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Adaptation of Collective Action in a Web of Mixed-Mode and Networked Environment

Meetup Groups as an Example of an Ecological Response

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Abstract

With the growth of communication technologies in society, collective action has taken new

forms that may not be well conceptualized by existing theories. Hence two meaningful

theoretical and practical questions are: how is collective action performed by these new forms of

human associations and with what effects? To address these questions, this study compared and

drew on theories of collective action and organizational ecology to investigate a particular type

of voluntary associations, *mixed-mode groups*. Mixed-mode groups are created and organized

online to meet physically in geographically defined ways. An online survey was conducted with

171 randomly sampled groups on Meetup.com. Meetup.com is a website that facilitates the

creation and coordination of mixed-mode groups. An analysis of the survey data showed that

using internal and external strategies helped groups generate positive group impacts: internal

strategies had direct effects on group impacts while external strategies had more circuitous and

additive effects on group impacts through network resources. Accordingly, mixed-mode groups

navigated across boundaries, became embedded in the networked environment, and generated

group impacts. These findings show that, unlike the expectations of collective action theories,

ecological theories can be robustly extended to address the mechanisms underlying collective

action of contemporary voluntary groups.

Keywords: collective action, boundary spanning, the Internet, voluntary associations, ecology

Adaptation of Collective Action in a Web of Mixed-Mode and Networked Environment

Meetup Groups as an Example of an Ecological Response

The expanding use of personal and digital communication technology is affecting all domains of human activity, including voluntary associations. Questions about how these technologies are used by voluntary associations and what their effects are on such organizations are critical because in contemporary societies voluntary associations are vital not only to attaining social ends but in many cases giving structure and meaning to people's lives. By engaging in collective action, voluntary associations not only provide benefits to their members but also generate impacts to the wider public (Babchuk & Edwards, 1965; Hooghe, 2003; Putnam, 1995, 2000; Stolle, 2000; Tocqueville, 1968; Wollebæk & Selle, 2002). Examples of traditional voluntary associations range from informal neighborhood associations, leisure groups, and hobby clubs to large sports leagues, religious congregations, activist political groups, and professional and alumni associations. As the digital era dawned, many analysts and scholars initially anticipated that new developments in communication, most particularly the Internet, would destroy or severely erode traditional forms of voluntary associations (Turkle, 1996). What was underestimated was the possibility of the Internet actually extending the reach of voluntary associations and creating many opportunities for new ones to come into being (Katz & Rice, 2002; Wellman et al., 2001). Yet what is in little doubt is that new communication technologies alter the operations of voluntary associations as well as affect their internal communication patterns and their ability to connect with current and potential new members.

Certainly, the public's view is that voluntary associations are significant factors in both the public sphere and in their own lives. A 2011 Pew Internet and American Life Project report underscores the Internet's contribution to contemporary voluntary groups on different levels.

The report shows that 59% of respondents think the Internet has played a role in their groups'

ability to impact society at large, and 49% believe that their groups can influence local

communities because of the Internet (Rainie, Purcell, & Smith, 2011). Voluntary associations

have the potential to generate outcomes that affect the group, the community, and the society,

and new communication and information technologies (ICTs) would seem to play an important

role in the process.

It is worth pausing to briefly specify what we mean by new communication technology.

While definitions of this term are many, there are a few elements that seem paramount in the

field of human communication. These are that they mean people using integrated circuit

(computer chip) based-devices to send, receive, or interact with data concerning societal or

personal matters. Such devices can include desktop and mobile computers, tablets, and cell

phones. We also use it here to specify that these are digital multiway channels of communication

among people and between people and information resources and which are personalized,

scalable, rapid, and convenient (Katz, Barris, & Jain, 2013).

In terms of new communication technologies themselves, research has found that their

use is linked to various forms of collective activities, making groups that use them more efficient

and effective (e.g., Obar, Zube, & Lampe, 2012; Penney & Dadas, 2014). At the same time,

there are questions concerning the way in which communication technology affects and are used

by members of voluntary associations and that raise the questions about the role and

sustainability of voluntary associations. That is, if people are able to use communication

technology to address their needs, it could be argued that there is a reduced role for voluntary

organizations. These are critical questions in light of communication technology's role in

delivering services or at the level of individual fulfillment. But these questions go further than

the individual, or even the fate of organization; indeed, their significance extends even to the

level of the sustainability of democracy (Lipset, Trow, & Coleman, 1956). Hence understanding

how communication technology affects the processes of voluntary associations in terms of their

recruitment of new members, their operations, and their impacts becomes an intellectually and

substantively worthwhile area of inquiry.

It is also a worthwhile area of inquiry of the intersection of communication and

organization theorizing. Analytically, theories of collective action appear to be a natural choice

to understand the interplay between technology use and organizational behaviors. Unlike

theorists asserting the importance of face-to-face engagement in collective action (Putnam, 2000),

earlier views contend that people are more empowered to participate in online collective action

because of the features of relative anonymous interaction and fluid membership (Lea & Spears,

1991; Postmes, & Brunsting, 2002). The outcomes of such collective activities made possible

online usually take the form of communal (information sharing) and connective (direct

connections) public goods (Fulk et al., 1996).

More recently, researchers have proposed that, instead of holding an either-or

(online/offline) lens, we should be concerned with how technology becomes a context for

varying forms of collective action (Bimber, Flanagin, & Stohl, 2012; Flanagin, Stohl, & Bimber,

2006). Although these new conceptualizations provide a broader lens for looking at fluid forms

of contemporary collective action, they also give rise to the question of where the "collective"

lies, that is, who are involved and affected by the outcomes of collective activity. Given the

widespread importance of voluntary associations in society, this is arguably a critical theoretical

void that needs to be addressed. Ecology theories, on the other hand, characterized by multilevel

analysis of the interaction of collective behaviors and environmental influences (Aldrich, 1999;

Monge, Heise, & Margolin, 2008), can provide insights into the adaptive process of individuals and the collective and the resulting effect of such adaptive efforts. They can thus be extended to analyze processes and outcomes of voluntary associations in a more meaningful way.

To address these pragmatic and theoretical questions, this article first reviews the relevant literature, then presents empirical evidence that sheds light on the above questions and finally draws conclusions from the inquiry. More specifically, this study uses a new form of voluntary associations, *mixed-mode groups*, to investigate empirically practical and theoretical concerns about contemporary collective action. Simply defined, mixed-mode groups are an emerging type of voluntary associations that are created and organized online to interact physically in geographically defined ways (Lai, 2014a, 2014b).

Theories of Collective Action and Ecological Approaches

General theories of collective action seek to explain the motivation of groups to cooperate and to perform collective action (Olson 1965). In essence, collective action is driven by mutual interests and benefits from coordination action (Marwell & Oliver, 1993) and can be seen as a communicative process "insofar as it entails efforts by people to cross boundaries by expressing or acting on an individual (i.e., private) interest in a way that is observable to others (i.e., public)" (Flanagin et al., 2006, p. 32). In particular, public goods theory is concerned with the explanation of collective human action to create public goods. Public goods are the outcomes of collective actions taken by two or more people that benefit the general public, some of whom do not contribute to the creation of the public good (Samuelson, 1954). Public goods

are non-rival, meaning that one's use of the public good does not reduce the amount that others can use. Public goods can be tangible (e.g., parks) and intangible (e.g., electronic databases).

