Public Administration - Dissertations

Maxwell School of Citizenship and Public Affairs

8-2012

Diversity, Networks and Performance: An Empirical Analysis of Metropolitan Planning Organizations in the United States

Yujin Choi
Syracuse University

ABSTRACT

Achieving network performance is a vital goal in response to the increase of inter-organizational networks public organizations involve. The primary aim of this research is to examine the factors that predict performance in public management networks by disentangling the idea that collaboration requires both diversity and unity. Drawing upon diversity theories, social capital theory and management literature as theoretical lenses, this dissertation serves to investigate the following questions:

1. What is the collaborative decision-making process in inter-organizational networks?

2. How does social capital mediate the relationship between network member diversity and performance?

3. How does network management strategy moderate the relationship between social capital and network performance?

My dissertation answers these questions by examining Metropolitan Planning Organizations (MPOs) in the United States, one of the regional transportation networks. MPOs are formal inter-organizational networks that go beyond informal and intra-organizational networks. The focus here is on collaborative decision-making activities by individuals (mostly top-level administrators) who represent organizations working across their boundaries. This dissertation provides an important evidence of the interactive effects between network management behaviors and structural properties of networks on performance; it also contributes to the existing knowledge of inter-organizational dynamics in transportation planning networks.

DIVERSITY, NETWORKS AND PERFORMANCE:
AN EMPIRICAL ANALYSIS OF METROPOLITAN PLANNING
ORGANIZATIONS IN THE UNITED STATES

by

Yujin Choi

B.A. Ewha Womans University, 2003
M.P.A. University of Georgia, 2007

DISSERTATION

Submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy in Public Administration in the Graduate School of Syracuse University

Syracuse University
August 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

1.1 Introduction to the Research

In the late twentieth century, networks have emerged in a wide variety of policy domains as alternative institutional arrangements. Working together through networks goes beyond the boundaries of traditional governments, and thus requires public managers to use various collaborative management activities (Agranoff, 2007; Bardach, 1998; Bingham, O'Leary & Carlson, 2008; O'Toole, 1997; Moseley & Oliver, 2008; Linden, 2002; Provan & Milward, 1995; Rosenthal, 1984; Van Bueren, Klijn & Koppenjan, 2003). This phenomenon occurs at all levels of government. As public organizations have increasingly recognized that many complex policy problems (often called "wicked problems") exist, consensus has developed that "collaboration is not just a good idea, but a necessity" (Ingraham & Getha-Taylor, 2008). Vigoda-Gadot (2003) further pointed out, "the questions today are not whether such collaboration is needed or is possible, but how can it be achieved and what transformations it will impose on the public sector " (p.100). The popularity of networks is likely to continue to increase as networks have become a key type of public management structure (Alter & Hage, 1993; Chisholm, 2001; Mattessich et al., 2001). This supports the view that we need to "treat network[s] seriously" (O'Toole, 1997).

A wave of public administration research and scholarship has recently aroused interest in collaboration and networks. A great deal of research has examined these issues from various theoretical angles, such as resource dependence theory, transaction cost theory and institutional theory (Rodríguez, Langley, Béland & Denis, 2007). Yet, much

of this literature to date has been focused primarily on "the question of whether collaboration exists, on what scale" (Bardach, 1998, p.23), and what factors motivate collaboration in inter-organizational networks in the public and nonprofit sectors (McGuire & Silvia, 2009). Although these studies are great resources for understanding what networks are, why they form and how they are structured, one important area in need of further research concerns network performance. However, stakeholders such as taxpayers and involved organizations want to know whether and when the networks are effective; but there is a paucity of empirical literature assessing whether inter-organizational collaboration leads to better performance (Chen, 2008; McGuire, 2006; Oliver & Ebers, 1998) and much of the literature and theories are of little help given that they choose not to focus on outcomes (Milward & Provan, 2000).

In response, scholars have recently paid attention to the importance of evaluating network performance (Agranoff, 2008; Heranz, 2010). These studies (e.g., Provan & Milward, 1995) have empirically analyzed performance at the network level to examine whether collaboration yields better performance (Daley, 2009; Lasker et al., 2001; Nylen, 2007). Such studies have been growing in number, but they remain few. Consequently, there is clearly a need for more empirical evidence and less rhetoric on collaborative performance.

Given this understanding from the previous literature, this dissertation takes note of one paradox inherent in collaboration, the "competing demands for both unity and diversity" (Connelly et al., 2008). In general, the essential value of collaboration lies in the synergistic effects that can rise from the diverse perspectives and resources multiple collaborating actors bring to the table (Huxham, 1996; Selden, Sowa, & Sanfort, 2006).

However, too much diversity increases the difficulty of reaching consensus. As Schruijer (2008, p.432) noted, "working with diversity is key to successful collaboration." Understanding diversity is the first step toward making collaboration work. Interestingly, this paradoxical nature of collaboration is analogous to the diversity-performance debate discussed in group diversity literature where a recurrent theme is that group member diversity can improve group performance; however, studies show mixed findings on the impact of diversity. Although some previous studies have suggested diversity has negative effect on group performance, the literature has shown the value of diversity.

Inter-organizational networks, which constitute the focus of this research, are composed of individuals (representatives) who differ in at least some dimensions from different organizations. Such networks commonly bring together actors of many different types, thereby creating diversity. By chance and by design, network members often differ from each other in various dimensions, including demographics and an array of psychological and social attributes. Therefore, this dissertation applies group diversity theory to the context of inter-organizational networks. Because diversity theory has not yet been explicitly applied to the issue of collaboration and networks in the public administration literature, rethinking inter-organizational networks through the lens of diversity theory may prove fruitful.

For taking advantage of the potential benefits of diversity, the group diversity literature has emphasized the importance of contextual factors (Jackson & Ruderman, 1995). Indeed, the value of diversity might be contingent upon contextual factors (e.g., collectivism culture). Hence, to disentangle the paradoxical nature of collaboration discussed above, this dissertation presents moderated-mediation hypotheses that capture

the effects of diversity, social capital and network management on network performance. It is imperative to look into diversity dynamics from a social capital perspective because the "nature of diversity reflects the relationships among individuals" (Chang, 2009, p.11). To examine the inner workings of networks, I also consider network management strategy.

