

연구논문

Behavioral Patterns and Leadership Styles in Organizational Networks: Evidence from the Columbia Police Department South Region, South Carolina

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〈 요약 〉

본연구의 목적은 조직 구성원간의 행태 유형과 리더십 유형을 파악하는 것으로서, 특히 사회연결망분석을 적용하여 조직내부의 연결망 구조가 행태 유형과 리더십 유형에 미치는 영향을 밝히고자 하였다. 일반적으로 조직의 구조는 공식적-계층적 권한관계로 정의되지만, 조직내 행태 유형과 리더십 유형은 조직 구성원간의 공식적-비공식적 상호관계를 통한 자기조직화의 결과라고 볼 수 있다. 본 연구에서는 사회연결망분석에 대해 알아보고 다양한 사회연결망적 기법을 활용하여 실제조직을 분석함으로써 공식적인 조직도표에서는 알 수 없는 관계를 파악하고자 한다. 이는 사회연결망 분석법의 조직행태와 리더십 분석으로의 발전가능성을 제시하는데도 의미가 있다고 본다.

[주제어: Formal and Informal Behavioral Relations, Leadership Patterns, Social Network Analysis]

I. Introduction

Recently the importance of 'informal'(or social) nature of organizations¹⁾ was

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1) In developing a more concrete notion of informal organization, a distinction is made between informal organization and social organization or networks. Informal organization is formed based on task related relationships among individuals in the organization and often called emergent

recognized but the design of organizations has been limited, for the most part, to rather formal structures. Informal structures are often ignored by their dysfunctional complex characteristics that are hardly recognizable when designing the organization. However, recent studies of social network system have proved the importance of informal networking structures that affect the functional operations of formal organizations.

Despite different characteristics between formal and informal organizations, the informal network structure of organizations is now regarded as an important organizational device for representing network relationships among its members. Informal network relations play a role of promoting communication and information flow, generating a shared consensus of values and beliefs, as well as building knowledge base and innovative activities in the formal organizations.

Krackhardt & Hanson (1993) argued that understanding complex relationships of informal networks could enhance and optimize the performance of the formal organizations. In addition, Chan & Liebowitz (2006) stated that understanding informal networks is useful to recognize the dynamics of knowledge flows within formal organization structures. Thus, without understanding informal networks of relationships the nature of formal organizations couldn't be explained (Blau & Scott, 1962). However, Tichy (1981) and Freeman (1991) noted that informal networks are often ignored due to the difficulty of classifying and measuring. This is a serious omission, because informal networks have significant effects on functional patterns of organizations. Thus, it is worthwhile to develop a deeper understanding of network relations and to outline a methodological approach to understand the informal networks in the formal organizations.

Regardless of this recognition of emergent informal relations in the formal organization, relatively little theoretically based empirical studies on the issue of informal network design, behavioral network patterns, and its relationship with

processes. Social organization also has an emergent feature but is defined as non-task related relationships.

leadership patterns have appeared in the literature. The purpose of this paper is to identify the networking behavioral patterns and leadership styles within organizations in order to understand the nature of network relations within the formal organizations. For this study, the organization of the Columbia Police Department South Region, South Carolina is selected as a short case study to highlight both the similarities and differences that exist between the formal and informal network structures by utilizing the social network approach. This study has its theoretical base on network relations in organizational structures rather than on the theory of leadership.

II . Literature Review

1. Perspectives on Networking Behavioral Patterns

There has been growing interest in examining the complex network relationships that exist in both the formal and informal organizations. It is well understood that there are certain characteristics that define the relationship between the organizational context and the informal networks within an organization. Generally, the traditional organization theories mainly focus on management control and organizational order as a means to preserve internal and external equilibria (Choi, 2003). In other words, formal organizations define a fixed flow of command and control through formal lines of communication channels in order to maintain functional structures. Chandler (1969) defined that the bureaucratic or functional authority structures (including formalities, rules, and regulations) of formal organizations are often driven by the mission-oriented directions or strategic objectives in pursuit of organizational goals.

