

The Value of Formative Investment in Organizational Federations

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Public goods theories highlight an incentive system that rewards "free riding" on the contributions of early contributors toward collective actions. However, because such theories focus on creation of the good, they may underestimate returns that accrue to early contributors subsequent to the good's realization. The concept of formative investment is introduced here to describe the extent to which organizations help to create public goods such as interorganizational linkages like participatory federations. Data from the CEOs of 48 organizations involved in a participatory federation were used to assess how an organization's level of formative investment is related to later patterns of dependency and interaction among federation members. Findings suggest that from a long-term perspective, and for goods that involve communication and interaction, the incentive structure may not be so favorable for free riders. To the extent that organizations with high formative investment have the capability to envision the future and communicate that vision to potential federation partners, they may be able to both reduce free riding and secure for themselves advantageous positions in the subsequent network of relations.

Structuralism and network analysis have a long and distinguished history in communication and the social sciences. Spencer (1982) and Durkheim (1964) in sociology, Radcliff-Brown (1959) in anthropology, Piaget (1971) in cognitive development, and de Saussure (1966) in linguistics all pioneered structuralism in their respective fields. Monge and Eisenberg (1987) trace the history of organizational

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communication network analysis to three separate structural traditions. The *positional* tradition, founded on the work of Weber (1947), Parsons (1951), and Homans (1958), views structures as sets of patterned relations among sets of positions. The *relational* tradition, rooted in modern systems theory (Buckley, 1967), focuses on networks as structures that emerge from regular patterns of interaction over time (Barnett & Rice, 1985; Richards, 1985; Rogers & Kincaid, 1981). The *cultural* tradition, based on the work of Levi-Strauss (1963) and Giddens (1979), explores how symbols and meanings are transmitted throughout social structures, each producing and constraining the other (McPhee, 1985; Riley, 1983).

Most theorizing and research in communication networks has occurred within organizations (Monge, 1987). However, a rapidly growing literature on interorganizational networks has emerged in recent years to explore such diverse phenomena as interlocking boards of directors (Knoke, 1993; Mizruchi, 1996), invisible colleges (Crane, 1972; Lievrouw, Rogers, Lowe, & Nadel, 1987), network forms of organizations (Monge & Fulk, 1999), and strategic alliances (Koza & Lewin, 1998; Monge, Fulk, Kalman, Flanagan, Parnassa, & Rumsey, 1998). For example, Danowski, Barnett, and Friedland's (1987) early research in this area showed that the more central an organization is in the interorganizational network, the more successful it is.

Although a number of alternative interorganizational forms exist, such as precompetitive alliances (Yoshino & Rangan, 1995) and joint ventures (Osborn & Hagedoorn, 1997), among the more intriguing of these forms is the participatory federation. Participatory federations are organizational alliances wherein network members grant control over some domain of their activities to a central coordinating agency, often called a federation management organization (Fleisher, 1991; Pfeffer & Salancik, 1978; Provan, 1983; Warren, 1967). The federation management organization acts on behalf of participating organizations to manage the complex alliance network and to coordinate the cooperative functions of network members. Participatory federations are found in all economic sectors but are a particularly favored form of alliance among not-for-profit organizations. Although considerable research has been conducted on other forms of strategic alliances, much less is known about participatory federations, particularly in their formation phase (Fleisher, 1991; Provan, 1983, 1984). This study examines how activities in the formation phase are related to later patterns of dependency and interaction among federation members.

The formation of a federation is a complex task requiring high levels of knowledge, expertise, and leadership (Provan, 1983). It involves decisions about the logistics, obligations, and expectations of member organizations. The formation process includes such activities as generating the idea for the relationship, soliciting cooperation from organizations, se-

curing commitments of contributions, negotiating requisite arrangements, and leading in pivotal areas such as knowledge, expertise, or information. The concept of *formative investment* is introduced here to describe the degree to which an individual organization participates in these ways in creating a participatory federation.

Federations, of course, are created out of interorganizational linkages. Eisenberg et al. (1985) identified three levels at which material or informational content can be exchanged among members of an interorganizational arrangement: institutional, representative, and personal. *Institutional* linkages occur when information or material is exchanged between organizations without the involvement of specific organizational roles or personalities. *Representative* linkages occur when people who are acting officially on behalf of their organizations contact officials who represent other organizations. *Personal* linkages arise when people from different organizations contact one another but in a nonrepresentative or private capacity.

Several scholars have found that participants in interorganizational relationships are differentially committed to the formation of cooperative ventures, and that some assume important leadership or sponsorship roles (Ching, Holsapple, & Whinston, 1996; Choudhury, 1997; Maidique, 1980; McKenney, Copeland, & Mason, 1995; Premkumar & Ramarmurthy, 1995; Reich & Huff, 1991). According to Gray (1989), some organizations function as *conveners* of interorganizational relationships, where "the role of the convener is to identify and bring all legitimate stakeholders to the table" (p. 71). In a participatory federation, conveners—who foster representative linkages between organizations—are crucial in order to recognize and initiate the interdependent activities among participants and to shift the appropriate tasks to the federation management organization.