Research on collective action generally falls into two categories: generative mechanisms of collective action (mobilization) and the adoption of innovations (Monge & Contractor, 2003). The former is centered on the individual and network mechanisms conducive to collective action and the creation of the public good. For example, with individuals and organizations embedded in dense and central networks, public goods are likely to be produced (Laumann, Knoke, & Kim, 1985; Monge et al., 1998; Wasko, Teigland, & Faraj, 2009). The latter is concerned with the individual variables predicting the adoption and use of innovations within an organizing context. For example, individuals are influenced by their perceptions of gains in deciding their contributions to the information commons such as intranets (Fulk et al., 2004; Wasko& Faraj, 2005); they are also influenced by others in terms of adopting a new communication system in organizations (Rice et al., 1990; Yuan et al., 2005). A widely known extension of the public goods theory to technological contexts is Fulk et al. (1996) conception of connective and communal goods. Connective goods refer to the functionality of communication and information systems (e.g., intranets and online discussion boards) that allow direct connections between members within the collective whereas communal goods are the collective information stored and shared among members.

Mixed-Mode Groups

Mixed-mode groups are created and organized online to interact physically in geographically defined ways (Lai, 2014a, 2014 b). Mixed-mode groups represent contemporary forms of voluntary associations, but with relatively low thresholds for initiating and participating in associational activities and the flexibility of organizing and interacting in a multimodal way

(Bimber et al., 2012). As such, they fulfill ongoing pluralistic needs and interests in human

society. Examples of websites that enable mixed-mode groups include Facebook, Craigslist,

Meeetup.com, and Twitter. An argument could be made that usage of Facebook and Twitter is

diverse compared to Meetup.com, whose primary focus is the creation and organization of

groups (based on shared interests and locations) that meet in a physical space. A group created

and organized through Meetup.com that engages in hiking activities in the San Francisco area is

an example. To more precisely examine how mixed-mode groups traverse online and physical

spaces in engaging in collective action, this study focuses on groups organized on Meetup.com.

Following these theories of collective action and public goods, collective action of

mixed-mode groups is exhibited through shared information and connections built online (Fulk

et al., 1996) as well as through social interactions taking place during face-to-face group

meetings (Putnam, 2000). Hence, outcomes of this collective action create the public good of a

relatively open online space made available to any current and potential members for operation

and organizing of the group. What is less known is that outcomes also take the form of impure

public goods as the facilitation of personal relationships and shared collaboration is made

available only to members who attend the face-to-face meetings. Impure public goods, or called

club goods, are similar to public goods because the consumption of club goods is nonrival to the

extent that all participating members can have access to the benefits; but unlike public goods,

club goods have the characteristic of exclusion based on active membership (Sandler &

Tschirhart, 1980). For example, the activities that a sports team engages in are only available to

the attending members; however, within the team, each member is offered equal enjoyment.

Two conceptual challenges stem from this application. First, depending on the space

where mixed-mode groups' collective action takes place, the collective goods may take either

public or impure public forms. Hence current theorizing about online connective and communal

public goods (Fulk et al., 1996) and club goods (Sandler & Tschirhart, 1980) appear inadequate

or ambivalent in seeking to comprehensively account for the collective action of mixed-mode

groups. Second, extant theories and research of collective action are heavily reliant on the

production of public goods, which leaves the issues of how the public goods facilitate group

outcomes relatively unexplored (Monge et al., 1998). For instance, as part of in-person meetings,

mixed-mode groups may visit local restaurants, which helps keep the business open or even

helps community overall. It is possible that the public goods of those groups may not only help

mixed-mode groups achieve member satisfaction but also spill over to the geographic

community. To address these challenges, we argue that ecological theories may serve as a more

useful framework for understanding contemporary forms of collective action.

<p style="text-align:center">Ecological Approaches and Collective Action</p>

In the organizational context, the ecological perspectives focus on the relationships

between organizations and environments and examine the process of how communities and the

populations of organizations that constitute them struggle to acquire resources in order to survive,

by means of interacting with other members as well as with their environments (Campbell, 1965;

Hannan & Freeman, 1977; McPherson, 1983). Central to the survival of organizations are the

seemingly mutually exclusive mechanisms: strategic choice and environmental forces. Simply

defined, voluntarism (choice) and determinism are the two categories that describe the

preponderance of the organization and the environment in deciding organization decision making,

change, and adaptation (Hannan & Freeman, 1977). A broadly accepted view is that these two

categories should be seen as interacting with each other, which in turn results in organizational

behaviors (Baum & Shipilov, 2006).

The advantage of the ecological perspectives lies in their ability to explain phenomena using the same theoretical process at different levels (Monge et al., 2008). In contrast with the research of collective action and public goods that treats organizations as relatively closed systems, ecological theories see individuals and organizations subject to influences from the environment (McPherson, 1983). In the collective action realm, ecological theories can thus be used to understand how individuals within organizations as well as organizations adapt themselves by coping with internal and external dynamics in order to accomplish collective action. These adaptations can take the form of strategic actions such as involving external social actors to secure necessary resources for group operation and task completion (Ancona, 1990; Ancona & Caldwell, 1988, 1992). Moreover, examining outcomes of voluntary associations reflects the ecological notion of *co-evolution*, which concerns the interactions between the organization and its environment, and the subsequent consequences of these interactions for the environment (Baum & Singh, 1994).

Instead of isolating online or offline environments, an ecological view can provide a systematic analysis of how mixed-mode groups incorporate both environments in producing outcomes of collective action, and how these interactions with the environments in turn influence the groups well as the environments. To answer these inquiries, and to inform the development of hypotheses (and in light of the lack of prior research linking strategic action and environmental influences in the context of technology-enabled collective action), we draw on existing research that addresses group boundary spanning. An emphasis on group boundary spanning provides a conceptual approach that fits the context of this study and constitutes an ecological lens for examining groups' interaction with the environment and the subsequent outcomes of such interaction.

Enactment of Strategies within and across Boundaries

Research on group boundary spanning (Ancona, 1990; Ancona & Caldwell, 1988) has great bearing on the ecological perspective because it examines how groups engage in communication activity involving external social actors in order to secure necessary resources for group operation and task completion. From the group boundary-spanning viewpoint, individual mixed-mode groups cannot avoid interacting with their environment, which consists of the physical community (e.g., local businesses and organizations) and other similar and dissimilar mixed-mode groups. Rooted in the resource dependence theory (Pfeffer & Salancik, 1978), boundary spanning research suggests that groups that can better manage their degree of dependence on their environments and related boundary spanning activities can perform better than those which focus only on internal dynamics (Ancona & Caldwell, 1988).

A set of strategies has been identified as representing the patterns of external activities groups perform, including ambassadorial efforts (persuading others to support groups and lobbying for resources), task coordination (coordinating and negotiating with outsiders for technical or design issues and obtaining feedback), scouting missions (general information gathering and mapping and scanning the environment), and guard responsibilities (avoiding releasing information) (Ancona & Caldwell, 1992).