Provan and colleagues (2007) classified inter-organizational network research into four types based on two levels of analysis—organizational- and network-level (See Table 1). Among the different types of networks, this dissertation focuses on *inter-organizational networks* with the "whole network" approach, which studies the entire network rather than the organizations participating therein (Kilduff & Tsai, 2003). Though frequently discussed, this approach has been infrequently studied (Provan, Fish, & Sydow, 2007). To fill this gap, this dissertation adopts the whole network approach, which has important implications for understanding network performance.

Table 1. A Typology of Inter-organizational Network Research

Independent variable	Dependent variable	
	Individual organizations	Collectivities of organizations
Organizational variables	Impact of organizations on other organizations through dyadic interactions	Impact of individual organizations on a network
Relational or network variables	Impact of a network on individual organizations	**Whole networks or network-level interactions**

Source: Provan, Fish, & Sydow (2007, p. 483)

1.2 Research Questions

The purpose of this research is to build and test a theoretical model and hypotheses concerning inter-organizational collaborations. Drawing upon diversity theories, social capital theory and management literature as theoretical lenses, this dissertation serves to investigate the following questions:

1. What is the collaborative decision-making process in inter-organizational networks?

2. How does social capital mediate the relationship between network member diversity and performance?

3. How does network management strategy moderate the relationship between social capital and network performance?

My dissertation answers these questions by examining Metropolitan Planning Organizations (MPOs) in the United States, one of the regional transportation networks. MPOs are formal inter-organizational networks that go beyond informal (often called "social networks") and intra-organizational networks. The focus here is on collaborative decision-making activities by individuals (mostly top-level administrators) who represent organizations working across their boundaries. In multi-organizational arrangements, they work together to solve problems that cannot be solved or easily solved by single organizations (Agranoff, 2003).

1.3 Significance of the Research

This dissertation contributes to the public administration literature in several key ways. First, this research makes a theoretical contribution to both diversity and collaborative management literature by integrating attributive and structural dimensions of the inter-organizational network. Tolbert and colleagues (1995) emphasized that increasing workforce diversity and collaborative arrangements are "two broad trends of reshaping contemporary organizations in the United States" (p.131). This research is a step to connect these two important issues in the public and nonprofit sectors.

Ospina (1996) noted that many public sector organizations have been relatively successful at diversifying their workforce, but are still struggling to reap the benefits of that diversity. Public administration literature is relatively quiet on the impact of diversity on performance (Pitts & Jarry, 2009). Although rapidly adopted inter-organizational collaboration strategies in recent years may aggravate this struggle, to date, public administration literature has not approached the collaboration issue in terms of the diversity framework. The theoretical framework this research presents contributes to the growing body of collaboration literature by integrating the largely independent literatures on diversity and network, thereby giving a new perspective for elucidating inter-organizational networks.

Second, much of the previous diversity research has chosen a "black box" approach, which does not consider additional theoretical constructs, and has focused on the main effects of group diversity and the effects of diversity are not yet fully understood (Pelled , Eisenhardt, & Xin, 1999).[1] A few but growing number of studies

---

[1] For a detailed critique of this approach, see Lawrence (1997).

have recognized that context is important in reconciling the mixed findings of past diversity research and adopted interaction variables affecting the link between diversity and performance (Horwitz & Horwitz, 2007). Yet, an integrative framework including contextual contexts has been lacking (Joshi & Roh, 2008). This research attempts to address this gap by employing a framework incorporating contextual variables (social capital and management variables) and considering how different types of diversity indirectly affect performance. In addition, the scope of previous diversity research has been limited mainly to groups within an organization (for example, cross-functional teams, project teams, or top-management teams) and within the business setting. This research attempts to expand the logic of diversity from the intra-organizational and business sectors to the inter-organizational and public sectors setting.

Although inter-organizational collaboration has drawn public management scholars' attention, empirical studies on network management and network performance have been under-researched with theoretical weakness (O'Toole & Meier, 2011). In their review of empirical studies at the network level, Provan and colleagues (2007) found the relative lack of empirical studies on whole networks. As they noted, the unit of analysis in traditional network research is the organization within a single network or a small number of network cases, and those studies mainly have been conceptual or have examined single descriptive case studies. This research uses a whole network approach by investigating MPOs as formalized inter-organizational networks; I hope the comparison of network-level characteristics across multiple networks will add useful insights into the existing body of knowledge on inter-organizational networks.

Finally, as Thomson (2008) indicated, collaboration research adopting quantitative approach is very rare. In particular, large-N network studies have rarely been conducted, despite their usefulness (Meier & O'Toole, 2005). This research does not have a large sample, but a larger sample than any other samples in the previous research using a whole network approach. Thus, the findings and results in this study hopefully will extend our understanding of inter-organizational networks.

In the literature of public policy and administration, public *service delivery* networks have been dominant objects of empirical analysis (Moseley, 2008). In practice, though, collaboration has occurred in the process of planning as well (Koontz, 2005). The empirical context in this dissertation is MPOs, which can be identified as inter-organizational transportation *planning* networks, not engaging in service delivery and implementation. Therefore, focusing on transportation planning networks will provide new insights to the growing body of collaborative public management literature.

1.4 Operational Definitions

This section defines two terms, collaboration and network, used throughout this dissertation. It is helpful to define these terms because prior studies have used many of them differently or interchangeably, depending on their discipline or context (Brass et al., 2004; Raab & Kennis, 2009). In this dissertation, I differentiate these two terms, based on the public management context.

Collaboration

The general phenomenon of collaboration is defined as "a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible" (Gray, 1989, p.5). Thomson and Perry (2006) defined collaboration as "a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions" (p.23). In addition, Bardach (1998) defined collaboration as "any joint activity by two or more agencies working together that is intended to increase public value by their working together rather than separately" (p.8). Agranoff and McGuire (2003) defined collaborative public management as "a concept that describes the process of facilitating and operating in multi-organizational arrangements to solve problems that cannot be solved, or solved easily, by single organizations" (p.4). Further extending this definition, Bingham, O'Leary and Carlson (2008) described that collaborative public management includes the involvement of public and citizens. In a similar fashion, Koliba and colleagues (2011) saw collaboration as "a purposive relationship designed to solve a

problem by creating or discovering a solution within a given set of constraints" (p.194).