In contrast, informal organizations are seen as emergent network of relationships that promote communication through informal lines within and between organizations. According to Stacey (1996), informal organizations can be explained as a response to the failure of bureaucratic control: first, bureaucratic control exhibits adverse effects

such as the subordination, de-motivation, and alienation of individual members; second, the bureaucratic structure is not efficient in handling environmental ambiguity and uncertainty. In addition, the emergent network of informal relationships can be understood as dynamic systems, in which network members of the organization interact with continual experimentation and restructuring through a process of self-organization (Prigogine, 1980 Prigogine and Stengers, 1984 Choi, 2003). Out of the self-organizing process various relational patterns of behavior are welded together in order to shape the dynamic characteristics of an organization. From this perspective, self-organizing networks emphasizing the roles of unpredictable and hidden patterns of behavior (Stacy, 1992) while still maintaining organizational functioning can become the essential feature of informal network structures.

Those different characteristics of formal and informal organizations may be distinguished along a series of dimensions, including the origin and stability of the structure, the nature and flow of influence, and the basis for interaction of individuals in the network, as shown in Table 1 below:

〈Table 1〉 Comparison of the Characteristics of Formal and Informal Organization

	Formal Organization	Informal (social) Organization
A. Structure a) Origin b) Rationale c) Stability	Prescribed Rational Stable	Emergent Emotional Dynamic
B. Influence a) Base b) Type c) Flow	Position Authority Top-down	Personality Power Bottom-up
C. Communication a) Channels b) Networks	Formal channels Well defined & follows formal channels	Grapevine Poorly defined & cut across formal channels
D. Individuals Included	Indicated by formal position & role	Only those deemed 'acceptable'
E. Basis for Interaction	Prescribed by functional duties & position	Spontaneous & personal characteristics

Note: Adapted from Gray & Starke (1984: 412) Organizational Behavior:
Concepts and Applications Columbus: Merrill Pub Co.

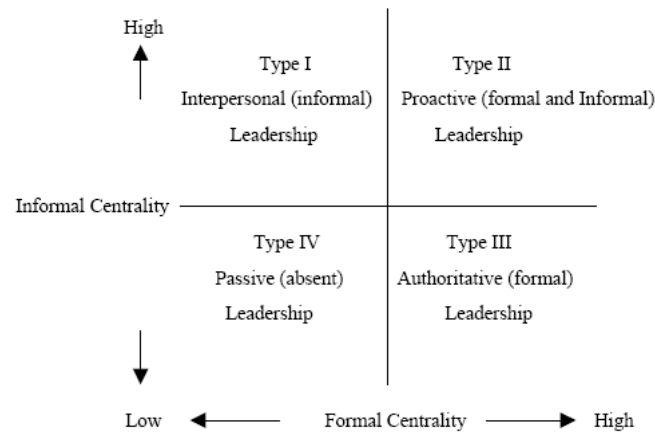
According to Mitchell (1980) and Scott (2000), social structures are related to the specific set of relationships among a defined set of individual agents, and the structural concerns can be addressed through the collection and analysis of relational data. In other words, relations are the emergent properties of the relational structure of individual members that are interconnected through social behavior. In this line of thinking, relational data are regarded as the primary sources of exploring the 'relational structure of social systems' (Marsden & Lin 1982 Scott 2000). In order to capture both prescribed and emergent processes of social systems, Tichy & Charles (1979: 510) asserted that the framework provided by the social network approach "makes it possible to compare and contrast formally prescribed and emergent relationships in a coherent fashion."

2. Perspectives on Relational Leadership Patterns

In addition to the relational patterns of network behavior, leadership patterns are related to network relationships within organizations. According to Huxham & Vangen (2000), collaborative organizational structures and work processes determine the role of leadership by shaping interactions among members. Pielstick (2000) argued that, while structural position defines the degree of formal leadership shaping legitimate authority and power, informal leadership is driven by beliefs and behaviors of members of organizations. Balkundi & Kilduff (2006) also mentioned that leadership is likely to be affected by social network relationships within and across organizations. Particularly, informal leaderships are dependent upon the relational network structures and the exercise of social interaction within organizations.

The framework in Figure 1 is an attempt to identify the types of leadership in organizational networks in terms of formal centrality and informal centrality: interpersonal leadership, proactive leadership, authoritative leadership, and passive leadership.