Nonetheless, the aforementioned benefits of boundary spanning activity do not minimize the equally important role of internal activity in influencing group outcomes. Despite contingencies, such as temporal development of a group or environmental influences, maintaining a balance between internal and external activity is critical to group outcomes (Ancona & Caldwell, 1988; Choi, 2002). Studies have identified the positive influence of

effective internal and external strategies on group outcomes (Ancona & Caldwell, 1988, 1992;

Druskat & Wheeler, 2003; Faraj & Yan, 2009; Guinan, Cooprider, & Faraj, 1998). But it must

be noted that boundaries of voluntary associations are often blurred and porous (Aldrich, 1999)

and associations typically lack sufficient resource bases (e.g., personnel, leadership) and

structural complexity to engage in externally reciprocated exchange relations and to obtain

external information and support, which in turn can influence overall effectiveness (Knoke &

Prensky, 1984). Therefore, it is both a theoretical and practical test to apply the existing research

on group boundary spanning to examine the accomplishment of collective action by mixed-mode

groups, a type of voluntary association. In light of the discussion mentioned above, the

following set of hypotheses examines the relationship between the strategies that mixed-mode

groups use and their resulting outcomes.

> H1a: The more strategies a mixed-mode group uses involving internal group processes,
>
> the more likely a group will perceive the accomplishment of positive group outcomes.
>
> H1b: The more strategies a mixed-mode group uses involving external actors, the more
>
> likely a group will perceive the accomplishment of positive group outcomes.

Networks and Resources

According to the perspective of group boundary spanning, resource acquisition is the

central mechanism that drives boundary spanning activity and external networking. In

conceptualizing external group interactions, two approaches have generally been adopted: a

qualitative or descriptive approach and a network analytical approach (Joshi, Pandey, & Han,

2009). The former provides insights into the processes of how groups initiate strategies to

enhance external visibility, secure information, and coordinate with others outside the group (e.g.,

Ancona, 1990) while the latter largely draws on social capital theory to investigate how groups

invest in external relationships that create values and result in resources (e.g., Oh, Chung, & Labianca, 2004). Social capital refers to the resources embedded within and available through social relations which are accessed and/or mobilized by actors in purposive actions (Coleman, 1988; Lin, 1999; Nahapiet & Ghoshal, 1998). Another similar concept, which is often examined in the interorganizational context, is social embeddedness. Research on social embeddedness is primarily concerned with how micro-social factors, such as an employee's social networks, influence the performance of a firm (Granovetter, 1985).

Incorporating the notions of social capital and social embeddedness in the ecological framework can help shed light on how organizations and groups secure resources and maintain existence by tapping into their social networks. For example, Westphal, Boivie, and Chng's (2006) study exemplifies how social embeddedness, in the form of friendship ties maintained among corporate leaders, provides advantages for organizations to manage resource dependence. Comparably, empirical studies on work groups show that groups which more frequently secure resources with different people outside those groups tend to attain better outcomes, such as getting higher performance ratings, producing more innovations, and having more efficient project completion (e.g., Hansen, 1999; Tsai, 2001). Oh et al.'s (2004) findings indicate that groups can attain maximum effectiveness by investing in intragroup closure relationships and expansive intergroup relational structures, through which resources can be accessed. Nonetheless, extant research is mostly developed and tested on work groups; less is known about whether these arguments of network resources can apply to voluntary associations and mixed-mode groups. Hence, a second set of hypotheses is proposed to investigate the possibility of engaging in external communication to obtain resources for mixed-mode groups.

H2a: The more a mixed-mode group is embedded in its external network contacts, the

more likely a group will receive resources necessary for group operation.

H2b: The more a mixed-mode group receives resources necessary for group operation,

the more likely a group will perceive the accomplishment of positive group outcomes.

While there has been extensive discussion on the advantages of resource networks in

facilitating positive organizational outcomes, the ecological perspective emphasizes the strategic

choices enacted on by organizations as they explore the networking environment and decide

whom to connect with (Aldrich & Pfeffer, 1976; Monge et al., 2008). At first glance, it might

seem reasonable that only when enacting external strategies will a mixed-mode group feel the

need to engage in external communication. Research has shown that organizations achieving

high performance often have a wide range of external strategies on hand, for example, initiating

multiple, simultaneous ties with potential outside partners (Ozcan & Eisenhardt, 2009). Yet it is

also plausible that even if a group focuses on internal strategies, they may acquire resources

through external communication. For instance, a group might evaluate other groups' situations

when implementing a group policy or deciding upon an appropriate activity format. Hence,

another two hypotheses are proposed to examine the relationships between both scopes of

strategies, network embeddedness, and the resources received.

H3a: Implementing more internal and external strategies helps a mixed-mode group to

become embedded in its external network contacts.

H3b: Implementing more internal and external strategies helps a mixed-mode group to

receive resources necessary for group operation.

The review thus far has revealed a common observation that a group is capable of

enacting external and internal strategies, building on the networking benefits it has accumulated,

which in turn helps achieve group outcomes. A well-researched line of work has identified the advantages of both internal and external network links in facilitating group outcomes (e.g., Oh et al., 2004; Reagans, Zuckerman, & McEvily, 2004). Yet, there is a limited understanding of whether, and how, network communication and resource acquisition might enhance the effects of internal and external strategies on group outcomes. Ancona's (1990) study indeed points out the accentuated effects of boundary spanning on group performance occurring in groups that need outside resources, support, or information. Compared to purely online groups, the sustainability of mixed-mode groups is closely linked to the factors outside the group such as the existence of other similar groups or availability of partnering organizations in the local area (Lai, 2014a). It is thus a possible conjecture that mixed-mode groups' receipt of resources from external contacts enhances group efforts invested in external strategies, more than in internal strategies, when it comes to producing outcomes. It is therefore hypothesized that mixed-mode groups' use of certain types of strategies will exhibit different effects on group outcomes through network communication and resource acquisition.

> H4: Compared with internal strategies, implementing external strategies is more likely to
> facilitate a mixed-mode group's accomplishment of positive group outcomes, when a
> group is embedded in its external network contacts and acquires resources.

Methods

The data were collected from Meetup.com, a website specifically designed to facilitate the creation of online groups based on shared interests and physical locations and to coordinate offline group meetings. Moreover, Meeup.com fits the needs of this study because of its large user base (over 140,000 local groups, 15.9 million users). A stratified random sampling strategy was used to generate 2,000 Meetup groups. Online survey respondents were recruited from this

sample. Considering the importance of age in group survival, as observed in a previous analysis

(Lai, 2014a),[1] the entire population of Meetup groups (mainly in North America) was sorted into

three subpopulations based on age (less than one year, between one and two years, and more than

two years). The 2,000 groups were then randomly pulled from these subpopulations in

proportion to the age distribution: 48.4% (968 groups) aged less than one year, 24.73% (495

groups) aged between one and two years, and 26.87% (537 groups) aged more than two years.[2]

In situations where the same organizers managed multiple groups, only one group was randomly

selected for invitation. Moreover, some groups listed in the sampling frame disbanded by the

time the invitation was extended. Consequently, 1,237 of the 2,000 sampled groups were

considered as valid subjects for invitation.