Conveners typically possess legitimacy among their peers, a relatively unbiased approach to the problem domain, and the capabilities to appreciate the potential value of collaborating, to envision the purpose for organizing, and to establish the collaborative process and context (Wood & Gray, 1991). The power of conveners is thus the "*power to organize*" (Gray, 1989, p. 124, emphasis in original) and conveners make considerable formative investments in participatory federations. In order to explore the importance of such investments, the research reported here examines data from the chief executive officers (CEOs) of 48 organizations involved in a participatory federation that was designed to facilitate effective communication and information sharing among federation members via an advanced computer-based system. Two theoretical perspectives provide important insights about how investments during the critical formative phase are linked to subsequent relations among participants: public goods theory and resource dependency.

Federations as Public Goods

Public goods theories examine how actors (i.e., people or organizations) undertake collective actions in order to provide "public goods" (Barry & Hardin, 1982; Hardin, 1982; Marwell & Oliver, 1993; Oliver, Marwell, & Teixeira, 1985; Olson, 1965; Samuelson, 1954). Public goods consist of traditional, physical goods like parks, bridges, or libraries (Marwell & Oliver, 1993; Olson, 1965; Samuelson, 1954) or less tangible goods like databases of information or communication systems (Connolly & Thorn, 1990; Fulk, Flanagan, Kalman, Monge, & Ryan, 1996; Markus, 1990). A central concern of public goods theory is how to induce collaborative efforts among self-interested individuals, groups, or organizations, assuming at least a certain level of common interest.

A federation can be conceptualized as a public good shared in common by its members (Monge et al., 1998). Inducing collective action to create a participatory federation is a considerable challenge, however, due to the diversity of organizational goals, strategies, and cultures. Furthermore, public goods theory proposes that early contributors to collective actions enjoy smaller marginal rates of return in the early stages of public goods provision (Markus, 1990; Marwell & Oliver, 1993) and once public goods are established, early contributors receive benefits that are only equal to those of the other participants (Oliver, Marwell, & Teixeira, 1985).

As a consequence, two key problems in the successful provision of a participatory federation are "free riding" (Hardin, 1968; Olson, 1965; Sweeney, 1973) and disincentives to contribute in the early phases. Free riding occurs when participants enjoy the benefits of the public good without contributing to its establishment or maintenance (Connolly & Thorn, 1990). Although recent theoretical and experimental work has challenged the magnitude of the free-rider problem (Bagnoli, Ben-David, & McKee, 1992; Bagnoli & Lipman, 1989; Bagnoli & McKee, 1991; Marwell & Ames, 1981), it remains a central theoretical concern for public goods explanations of participatory federations. Indeed, a core defining feature of a public good is the impossibility of excluding any member of the collective from enjoying collective benefits, whether or not the member is contributing to the continuing viability of the good (Chamberlain, 1974; Head, 1972; Marwell & Oliver, 1993).

Disincentives to contribute in the early phases of public goods formation may occur for some types of public goods (such as participatory federations that involve continuing interaction among participants) because returns to early contributors are deficient. That is, early contributors must invest in the absence of investments by others, and thus receive little in terms of direct, immediate benefits from their contributions. In essence, the incentive system rewards each participant for waiting until others contribute, thus serving as a disincentive for early contributors or conveners.

Consequently, the public good is not created unless there are some especially interested and resource-rich participants who are willing to pay the substantial start-up costs without receiving corresponding benefits. Even if such conveners do exist to make this necessary formative investment, the marginal returns are low because the benefits of the collective action are divided equally among all participants, regardless of level of investment. However, we argue here that public goods theories may underestimate the general returns to early contributors to collective actions, because such contributors may be compensated for formative investment efforts by “auxiliary” benefits derived from being an early investor. Specifically, we argue below from a resource dependence perspective that formative investment can be seen to lead to certain “private” benefits to conveners not foreseen by public goods theories—benefits that boost the overall return to early investors.

Formative Investment and Resource Dependence

Resource dependence theory (Aldrich & Pfeffer, 1976; Pfeffer & Salancik, 1978) is a form of exchange theory that views social behavior as an exchange of material (e.g., money) and nonmaterial (e.g., approval or prestige) resources (Blau, 1964; Cook, 1977; Homans, 1950, 1974; Levine & White, 1961). According to this view, relationships are anchored in dependencies that arise from one organization’s possession of resources needed by another organization. Emerson (1962) viewed dependence and power as yoked together, in that he saw dependency as a function of the need for valuable resources controlled by powerful others.

Resource dependence propositions in interorganizational relationships have been widely studied over the last several decades. For example, dependencies among organizations have been linked to increased interaction and decreased conflict (Levine & White, 1961), decreased autonomy of action (Knoke, 1983), and lower likelihood of organizational failure (Miner, Amburgey, & Stearns, 1990). Further, economic resources and interests are strong predictors of organizations’ centrality in a network (Galaskiewicz, 1979), and network centrality is positively related to dominance, influence, and power within the network (Boje & Whetten, 1981; Burkhardt & Brass, 1990; Galaskiewicz, 1979).