〈Figure 1〉 Types of Leadership



In Type I, interpersonal (informal) leadership occupies central position in the informal relationship, but is not considered to be powerful in the formal work relations. Interpersonal leaders may have no formal authoritative power to exert command and control to achieve strategic objectives in the organizations. Instead, they pay more attention to trust building within organizations through informal communication and interpersonal relationships among members in organizations. Based on Goleman's leadership styles (2000), interpersonal leadership can be described as the affiliative style. According to him, affiliative leaders take into account individual value, trust, needs, and emotional links and encourage communication among members. However, this leadership style is not effective in maximizing organizational performance due to the lack of a constructive role in motivating members to achieve an organization's strategic goals.

In Type II, leadership is obtained through both the formal and the informal relationships. Proactive leaders promote formal interaction among members by harmonizing interpersonal relationships with the common organizational goals. The term "proactive leadership" can be used synonymously with the term "transformational leadership". According to Burns (1978) and Bass (1985), transformational leaders encourage members to unify diverse self-interests into a shared common goal of the organization by adjusting their leadership abilities to meet the needs of members.

Shamir, House, & Arthur (1993) also defined such leadership as charismatic that transforms self-interests of individual members into the leader's mission to gain collective interests.

In Type III, authoritative (formal) leadership holds central position in formal relationships, but is located in peripheral position in informal networks. Authoritative leaders are task oriented and set forth a strategic plan for organized action and exercise formal power and authority as a means to orient members toward the shared mission in pursuit of organizational goals. Goleman (2000) noted that, however, the authoritative style is not working along with other experienced members within the organization.

In Type IV, leadership may be passive or not exist in both the formal and the informal relationships. The lack of leadership appears when the leader has no effective means to bring members to pursue a common organizational objective or has no members to whom to assign responsibilities for the tasks. Stogdill (1950) also stated that no leadership is necessary if all members may be called on to perform the same tasks in the same manner.

Therefore, utilizing the relational approach is more appropriate in studying informal network relations rather than the structural approach that is more relevant to well-established systems (Blau & Alba, 1982). Thus, this study utilizes the relational network analysis to understand the behavioral patterns and leadership styles emerging from organizational networks.

III. Analytic Methods

1. Organization Chart and Workflow Diagram

The Columbia Police Department South Region has a vertical hierarchical structure, constituted by the command and control system. Under the management of the

commanding officer of the Patrol Operations, the South Region is committed to the day-to-day patrol operations, which aim to protect and serve the community. At the top level, the South Region is commanded by Police Captain S18. Directed by the captain, the South Region is divided into four squads, A, B, C and D, each having day and night shifts. Each squad is commanded by police lieutenant, with the assistance of police sergeants, and police officers, and a number of employees as may be assigned by the police chief (in this case study police lieutenants of squad A, B, and C are not participating in the survey questionnaires). Squad A, B, C, and D are taken care of by Police Sergeant SAM1, SBM31, SCM 35, and SDM26 with Lieutenant S13. The management of field operations at the South Region, at the bottom level, is dependent on the coordinate activities of the various tasks such as staff support, squad management and support, operations, and residential patrol/community response suggesting that the formal lines of communications may affect the mutually interdependent relationship among the squad members.

All three levels constitute a single entity of South Region and are under the operational control of the commanding officer. The organization chart/workflow

〈Figure 2〉 Formal Organization Chart /Work Flow Diagram

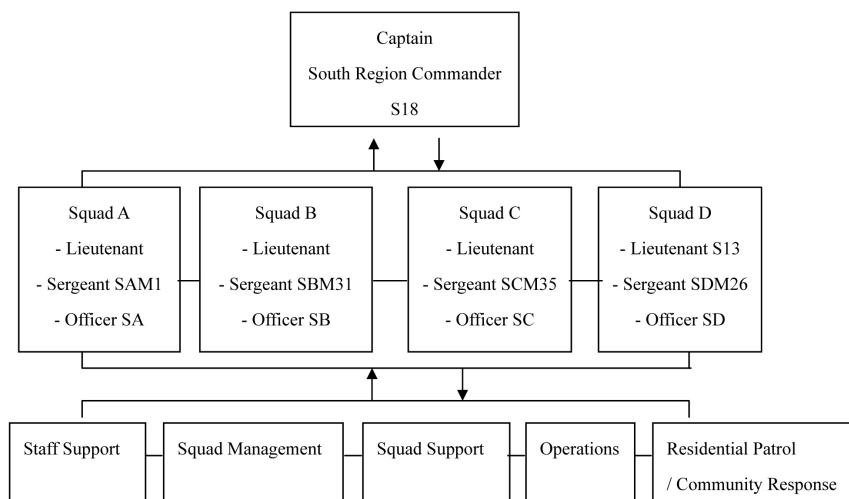


diagram in Figure 2 illustrates the essential steps, which must take place, in order to carry out field operations at the South Region.