Those 1,237 selected organizers were asked individually through the contact function on

Meetup.com to participate in the online survey, and 171 responded (response rate = 13.82%).[3]

Although this response rate was disappointing, it was not uncommon to experience comparable

low rates in online surveys (Dillman, 2000). Data collection lasted approximately two months,

from December 4, 2010 to February 1, 2011. The age distribution of the participating groups

was slightly different from the Meetup population. The groups aged less than one year were

29.76% of the sample (under-represented), those aged between one and two years were 30.36%

of the sample, and those over two years were 39.88% of the sample (over-represented).

Moreover, among the 171 groups, about one-third (31.8%, n = 54) of the groups experienced a

leadership change as the originator of the group yielded the running of the group to someone else.

<div align="center">Instruments and Measures</div>

To test the hypotheses, this study evaluates different sets of variables, including group

strategies, group impacts, network embeddedness, and resource acquisition (see Figure 1).

Because of the study' exploratory nature, these variables were largely informed by the literature

of group boundary spanning and network theory (e.g., Ancona & Caldwell, 1992; Oh et al.,

2004). Yet to increase the relevance of the measures, the previously conducted interviews with

Meetup group organizers were used to modify the scales to make them relevant and feasible for

the Meetup groups under study (Lai, 2014a, 2014b). To ensure content validity, the survey was

also pilot tested with five Meetup organizers to validate original scales and clarify question

wording.

Types and Scope of Strategies Used

To examine the patterns of internal and external activities that a group engages in, we

used the scope of strategies. The scope of strategies was examined through two categories:

internal and external strategies. Each respondent was asked to indicate whether and how often

they used a given strategy to run the group, using a 5-point scale (1 = *never*, 2 = *once*, 3 = *a few*

times, 4 = *many times*, and 5 = *regularly*). Internal strategies were measured using ten items and

external strategies using eight items, according to the examples provided by the organizers

during the previously conducted interviews. These ten types of internal strategies included:

group policy, requirement of member dues, member involvement, diversity of activities, creation

of subgroups, private events, focused topics, use of technology for communication, diversity of

locations, and regular events. Eight types of external strategies included: copy other Meetup

groups, copy other non-Meetup groups, cross-post events by other Meetup groups, cross-post

events by other non-Meetup groups, joint events with other Meetup groups, joint events with

other non-Meetup groups, activity as part of local events, and interaction with local venues.

Each of the 18 items was further dichotomized into "0," where the given strategy is never used,

and "1," where the strategy is used at least once. Index values ranged from 0 to 10 for internal

strategies and from 0 to 8 for external strategies. Two separate indexes were then created by

aggregating the values of the ten items for internal strategies ($M = 5.967$, $SD = 1.986$) and eight

items for external strategies ($M = 3.831$, $SD = 2.365$).

Network Embeddedness

Directionality was considered when measuring a group's embeddedness with its external

network contacts through communication. To measure incoming flow of networking,

respondents were asked to indicate how often other Meetup groups and other non-Meetup groups

or organizations have contacted them over the course of their groups' development, using a 6-

point scale (1 = *never*, 2 = *once or twice a year*, 3 = *once or twice a month*, 4 = *once or twice a*

week, 5 = *several times a week*, 6 = *nearly every day*). Another set of items examined a group's

outgoing networking with five different contacts, including other Meetup groups, local venues to

hold group events, other organizations, personal contacts, and members of other Meetup groups.

These items were also assessed on a 6-point scale with response options ranging from 1 = *never*

to 6 = *nearly every day*. The aggregated latent variable of network embeddedness ($\alpha = .806$, $M =$

1.907, $SD = 0.653$) consisted of these six items that measured the frequency of a group's overall

communication with its external network contacts.[4]

Resource Acquisition

Inspired by boundary-spanning literature that examines a network's internal density,

external range, and impacts on group performance (e.g., Reagans et al., 2004), resource

acquisition was investigated in two dimensions: density and diversity of resources received.

Respondents were asked to indicate how often they had received help of any sort for running the

group from six types of network contacts using a 6-point scale (1 = *never*, 2 = *once or twice a*

year, 3 = *once or twice a month*, 4 = *once or twice a week*, 5 = *several times a week*, 6 = *nearly*

every day). The aggregated latent variable of density of resources received ($\alpha = .796$, $M = 1.722$,

$SD = 0.624$) consisted of six items that measured the frequency of a group's receipt of resources

from its network contacts.[5] Each of the six items was further dichotomized into "0," where the

given contact was never sought after for support, and "1," where the contact provided support at

least once.[6] The index of diversity of resource received was then created by aggregating the

values of the six items and the index value ranges from 0 to 6 ($M = 2.919$, $SD = 1.857$). To

avoid the potential problem of multicollinearity, a two-stage approach was performed to create a

second-order construct called *resource acquisition* (Agarwal & Karahanna, 2000; Chin & Gopal,

1995; Osei-Bryson, Dong, & Ngwenyama, 2008). The latent variable scores of density of

resources received were initially estimated, and these scores, along with diversity of resources,

were then entered as indicators for the second-order construct of resource acquisition ($M = 2.021$,

$SD = .899$). Resource acquisition was the variable used in the assessment of the complete model.

Group Impacts

Accomplishment of positive group outcomes was measured through the concept of group

impacts, which captures internal and external outcomes (Smith, 2000) and thus reflects the co-

evolution between groups and the environment (Baum & Singh, 1994). Informed by Meetup

organizers' responses during the previously conducted interviews (Lai, 2014a, 2014b), a group's

impact was measured using six items that assessed aspects of interpersonal relationships,

community development, and local interaction. These dimensions coincided with the internal

and external impacts of voluntary associations as suggested by Smith (2000). Six items were

assessed on a 5-point scale, with response options ranging from 1 = *strongly disagree* to 5 =

strongly agree. Some examples of the possible responses include "my group has contributed to

building and/or maintaining relationships among members" and "my group has maintained local

area interest in the group topic" ($\alpha = .874$, $M = 4.132$, $SD = 0.756$).

Control Variables

Three additional variables were included as controls: *group age*, *group size,* and *meeting*

frequency. It has been argued that a voluntary association's impacts are usually observable after

one or two years of its establishment (Smith, 2000). In the boundary-spanning literature,

temporal development is suggested to relate to boundary-spanning activity, which in turn affects

group outcomes (e.g., Sawyer, Guinan, & Cooprider, 2010). Hence, group age was included as a

control variable in the model. Note that at the sampling stage, group age was considered a

salient factor pertaining to group outcomes, and thus stratified sampling was implemented to

ensure representativeness of groups of different ages. It is logical that group size and frequency

of face-to-face interaction are also key factors to generate impacts of voluntary associations: a

group with enough members who frequently show up for activities would be likely to see

significant impacts (Smith, 1999). Interestingly, research thus far has found mixed yet

significant effects of face-to-face meetings on the continued collective action of online groups

(e.g., Sessions, 2010; Shen & Cage, 2013). Respondents were asked to provide their groups'

month and year of establishment on Meetup.com. Based on this information, the group ages for

all 171 groups were calculated to the cutoff date of February 1, 2011. Group size was based on

the respondents' self-reported numbers of members at the time of the survey. Respondents were

also asked to identify how often (number of times) their groups met in the last month to assess a

group's meeting frequency.

