Examining Social Structure in an Electronic Network of Practice

Molly McLure Wasko
Florida State University, USA

Robin Teigland
Stockholm School of Economics, Sweden

INTRODUCTION

Recent advances in IS have led to the development of electronic networks that enable thousands of geographically dispersed individuals, who are typically strangers from diverse organizational, national, and demographic backgrounds, to interact (Sproull & Faraj, 1995). In these networks, individuals engage in knowledge sharing and problem solving through message postings offering professional advice, storytelling of personal experiences, and debate on relevant issues (Wasko & Faraj, 2000). Individuals benefit from these networks since they gain access to new information and expertise related to their practice that are often not available locally. Based on previous research (Wasko & Teigland, 2004), we define *an electronic network of practice (ENOP) as a self-organizing, open activity system focused on a shared practice that exists through computer-mediated communication*.

Despite the growing interest in online social structures such as electronic networks of practice, we know surprisingly little about how or why these structures support knowledge exchange (Desanctis & Monge, 1999; Lin, 2001). Thus, the goal of this exploratory research is to investigate electronic networks of practice by drawing upon theories of public goods and collective action. Building upon work by Fulk and colleagues (Fulk, Flanagin, Kalman, Monge, & Ryan, 1996), we investigate ENOPs as a form of collective action by examining two fundamental research questions: (1) what is the pattern of interaction underlying knowledge exchange in an ENOP and (2) why do some individuals participate more than others in an ENOP. The article concludes with a discussion and areas for future research.

THEORY DEVELOPMENT

We begin with a discussion of public goods and collective action. Public goods are generally associated with two characteristics: nonrivalry and nonexcludability, and typical examples of public goods include both tangible and intangible goods, such as public parks, lighthouses, and public television. Nonrival means that a good is not depleted in its consumption (Shmanske, 1991) while nonexcludability (Head, 1962) means that that all individuals in a collective may use and benefit from the good regardless of whether they contributed to its production or maintenance in the first place. Public goods are generally considered to evidence both nonrival and nonexcludable characteristics; however, a connection between nonrivalry and nonexcludability does not necessarily exist. A nonrival good can be excludable while a nonexcludable good can be either rival or nonrival (Shmanske, 1991).

Considerable research has concluded that public goods are subject to underproduction by a collective (Shmanske, 1991). The nonrival nature of a public good allows the good and its benefit to be offered to everyone in the collective, and nonexcludability influences individual decision making about participation in the production, maintenance, or consumption of the public good. In particular, nonexcludability may result in the tendency to free ride, that is, to consume the public good without contributing to its production or maintenance. In fact, the rational individual decision is to free ride and consume the public good without contributing anything in return. However, if everyone decided not to contribute, then the public good would not be created and everyone in the collective would be worse off.

In the formal language of collective action theory, we suggest, then, that the participants in an electronic network of practice form the collective. These individuals create a continuous stream of knowledge by posting and responding to messages, and the archive of collective knowledge in the saved messages produced by this interaction exhibits the characteristics of public goods. First, the archive of collective knowledge is nonrival since one individual's use of this knowledge does not deplete the supply or diminish the ability of other individuals to use the knowledge as well. In terms of nonexcludability, when one participant responds to a posting, then all members

may benefit even though they did not contribute to the original exchange. Furthermore, the costs of posting a message to the network are the same, regardless of the number of individuals who benefit.

Prior research has identified two critical areas for understanding collective action and the production and maintenance of public goods: (1) the social ties or relationships between individuals within the collective (Oliver, Marwell, & Teixeira, 1985) and (2) individual factors such as motivations and resources (Marwell & Oliver, 1988). However, it is less well established as to exactly how and why social ties and individual factors within collectives are important (Marwell & Oliver, 1988). Thus, building upon this research, we examine several factors through the structural study of the social ties of one electronic network of practice. Specifically, we examine (1) the underlying interaction pattern and the presence of critical mass and (2) the attributes of the collective's individuals.

STUDY DESIGN

This study examines a single ENOP of a U.S. professional legal association. The technology used is an electronic bulletin board similar to that of Usenet newsgroups where questions and responses are connected in a thread and messages are archived and made openly available. The association's members have access to the ENOP as part of their membership, yet participation is voluntary. Individuals in this study were chosen based on their posting a message to the ENOP during April–May 2001. Data were collected through an analysis of the 2,460 messages posted by 526 unique individuals and a survey (152 valid responses, response rate 29%).

RESEARCH QUESTIONS AND RESULTS

In ENOPs, contribution to the public good is reflected in the posting of questions and replies taking the form of a conversation. This interaction creates social ties between participants. Thus, we define a social tie in ENOPs as the tie created between two individuals when one person responds to another's posting. In our study, we examined all ENOP messages to determine the identity of the person posting and coded the messages as seeds (the first messages in a thread), singletons (seeds without a response), questions, responses, or other. We then built a social network matrix consisting of all 526 participants to determine who was responding to whom, thus creating a directed, social tie. Using this data, we then proceeded to examine our two research questions.

RQ1: What is the Pattern of Interaction Underlying Knowledge Exchange in an ENOP?

The majority of formal collective action analyses have assumed that contribution is uniformly distributed across members. However, recently a competing argument has suggested that a subset of the group may make the majority of the contributions to the production and maintenance of the public good. Borrowing from nuclear physics, this subset is labeled critical mass, referring to the idea that a certain threshold of participation or action has to form before a social movement may develop (Oliver & Marwell, 1988). Thus, our first question is to investigate the underlying pattern of interaction. In particular, we are interested in whether ENOPs are characterized by a critical mass constituting a core. To investigate this, we built upon some ideas underlying more traditional, face-to-face networks or communities of practice (COPs). Wenger (1998) suggests that there are different COP participation levels: (1) full participation (insider), (2) peripherality (legitimate peripheral participant or LPP), and (3) full nonparticipation (outsider). In full participation, individuals are inclusive community members. They have gained legitimacy through engaging with other community actors in common actions and have acquired the formal and informal ability to behave as a community member (Lave & Wenger, 1991). Peripherality connotes legitimate partial participation in the community. Full nonparticipation is total exclusion from the community and occurs because an individual either does not desire to participate or is not allowed to participate by the community. Based on this classification, we are thus interested in examining the pattern of interaction underlying knowledge exchange and in particular whether an ENOP has a critical mass of participants sustaining the good.

RQ1 Results

Our first step was to look at the pattern of social ties, and we found that individuals do not participate equally. If people had participated equally, we would have expected all participants to have posted the average of 4.7 messages. However, the median participation is two message postings, and 64.8% of network members posted less than four messages, indicating that people are not equally sustaining the public good. The frequency rates of participation are provided in Table 1.

Further analysis indicated that there were 1,306 exchanges between 455 individuals with only 130 reciprocated by the same individuals. Thus, only 10% of the contributions sustaining this ENOP are directly reciprocal. These findings indicate that people do not participate equally in public good