In short, collaboration is considered as a *process* of individuals (or organizations) working together to find possible solutions.

Networks

While "collaboration is seen as a process, networks are often viewed as the *structure* through which collaboration occurs" (Silvia, 2010, p.20). O'Toole (1997) defined networks as "structures of interdependence involving multiple organizations or parts thereof, where one unit is not merely the formal subordinate of the others" (p.45). McGuire (2003) viewed networks as "structures involving multiple nodes–agencies and organizations–with multiple linkages. A public management network thus includes agencies involved in a public policy making and administrative structure through which public goods and services are planned, designed, produced, and delivered" (p.4). Kickert and colleagues (1997) suggested three important characteristics of networks: (1) networks exist because of interdependencies between actors (2) networks consist of a variety of actors, each with their own goals (3) networks consist of relations of a more or less lasting nature between actors (p.30).

These definitions coincided with the socio-ecological perspective of inter-organizational networks. From this view, (1) individual members representing independent organizations that are physically dispersed and only meet occasionally as required to carry out the higher-level system purpose; (2) they belong to networks to enable them to deal with meta-problems single members cannot handle alone; (3) networks also rest on horizontal rather than hierarchical organizing principle: one

organization or member does not have a superior-subordinate relationship with another (Chisholm, 2001, p.104).

O'Toole and Meier (2011) recognized the importance of inter-organizational networks because they have been prevalent in contemporary public managers' institutional settings. Focusing on inter-organizational relationships among public and non-government organizations, Agranoff (2007) defined that public management networks (PMNs) are "collaborative structures that bring together representatives from public agencies and NGOs" (p.3) and they are "led or managed by government representatives" (p.7). He identified two types of the PMNs: chartered and nonchartered. The networks (i.e., MPOs) analyzed in this dissertation belong to chartered PMNs, which are defined as "formally established as organized entities, often by intergovernmental agreement, registration as a 501c (3) nonprofit organization, by act or resolution of a state legislature, a governor's executive order, and/or through corporate registration with a state government representative, such as the secretary of state" (p.7). Although the PMNs have been seen in various policy areas, including environmental protection, education and criminal justice, this dissertation confines the scope to the PMNs in regional transportation planning, specifically, Metropolitan Planning Organizations (MPOs).

1.5 Structure of the Dissertation

Chapter 1 has provided an introduction to the research questions and significance of the research. Chapter 2 reviews relevant literature that serves as the foundation for investigating the research questions. This chapter includes the group diversity theories, social capital theory from a structural approach and the network management literature. The chapter concludes with a research framework used throughout the dissertation. Chapter 3 provides information regarding the empirical context, Metropolitan Planning Organizations (MPOs). The fourth chapter discusses my research methods, data collection and measurement approaches. Chapter 5 presents the analysis, results and findings. The final chapter presents my findings and a discussion of their implications.

CHAPTER 2. LITERATURE REVIEW

In the public administration literature, there are two important, but relatively under-researched questions: (1) do collaborative networks increase performance and (2) how does diversity affect performance? As discussed in Chapter 1, these two strands of research have equivalent arguments, but the literatures on diversity and networks remain largely independent. Thus, this dissertation uses diversity theory to explain inter-organizational network performance. The diversity literature has stressed that the value of diversity may depend upon contextual factors (Rodan & Galunic, 2004). To resolve prior studies' discrepant findings on the impact of diversity, this dissertation considers social capital theory and network management literature as contextual factors. This chapter reviews the theoretical and empirical literature relevant to formulating my theoretical model and specifying testable hypotheses. The three major bodies of literature–group diversity theories, social capital theory and network management literature–that construct the bedrock of this research's theoretical model are discussed.

2.1 Group Diversity Research

This section focuses on the connection between group diversity and performance and reviews the literature on the types of diversity.

2.1.1 The Diversity-Performance Theories

Diversity is a multi-dimensional construct lacking a clear, universally shared definition (Edmondson & Roloff, 2008; Jackson & Ruderman, 1995), but it generally refers to the extent to which members of social units are dissimilar from each other on one or more attributes (Jackson & Joshi, 2010). One of the key questions in diversity

research is how diversity affects group processes and performance (Van Knippenberg & Schippers, 2007). Previous research has underscored that group members' diverse characteristics, at least partly, affect aspects of team functioning such as team effectiveness, team in-role performance and team satisfaction (Van Emmerik & Brenninkmeijer, 2009). Maznevski (1994) also indicated "the diversity becomes salient only when it contributes to or detracts from the group's ability to achieve its goals" (p.532).

Research on the link between diversity and performance is often depicted as a "double-edged sword" or "mixed blessing," which presents both opportunities and threats at the same time (Riordan, 2000). There are few consistent findings despite the large number of empirical studies on the effects of diversity (Horwitz, 2005; Horwitz & Horwitz, 2007; Sauer, Fesling, Franke, & Ruttinger, 2006; Tsui & Gutek, 1999). Two opposing camps, representing different theories, have guided the diversity-performance debate (Jackson et al., 2003; Milliken & Martins, 1996; Williams & O'Reilly, 1998; Van Knippenberg, De Dreu, & Homan, 2004). This section first explains key theories directing this diversity-performance debate.

The pessimistic view, represented by social categorization theory, social identification theory and similarity-attraction theory, focuses on the negative effects of diverse groups on performance. The basic argument underlying these theories is that similarity in attributes, ranging from attitudes and values to demographic variables, increases attraction and thus, people prefer to work with those similar to themselves.

Social categorization theory illustrates that people classify themselves and others with different social categories such as age, gender and race (Tajfel & Turner, 1986).

When social categories are salient, group members distinguish similar in-group members and out-group members. They are more likely to interact with in-group members than with their out-group members. Such categorization processes may result in communication difficulties, relational conflicts and less cooperative processes when diversity is imposed, rendering lower performance (Van Knippenberg & Shippers, 2007; Williams & O'Reilly, 1998). The social categorization theory can be complemented by similarity-attraction theory. The similarity-attraction theory suggests interpersonal similarity (for example, attitudes and values) is a crucial determinant of interpersonal attraction. According to these theories, group members who belong to various social categories tend to have lower performance than groups in which individuals belong to the same social category (Van Knippenberg & Shippers, 2007).