2. Data

The case study we describe here is based on data about the informal structural patterns of 43 police officers, who served in the Columbia Police Department South Region, South Carolina. Data was collected during June 2005 using survey questionnaires on relationships among officers, which included questions on communication describing formal decision making process and informal lines of communication channels in order to understand informal organizational structure and the leadership patterns in the police department:

Q1 (Formal Network): Whom are you most likely to contact formally for work-related issues?

Q2 (Informal Network): If you had extra tickets to a sporting event, whom would you most like to share them with?

3. Social Network Analysis

This study uses UCINET, which performs social network analysis of the data, to calculate the network centrality between the relational patterns of formal organization. In social network analysis, position in the network affects the behavior of actors, and the behavioral patterns define the social relations of the organization. Thus, the location of actors in the network corresponds to relative power in the relationship. In other words, the central point of the network represents social power weighted by the location of actors within the network.

The concept of centrality examined in this study is degree centrality and betweenness centrality.²⁾ Network centralization describes the extent to which nodes in

2) This study employs Freeman(1979)'s concept of degree and betweenness centrality to analyze

a network are connected to individuals or a group of actors. Degree centrality is defined as the number of links connected to the node in a network. Nodes indicate network actors and links between them specify the information or communication flows. In directed networks we can define an in-degree centrality and out-degree centrality. First, in-degree centrality represents the number of links directed toward the node. If an actor in a given network received many links, that actor is often considered to have high prestige (or status) or to be prominent. In-degree centrality is defined as: $Z_{ijk} = Z_{jk}$. Z_{ijk} is the normalized centrality index of the set of actors, i and j , where k is the number of links in a given network. Out-degree centrality is defined as the number of links directed from one node to the other. Actors who have high out-degree centrality are often said to be influential actors, whom are able to exchange their views with many others. Thus, out-degree centrality is defined as: $Z_{ijk} = Z_{ik}$.

Second, betweenness centrality presents the extent to which a particular actor as an intermediary lies between the various other actors in the network. In other words, actors who have high betweenness centrality are often considered to have more power than others to control, coordinate, and influence a given network. Betweenness centrality is defined as: $(Z_{ij} + Z_{ji}) / (Z_{ij})$. Z_{ij} is defined as the number of geodesic paths (shortest number of links) between actors i and j .

Finally, in order to derive the types of leadership available to organizational networks, this analysis first developed a conceptual framework, and then applied the framework to an actual case study to identify the leadership patterns emerging in the Columbia Police Department.

In order to formulate the leadership framework, centrality measure for social network analysis is employed to identify the leadership position in the network relations.

