

SOCIAL NETWORK THEORY AND TERRORISM

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Abstract: *Social Network Analysis has been used in several fields such as sociology, anthropology, and social psychology. However, it has been started to be used in security studies and criminology. Social network analysis came out as an alternative of traditional study methods. The value of social network theory versus other political science and sociological approaches is its focus on the value of the network structure rather than the characteristics of the individual. There is a growing interest in social networking research, particularly when networks play in facilitating terrorist tactics and strategic behavior. Within this regard, social network analysis of terrorist networks gained big importance in security studies. Social network analysis could be used as a very effective tool to understand vulnerabilities and weaknesses of terrorist networks. The Internet has become the main propaganda source for the organization as well as providing different information for the target audience. Presence of a terrorist organization is very important for ideological activities.*

Key Words: *Social Network Theory, Internet, Terrorism, Terrorist Use of Internet.*

1. INTRODUCTION:

Social Network Theory

Social network analysis originated in several fields, including sociology, anthropology, and social psychology.² The first initiator of the study was J.L. Moreno who developed the notion of a sociogram in the 1930s. It was a picture in which people are represented as points in two-dimensional space, and lines linking the corresponding points represent relationships among pairs of people.³

However, the contemporary social network analysis could start with the work of Stanley Milgram. In his work in 1967, Stanley Milgram held a test to understand how people are connected to others. In his research, Milgram found that most people were connected by six relationships.⁴

After the publication of two journals on social networks analysis namely “Social Networks” and “Connections” in 1970s, sociological studies have increased. Network analysis emerged as an alternative of traditional reductionist research methods and approaches, because social network analysis refuses “social behavior is a result of individuals’ behavior” statement in sociology and it examines patterns of relationships.⁵

Social network analysis came out as an alternative of traditional study methods. The value of social network theory versus other political science and sociological approaches is its focus on

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²Arquilla, John and Ronfeldt, David, (2001), *Networks and Netwars: The Future of Terror, Crime, and Militancy*, USA: RAND, p.66

³ Wasserman, Stanley and Faust, Katherine, (1994), *Social Network Analysis: Methods and Applications* Cambridge: Cambridge University Press, p.11, 12.

⁴ Ressler, Steve, (2006), “Social Network Analysis as an Approach to Combat Terrorism: Past, Present, and Future Research”, *Homeland Security Affairs*, Vol. 2, No.2, <http://www.hsaj.org/pages/volume2/issue2/pdfs/2.2.8.pdf>.

⁵Emirbayer, Mustafa, and Goodwin, Jeff, (1994), “Network Analysis, Culture and the Problem of Agency”, *American Journal of Sociology*, Vol. 99, No. 6, p. 1411-1414.

the value of the network structure rather than the characteristics of the individual. Network analysis focuses on the analysis of data originating from interactions between actors rather than analyzing independent behavior of the actors.⁶ Social network analysis can provide rich social information about dynamics and information flow structures in organizations for the predesigned stage of information systems comparing to the well-known social research methods. Social network analysis is an effective tool to understand the characteristics of information circulation, social barriers to reach information and knowledge, closed sub networks groups and actors playing bridge and gateway roles inside an organizational network.⁷ While social network analysis leaves room for individuals to affect their fate, it argues that the structure of the network and relationships and ties with others in the network are more important.⁸

Social network analysis is the mapping and measuring of relationships and flows between people, groups, organizations, computers, URLs, and other connected information entities. The nodes in the network are the people, groups or URLs while the links show relationships or flows between the nodes. Social network analysis provides both a visual and a mathematical analysis of relationships.⁹ Social network is a set of actors that may have relationships with one another. Networks can have few or many actors (nodes), and one or more kinds of relations (edges) between pairs of actors.¹⁰ Social network analysis shows the structure of relationship, ranging from casual acquaintance to close bonds, Social network analysis assumes that relationship are important and it maps and measures formal and informal relationships to understand what facilitates or impedes the information flows that bind interacting units, who knows whom, and who shares what information and knowledge with whom by what communication technique.¹¹

Weak Ties Versus Strong Ties

There is an ongoing theoretical argument on the types of the ties that are more beneficial for the actors in a network. The traditional social capital approach is based on the idea of close and powerful social ties that can ease the constitution of trust and mutual trade relations between the parties.¹² The authors¹³ who defend the strength of strong ties in a network claim that closely tied members can decrease the level of uncertainty and cooperate for their groups' self-interests. Strong ties can provide control over the members and transfer great amount of information to the actors.¹⁴ (Podolny, 2001: 34; Hospital & Ta, 2019; Jermsittiparsert et al., 2019; Galatti et al., 2019). Strong tie formation tendency of the actors to gain power can lead to emergence of several sub network sets. These sub network sets restrict flow of information, because the members of sets attempt to share their information resources with the group members. Existence of groups of intensive social relations may prevent knowledge transfer between groups or industries.¹⁵

⁶Parkhe, Arvind, et al., (2006), "New Frontiers in Network Development", *Academy of Management Review*, Vol.31, No.3, p.561.