An important resource in a participatory federation is the ability and willingness of an organization to conceptualize, initiate, and bear the bulk of the substantial costs of alliance formation. That is, high formative investment can create enduring dependencies whose private benefits to the investor continue subsequent to the network’s initial realization. Although the collective benefits of creating the federation itself may still accrue to all participants equally, private benefits may accrue and be sustained for

those whose efforts and investments shape the structure and form of the collective endeavor. Viewed this way, new emphasis is placed on the continuing influence of the provision process on relations among organizations *following* the initial realization of the public good. This integrative view extends traditional public goods applications that have tended to separate issues of public goods production from the distribution of benefits.

Resource-dependence relations are especially likely to develop when resources are critical to organizations, cannot be obtained elsewhere, and imply potential benefits beyond the initial advantages of the good (Emerson, 1962; Levine & White, 1961; Pfeffer & Salancik, 1978), even in view of the potential loss of autonomy that can result (Oliver, 1991). Because the information necessary to create, and especially to maintain, participatory federations is often widely distributed, difficult to locate, and can combine in ways that are useful but not always obvious or known beforehand, the value of creating mechanisms for information sharing and pooling can be great.

Accordingly, the provision of *connectivity* and *communality* can create compelling resource-dependence relations among organizations forming network alliances such as participatory federations, particularly if they rely on advanced technologies that enable these capabilities. Physical connectivity (the infrastructure making communication among participants possible), social connectivity (the utilization of the physical connectivity among users), and communality (the establishment of a forum for collectively sharing information) provide capabilities that are crucial to federations and other forms of alliances (Fulk et al., 1996). When direct contact among organizations is important to achieve organizational goals, the physical infrastructure on which to do so is imperative, as is a mechanism that motivates or requires participants to use the infrastructure to connect to each other. Among organizations performing functions that rely heavily on information that is accurate, gathered from a variety of sources, and timely, communality provides the requisite information base to perform organizational tasks effectively. In this way, efforts to establish connectivity and communality may be the source of important resources to organizations in a federation.

Empirical research indicates that resource dependence can result in influence and network centrality within interorganizational alliances (Boje & Whetten, 1981; Brass & Burkhardt, 1992; Galaskiewicz, 1979). In combination, this research and public goods and resource-dependence theories suggest that conveners who engage actively in formative investments in a participatory federation should subsequently benefit from increased influence and centrality in their participatory federations.

Advice sources and formative investment. One important form of influence relation with a rich history is the relationship between advisor and advisee. Blau (1964) and Homans (1974) identify advice as a specific indicator of a resource-dependence relationship. They argue that seeking advice demonstrates a form of dependence by the resource poor, and that serving as an advice source is indicative of the power and influence of the resource rich. Serving as an advice source can thus be an important indicator of general influence relations within a network of organizations.

Serving as an advice source in areas outside of the domain in which an organization enjoys legitimate and widely known expertise is indicative of a particularly influential impact within the collective. For example, when an organization's expertise in one particular field is of sufficient value to generate strong resource-dependence relations among participants, such expertise might prompt others to consult it for advice concerning unrelated matters. Similar dependence relations at the organizational level can be seen in institutional pressures exerted by influential organizations within a sector on those organizations that feel compelled to emulate leaders' actions (DiMaggio & Powell, 1983).

In a participatory federation, *advice sources* are those organizations sought out by others for information relevant to the general function and operation of the advice-seeking organization. Advice sources thus enjoy a general form of influence that results from the control or exercise of a widely valuable resource. In this way, advice sources fulfill many of the same functions as resource rich opinion leaders (see Coleman, Katz, & Menzel, 1966, 1977; Rogers, 1995): They gather and filter information and provide others with an assessment of its relevance and value. By offering guidance, advice sources help organizations to reduce uncertainty and cope with the environment.

In cooperative federations that link CEOs who share similar goals, serving as an advice source is a particularly critical role. Unlike lower level managers who can seek advice from hierarchical superiors, CEOs cannot readily seek advice upward in the organization. CEOs can and do, however, seek advice from noncompetitively positioned CEOs. Indeed, environmental scanning by top management incorporates important personal communications with top executives in other organizations (Daft, Sormunen, & Parks, 1988). When CEOs face environments that are complex and dynamic they rely even more heavily on judgments, for which other CEOs can be important sounding boards, than on formal organizational programs for information collection (Boyd & Fulk, 1996; Daft & Weick, 1984). CEOs who serve as frequently sought-out advice sources become influential within a network of complex resource dependencies.

Thus, public goods and resource dependence theories can be used to predict that formative investment is linked to serving as a general advice source. However, a number of other factors might reasonably be considered to affect the advice-giving relationship. Serving as an advice source also might be a function of general working relations, organizational size, and the years of experience that CEOs have in the profession. More specifically, close working relations suggest a natural source of advice among peer organizations, given the potential avenues for information exchange that characterize closely coordinated relations. In addition, larger organizations are often viewed as opinion leaders within a field, due to their relatively higher power and resource levels. Finally, the opinions of CEOs with lengthy tenure in the profession may, by virtue of their experience, be relatively more valued. Therefore, controlling for the degree to which organizations work closely with each other in the execution of their tasks, organizational size, and the level of executives' experience, the following hypothesis is proposed:

- H1: Controlling for other factors, formative investment in a participatory federation is positively associated with serving as an advice source on dimensions not directly related to the interorganizational alliance.