<center>Analysis Procedures</center>

Given the exploratory nature of this study, partial least squares (PLS) path modeling was used (see reviews of PLS modeling by Henseler, Ringle, & Sinkovics, 2009 and Sosik, Kahai, & Piovoso, 2009). Data were analyzed using Smart PLS (Ringle, Wende, & Will, 2005), an easy-to-use PLS path modeling software (Temme, Kreis, & Hildebrandt, 2010). According to Chin (1998), PLS models can be evaluated using a two-step process: (1) the assessment of the outer/measurement model (i.e., reliability and validity of reflective constructs) and (2) the assessment of the inner/structural model (i.e., variance explanation of dependent variables, effect sizes, and significance of the path coefficients). In the following section, the measurement model is assessed using these criteria, after which the results of assessing the structural model and the significant paths are reported.

Results

A measurement model is typically assessed based on its reliability and validity (Henseler et al., 2009). Except for network embeddedness and group impacts, the other six variables were measured with a single indicator or an aggregated index and thus were not included in this part of the assessment. For the assessment of reliability, outer loadings of all indicators for network embeddedness and group impacts were greater than .60, and the composite reliability and Cronbach's alpha for these two latent variables were well above .70, indicating the measurements were reliable (Bagozzi & Youjae, 1988; Fornell & Larcker, 1981; Gotz, Liehr-Gobbers, & Krafft, 2009; Sosik et al., 2009) (see Table 2). There was also evidence of sufficient convergent and discriminant validity.

First, the average variance extracted (AVE) for network embeddedness and group impacts exceeded the recommended criterion of .50, suggesting sufficient convergent validity because these two latent constructs can explain at least 50% of their indicators' variances on

average (Chin, 1998; Fornell & Larcker, 1981; Gotz et al., 2009). Second, the AVE of network

embeddedness and group impacts were greater than their squared correlations with any other

constructs, meaning each latent variable shared more variance with its own assigned indicators

than with another latent variable representing a different block of indicators (Chin, 1998; Fornell

& Larcker, 1981; Gefen, Straub, & Boudreau, 2000; Gotz et al., 2009) (see Tables 1 & 2).

Another criterion of discriminant validity is to check whether the loading of each indicator is

greater than all of its cross-loadings (Chin, 1998; Gefen et al., 2000). A cross-loadings table (see

Table 3) revealed that each item loading was higher on its assigned construct than on the other

constructs, supporting adequate discriminant validity. All of the t-values of outer loadings were

greater than 2.58 ($p < .01$).

In terms of the overall model fit of the structural component, three criteria were used

(Chin, 1998; Henseler et al., 2009). First, Smart PLS generated the results of the R-square for

the three endogenous variables: group impacts ($R^2 = .234$), resource acquisition ($R^2 = .470$), and

network embeddedness ($R^2 = .428$). In other words, 23% of the variance of group impacts, 47%

of the variance of resource acquisition, and 43% of the variance of network embeddedness,

respectively, were explained by the model. These values approximate or exceed the criterion of

$R^2 = .26$ (Cohen, 1988) for large effect sizes, which supports the argument that the conceptual

model offers an adequate explanation of the analytical results.

Second, an F-test was conducted to assess whether the model is a significant overall fit to

the data. The results showed that the four predictors together (internal strategies, external

strategies, network embeddedness, and resource acquisition) had a substantive effect on the

endogenous variable of group impacts ($F[4,163] = 6.756, p < .001$). Last, a global criterion of

goodness-of-fit for PLS path modeling, the GoF index, was used. The GoF index is the

geometric mean of the average communality index (outer measurement model) and the average

R^2 value of the endogenous latent variables (Tenenhaus et al., 2005). It ranges from 0 to 1,

where higher values represent better path-model estimations (Henseler et al., 2009). The GoF

value of the model was 0.614, which exceeds the cut-off value of 0.36 for large effect sizes of R^2

(Wetzels, Odekerken-Schröder, & van Oppen, 2009).[7] In sum, the results indicate a good

prediction performance of the model overall.[8]

Hypothesis Testing

Hypotheses were tested by examining the significance of the path coefficients through

asymptotic t-statistics, which were obtained by bootstrapping resampling (500 samples) (Chin,

1998).[9] Figure 2 presents the estimates obtained from the PLS analysis. Results showed that the

paths from the two control variables (group age and meeting frequency) significantly predicted

group impacts. Both internal and external strategies significantly predicted network

communication, which in turn affected resource acquisition. As such, H2a and H3a were

supported. Network embeddedness was useful for groups to acquire resources when

implementing either internal or external strategies. Yet the external and internal strategies

differed, as the former had both significant direct and total effects on resource acquisition, while

the latter only had significant effects on resource acquisition after including network

embeddedness ($\beta = .156$, $t = 2.257$, $p < .05$). Thus H3b was partially supported. Both internal

and external strategies had significant total effects on group impacts, but only internal strategies

had direct effects on group impacts. External strategies, on the other hand, had effects on group

impacts after including network communication and resource acquisition ($\beta = .173$, $t = 2.292$, p

$< .05$). Based on these results, it appears that H1a and H4 were supported while H1b was

partially supported.[10] Nonetheless, the results failed to find a positive effect of resource

acquisition on group impacts, thus H2b was not supported.

Discussion

In terms of accounting for multimodal collective goods and inevitable group interactions

with multimodal environments, existing theories of collective action and public goods have

limited applicability when it comes to mixed-mode groups. To address this limitation, this study

employed ecological theories to investigate the process and outcomes of contemporary collective

action. Groups from the website Meetup.com were studied as an example of mixed-mode groups.

While being embedded in the environment consisting of individuals and groups within and

outside Meetup.com, online and offline, these Meetup groups enacted strategies coping with

internal and external dynamics. Specially, by interacting with the environment in the form of

external networking helped these groups acquire resources necessary for group operation, and

generate impacts that influenced members and the local community.

Applying the ecological perspectives helps provide theoretical reasons to explain the

importance and usefulness of Internet use in facilitating group outcomes. In other words, the

Internet, along with face-to-face communication, provides a means for mixed-mode groups to

initiate and maintain communication with external social actors as part of the group strategy for

securing resources. It thus makes theoretical sense to conclude that the Internet has become

incorporated in the adapted organizational practices of mixed-mode groups and that group

impacts are likely accomplished through these efforts.

Relationships between Mixed-Mode Groups and the Environment

This study extends the group boundary spanning literature to voluntary associations, in

particular to the mixed-mode group context. Meetup groups, being embedded in their hosting

environment of Meetup.com as well as other larger resource environments, tend to have amorphous and porous boundaries that facilitate interaction within and across groups. Groups were observed to engage in external communication with individuals and organizations outside Meetup.com, which helped them to acquire resources necessary for group operation. Unlike task groups, work organizations, or formal non-profit organizations, which are the dominant targets of study under boundary spanning and organizational ecological research, mixed-mode groups resemble a type of association that may not be easily defined as small group or organization. In response to Knoke and Prensky's (1984) questioning of the applicability of contemporary organization theories to voluntary associations, this study provides empirical evidence demonstrating the usefulness of employing the ecological lens of group boundary spanning in explaining and understanding voluntary associations in general and mixed-mode groups in particular.