The optimistic view, including information/decision making theories, predicts positive effects when members with a broader range of backgrounds, functions, values and attitudes work together (Van Knippenberg et al., 2004; Williams & O'Reilly, 1998). This perspective implies that heterogeneous groups have the potential to produce better solutions than homogeneous groups because diverse groups include relationships among people with different sets of contacts, information and resources for creative problem solving, decision making and idea generation (Simons et al., 1999). Compared to heterogeneous groups, homogeneous groups have redundant perspectives and resources, thereby limiting their performance (Bantel & Jacskon, 1989; Pelled et al., 1999; Tsui & O'Reilly, 1989; Van Knippenberg et al., 2004). The increasing inter-organizational networks might be a reflection of this rationale that diversity may encourage innovation, creativity and positive synergy, thereby improving performance.

The themes of these two traditions are evident in empirical studies. The literature on the effects of group diversity exhibited highly inconsistent findings. To make sense of the array of findings, reviewers of the literature have provided possible explanations and called for further investigation: (a) the results are partly contingent upon "what kinds of differences constitute diversity in question" (Ely & Thomas, 2001); (b) different types of group diversity may have different influences on performance in terms of magnitude (Horwitz, 2005); and (c) many prior studies on diversity have not specified the impact of contextual factors that may mediate or moderate the effects of diversity (Van Kinppenberg & Schippers, 2007). Heeding these calls and applying group diversity discussion to the inter-organizational network setting, this dissertation employs different types of diversity and examines how two types of network members' diversity influence network performance, hypothesizing that social capital mediates and network management moderates the effects of network member diversity on performance.

2.1.2 Types of diversity

Understanding what constitutes diversity is a crucial presumption to assess and manage the effects of group diversity (Jackson, 1996; Jackson & Joshi, 2010). The existing diversity literature covers a broad range of differences (Jackson et al., 2003; Williams & O'Reilly, 1998). Scholars have proposed typologies that may be used to classify different dimensions of diversity and have explained how different types of diversity affect group processes and outcomes (Jackson et al., 2003). For example, Jackson and colleagues (1995) suggested two taxonomic dimensions of group diversity. They argued that both "readily detected and underlying attributes contribute to the total

diversity present in a group." The former type of diversity is recognized by immutable features, whereas the latter may be less obvious and more difficult to verify.

The typology Harrison and colleagues (1998; 2002) employ is termed surface- and deep-level diversity. Diversity at a surface level refers to "differences among group members in overt, biological characteristics that are typically reflected in physical features" and diversity at a deep level includes "differences among group members' attitudes, beliefs, and values" (Harrison, Price, & Bell, 1998).

Jackson and Ruderman (1995) broadly categorized the construct of diversity into demographic diversity (based on gender, race, age), psychological diversity (based on values, beliefs, knowledge) and organizational diversity (based on tenure, occupation, hierarchical level). According to their argument, it is important for effective work groups to recognize that all three types of diversity contribute concurrently to the composition of work group.

Northcraft and colleagues (1995) suggested two different levels of variety. On one hand are a workforce's category memberships, which include demographic and organizational characteristics. On the other hand is functional variety in values, perspectives and cognitive and physical resources. This grouping is similar to the differentiation between readily-detectable and underlying diversity Jackson and colleagues (1995) outlined. Northcraft and colleagues (1995) also maintained that cognitive diversity has more valuable effects than demographic diversity has on the performance of collaborative groups.

McGrath and colleagues (1995) identified five clusters of attributes that are especially important for work groups. They are demographic attributes (DEM); status in

the work group's embedding organization (ORG); task-related knowledge, skills and abilities (KSA); values, beliefs and attitudes (VBA); and personality and cognitive and behavioral styles (PCB). Although the first two attributes are relatively easy to observe and are more immutable, the remaining three clusters are much more difficult to assess and much more mutable. The last three clusters of diversity correspond to underlying attributes and fit under the functional diversity umbrella Northcraft and colleagues (1995) described.

Although researchers have often used different terms for similar definitions, a review of the literature shows that one commonly accepted classification is to distinguish two types of diversity attributes: surface-level (or readily detected) and deep-level (or underlying) diversity. Surface-level diversity refers to easily observable differences among group members in overt demographic characteristics, whereas deep-level diversity refers to differences among members that can be verified by interaction, such as values, personality and attitudes (Jackson & Joshi, 2010). Deep-level diversity is more covert and is related to personal characteristics (Van Emmerik & Brenninkmeijer, 2009). The following section explains these two types of diversity and provides empirical evidence on their effects on group outcomes.

Surface-Level Diversity

Surface-level diversity refers to observable heterogeneity, such as demographic attributes and organizational characteristics (Pelled et al., 1999). It is determined by immutable, easily observable, and simply measurable characteristics. In fact, the term "diversity" usually has been used to indicate the demographic composition of a group (Joshi & Jackson, 2003; Tsui & Gutek, 1999). There is an implicit consensus that age,

gender and ethnicity represent typical demographic attributes (Jackson et al., 1993). The conventional focus of the previous studies has been on surface-level diversity of characteristics of the group members (Van Emmerik & Brenninkmeijer, 2009). Demographic diversity has commonly been studied at the work group level in organizational and psychological research to date (Harrison et al., 1998; Milliken & Martins, 1996; Tsui & O'Reilly, 1989).

In general, the evidence for the effects of demographic attributes in groups is inconclusive (Jackson et al., 2003; Williams & O'Reilly, 1996). Hambrick and Mason (1984) found that demographic homogeneity in a group was positively related with group effectiveness. Meanwhile, Bantel and Jackson (1989) found that age diversity did not influence top management banking teams' innovations.

Demographic diversity, such as age, gender and race, is considered as low job-related diversity and thus, they have less direct influences on group objectives and group work performance (Pelled et al., 1999). However, as categorization theory suggests, demographically heterogeneous groups may face relationship conflicts. Of course, other types of diversity can lead to emotional conflicts by categorization as well, but the impermeable characteristics of demographic diversity tend to deepen relationship conflicts (Kramer, 1991). This may offset work-related collaborative advantages.