⁷Sozen, H.Cenk and Sagsan, Mustafa, (2009), "Social Networks Versus Technical Networks: How Different Social Interaction Patterns Effect Information System Utilization in the Organizations?", *Journal of US-China Public Administration*, Vol. 6, No.7, p.67.

⁸ Ressler, (2006), *ibid.* p.2

⁹ Krebs, Valdis, (2008), "Social Network Analysis, A Brief Introduction", <http://www.orgnet.com/sna.html>, (Accessed on 21.07.2010).

¹⁰Hanneman, Robert A. and Riddle, Mark, (2005), "Introduction to Social Network Methods", Riverside, CA:University of California, http://www.faculty.ucr.edu/~hanneman/nettext/C10_Centrality.html#Betweenness,

¹¹Serrat, Oliver, (2009), "Social Network Analysis", *Knowledge Solutions*, February 2009/28, :
<http://www.adb.org/Documents/information/knowledge-solutions/Social-Network-Analysis.pdf>,

¹²Gargiulo, Martin and Benassi, Mario, (2000), "Trapped in Your Own Net? Network Cohesion, Structural Holes, and the Adaptation of Social Capital", *Organization Science*, Vol.11, No.2, p.184

¹³ Bourdieu, Pierre, (1983), "Forms of Capital", J.R. Richards (ed.), *Handbook of Theory and Research for the Sociology of Education*, New York: Routledge, p.249;

Coleman, James S., (1988), "Social Capital in the Creation of Human Capital", *The American Journal of Sociology*, Vol.8, No.2, p.96;

Podolny, Joel M., (2001), "Networks as the Pipes and Prisms of the Market", *The American Journal of Sociology*, Vol.107, No.1, p.35.

¹⁴Podolny, (2001), *ibid.*, p.34.

¹⁵ Burt, Stuart, (2005), *Brokerage & Closure*, New York: Oxford University Press, p.23.

Granovetter¹⁶ found that information about a new job position is obtained through the weak ties, which are defined by rare and nonsocial interactions. These kinds of arms-length ties are transactions between parties operating without social closeness.¹⁷ Weak ties undertake an integrative role in the society by building connections between social groups.¹⁸ When we carry “strength of weak ties” thesis to the macro level, ideas diffuse slowly, scientific efforts might be hindered and sub closed groups may emerge in societies with less weak ties.¹⁹ The main proposition about arms-length ties state that access to diverse information of an actor in a market depends on the amount of owned weak ties.²⁰

Structural Holes Theory

Structural holes theory is quite different from two other network perspectives because it tries to explain the power of actors with their position in the network instead of their tie formation preferences. Structural holes are the gaps between individuals, groups and organizations in a social network.²¹ These gaps emerge because of different beliefs, identities and practices of the actors. Structural holes theory can be explained as information and control advantage of brokers while providing relationships between individuals.²² Briefly, structural holes emerge with the existence of unconnected actors in a network and those, who link the actors by building bridges, undertake brokerage roles.²³

Burt²⁴ emphasized that the organizations, which connect the structural holes by their management and collaboration networks can learn faster than the others learn and be more creative in their fields. There are three benefits of being a broker;²⁵ ability to access alternative visions and applications, early access to new ideas and thoughts in the social system, and transfer of information to the groups if there is an advantage to be gained. In macro level, board members of the organizations may function as brokers who provide information and connections with others in the sector, state bureaucracy, relevant sectors, scientific institutions and NGO's. In micro level, employees who undertake brokerage roles may create links between departments, hierarchical levels and individuals.

Figure 1, Brokerage Roles in the Organizations

¹⁶Granovetter, Mark, (1983), “The Strength of Weak Ties: A Network Theory Revisited”, *Sociological Theory*, Vol.1, No.1, p. 205.

¹⁷Uzzi, Brian, (1999), “Embeddedness in the Making of Financial Capital: How Social Relations and Networks Benefit Firms Seeking Financing”, *American Sociological Review*, p.483.

¹⁸ Burt, Stuart, (1992), *Structural Holes: The Social Structure of Competition*, New York: Harvard University Press, p.26.