Network centrality. Network measures of power also capture the essence of dependency and influence relations in interorganizational alliances. In resource dependence terms, dependency relations are created by resource control and power is a function of control over scarce resources. Resultant power-dependence relations drive interactions among network members. The network characteristic that has been most widely connected to power in network relations is *centrality*, or the relative position of a network member to all others.

Centrality is a function of an organization's structural position within a set of relations (Mizruchi & Bunting, 1981) and is often used as a direct measure of power within social networks (Boje & Whetten, 1981; Brass & Burkhardt, 1992; Galaskiewicz, 1979). In a study of power within a publishing company, Brass and Burkhardt (1992) found that irrespective of which of the many measures of centrality was used, power and centrality were positively related. Within a community organizational network, organizations controlling the largest amount of funds were found to be more central than other organizations in various types of resource networks (Galaskiewicz, 1979). Wasserman and Faust (1994) linked centrality to prestige, and Burkhardt and Brass (1990) found that within an organizational network early adopters increased both their centrality and power following the introduction of a new technology. Centrality and power of early adopters increased more than that of late adopters, demonstrating that

early adoption benefits one's network position and overall influence within the set of relationships. Finally, centrality has also been positively associated with influence in social service organizations (Boje & Whetten, 1981).

As discussed earlier, high degrees of formative investment can be quite costly to investors, including such activities as generating the vision for the federation, soliciting and securing widespread support and cooperation, securing commitments of contributions, negotiating arrangements, and putting into place the requisite structures and control systems. Investors who bear these costs create reciprocal cost savings to organizations with low formative investment, thus contributing to the power-dependence relations among organizational network members. To the extent that formative investment reflects resource dependencies, we can expect it to be correlated with centrality within the network of federation participants. Thus, once again taking into account the effects organizational size, working relations, and executive experience, the following hypothesis is proposed:

- H2: Controlling for other factors, formative investment in a participatory federation is positively associated with centrality within the network of relations among organizations.

METHOD

Participants

Primary participants in the research were the chief executive officers of 48 law enforcement organizations involved in a participatory federation, hereafter identified by the pseudonym "El Centro."¹ Given the hierarchical structure of law enforcement agencies, these executives were selected as the spokespeople for their respective organizations. In Eisenberg, et al.'s (1985) terms, the chiefs forged representative linkages on behalf of their respective organizations, thus making them the appropriate interviewees for this research. During the course of data collection, 4 executives either resigned or were relieved of their positions. Due to the reciprocity required of many of the network level measures used in this study, some network data for these four organizations were not usable, reducing the number of organizations to 44. An examination of the data for the 4 organizations for which data were unusable revealed no unusual trends or values.

Archival and interview data showed that the genesis of El Centro was the recognition of common, countywide challenges in combating illegal drug activity. Among the most serious concerns were the increasingly

violent nature of drug criminals and activity, the increased sophistication of criminals in the use of computer and information technology, and the high mobility of criminals among jurisdictions. Executives believed that these issues could be addressed by more effective communication and information sharing among police organizations. For example, one executive spoke of the "high probability of overlap" of information held by officers working in different cities and the need to make such information easily accessible to all officers. Another CEO referred to the fact that getting the right information needed for a successful drug investigation was largely a matter of "luck" and "knowing the right people." Several executives mentioned the need to pool information in some central repository, thus making all officers' case and intelligence information available to all others. Signaling the importance of effective sharing of information resources, one executive commented that "in this business, you're only as good as your information."

Procedures

Data were collected through face-to-face interviews, surveys, participant observation, and through archival and public records. Although researchers spent considerable time on site at the federation management's headquarters and on the street with officers, the majority of the data relevant to the hypotheses reported here is derived from interview, survey, and archival records. The interview protocol contained demographic information, Likert-type survey items, and open-ended questions. Executives also filled out a communication network survey in the same session.

Measures

Formative investment. Formative investment was determined through a two-step process. First, ordinal categories for identifying extent of investment in the formative phase were derived from interview data and from archival data consisting of memos, personal notes, meeting minutes, newspaper articles, and official releases authored by the CEOs. Second, CEOs were assigned to one of the three resultant categories based on (a) self-report data regarding their role in the formation of El Centro, and on (b) open-ended responses from CEOs about the formative investment of the other CEOs obtained during interviews. Multiple coders were employed in order to assess the reliability and validity of the categorization. The three formative investment categories used in the analysis were creators, supporters, and participants.

Creators played critical roles in the formation of El Centro. Analogous

to Gray's (1989) conveners, creators "invite and/or persuade other stakeholders to participate" (p. 70). For example, meeting minutes and personal notes identified those executives who promoted the idea for El Centro and who secured funding from external sources for the development of the technological backbone of the system. Memos indicated that certain organizational members lobbied external sources in order to obtain sponsorship. Such activities clearly show that among the network members certain executives assumed proactive, critical roles in forming El Centro.

Supporters did not actually help to form the participatory federation, but did play important roles in seeing it come to fruition. Meeting minutes, for example, identified executives who offered suggestions or who gave presentations on potential system capabilities. Newspaper articles noted executives who were outspoken supporters of El Centro, although not creators per se. Such roles suggest that although the federation was not their idea, the contributions of these executives were important in realizing the formal relationship.