Deep-Level Diversity

Many organizations and prior studies have limited their use of the *diversity* label to demographic heterogeneity, which includes gender, age and race. As noted, surface-level variables have predominated empirical research on diversity (Jackson et al., 2003) and deep-level (or underlying) diversity has received less attention among scholars. This

is partly because researchers can easily measure such variables. Previous research often used surface characteristics as proxies for diversity of deep-level diversity, but there is growing acknowledgement of the influence of deep-level diversity on group processes and outcomes (Mohammed & Angell, 2004). For example, upper-echelons theory has recognized other potentially relevant types of diversity in groups including diversity of job knowledge, behavioral styles, values and beliefs.

Recent studies have encouraged scholars to assess simultaneously both the surface- and deep-level dimensions of diversity to improve our understanding of whether and how different dimensions of diversity affect group processes and outcomes differently (Jackson et al., 1995; Van Emmerik & Brenninkmeijer, 2009). Notwithstanding, previous literature provides little guidance on what kinds of variables can be selected to reflect deep-level diversity. These variables may include various psychology characteristics (Harrison et al., 1998). In the following section, cognitive and cultural diversity are reviewed as deeper characteristics of diversity because they are especially relevant and useful to the study of inter-organizational network settings in this research.

Cognitive diversity

Group members' cognitive resources include knowledge and skills, values and attitudes, and personality and styles (Northcraft et al., 1995). Miller and colleagues (1998) defined cognitive diversity in a group setting as the degree to which [group] members differ in terms of beliefs and preferences. These cognitive differences tend to persist through time. According to Olson and colleagues, "these are not mere differences of opinions on simple and insignificant matters but are divergent views on highly important

matters that would have substantial ramifications for the organization" (2007, p.200).

Thus, the concept of cognitive diversity is often described as particularly relevant to

executive decision making (Kilduff et al., 2000) and group performance (Milliken &

Martins, 1996; Williams & O'Reilley, 1998). Consistent with this reasoning, most

research on cognitive diversity has been conducted at the top level of management teams

or board of directors (Milliken & Martins, 1996).

The proponents of cognitive diversity argue that the effects of diversity on group

performance are positive. As cognitive diversity increases, a group would generate viable

alternatives that may be essential for quality decisions (Olson et al., 2007). Drawn from a

meta-analysis method, Horwitz and Horwitz (2007) examined the link between team

diversity and team outcomes. They found a positive impact of task-related diversity (e.g.,

expertise, experience) on outcomes, whereas bio-demographic diversity (e.g., age, race)

did not have a significant relationship with team outcomes.

Olson and colleagues (2007) examined cognitive diversity of top management

teams (TMT) in the health care industry and found that diversity yielded positive effects

on decision outcomes measured with decision understanding, commitment and quality. In

this study, cognitive diversity was derived from Miller and colleagues' (1998) definition,

reflecting the differences of belief and preference about strategic goals.

Using a computer-based simulation, Sauer and colleagues (2006) examined the

multiple effects of two types of cognitive diversity: system understanding (the depth of

understanding team members) and team specialization (the degree to which knowledge

about system fault scenarios was distributed between team members). The results

partially supported a positive relationship of cognitive diversity with performance because no significant relationship was found with regard to specialization.

In contrast, other studies shed light on the negative influences of cognitive diversity on outcomes (Bunderson & Sutcliffe, 2002). For example, Miller and colleagues (1998) found that cognitive diversity appeared to yield negative effects on the strategic decision process in upper-echelon executive groups. This result may reflect that high levels of diversity were not managed effectively. Studies by Meglino and colleagues (1989) also provided empirical evidence that value congruence among group members was positively associated with outcomes.

Despite the primal influence of values on individuals' lives, value diversity, specifically deep-level diversity, has seldom been examined in the literature (Klein et al., 2011). Values refer to "generalized, enduring beliefs about the personal and social desirability of modes of conduct or 'end-states' of existences" (Kabanoff et al., 1995, p.1076). Regardless of situations, values guide and predict people in deciding how they "should or ought to behave" and how they interact with others (Meglino & Ravin, 1998; Schwartz. 1999).

Value differences among group members affect group processes and performance. If group members have clearly different values, they are assumed to have different expectations about each other's behavior. This makes it hard to reach to consensus by group members and to collaborate with each other (Jehn & Mannix, 2001; Kirkman & Shapiro, 2005). This is especially important because managers in inter-organizational networks must face the "dominance of professional values" (Porter & Warner, 1997). Unlike traditional governments, the values, ethics and beliefs of network members

dominate their behavior (Mandell, 1990). In his study on strategic management in inter-organizational networks, Mandell (1990) argued, "the smooth running of the network depends on the degree of value congruence between members in the network" (p.40); however, empirical studies on the effects of group diversity in values have yielded conflicting results (Van Knippenberg & Schippers, 2007).

Cultural diversity

Because inter-organizational collaborative networks consist of members from multiple organizations or sectors, each collaborating member in the groups is embedded in different organizational or sectoral cultures, generating cultural diversity in collaborative networks. The literature on organizational culture has developed various dimensions (or contents) of organizational (or sectoral) cultures (Rainey, 2003). For example, organizational cultures have been found to differ in terms of individualism versus collectivism, competitive versus cooperative behavior, uncertainty avoidance, risk tolerance and locus of control (Cox, 1993; Hofstede et al., 1990). Khademian (2002) further examined organizational cultures in the context of public sector. She suggested a cultural roots framework in public organizations, which included the public tasks, resource and environment.

Although cultural differences may be related to patterns of behavior and group performance, the impact of a group's cultural diversity on problem-solving effectiveness and performance has rarely been addressed in the literature (Milliken & Martins, 1996; Thomas, 1999). Many of the studies limited their focus to short-term groups that "exist only for the duration of their studies" instead of ongoing groups that are more culturally diverse (Watson et al., 1993). In addition, these studies have mainly focused on cultural

differences from nationality or ethnic background in cross-functional teams or multinational firms (e.g., Ely & Thomas, 2001; Watson et al., 1993; Gomez-Mejia et al., 1997). For example, Watson and colleagues (1993) defined culturally diverse groups as those having both ethnic and national differences among members. Consequently, group diversity, resulting from differences of organizational cultures, has been overlooked, despite its importance in an inter-organizational collaboration setting.

