities and similar social networks concerned with protest movement in many part of a country.

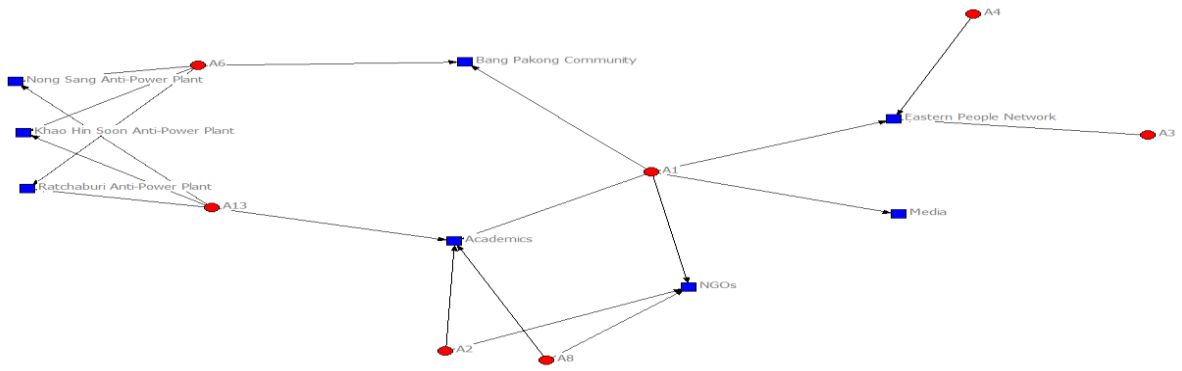

Figure 4. The support social network map of APPM (2- mode)

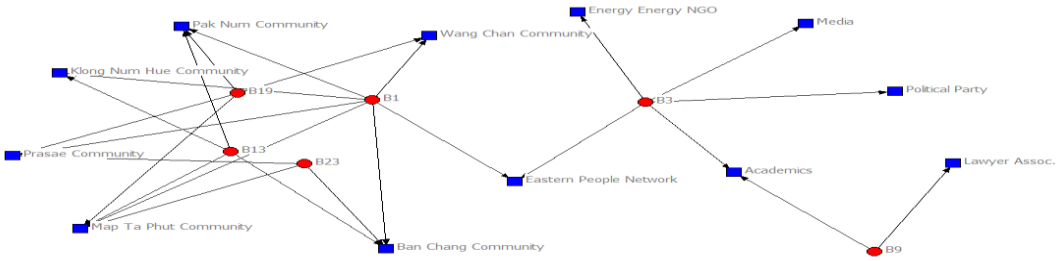

Figure 5. The support social network map of AWAM (2- mode)

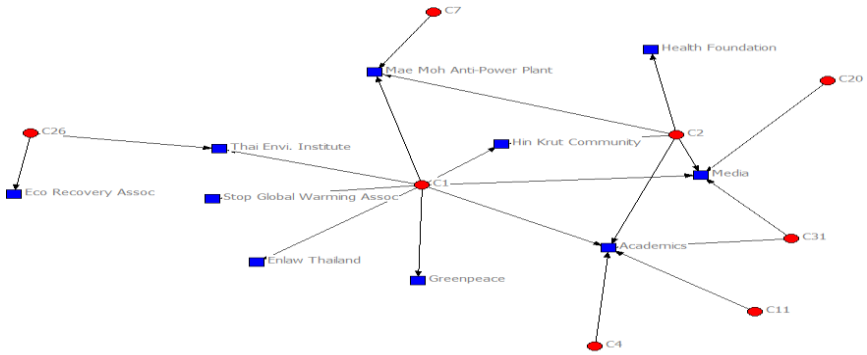

Figure 6. The support social network map of AIPM (2- mode)

All digraphs depict nominated lines of information and frames supported and indicate the direction in which information flows from outside network to actors. The findings suggest that the flows of frames and information can be diffused through interpersonal and intergroup networks, and show the important of networks in creating frames for mobilizing and sustaining the protest movements.

Discussion and Conclusions

The results of research generate a social network map of three protest movements consisting of 32 individuals known to be involved in APPM, 31 individuals for AWAM, and 34 individuals for AIPM. These movements are the result of the impact of development problems in the area, including pollution problem, water allocation problem, and health impact problem. From the context of problem's severity, the villagers have to immediately come together to solve the problem by themselves. Due to the ignorance and neglect to solve the problems of the relevant authorities, the movements quickly assembled in order to find a support network to strengthen the movement.

Overall, the findings indicate that the roles of movement leaders are centralized on a few positions. Measures of centrality in all movements mirror overall structure with centrality shared between a small number of actors who occupy key points of connection between the core and periphery. It could be possible to conclude that the center of the protest movements is the leaders who have play important roles in motivating people and mobilizing collective action, shared information and frames, managing movements, and deciding on strategy. These centralized structures have come from the urgent need to mobilize people and resources needed in generating protest movements such as frames and information, money, and advice (Levkoe, 2015; Teo, 2014). Thus, few leaders have played a major role in the movements and such findings agreed with the works of Willems and Jegers (2012), Osa

(2003), and Koschade (2006) that reported the roles of a few leaders that have the power and influence to make decisions and manage the movements.

For recommendation, it is important to study the roles of other leaders especially who are closer to central leaders (eigenvector centrality), since the protest movement organizations have many leaders and different roles especially in creating and diffusing frames and information. Later, in order to gain insights into the roles of leaders in seeking partnership and building coalition for generating support network, it should be inevitably studied the concept of structural holes as well as brokerage roles for coordinating and mobilizing protest movements.

Acknowledgement

This paper was originated and extended from the research entitled "Justice in Development: A Grounded Theory Approach", in which granted and received supportive funded for publication program under the fiscal budgeting year of 2018 from the Faculty of Social Sciences, Kasetsart University. The researcher would like give sincerely thanks to all great supportive and guidance from the Faculty of Social Sciences with the best respects.

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