Participants took active and positive roles in the interorganizational relationship without helping in other ways to form the network. As one participant succinctly put it, "I thought it best to shut up and listen." Records and interviews suggested that no executives were outright opposed to the formation of the participatory federation.

After definition of the three ordinal categories from the archival data, three coders were employed to assign each executive to one of the categories. Coders were provided detailed descriptions of the three categories of formative investment, as well as the responses of the 44 executives to interview questions. The primary interview data were taken from responses to two questions. (1) "In what ways did you participate in the creation of El Centro?" (2) "Were there ways other than the [regular police chiefs association meetings] that you participated in the planning of El Centro?" A number of executives elaborated their answers to describe the role of other executives in the formative phase, and these data were also provided to coders.

The coders independently placed each executive into one of the three ranked categories of formative investment. In instances where there was disagreement among coders, the executive was placed in the category on which two of the coders had agreed. There were no instances in which coders categorized executives independently into three different categories.

Advice sources. Data to measure advice sources were obtained from the communication network survey administered in person to each of the CEOs. The instrument listed the names and organizational affiliations of

all executives within El Centro. Participants were asked to rank the 10 of the 48 executives with whom they talked most about the management and operations of their own organization. The remaining 38 CEOs were not ranked. These ordinal, network data on advice source were reversed (10 = 1, 9 = 2, etc.) so that high scores indicated high advice source rankings and transformed to continuous data using the following formula:

$$A_i = \sum_{j=1} a_j * (r_i / N-1),$$

where A_i represents the advice source score of person i relative to all others, a_j is the sum of others' rankings of person i , r_i equals the number of times person i was ranked by others, and N is equal to the number of organizations in the study. Thus, person i 's advice source score is composed of the sum of the ranks person i received from others, weighted by the proportion of others giving person i a ranking.²

Network centrality. Network centrality is the relative proximity of each participant to the core of a system of exchanges like a participatory federation (Hoffman, Stearns, & Shrader, 1990; Mullen, Johnson, & Salas, 1991; Wasserman & Faust, 1994). It defines the extent to which a person is located closely to all others within the network of relations. Centrality scores were based on the communication patterns among all executives involved in the interorganizational relationship. CEOs were asked to report the overall amount of time spent in communication with each of the other executives in the network during a recent, typical month. Communication was defined to include telephone conversations, time spent reading and sending memos and letters, electronic mail exchanges, time in meetings together, and time spent in face-to-face conversations.

Bonacich's (1972a, 1972b, 1987) measure of power centrality was used to measure network centrality.³ Bonacich power centrality accounts not only for a person's links to others but also for the centrality of others in the network (Mizruchi & Bunting, 1981). Thus, by weighting the centrality of people to whom one is connected, centrality is a function of one's own network relations as well as those of all others to whom one is connected.⁴

Control variables. The measure of *working relations* was derived from data obtained from the communication network survey. Executives were asked to rank the 10 organizations with which their organization worked most closely in performing their duties in law enforcement. As with advice source data, these ordinal network measures were reversed and then transformed to continuous data using the following formula:

$$W_i = \sum_{j=1} w_j * (r_i / N-1),$$

where W_i represents the working relation score of organization i relative to all others, w_j is the sum of others' rankings of organization i , r_i equals the number of times organization i was ranked by others, and N is equal to the number of organizations in the study. Thus, those organizations with high scores are those that other organizations report working closely with to achieve their organizational goals. In general, these tended to be organizations that shared jurisdictional boundaries with a number of other police departments. There also was a subset of cities that worked closely on task forces to combat specific types of crime such as trade in illegal narcotics. Some subsets of adjacent jurisdictions also shared common dispatch facilities, which required them to work closely on the dispatch function. Jurisdictions with high scores on this variable typically worked closely with other jurisdictions through several of these mechanisms. One county agency also was responsible for special activities at the city level, such as investigating shooting incidents that involved a city police officer.

Size of organization was determined by the number of sworn law enforcement officers employed by each organization. Sizes varied considerably, ranging from 15 to 8,363 officers. *Executive experience* was determined by the number of years that each CEO has worked in law enforcement in any jurisdiction within or outside of the county. The range of executive experience was from 16 to 39 years.

Analysis

Intercoder reliability was calculated by a weighted Kappa for each of the three possible coder pairs (Kw_{AB} , Kw_{AC} , Kw_{BC}), with the final weighted Kappa (Kw) equal to the mean of these scores. Hypotheses 1 and 2 were each assessed by an analysis of covariance with formative investment as the grouping variable, advice source and network centrality scores as the respective dependent variables, and several control variables.⁵

RESULTS

Measurement Results

Intercoder reliabilities were as follows: $Kw_{AB} = .75$, $Kw_{BC} = .66$, and $Kw_{AC} = .91$. The final weighted Kappa, Kw , was equal to .77. Table 1 provides demographic information on the executives and their jurisdictions.