As we propose in this paper, by considering the broader ecology of voluntary groups in general and mixed-mode groups in particular, it helps us understand the multiple ways of accomplishing contemporary collective action and interaction with environments taking different forms is found integral to this process. These are evidenced by the significant direct effect on resource acquisition from external strategies and the significant total effect on resource acquisition from internal strategies through network embeddedness. Even when a mixed-mode group implements strategies related to internal group processes, it benefits from tapping into its external networks in obtaining resources for group operation. As well, the differential effects of internal and external strategies on group impacts indicate that in the case of environment-prone mixed-mode groups, with or without external networking resources solicited, implementing internal strategies alone is helpful for generating positive group outcomes, which is consistent

with research on traditional work groups (e.g., Guinan et al., 1998; Mathieu, Maynard, Rapp, & Gilson, 2008). Yet these networking resources will be particularly useful for mixed-mode groups, whose environments expand online and offline domains, to accomplish similar outcomes with an adequate set of external strategies configured. Together, these results establish that boundary spanning represents not only a type of strategic action to obtain resources and produce positive outcomes but also an inherent and defining mechanism of engaging in collective action by contemporary voluntary groups.

The topic of how mixed-mode groups practice boundary spanning and interact with the multimodal environments merits further research as it bears on the ongoing tension of environmental opportunities and constraints in human collective behaviors (Baum & Shipilov, 2006), which can further enrich the application of ecological theories in understanding contemporary collective action. Environments may merely embody untapped opportunities or even constraints for mixed-mode groups, if no adequate and appropriate strategic actions are configured. In this study, resource acquisition was measured by resources received from members, other Meetup groups, and organizations outside Meetup.com. This has two implications. First, within the population of Meetup.com -- consisting of tens of thousands of groups -- members are likely to belong to multiple groups. Echoing previous research (Ancona & Caldwell, 1988), this condition of multiple affiliations is conducive to boundary spanning, which may also explain its beneficial effects on the Meetup groups under study. Second, due to technical difficulties, survey respondents were only asked about the general resources they received from contacts, without further details retrieved concerning the specific content and type of resources involved. Moreover, the measurements of network embeddedness and resource acquisition did not differentiate among face-to-face and electronic means. This inadequacy of

measurement may help explain the result of a non-significant relationship between resource acquisitions and group impacts. Another possible conjecture is that, instead of an aggregate set of resources, certain resources weigh more heavily than others in leading to group impacts.

Future research should include granular inspections of network communication and resource acquisition to better understand how mixed-mode groups interact with their environments. Network links provisioned with different resources have been found to influence each other and together determine the evolution of organizational communities (Lee & Monge, 2011). Specifically, studies can pay more attention to the degree of multimodal communication and the resulting group impacts. It is possible that the importance of resource acquisition may vary depending on the level of multimodality. Through more diverse modes of organizing (e.g., Meetup, Facebook, offline), a group is more likely to tap into different generators of resources from its environment, and achieve desired outcomes accordingly.

Incorporating both internal and external dimensions of strategic variations and group outcomes, this study contributes to the existing research on intraorganizational and organizational ecology and evolution. Applying the concept of internal evolution (Miner, 1994) and co-evolution (Baum & Singh, 1994), organizers can be said to play an important role in deciding which strategies to act on, choose, and retain as part of a group's routine practices. Building on these strategic choices, organizers further adjust groups' relationships with other Meetup and non-Meetup groups and organizations, which in turn results in the co-evolution of groups and the external environments by producing impacts. Yet, the fluid and blurred group boundaries may also render the leadership function less rigid (Flanagin et al., 2006). Future research should examine the conceptualization of leadership in the collective action of mixed-mode groups. It is hypothesized that leadership may become more emergent and shared as

members can take on the leadership role whenever they show the ability to facilitate the group's

online internal coordination as well as interaction with other online groups. Organizers were

asked about the strategies they used, but without differentiating online and offline domains, a

regrettable limitation of the data-acquisition methodology. For future research, a worthwhile

topic of inquiry would be the degree to which groups' strategic actions taking place online and

offline are similar or different and how that variation affects the emergence of leadership and

group impacts.

Limitations and Conclusion

There are several limitations of this study. First, the small-to-moderate sample size and

uncertainties over true respondent randomness led to the selection of non-parametric PLS for

statistical analysis and recognition that the findings may be interpreted with caution. Second, the

measurements of the variables used were drawn mostly from the existing literature and

previously conducted interview data. Though this argues for their construct validity, it was not

possible to gain independent validation of them in this context. Future efforts should focus on

applying the scales to a different population of mixed-mode groups and integrating established

scales. Third, due to resource and time constraints, this study could only collect data at the group

level, so group organizers were the ones providing responses to the survey questions. Yet, in

defense of this approach, it was observed that, on behalf of the group, the group organizers were

capable of answering the questions related to group development and the strategies used, and

they also had the best knowledge of group interaction with external actors. Fourth, a cross-

sectional survey limits causality claims, as is the case with all research derived with this method.

Despite these limitations, this study makes theoretical contributions by comparing

collective action and ecological theories to answer two important questions in the contemporary

society: how is collective action performed by new forms of human associations and with what effects. This present study suggests in the context of a digitally networked society that there are advantages to using ecological theories relative to collective action theories to understand the emerging technologically enabled behaviors at the interstice of organizational processes and human communication. A reason why ecological theories should be applied is because theories of collective action mostly focus on the generation of public goods, especially in either online or face-to-face forms, but not on how public goods facilitate group outcomes.

Given the importance of voluntary associations in society on various levels, these theories cannot explain how public goods actually "do good" in society. In ecological theories, a common understanding is that both choice and determinism are important in influencing organizational behaviors. The findings reported here seem to confirm the utility of the ecological perspectives by showing the interaction of strategic choices and environmental constraints involved in the collective action of Meetup groups, which in turn influenced the group as well as the local community. Hence, in this increasingly important context, theories of organizational ecology are a better framework for understanding collective action because they can account for behaviors at both individual and organizational levels, and for mutual influence between the group and the environment.

Notes

1. More details about the interviews and the findings from the interviews were reported in Lai (2014b).

2. Meetup.com provided the information about the age distribution in Meetup groups and helped generate the sample.

3. Nonresponse bias analysis was conducted by comparing the earliest and latest third of respondents for each of the variables. No significant differences were found between these two groups of respondents on any of the variables.

4. In the network embeddedness, six items (NE1-6) were included. The item of communication with personal contacts was not included because of its low factor loading (.569). Including this item also reduced the AVE of network embeddedness below the threshold of .50.

5. Six network contacts were included: group members, other Meetup groups, local venues, other groups/organizations, personal contacts, and members of other Meetup groups. One of the six items (DR1) had a factor loading below .60 (.502), but it was still included considering the construct validity of this measurement. Moreover, the AVE was still above the threshold of .50 when including this item.

6. A descriptive analysis was conducted. The results showed that groups answering "1=never" and those answering "2=once or twice a year" were distinct because the former accounted for a certain percentage of the sampled groups (ranging from 20% to 60%). It means that groups that did not engage in any resource acquisition effort were different than those groups that did so at least once or twice a year. Accordingly, this enhances the validity of our decision to transform the items into dichotomized ones based on the original options of 1 (never) and 2-6 (once or twice a year to nearly every day).