IV. Empirical Results

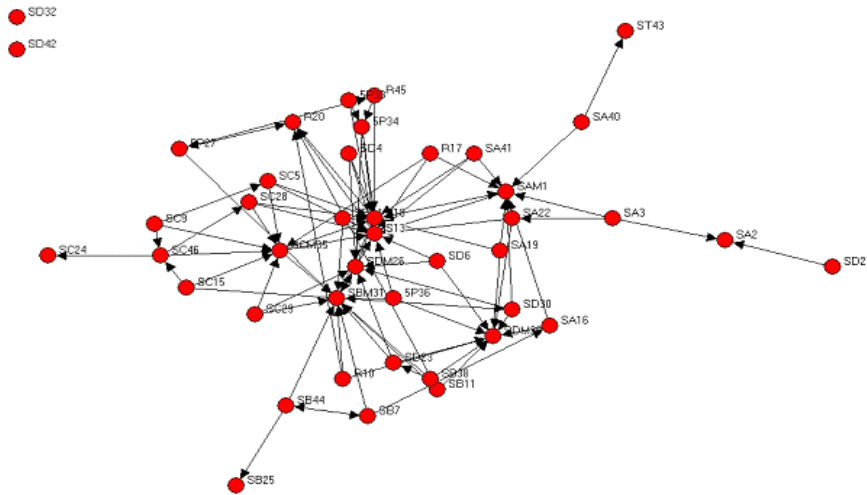
1. Formal Network Analysis

Social network analysis visually displays formal lines of communication channels in the police department. As shown in the Figure 3 some officers held strongly central and prestigious positions, and others located in peripheral positions. There are two officers isolated from the formal network (SD32 and SD42 in Figure 3). Descriptive statistics for formal network analysis in Table 2 indicates that network centralization for in-degree is around 35.88 percent of a purely centralized network, and is higher than out-degree centrality (1.76). That is, the work-related network relation is more strongly oriented to inflows of formal contact rather than outflows. Figure 3 and Table 3 also indicates degree centralization among officers in the police department. Actor S18, SBM31, and S13 have a higher percentage of in-degree links, and might be regarded as the high-status officers in the police department. For out-degree centrality, most of actors (29 out of 43 actors including S18 and SBM31) have high out-degree links, indicating that command lines are well distributed among police officers.

〈Table 2〉 Descriptive Statistics

	OutDegree	InDegree	Betweenness
Mean	2.279	2.279	3.767
Std Dev	1.168	3.984	8.441
Sum	98.000	98.000	
Variance	1.364	15.876	
Minimum	0.000	0.000	0.000
Maximum	3.000	17.000	36.833
Network Centralization (Outdegree) = 1.757%			
Network Centralization (Indegree) = 35.884%			
Network Centralization Index (Betweenness)= 1.97%			

〈Figure 3〉 Formal Network



The overall network centralization of betweenness in Table 3 shows that actor S18, SBM31, and S13 appear to play a role of intermediary by this measure. However, betweenness centralization index is relatively low (1.97 percent), indicating that most work-related formal networks could be made directly rather than throughout the aid of any intermediary.

Based on the analysis of work-related formal network, Police Captain (S18) and Police Sergeant of squad B (SBM31), C (SCM35), and D (SDM26) hold strongly central positions (indegree, outdegree, and betweenness) of commanding and controlling police operations at the South Region. Police Lieutenant of squad D (S13) and Sergeant of squad A (SAM1) also occupied the central role of coordinating field operations at the South Region. In the formal contact network, moderately strong links well exist among officers of each squad A, B, C and D. As we assumed, the work flows of police officers at the South Region are generally formed based on mission-oriented directions and rules commanded by the captain and the sergeant in each squad.

〈Table 3〉 Centrality Measure Scores for Formal and Informal Network

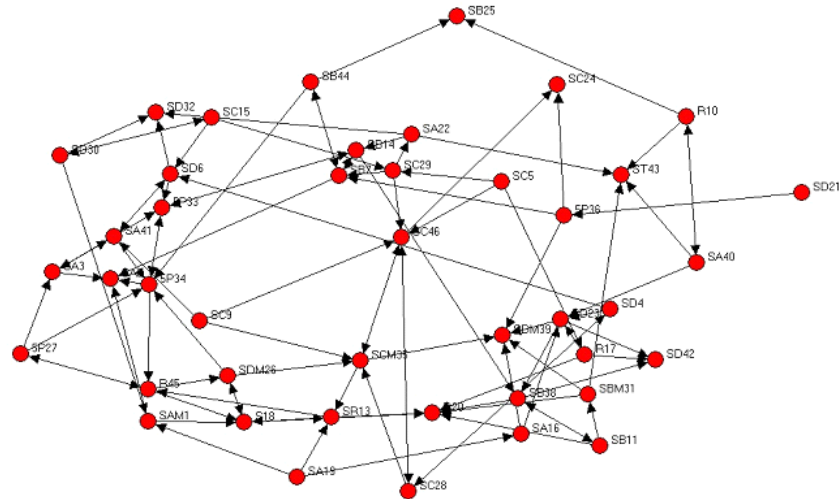
		In-Degree		Out-Degree		Betweenness	
F o r m a l	1	S13	17	S18	3	SBM31	36.8
	2	S18	12	SBM31	3	S18	33.8
	3	SBM31	12	SCM35	3	S13	21.5
	4	SAM1	9	SDM26	3	SCM35	19.6
	5	SCM35	7	SD	3	SAM1	11.0
	6	SDM26	7	SC46	3	SDM26	10.8
I n f o r m a l	1	5P34	5	5P34	3	5P33	204.2
	2	SC46	5	SC46	3	5P34	204.1
	3	S18	4	S18	3	SB14	196.0
	4	SCM35	4	SCM35	3	R45	181.2
	5	5P33	4	5P33	3	SDM26	155.7
	6	SB7	4	SB7	3	SCM35	137.9
	7	SD23	4	SD23	3	SB38	128.3
	8	SB14	3	SB14	3	SC46	126.2

2. Informal Network Analysis

Analysis on informal network relation is based on sports ticket network (or leisure relationship). This relationship together would represent a different type of organizational networks that could be viewed in informal behavioral structures within formal organizations. As can be seen from the following illustration (Figure 4), this relationship shows a clear difference compared to the formal work-related network in Figure 3.