TABLE 1
Demographics for Formative Investment Categories (N = 44)

	<i>Formative investment category</i>		
	<i>Participants</i> (n = 28)	<i>Supporters</i> (n = 8)	<i>Creators</i> (n = 8)
City size ^a	234,660 (48,575)	48,747 (48,025)	62,350 (59,450)
Organization size ^a (number of sworn officers)	565 (65)	84 (71)	96 (92)
Total annual crimes ^a	14,928 (2,214)	2,738 (2,163)	3,313 (3,302)
Annual public safety expenditure ^a (in millions)	78.676 (12.751)	15.658 (12.815)	23.333 (24.313)
CEO experience ^b (in years)	27.40 (27.5)	27.69 (27.0)	26.38 (27.0)
CEO's technical knowledge, relative to others ^c	2.26 (.14)	46.8 (2.11)	110.4 (96.7)
CEO's average total communication with other CEOs ^b (minutes per month)	766.74 (660)	2,373.75 (2,115)	6,127.5 (2,093)
Per capita annual public safety expenditure ^{a,d}	335	321	374
Crime rate (per 1,000 residents) ^{a,d}	63.6	56.1	53.1

NOTE: Median values are indicated in parentheses.

^aMean value for category; from archival data.

^bMean value for category; from interview data.

^cFrom communication network survey data. Executives ranked the 10 individuals who were most knowledgeable about the type of technology used by El Centro. This ordinal measure was transformed to a continuous measure using the same method as for the advice sources measure.

^dCalculated value.

Primary Results

Table 2 shows the zero-order correlation matrix for the variables in all hypotheses.⁶ Table 3 provides the results for Hypothesis 1, which claims that formative investment in the participatory federation is positively related to serving as an advice source for information beyond the federation's domain. Based on the means adjusted for the covariates of working rela-

TABLE 2
Zero-Order Correlations Among Variables (N = 44)

	<i>M</i>	<i>Mdn</i>	<i>sd</i>	1	2	3	4	5
1. Advice source	12.55	4.02	18.11					
2. Bonacich power centrality	33.51	30.30	15.57	.64**				
3. Formative investment	1.55	1.0	.79	.55**	.55**			
4. Working relations	11.15	5.38	17.08	.60**	.51**	.23		
5. Size of organization	367.63	78.0	1340.7	.00	-.06	-.15	.37*	
6. CEO experience	27.23	27.0	6.19	.04	.08	-.06	.21	.22

NOTE: * $p < .01$. ** $p < .001$.

tions, organizational size, and executive experience, a significant effect was found for advice source, $F(3, 39) = 4.85$, $p \leq .05$. Considering the effect of the covariates on the advice source scores, the adjusted means showed that participants ($M = .48$), supporters ($M = .77$), and creators ($M = .95$) received, respectively, lowest to highest scores on advice source ratings, with participants differing significantly from creators ($p \leq .05$). Level of formative investment explained 6% of the variance ($\eta^2 = .06$) after removing the effects of the covariates. Thus, this test provides partial support for the hypothesis.

Hypothesis 2 states that formative investment in the participatory federation is positively related to network centrality. Controlling for working relations, organizational size, and executive experience, a significant result was obtained for the effect of Bonacich power centrality, $F(3, 39) = 5.33$, $p \leq .01$, Bonacich β parameter = .02. Participants received the lowest centrality scores ($M = 29.05$), supporters received higher scores ($M = 35.71$), and creators received the highest centrality scores ($M = 46.90$). Controlling for the covariates, 20% of the variance in centrality was accounted for by formative investment levels ($\eta^2 = .20$). Significant differences were found between creators' centrality scores and those of participants ($p \leq .01$). Thus, Hypothesis 2 was partially supported, as summarized in Table 4. Reanalysis with the Bonacich β parameter increased to .03 did not affect these results.

DISCUSSION

This research examined the extent to which CEOs who are influential in forming participatory federations enjoy private advantages relative to those who only participate in the collective. The concept of formative investment was introduced to represent activities contributing to the formation of a participatory federation. Premises from public goods and re-

TABLE 3
Analysis of Covariance; Advice Sources by Formative Investment, With Working Relations, Size of Organization, and CEO Experience as Covariates (N = 44)

<i>Effect</i>	<i>df</i>	<i>F</i>	<i>p</i> ≤
Advice source	2, 41	8.86	.001
Advice source adjusted for covariates	3, 39	4.85	.05

	<i>Means and (standard deviations)</i>		
	<i>Participants</i> (<i>n</i> = 28)	<i>Supporters</i> (<i>n</i> = 8)	<i>Creators</i> (<i>n</i> = 8)
Advice source	.31 _{a,b} (.68)	1.00 _a (.62)	1.29 _b (.54)
Advice source adjusted for covariates	.48 _a	.77	.95 _a

NOTE: Means with subscript = a are significantly different within their row, at $p \leq .05$; means with subscript = b are significantly different within their row, at $p \leq .01$; means without common subscripts are not significantly different within their row.

source dependence theories were synthesized to develop hypotheses linking formative investment to (a) influence on everyday operations of organizations within the federation and to (b) subsequent centrality within the network of CEOs. Data were obtained from a census of the CEOs of 48 organizations in a law enforcement federation in order to test these hypotheses.