Like other dimensions of group heterogeneity, empirical findings that investigate the effects of cultural diversity showed mixed results. A stream of research has argued that culturally diverse groups are more likely to result in process losses, lowering group performance than homogeneous groups are (Hill, 1982). On the other hand, a considerable number of studies revealed that culturally heterogeneous groups yielded better decisions. For instance, Thomas (1999) employed three mechanisms (i.e., collectivism, cultural identity, relative cultural distance) to examine the effects of cultural diversity on groups. His study found a pattern that culturally heterogeneous groups outperform homogeneous groups in both complex and simple tasks, but this result depended on the group task and process-related feedback on group performance.

2.1.3 The magnitude of diversity types

Not all types of diversity generate equal consequences (Jackson & Joshi, 2010). Regarding the magnitude of effects, deep attributes of diversity are expected to be more influential for group performance than readily detectable attributes (Northcraft et al., 1995; Milliken & Martins, 1996; Pelled et al., 1999). Williams and O'Reilly's (1998) study contended that the benefit of group diversity is often based more on variation in underlying attributes than on visible attributes. Empirical studies also found that the

24

diversity of deep-level group member attributes has a stronger influence on team performance (Harrison et al., 1998, 2002; Hollenbeck et al., 2004) because "more accurate knowledge of others can be inferred from deep-level psychological characteristics (e.g., values and attitudes)" (Van Emmerik & Brenninkmeijer, 2009). Van Emmerick and Brenninkmeijer (2009) also mentioned that "surface-level characteristics would provide less straightforward information about individuals' core self and would leave more room for stereotypical perceptions and biases. As such, deep-level diversity could have more straightforward implications for the group cooperation and performance." Based on these findings of earlier studies, this research attempts to disentangle the effects of surface-level and deep-level diversity on network performance. It is important to note that this hypothesis does not specify directions, but focuses on magnitude because the diversity-performance relationship may depend on contextual factors:

> **H1:** Different types of diversity have different influences on performance, in that deep-level diversity has a stronger relationship with performance than surface-level diversity does.

2.2 Social Capital Research

Heterogeneity in a work group does not automatically create positive or negative work outcomes because the effect of diversity on performance is a "complex function of the interaction of member identity structures and various contextual factors" (Cox, 1995). It depends on the connectedness among group members (Joshi & Jackson, 2003). Thus, group diversity research may benefit by focusing on the network structure (Jackson et al., 2003). To discover if the collaborative group maximizes the positive effects of diversity while minimizing its negative effects, it is important to examine how collaborating actors in the network configuration interact with each other and share information and expertise to achieve better performance (Chang, 2009; Van Knippenberg et al., 2004). Social capital is embedded in network relations because those ties provide individuals or groups valuable interpersonal connections (Moore, Sobieraj, Whitt, Mayorova, & Beaulieu, 2002). Therefore, a network's capacity established by network member interaction can be characterized in terms of its social capital. Despite its importance, little is known about the role of social capital in collaboration (Agranoff & McGuire, 2001). Few empirical studies have addressed how group heterogeneity influences interaction among group members from a social capital perspective.

The value of social capital has been widely discussed in the literature, and scholars in different disciplines have offered a plethora of varying definitions and perspectives of social capital (Lesser, 2000). For example, researchers from different fields have discussed trust, relationship and shared norms as elements of social capital. In a broad sense, social capital is defined as "assets in networks" (Lin, 1999) or "assets embedded in relationships of individuals, communities, networks or societies" (Leana &

26

Van Buren, 1999). Like other types of capital, such as physical, human, or financial capital, social capital implies a "source of potential value." However, unlike capital of any kind, the source is embedded in the relationships among individuals, not existing in the actors themselves (Adler & Kwon, 2000; Rodan & Galunic, 2004). Those relationships enable individuals to exchange resources and use information more effectively, thereby yielding better outcomes.

Conceiving social capital as a relational concept, sociologists began to adopt social network analysis as a method for studying and measuring social capital. They view social capital through a network lens and take a network-based approach for measuring it. In this perspective, social capital exists in the *structure* of relations among actors (Coleman, 1988). The scholars in this structural approach (e.g., Rodan & Galunic, 2004) expect the pattern of interconnections among network members to influence the ability of that network to function effectively. They analyze the presence or absence of relationships among network actors and network configurations through various measures such as density and connectivity (Coleman, 1990).

In their comprehensive review of social capital definitions, Adler and Kwon (2000) categorize [network-based] social capital into two types, depending on whether the definitions focus on "the relations an actor maintains with other actors" or "the relations characterizing the internal structure of an organization" (for details, see Adler & Kwon, 2000). The first view, which is an individualist approach, describes social capital as individual resources. This approach examines "how much social capital an individual actor has based on features of that actor's network or the position of an actor within a network" (Prell, 2006). The second view, the groupist approach, conceptualizes social

capital as a collective good at the group (or network) level. In this perspective, researchers explore structural characteristics of the entire network. Coleman (1988, 1990), Putnam (1993, 2000) and Fukuyama (1995) are the main representatives of this approach. Oh and colleagues (2004) specified the second view, collective social capital, as "group social capital." Group social capital, as a special type of social capital, is different from social capital at the individual level in the sense that it focuses on how members' relationships have group work outcomes as a whole (Van Emmerik & Brenninkmeijer, 2009).

Scholars looking at network-based social capital on the group level have discussed two types of network resources: bonding and bridging social capital. Bonding social capital refers to "resources that people can obtain from within-group ties" (Yuan & Gay, 2006). It fosters network cohesion and trust among network members (Putnam, 2000). Coleman's (1998) closure argument also indicated that closure increases the credibility of information and trust within a network. In contrast, bridging social capital refers to "resources people can gain from their ties with people outside the network" (Putnam, 2000).