The degree of information on the relationships existing at the South Region uncovers unknown behavioral patterns that are not obvious in the formal network and presents new actors occupying central position in the informal relation. In Figure 4, there are no officers isolated from the informal network. Officers in the network have built certain relationships among themselves. For degree centralization, officer 5P34 (Residential Patrol and Community Response) and officer SC46 (squad C) have a higher percentage of in-degree links, and might be regarded as the most popular officers in the informal relationship. For out-degree centrality, a majority of actors (32 out of 36 actors including 5P34, 5P33, SB14, SC46, S18, and SBM31) has high

〈Figure 4〉 Informal Network



out-degree links, and might be considered to have well distributed informal connections among officers in the police department. For betweenness centrality, officers 5P34, 5P33, and SB14 appear to play an intermediary role among various other officers in the network.

In addition to the centrality analysis, the cliques analysis identifies whether sub-groups (clusters) of the formal and informal relation network exist. Sub-groups are formed based on similar locations of actors connected to each other member within the network. Actors sharing common locations in a given network are likely to share similar belief or value or hold common work patterns. This cliques methodology indicates that the formal network is composed of 28 sub-groups as shown in Table 4. We can see that the clusters are categorized mainly based on squad A, B, C and D. Police Captain (S18) and Police Lieutenant of squad D (S13) are included in at least one of each squad clique as an actor responsible for overall police operation or work-related issues. In the informal network, 14 clusters are created based on informal relationships among officers, and eight cliques contain the prominent actors (5P34, SC46, or SD23) with highest in-degree centrality.

〈Table 4〉 Clusters for Formal and Informal Network

	Formal Network	Informal Network
(Group 01)	SAM1 SA3 SA22	SBM31 SB11 R20
(Group 02)	SAM1 SA19 S18	SCM35 SC28 SC46
(Group 03)	SAM1 SA22 S13	SCM35 SC9 SC46
(Group 04)	SAM1 SA41 S18 S13	SDM26 R45 5P34
(Group 05)	SAM1 R17 S13	SDM26 R45 S18
(Group 06)	SBM31 SCM35 SC29	SB11 SB38 R20
(Group 07)	SBM31 SCM35 S18 S13	SA40 ST43 R10
(Group 08)	SBM31 SDM26 S18 S13	SB38 SD23 SD42
(Group 09)	SBM31 SDM26 SD23	SC5 SC29 SC46
(Group 10)	SBM31 SDM26 SC29	SD23 SD42 R17
(Group 11)	SBM31 SB7 SB44	SD23 SA16 SDM39
(Group 12)	SBM31 SB14 S18 S13	R20 S18 SR13
(Group 13)	SBM31 SB38 SD23	R45 S18 SR13
(Group 14)	SBM31 5P36 S13	R45 5P27 5P34
(Group 15)	SCM35 SC5 S18 S13	
(Group 16)	SCM35 SC5 SC9	
(Group 17)	SCM35 SC9 SC46	
(Group 18)	SCM35 SC15 SC46	
(Group 19)	SCM35 SC28 S18 S13	
(Group 20)	SCM35 SC28 SC46	
(Group 21)	SCM35 R17 S13	
(Group 22)	SDM26 SD4 S18 S13	
(Group 23)	SDM26 SD6 S13	
(Group 24)	SDM26 5P34 S18 S13	
(Group 25)	SB38 SD23 SDM39	
(Group 26)	R20 S18 S13	
(Group 27)	R45 5P34 S13	
(Group 28)	5P33 5P34 S13	