The results showed that those CEOs who made the highest level of formative investment (creators) were significantly more central in the network of CEOs compared to CEOs who simply participated in the federation. Creators also were significantly more sought out for advice on issues unrelated to the federation itself. Interestingly, these creators were not CEOs of the largest organizations. Table 1 shows that creators headed relatively smaller organizations. This observation is consistent with Lipparini and Sobrero (1994), who found that entrepreneurs in small networks come from relatively smaller firms. Interview data with El Centro CEOs suggested a possible reason. Several CEOs from organizations that were smaller and had lower narcotics crime rates reported that they were motivated to cooperate in the collective because individually they did not have sufficient scope of narcotics-related information and technical resources (e.g., narcotics staff, facilities, and specialized labs and equipment) to be self-sufficient. Further, large and powerful organizations often show considerable inertia (Kanter, 1989). For our sample, the two larg-

TABLE 4
Analysis of Covariance; Bonacich Power Centrality by Formative Investment With Working Relations, Size of Organization, and CEO Experience as Covariates (N = 44)

<i>Effect</i>	<i>df</i>	<i>F</i>	<i>p</i> ≤
Bonacich centrality	2, 41	8.89	.001
Bonacich centrality adjusted for covariates	3, 39	5.33	.01

	<i>Means and (standard deviations)</i>		
	<i>Participants</i> (<i>n</i> = 28)	<i>Supporters</i> (<i>n</i> = 8)	<i>Creators</i> (<i>n</i> = 8)
Bonacich centrality	27.65 _a (12.41)	38.11 (14.72)	49.42 _a (15.11)
Bonacich centrality adjusted for covariates	29.05 _b	35.71	46.90 _b

NOTE: Means with subscript = a are significantly different within their row, at $p \leq .001$; means with subscript = b are significantly different within their row, at $p \leq .01$; means without common subscripts are not significantly different within their row.

est organizations had the greatest amount of narcotics staff, specialized equipment and facilities, and total budget for narcotics interdiction. Both of these organizations were simply participants—neither took a proactive role in the federation. Interview data suggested that because these large organizations already had some resources to fight drug crime and controlled a large amount of data relevant to illegal narcotics activity in the county, they were less motivated to form the federation.

Marwell and Oliver (1993) argue that collective action is most likely where interest and resource heterogeneity exist because the likelihood increases that at least some entities will possess enough of both to initiate and support the creation of public goods. For the participatory federation studied here, information resources were concentrated in the large organizations, but they did not generate the greatest interest. Consequently, even the vast resources of these large organizations were not sufficient to provide the public good for all members of the federation.

However, smaller organizations did have other types of resources that were particularly beneficial to the federation formation process. For example, Table 1 shows that creators included the CEOs ranked most highly on reputation for technical knowledge about information systems. They also had organizational and political ability, as evidenced by several having served as presidents of the county police chiefs' association, and several having succeeded in securing large sums of federal money to sup-

port local law enforcement programs. In essence, these CEOs of smaller organizations had the interest and resources to initiate a participatory federation that, if successful, would provide them with operational information resources they lacked for combating illegal drug activity. The resources they possessed were resources related to forming the federation, rather than resources of the type that the federation was designed to generate. As Gray (1989, p. 124) noted, they demonstrated the "power to organize," and the technical sophistication needed to build an information technology-based federation.

The results for the supporter category were in the predicted direction for both hypotheses, but supporters did not differ significantly from either participants or creators. Thus, supporters appear to have benefits in subsequent interaction similar to those of participants, but with somewhat higher levels of formative investment. Yet, only creators appear to enjoy the full benefits of formative investment efforts.

It is not possible without pre-formation network and influence data to rule out the alternative explanation that creators were already highly central and influential within the network before the federation was formed. The retrospective data on formative investment implicate an earlier time period, but a clearly causal design was not achieved. Nevertheless, theory and prior research are highly supportive of the interpretation presented here. Empirical research has shown that resource dependencies lead to increased interaction (Levine & White, 1961) as well as increased centrality and influence (Boje & Whetten, 1981; Galaskiewicz, 1979), including resource dependencies related to introduction of new information technologies (Burkhardt & Brass, 1990). To the extent that future researchers can position themselves to anticipate federation development and collect pre-formation network data, explicit causal claims will be more strongly supportable.

Theoretical and Future Research Issues

Public goods theories highlight an incentive system that rewards free riding on the contributions of early investors. Because such theories focus on creation of the good, they may underestimate returns to early contributors subsequent to the formation process. The results of this research suggest that from a long-term perspective, and for goods that involve communication and interaction, the incentive structure may not be so favorable for free riders. To the extent that creators have the capability to envision the future and communicate that vision to potential federation partners, they may be able to both reduce free riding and secure for themselves advantageous positions in the subsequent networks of relations.

This research suggests possibilities for the synthesis of collective ac-

tion and resource dependence theories. Resource dependencies can illuminate some of the reasons that organizations work together to achieve a common goal. Collective action theories can explain why some concerted action never materializes, despite resource dependencies. Together these theories provide a more complete picture of how federations develop and are sustained over time by interactions among members. Further, these results suggest that public goods theories should be revised to account for possible private benefits that may be acquired over and above the shared collective benefits that accrue to those who participate in a public good.