The bridging argument is related to Burt's (2001) concept of structural holes that is defined as "a relationship of nonredundancy between two contacts.… As a result of the hole between them, the two contacts provide network benefits that are in some degree additive rather than overlapping" (p.18). Structural holes exist when alters (actors an ego has ties with) have ties to the same ego (a focal actor), but are not connected to each other—for example, if actor A and B are connected to actor C, but they are not linked. Thus, the ego networks with many structural holes can access to unique sources of

information or knowledge. Without structural holes, the group is unwilling to accept ideas developing from outside the group (Oh, Labianca & Chung, 2006). Therefore, the presence of structural holes is expected to play an important role in network performance (Ahuja, 2000; Balkundi, Kilduff, Barsness & Michael, 2007). Burt (2001; 2005) discusses how bridging structural holes (weak ties) within and across benefit groups by introducing new information. As Burt (2005) emphasized, "bridging (or brokerage) is critical for creating information variation, while bonding are valuable for eliminating variation and protecting connected people from information inconsistent with what they already know" (p.25). Recent studies argue that both bonding and bridging social capital are important to achieve better performance. Oh, Labianca and Chung (2006) suggested an optimal level of bonding and bridging exists for better performance.

Observing that two perspectives on diversity-performance are parallel to the literature of social capital, Reagans and Zuckerman (2001) and Reagans and colleagues (2004) drew on social capital theory to resolve the inconsistent results of the diversity-performance debate. They argued that the contrasting views on the effects of diversity on performance could be reframed in terms of the network-based social capital variables that reflect distinct forms of social capital (Reagans & Zuckerman, 2001).

Following Reagans and Zuckerman's (2001) approach, this dissertation models group social capital as a mediating variable. Moving the focus from the group to network, both diversity characteristics and network configurations are examined to explain network performance. Regarding network-based social capital, this dissertation specifically focuses on two concepts: bonding and bridging social capital, the most relevant concepts of social capital to the diversity-performance debate and examines how

29

they affect network performance. Sociologists have measured them with different concepts such as network density and external range. Network density refers to the average strength of connection between network members and external range is defined as the amount of range in the group's external connection (Reagans et al., 2004).

Reagans and Zuckerman (2001) argued that the primary basis of conflict between two perspectives lies in the fact that diversity has been used as a proxy for network patterns in existing literature. In fact, many prior studies have assumed that individuals' social network and demographic characteristics can be used interchangeably. One rationale is that they assume network patterns are characterized by a significant amount of homophily (Lawrence, 1997). However, as Lawrence (1997) criticized, empirical evidence has revealed that not all groups show a strong tendency toward homophily, enough to justify using diversity as a proxy for network variables. The fact demographic diversity data are more accessible in comparison to social network data can be another reason to use diversity measures as proxies for network variables (Pfeffer, 1982).

Reagans and Zuckerman's (2001) basic argument is that the effect of group diversity on performance is mediated by network-based social capital variables. In their causal model underlying the diversity-performance debate, increasing diversity is expected to restrict a group's internal density (diverse group members are presumed to have relatively weak relationships with one another) and enhances external range (diverse group members are presumed to be able to reach different constituencies outside the group), and each network variable has a positive effect on performance. The pessimistic perspective on diversity, focusing on local interactions, involves the concept of network density or social network closure (Coleman, 1988, 1990). This view expects less diverse

groups to yield better performance because such groups are thought to have a high level

of network density. Increases in network density lead to enhanced coordination capacity,

resulting in a higher level of performance. On the other hand, the optimistic view focuses

on global structural holes and benefits by brokering those holes (Burt, 1982). In this view,

diverse groups improve performance because diverse group members generate the

relationships across groups. In other words, they allocate more of their network time to

intergroup interactions" (Reagans & Zuckerman, 2001).

Figure 1. Local Versus Global Structural Holes

Global Structural Hole

Global structural holes refer to interactions between people outside of the team.

C's Contact Network

B's Contact Network

A's Contact Network

Local Structural Hole
Local structural holes refer to interactions inside a team.
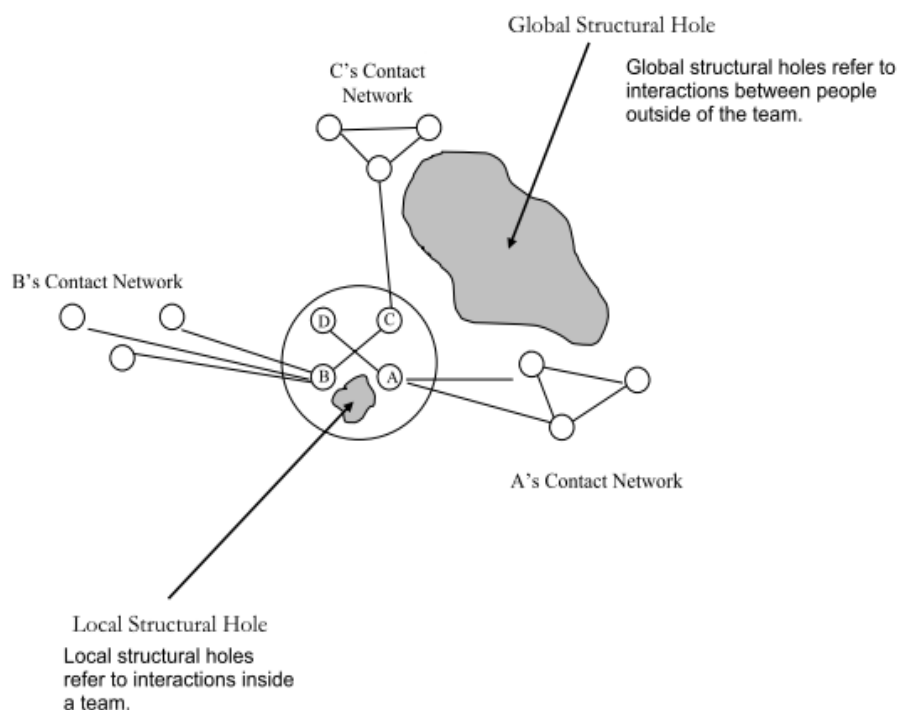
Source: Reagans and Zuckerman (2001); Reagans, Zuckerman and McEvily (2004)

Since these two network variables are distinct mechanisms operating

independently and apply at different locations–local and global structural holes (see

Figure 1)–in the social structure (Burt, 2000, 2001; Gabbay & Zuckerman, 1998), the

opposing views of diversity-performance do not contradict (Reagans & Zuckerman, 2001). In other words, the causal path of diversity, network-based social capital variables, and performance they presented is compatible with both the optimistic and the pessimistic perspectives on diversity. Reagans and Zuckerman (2001) criticized the fact that existing empirical evidence on the diversity-performance link considered one but not the other network variable and did not analyze them directly, thereby showing the mixed results with respect to the performance impact of diversity. Figure 2 depicts their causal model linking demographic diversity to network variables and team performance.