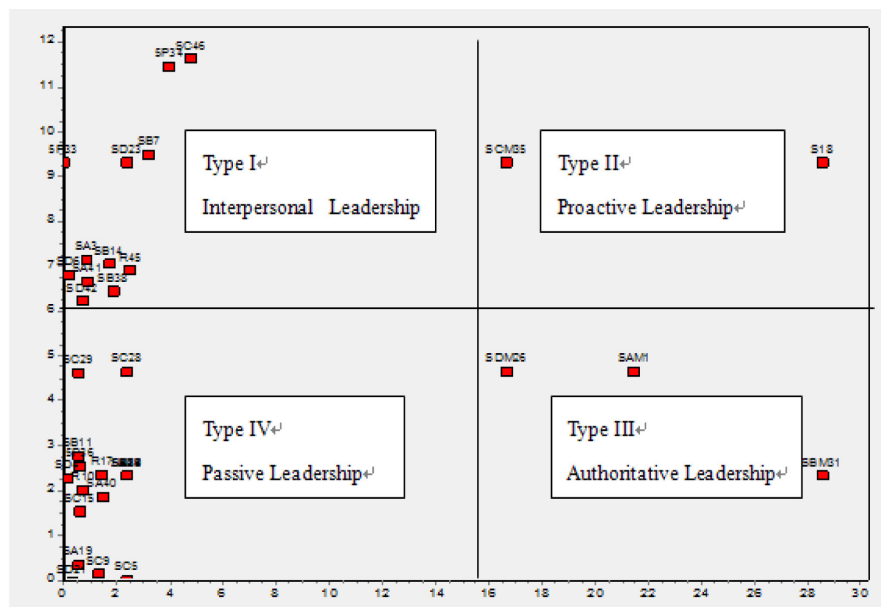
3. Types of Leadership in Organizational Networks

To identify the types of leadership available to formal and informal networks, we conducted correlation analysis between the formal centrality and the informal centrality. The scatterplot matrix in Figure 5 shows the network relationship based on the indegree centrality of each individual police officer and reveals various leadership patterns emerging in the Columbia Police Department.

Inspections of Figure 5 makes it clear which leadership types are emerged either in the formal or informal network. Police officers in Type I are considered to

demonstrate interpersonal leadership in the informal network relations. Officer 5P34 and 5P33 of Residential Patrol and Community Response and officer of squad B (SB7), C (SC46), and D (SD23) are not considered to be powerful in the formal work relations, but play a leadership role in the informal network. They have no formal authoritative power to direct field operations at the South Region, but can actively foster interpersonal relations by encouraging informal communication among all officers. Police Captain (S18) and Police Sergeant of squad C (SCM35) are identified to hold the highest centrality both in the formal and informal network and could be classified as proactive leaders (Type II). They hold strongly central positions of commanding and controlling the overall police operation as well as play a role of interpersonal leader within the Department. Officers included in Type III (authoritative leadership) are police sergeants of each squad, except for SCM35 (Police Sergeant of squad C). Police Sergeant of squad A (SAM1), B (SBM31) and D (SDM26) occupied central position in the formal relationship as a team leader in charge of the

〈Figure 5〉 Scatterplot matrix between Formal (x) and Informal Indegree Centrality (y)



day-to-day operations at the South Region. However, they have weak ties outside the formal network. Finally, officers holding lower level of centrality both in the formal and the informal network could be seen as passive leaders (Type IV). They have neither discretion with respect to managing police operations, nor informal coalitions promoting mutual trust and cohesiveness among officers.

V. Conclusion

In this study we used analysis of social networks in the police organization to examine the nature of behavioral relations and leadership styles and to identify its association with organizational network structure. The case study examined above confirms the existence of networking relationships that affect behavioral patterns in organization structure and identifies the types of leadership available to network structure.

The central principle of this study is that behavioral patterns and leadership styles are driven not only by formal lines of communication channels, but also by relative positions of informal networks emphasizing shared social values, beliefs, and trust caused by network interactions among members. We found that social network analysis can be a useful tool for predicting formal and informal network of relationships that affect the patterns of behavior among network members and the leadership styles formed in the police organization.

This social network approach is compatible with current theory on the characteristics of complex systems identifying the emergent property of self-organizing process of network relationships that promote integration among members in the organization. Thus, the lack of understanding of these emergent self-organizing network relations is perhaps the biggest failure of understanding the various relational patterns of behavior and leadership that form and influence the dynamic characteristics of organizational network structures and processes. Therefore, an understanding of the

nature and role of interactive network of formal and informal relationships is required to fully recognize the distribution of self-organizing process placed among its network members in conjunction with its functional authority structure.

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