These insights may also prove valuable to stage models of development of partnerships and alliances in general (e.g., Benassi, 1993; Gulati, 1995; Kanter, 1994; Kogut, Shan, & Walker, 1992; Ring & Van de Ven, 1994; Zajac & Olsen, 1993). For example, Zajac and Olsen (1993) emphasize that orientation toward future value characterizes the first phase of successful alliances. Based upon our findings, it is reasonable to ask: What roles do creators play in envisioning and communicating this future value? Do those with greater formative investment secure a greater portion of the future value that is embedded in networks of influence?

Conclusion

This research makes several important contributions. First, it identifies formative investment as an important concept for participatory federations and demonstrates its significance for interactions within the federation. Second, it offers a new explanation for why some federation members are more powerful and influential in ongoing interactions within the federation. Third, it integrates key premises from collective action and resource dependence theories and suggests fruitful areas for synthesis. Fourth, it offers a view of participatory federations that is based on communication and information goods, rather than material goods, and emphasizes the importance of both the provision of the good and its continued maintenance. Thus, this research helps to address the rapid expansion of interorganizational networks in the contemporary landscape that makes knowledge of network dynamics in participatory federations increasingly vital.

NOTES

1. Human subjects approval for this project was granted as an "exemption," due to the assessment that (a) if the subjects' responses became known, they could not place subjects at risk of criminal, or civil liability, or be damaging to the subjects' financial standing or employability, and (b) the research did not deal with sensitive aspects of the subjects' own behavior, such as illegal conduct, drug use, sexual behavior, or use of alcohol. Participation in the study by the CEOs was voluntary but all subjects chose to participate. Subjects were informed that their responses would be confidential to the research team and that specific quotes would not be attributed to individuals. Feedback provided to respondents after the data were collected included summary statistics that identified no respondent individually.

2. In order to perform the calculations, data were entered into a $N \times N$ matrix ($N = 44$) where row and column labels correspond to individual identities and row values (i) and column values (j) are arranged in identical order. In this manner, where $i = j$, row i reflects person i 's ranking of all others while column j contains all rankings of person i by others. The sum of others' rankings, a_j , is obtained by summing the vector j for each person. The sum of dichotomized ranks of the same vector yields r_i , the number of times person i was ranked by others. The application of the formula then produces each person's advice source score. The same procedure was used for the derivation of working relation scores.

3. Alternative measures yield related concepts. For instance, prestige, which captures the extent to which an actor in a network is the recipient of ties from others, might also reflect an actor's prominence when network data are directional. Although Bonacich centrality was selected due to its ability to capture the extent to which network members were connected to well-connected others, analyses were also performed using a prestige measure (based on each individual's indegree, or the extent to which they were the recipient of ties from others). This analysis revealed nearly identical results, indicating that multiple measures suggest similar conclusions.

4. Bonacich's (1987) centrality measure relies on a parameter, β , that allows one to vary the degree (and direction) of dependence of each actor's centrality score on the score of other actors. The magnitude of β controls the degree to which distant ties are taken into account. When $\beta = 0$, Bonacich power centrality is identical to degree centrality, simply counting the number of adjacent links to and from an actor. As β is increased, more and more distant ties are taken into account. In essence, as β is increased the centrality moves from a local to a global measure of centrality or power. According to Bonacich (1987), "If β is zero, then only the quality of one's direct ties to others matters, and the greater β , the greater the effect of the whole pattern within which one is embedded" (p. 1171).

Borgatti, Everett, and Freeman (1992) recommend setting β so that its absolute value is less than the absolute value of the reciprocal of the largest eigenvalue from the adjacency matrix. Accordingly, the β selected was less than .0233, the reciprocal of the maximum possible eigenvalue (all eigenvalues are less than the largest row or column sum of 43). Given this recommended upper bound, a β smaller than, but approaching, this limit was chosen in order to maximize the emphasis placed on the entire pattern of relationships (Bonacich, 1987). Therefore, β was set at .02 for the calculation of Bonacich power centrality. In order to calculate the Bonacich power centrality, the valued communication relations were dichotomized (coded as either present or absent) and symmetricized (the tie between network actors was made nondirectional, i.e., without designating an origin and a destination), yielding a 44×44 adjacency matrix containing dichotomous data representing patterns of communication among executives.

5. Assessment of the data for adherence to the relevant statistical assumptions revealed some violations. In order to partially address these violations, transformations were per-

formed on three main variables from this study: advice source scores underwent a logarithmic transformation and working relations and organizational size were both transformed by taking the inverse of these measures. These transformations resulted in skewness and kurtosis measures much closer to 0 and bivariate plots that exhibited much more appropriate patterns for the analyses invoked. Data reported herein reflect these transformations, except where noted.

In addition, due to the interdependent nature of network data (any observation is dependent on other actors in the network), independence of observations in the data was not achieved. However, due to a lack of tests that account for this interdependence, correlational analysis techniques were employed, although such tests assume independence among observations.

6. Values reported are those prior to the transformations. Although the Pearson correlation is reported for the variable support level, it should be noted that support level is ordinal, not continuous.

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