¹⁹ Granovetter, (1983), *ibid.*, p.202.

²⁰ Uzzi, (1999), *ibid.*, p.483.

²¹ Burt, (2005), *ibid.*, p.15, 16.

²² Stuart, Burt, (1997), “The Contingent Value of Social Capital”, *Administrative Science Quarterly*, Vol.42, p.339.

²³ Burt, (2005), *ibid.*, p.18.

²⁴ Burt, Stuart, (2004), “Structural Holes and Good Ideas”, *American Journal of Sociology*, Vol.110, No 2, p.357.

²⁵ Burt, (2005), *ibid.*, p.23.

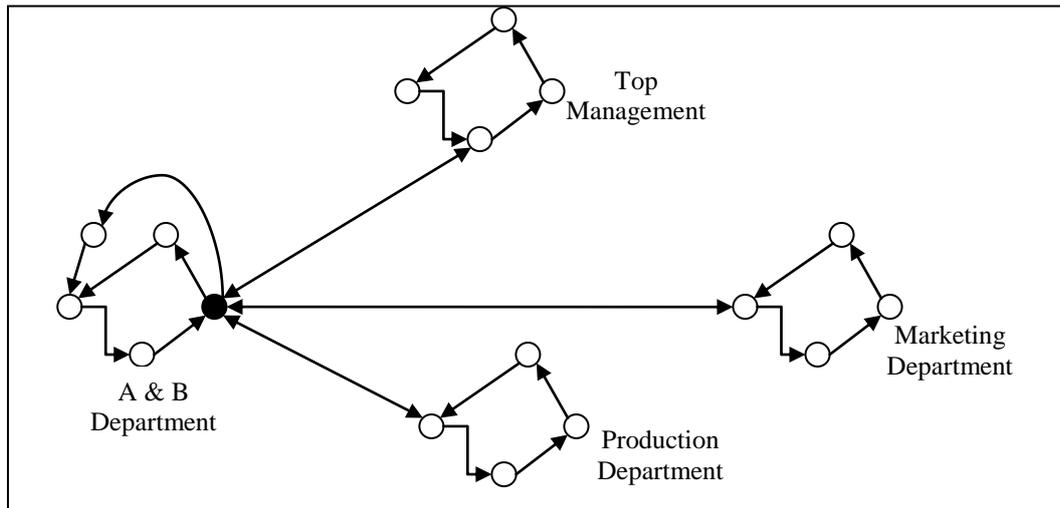


Figure 1 is an example of how brokerage roles operate in organizations. There are structural holes between production, marketing, A & B departments and the top management team. An employee from A & B department may have social ties with the other departments and top management. This position creates a dependency relationship between the broker and others in the organization. Broker plays an important role in terms of knowledge transfer between vertical and horizontal levels in an organization.

There are four different types of brokerage that may create value for an actor according to Burt²⁶;

- (1) The simplest type of brokerage is to inform the groups about challenges and interesting topics.
- (2) The transfer of the best practices between groups is a higher level of brokerage. The actor who is familiar with the activities of unconnected groups is privileged to transfer beliefs and activities, which may create value to both sides.
- (3) To transfer information related to similar aspects of the sides.
- (4) Brokerage role gives actor a possibility to create a synthesis of behaviors and beliefs of unconnected sides.

Employees in any kind of hierarchical level in organizations can benefit from the advantages of being a broker. A brokerage position in an intraorganizational network may create a dependency relationship with the focal actor and others. Nevertheless, this depends on the perceptions of the potential brokers. Some of them may view the structural holes as an opportunity to position themselves as brokers in social networks whereas the others may not.

Degree Centrality Analysis

Actors who are central tend to be more active (continuously working to maintain contacts) and have more ties (quantity) or the configuration of ties (strategic location).²⁷ Degree centrality reflects actor's popularity within a network. Degree centrality can be further defined in terms of in-degree centrality and out-degree centrality. Out-degree centrality is the extent to which the focal actor has identified others as a close node. In-degree centrality is the extent to which others in the network have identified with the focal actor. Out-degree centrality is

²⁶ Burt, (2004), *ibid*, p.355.