7. $F= [(R_2^2 - R_1^2)/(k_2 - k_1)]/[(1-R_2^2)/(N - k_2 -1)] \rightarrow [(0.234-0.107)/(7-3)]/[(1-0.234]/171-7-1]=6.756$, with $[(7-3),(171-7-1)]$ degrees of freedom. $R2^2$ is for the superset model that includes the set of main predictors, $R1^2$ is the baseline model, k_2 is the number of predictors for the superset model, k_1 is the number of predictors for the baseline model, and N is the sample size. See Chin (1998, 2010). GoF=sqrt(average(AVE)*average(R^2)) = sqrt (0.613*0.377)= 0.614 (Tenenhaus et al. 2005).

8. Despite the limitations, the proposed model was run with AMOS to ensure its validity. The results were comparable to those from the analysis with PLS (Smart PLS).

9. Following Chin's (1998) recommendation, we performed bootstrapping using 500 samples. But to verify the results and ensure the stability of the magnitude and significance of the estimated path coefficients, the model was replicated with bootstrap samples of 2,000 and 5,000. The results were consistent across these samples.

10. To further determine the significance of the indirect effects, bootstrapping simple

mediation was used with 5,000 bootstrap resamples (Hayes 2009; Preacher & Hayes 2008). Results showed that the indirect effects of both types of strategies on resource acquisition through network embeddedness were significant. Thus, the total effects of external strategies on resource acquisition were ascribed to both direct and indirect effects; in contrast, the total effects of internal strategies on resources were mainly attributed to the indirect effects. Nonetheless, the total indirect effects of both strategies on group impacts were not significant. A further examination showed that the indirect effects of these mediating variables (network embeddedness and resources) did not differ from each other significantly. Therefore, it is suggested that the total effects of internal strategies on group impacts were primarily ascribed to the direct effects; in contrast, the total effects of external strategies on group impacts were attributed more evenly to direct and indirect effects, even though none was significant.

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Table 1

Summary of Intercorrelations among the Study Variables

Variables	1	2	3	4	5	6	7	8	9	10
1. Group Age	-									
2. Group Size	.548**	-								
3. Meeting Frequency	.035	.043	-							
4. Internal Strategies	.177*	.308**	.271**	-						
5. External Strategies	.183*	.344**	.161*	.457**	-					
6. Network Embeddedness	.144†	.400**	.185*	.442**	.630**	-				
7. Density of Resources	.076	.365**	.153*	.342**	.529**	.687**	-			
8. Diversity of Resources	.097	.252**	.108	.364**	.489**	.595**	.861**	-		
9. Resources (second-order)	.090	.320**	.136†	.366**	.528**	.665**	.965***	.964***	-	
10. Group Impacts	.189**	.178*	.229**	.396**	.318**	.302**	.264**	.266**	.275**	-
# of items	1a	1a	1a	1b	1b	6	6	1c	2d	6
Mean	25.214	219.036	3.275	5.967	3.831	1.907	1.722	2.919	2.021	4.132
SD	20.532	289.67	4.138	1.986	2.365	.653	.624	1.857	.899	.756

Note. Total number of participants studied, N = 171.
[a]Group Age=one item measuring observed group age, group size=one item measuring observed membership size, meeting frequency=one item measuring observed meeting frequency. [b]Internal strategies=the sum of ten items; external strategies= the sum of eight items. [c]Diversity of resources= the sum of six items measuring occurrence of receiving resources from contacts. [d]Resource acquisition is a second-order construct consisting of density and diversity of resources received. $^{†}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$

Table 2

Reliability and Validity of Multi-Indicator Latent Variables

Construct	AVE	Composite Reliability	Cronbach's alpha	Indicator	Mean	SD	Loading	T-value
Network Embeddedness	.509	.861	.806					
				NE1	1.88	.918	0.663	11.230
				NE2	2.12	.883	0.623	11.473
				NE3	1.70	.877	0.802	23.732
				NE4	2.09	.973	0.681	10.355
				NE5	1.82	.924	0.796	23.096
				NE6	1.88	1.115	0.700	14.269
Density of Resources[a]	.500	.854	.796					
				DR1	2.48	1.035	0.502	5.673
				DR2	1.44	.714	0.797	17.161
				DR3	1.76	.996	0.605	6.415
				DR4	1.55	.834	0.796	17.101
				DR5	1.96	1.069	0.717	10.690
				DR6	1.63	.914	0.776	14.317
Resources (second-order)	.930	.964	.925					
				DeR [b]	1.722	.624	0.968	162.951
				DiR	2.919	1.857	0.961	102.807
Group Impacts	.609	.903	.874					
				GI1	4.15	1.013	0.768	15.845
				GI2	4.55	.790	0.781	14.663
				GI3	4.44	.919	0.763	14.986
				GI4	4.06	1.059	0.792	14.300
				GI5	3.92	1.031	0.826	22.064
				GI6	3.39	1.262	0.752	18.378

Note. [a]Factor loadings of the indicators of density of resources were calculated separately in the initial model when the second-order construct of resources was not present. [b]DeR=density of resources, DiR=diversity of resources.

Table 3

Factor Loadings and Cross Loadings of Measures

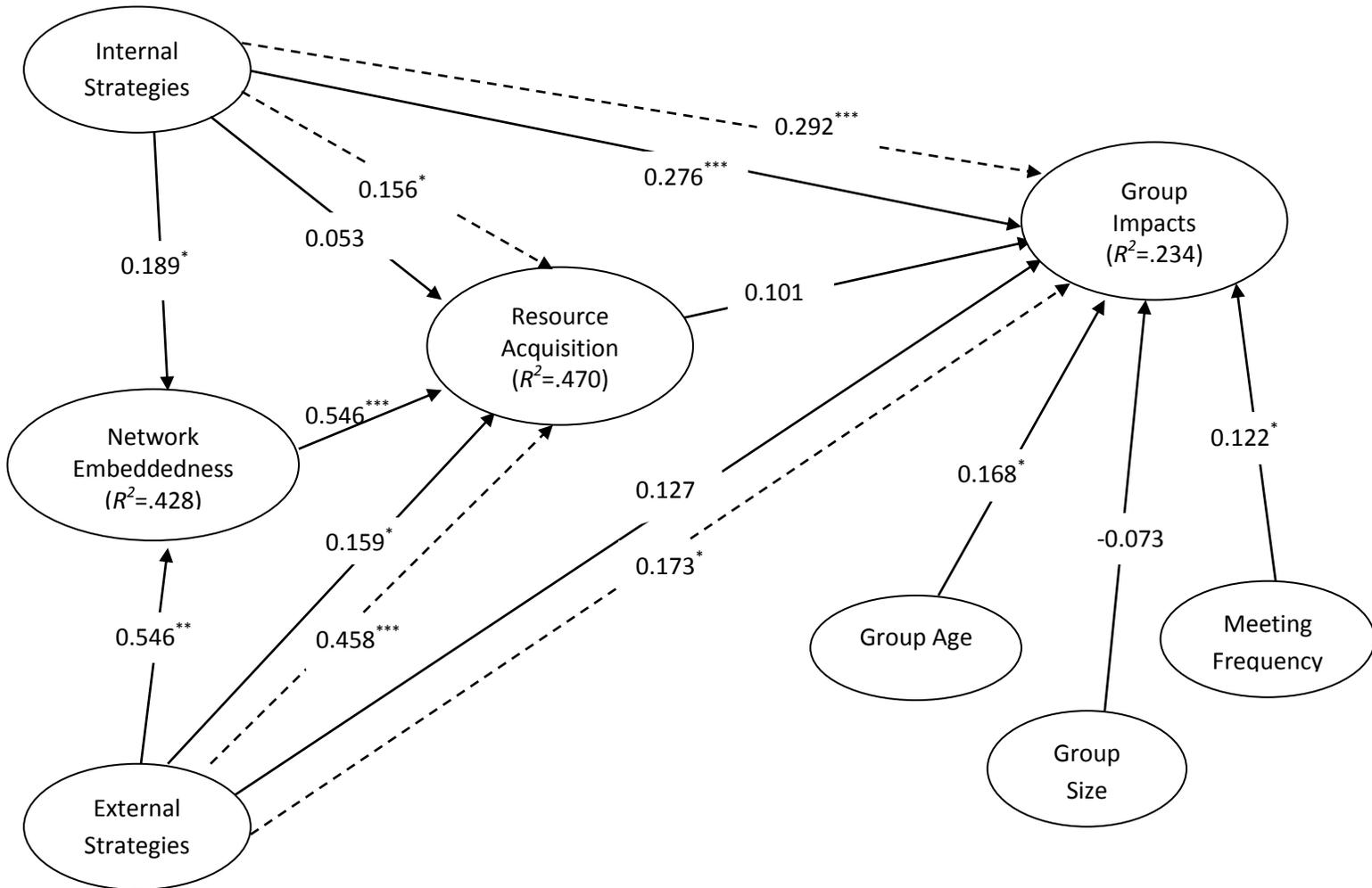|	Network Embeddedness	Group Impacts	Resources	Group Age	Group Size	Meeting Frequency	Internal Strategies	External Strategies
NE1	**0.663**	0.259	0.405	0.165	0.269	-0.020	0.290	0.406
NE2	**0.623**	0.301	0.351	0.113	0.263	0.171	0.395	0.336
NE3	**0.802**	0.145	0.532	0.120	0.303	0.157	0.252	0.546
NE4	**0.681**	0.380	0.436	0.105	0.300	0.179	0.404	0.388
NE5	**0.796**	0.263	0.542	0.088	0.292	0.183	0.340	0.572
NE6	**0.700**	0.041	0.567	0.027	0.290	0.113	0.238	0.413
GI1	0.157	**0.768**	0.248	0.183	0.181	0.152	0.317	0.195
GI2	0.156	**0.781**	0.242	0.061	0.139	0.161	0.250	0.215
GI3	0.208	**0.763**	0.221	0.000	0.045	0.176	0.260	0.213
GI4	0.266	**0.792**	0.232	0.204	0.120	0.199	0.345	0.220
GI5	0.274	**0.826**	0.138	0.151	0.165	0.185	0.301	0.282
GI6	0.337	**0.752**	0.215	0.293	0.185	0.205	0.394	0.372
DeR	0.691	0.265	**0.968**	0.076	0.365	0.153	0.342	0.529
DiR	0.598	0.270	**0.961**	0.097	0.252	0.108	0.364	0.489

Figure 1. The conceptual model.
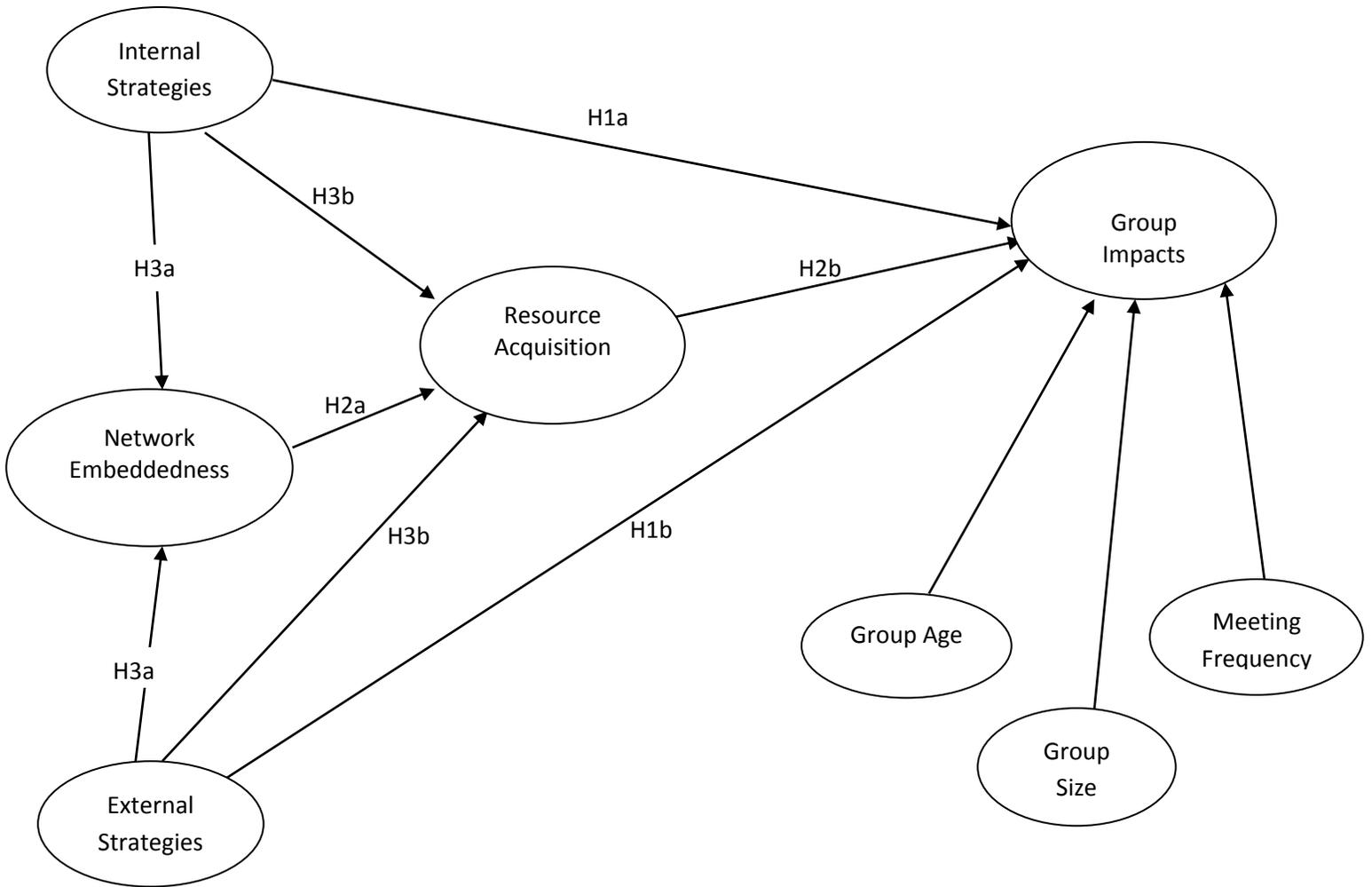
Figure 2. The resulting model via PLS analysis. The path coefficients displayed are standardized.
Dashed lines refer to the total effects.

*p < .05, **p < .01, ***p < .001