²⁷ Lee Seung Hwan Mark, et al., (2009), "The Role of Network Centrality in the Flow of Consumer Influence", *Journal of Consumer Psychology*, Vol.20, Issue 1, p.67.

concerned within an individual's self-perception of actor's own popularity, whereas in-degree centrality is concerned with the individual's popularity as rated by others in the network.²⁸

Actors who have more ties to other actors may be advantaged positions. Because they have many ties, they may have alternative ways to satisfy needs, and hence are less dependent on other individuals. Because they have many ties, they may have access to, and be able to call on more of the resources of the network as a whole. Because they have many ties, they are often third-parties and deal makers in exchanges among others, and are able to benefit from this brokerage. Therefore, a very simple, but often very effective measure of an actor's centrality and power potential is their degree.²⁹

Betweenness Centrality Analysis

Betweenness centrality is defined as the extent to which an actor falls between pairs of other actors on the shortest path connecting individuals in the network.³⁰ For example, if the actor is high in betweenness centrality, the actor strategically holds a position in a network such that the actor provides links to otherwise unconnected individuals. In other words, betweenness centrality refers to the degree to which an actor is on the path between other actors. Thus, the centrality measure comes closest to measuring the degree to which an actor operates as a powerful broker within a network.³¹

Betweenness centrality identifies an entity's position within a network in terms of its ability to make connections to other pairs or groups in a network. Actor with a high betweenness centrality generally; holds a favored or powerful position in the network, has a greater amount of influence over what happens in a network. Sharing of knowledge is important not only for the transmission of knowledge between the actors within the organization but also for the interaction between organizations. Quality and management of the relations that an organization or an individual has obtained at a certain period can be determiner of the performance of the actor or inter organizational networks that the actor is a member of.³² These actors, who have a brokerage role in the transmission of knowledge in the system, are brokers who gain the advantage of affecting the system according to their own interests.

Closeness Centrality Analysis

Closeness centrality describes centrality by specifying the location that an actor occupies in a social network. It points out reachability; that is; an actor's ability to easily reach or connect to others by being connected closely enough that the actor has access to others' information. Closeness centrality is a straight forward measurement that simply calculates the average of the direct and indirect links to all others in the network relative to the focus actor.³³ Closeness centrality measures how many steps an actor is from others in the network. Those with high closeness are those who can reach many actors in few steps.

One could criticize the degree centrality measures because scores only take into account the immediate ties that an actor has, or the ties of the actor's neighbors, rather than indirect ties to all others. One actor might be tied to a large number of others, but those others might be

²⁸ Lee Seung, et all, (2009), *ibid.*, p.67.

²⁹ Hanneman and Riddle, (2005), *ibid.*, p.63.

³⁰ Freeman, Linton C., (1979), "Centrality in Social Networks: Conceptual Clarification", *Social Networks*, Vol.1, No.1, p.220; Mehra, Ajay, et all, (2001), "The Social Networks of High and Low Self-Monitors: Implications for Workplace Performance", *Administrative Science Quarterly*, Vol. 46, No.1, p.123.

³¹ Ansell, Christopher, (2003), "Community Embeddedness and Collaborative Governance in the San Francisco Bay Area Environmental Movement", p.126, (Diani, Mario and McAdam, Doug ed.), *Social Movements and Networks, Relational Approaches to Collective Action*, Oxford, New York: Oxford University Press.

³² Kirkbesoglu, Erdem and Sagsan, Mustafa, (2009), "Knowledge Manipulation in Inter Organizational Networks: A New Role for Brokers", (Bolisani, Ettore and Scarso, Enrico ed.), *Proceedings of the 10th European Conference on Knowledge Management*, Vol.1, Italy: UniversitaDegliStudi Di Padova, , p.452

³³ Brass, Daniel J., (1995), "A Social Network Perspective on Human Resources Management", *Research in Human Resources Management*, Vol.13, p.45.

rather disconnected from the network as a whole. In a case like this, the actor could be quite central, but only in a local neighborhood. Closeness centrality approaches emphasize the distance of an actor to all others in the network by focusing on the distance from each actor to all others.

Closeness centrality analysis provides a number of alternative ways of calculating the farness of each websites from all others. Farness is the sum of the distance from each ego to all others in the network. Farness is transformed into "nearness" as the reciprocal of farness. That means, nearness would be equal to the score that one websites is divided by farness. Nearness can be further standardized by norming against the minimum possible nearness for a graph of the same size and connection.

Geodesic Distances Analysis

Most algorithms to define more complex properties of individual's positions and the structure of the network as a whole use one particular definition of the distance between actors in a network. This quantity is the geodesic distance.³⁴ Geodesic distance is the shortest distance between two actors. The geodesic metrics are useful for describing the minimum distance between actors in the network. Geodesic distances analysis shows us any information that was put in the system gets around fast enough in the whole network.

Terrorist Networks and Social Network Analysis

Terrorism is defined in the Oxford Dictionary as "the unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims." We quickly see that this definition is unspecific and subjective.³⁵ Although there are so many definitions of terrorism however there is no internationally accepted definition of terrorism. Nevertheless, some international organizations and countries are having terrorist organizations list. One of the main problem in terrorism and terrorist networks studies is that it is frequently mixed with political violence. To be considered an act of terrorism, an action must be violent, or threaten violence. As such, political dissent, activism, and nonviolent resistance do not constitute terrorism.³⁶ Although struggles to launch an internationally agreed definition of terrorism have been ineffective, it can be agreed that terrorism pursues to cause human suffering and extensive fear. Regardless of the terrorist organization's ideology, terrorists are aiming to create fear among the public to achieve their goals. Besides, various forms of organizations have intersecting motives, tactics, and targets.

Social Network Analysis (SNA) is shown as a useful approach in defining and interpreting information links by examining research topics, authors and inter-institutional relationships in a particular field (Scott, 2000). Terrorist networks are not exception of this system. Terrorist organizations are suitable to study using social network analysis. Terrorist organizations are different from other legal organizations. Social network analysis can provide important information on the unique characteristics of terrorist organizations, ranging from issues of network recruitment, network evolution, and the diffusion of radical ideas.³⁷ Organizations and individuals that have numerous network ties can anytime use these connections to transfer knowledge, to reach resources and to influence others in their environment.³⁸

³⁴Hanneman and Riddle, (2005), *ibid.*, p.50.

³⁵Teichman (1989). 64(250), 505-517.

³⁶Ritchie, Hasell, Appel and Max Roser, (2013)

³⁷ Ressler, (2006), *ibid.* p.1

³⁸Gargiulo, Martin and Benassi, Mario, (2000), "Traped in Your Own Net? Network Cohesion, Structural Holes, and the Adaptation of Social Capital", *Organization Science*, Vol.11, No.2, p.184

Open source research of information regarding terrorist networks offers a very good data which social network analysis can transform into useful information for mapping terrorist networks and providing tools for terrorist activities.

There is a growing interest in social networking research, particularly when networks play in facilitating terrorist tactics and strategic behavior. Much of the networking literature on terrorism has focused on the tactical significance of networks. It is very difficult to construct a network analysis of terrorist organizations, especially to build an accurate terrorist organization map.

Social network analysis could be used as a very effective tool to understand vulnerabilities and weaknesses of terrorist networks. The Internet has become the main propaganda source for the organization as well as providing different information for the target audience. Presence of a terrorist organization is very important for ideological activities. In this case, social network analysis can be used to spot which websites are important to get rid of to reduce the effect of the organization and to interrupt the complete terrorist network. In the preparation stages of social network analysis, the boundaries of the network, the target audience, the methodological tools and surveys in data collection, the characteristics of the questionnaires, the reliability and validity of the data and ethical concerns should be resolved. This issue is very important when to study terrorist networks.

Due to the lack of studies on this specific issue, the researchers should focus on social network analysis on mapping the terrorist networks in order to foil the exploitation of Internet by terrorist organization.

2. CONCLUSION

A social network is a set of actors that may have relationships with one another. The analysis of it came out as an alternative of traditional study methods in 1970s in several fields. As explained it can provide rich social information about dynamics and information flow structures in organizations comparing to the well-known social research methods. In this modern and technological world, activities in all areas of life leave digital traces of the relationships between each other. Structural analyzes to be made using these traces have turned into a valuable research field. It also gives great opportunity to research terrorist networks.

Although the roots of the concept of network are located in sociology and anthropology (Bott, 1957, p.60), the techniques developed to analyze social network structures in recent years have led to an increased interest in this approach from different disciplines. Social network analysis and method has its own characteristics that differ from other social science research. Social network theory in social sciences has emerged and developed as a result of the mutual interaction of theory and practice. Most of the concepts used in network analysis are the phenomena that researchers observe in real life and are theoretically interested. It is a product of the effort to explain. By Degree Centrality, Betweenness Centrality, Closeness Centrality and Geodesic Distances Analysis, it shows the structure of relationship, ranging from casual acquaintance to close bonds. The previous research shows that Social Network Analysis is an eligible and reliable analysis technique for social science areas in mapping and measuring of relationships and flows between people, groups, organizations, computers, URLs, and other connected information entities.

There is a growing interest in security studies especially in terrorism studies. It is very important for government agencies to eradicate terrorist activities in their country. In this

regard, social network analysis is giving great chance to officials and researchers to make a detailed study on the terrorist organization. However, it is sometimes hard to gather enough information about the terrorist organizations since they are clandestine organizations. Terrorist networks are very complex and hard to get information organizations.

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