Figure 2. Causal Structure Linking Demographic Diversity to Network Variables and Team Performance

Internal Density

$\beta_2 < 0$ $\lambda_2 > 0$

$\delta = (\beta_1 \lambda_1) - (\beta_2 \lambda_2)$

Demographic Diversity   Performance

$\beta_1 > 0$ $\lambda_1 > 0$

External Range
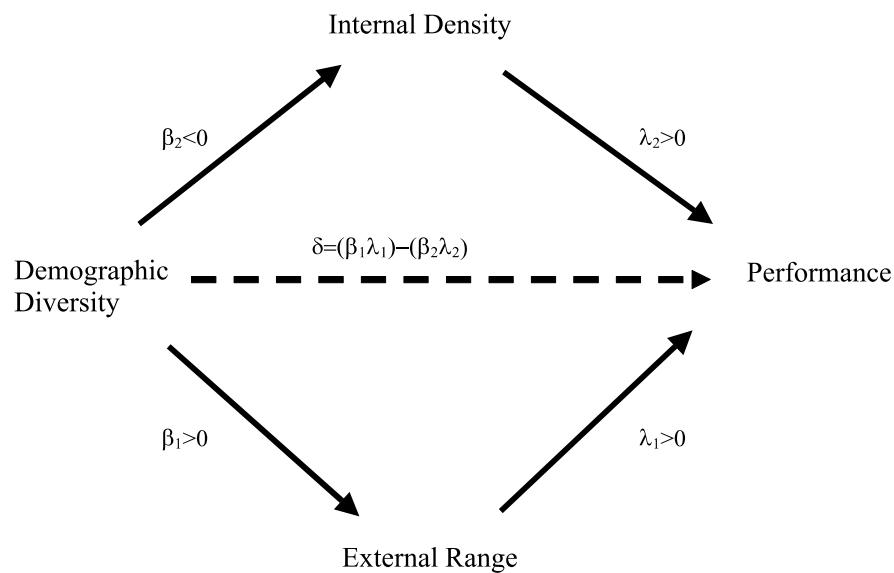
*****Source***: Reagans, Zuckerman, & McEvily (2004, p.103)

This causal structure linking diversity to network-based social capital variables and linking those network variables to performance is applied to the theoretical model of

this dissertation. As expanding the above deliberation to the inter-organizational network, the following hypotheses are proposed:

H2: The greater the network member diversity in inter-organizational networks, the lower the network density in the networks.

2-1: The greater the surface-level diversity (gender) in networks, the lower network density in the networks.

2-2: The greater the deep-level diversity (organizational culture) in networks, the lower network density in the networks.

H3: The greater the network member diversity in inter-organizational networks, the higher the external range in the networks.

3-1: The greater the surface-level diversity in networks, the higher the external range in the networks.

3-2: The greater the deep-level diversity in networks the higher the external range in the networks.

H4: The greater the density in a network, the higher its network performance.

H5: The greater the external range in a network, the higher its network performance.

H6: Network-based social capital variables mediate the effects of the diversity on performance.

6-1: Network-based social capital variables mediate the effects of the surface-level diversity on performance.

6-2: Network-based social capital variables mediate the effects of the deep-level diversity on performance.

2.3 Network Management Research

As Agranoff (2004) notes, "how to manage in a network is an important 21st century issue" (p.62). Research on network management and structure in public management literature has been developed mainly from the studies in intergovernmental relations, which is based on complex vertical and horizontal relationships among all levels of government entities (Berry et al., 2004). Intergovernmental scholars argued that network management is imperative to run intergovernmental programs effectively (Agranoff, 1986; Gage & Mandell, 1990). From the late 1980s, public management scholars started to look at network participants' managerial behaviors and skills.

The shift from hierarchy to network is accompanied with a structural change as well as a cognitive change (Ansell, 2000). The collaborative governance perspective has been predominant in network and collaboration studies (Berry et al., 2004). Network structure and the position of each organization in the network have been addressed in the public administration literature. Although this structural approach is important in understanding networks, there are some criticisms that the network approach is not capable of explaining the network performance, but only of providing a description (Klijn & Koppenjan, 2000).

Considering the fact networks become common public management structures, it is important to understand the ways in which public managers form the outputs and outcomes of public policy in networks (O'Toole & Meier, 2000). O'Toole (2000) argued that management is more important in a network setting than in a hierarchy because, in a network, "managers must spend more time on maintenance within the structure because the network is less inertial and [they also] spend more time on interaction with the

environment because the structure is more open to environmental influences" (O'Toole &

Meier, 2000, p. 275). Klijn and Koppenjan (2000) also stated that network management

should be part of standard operating procedures.

However, network management as a cognitive approach has been largely

overlooked in the literature (Ansell, 2000; Walker et al., 2007). Public management

scholars appear to have assumptions that networks should be managed in a different

manner than hierarchies (Agranoff & McGuire, 2003; Rethemeyer & Hatmaker, 2008).

For instance, O'Toole and Meier (2000) indicated two key differences between

hierarchies and networks in terms of management. In more networked contexts,

challenges commonly arise from the uncertainties and complexities of the structurally

ambiguous setting itself, and multiple directions or actors rather than a single locus

attempt to manage networks.

Network management aims at improving cooperation among network actors with

different goals and preferences, thereby "mediating and coordinating inter-organizational

policy making" (O'Toole, 1988). Kickert and Koppenjan (1997) described network

management as "promoting the mutual adjustment of the behavior of actors with diverse

objectives and ambitions with regard to tackling problems within a given framework of

inter-organizational relationships" (p.44). They recognized two types of network

management: game management and network structuring. Game management is about

"managing interactions within networks" and involves five types of strategies: network

activation, arranging interaction, brokerage, facilitating interaction and conflict

management (mediation and arbitration). Network structuring is about "tinkering with the

network" and involves mobilizing new coalitions, managing by chaos and influencing

formal policy, interrelationships, values, norms and perceptions.

Agranoff and McGuire (2001) proposed similar types of network management.

Their framework, further extended by McGuire (2002), identified four types of network

actors' behaviors: activation, framing, mobilization and synthesizing (pp.602-3).

Activation is defined as a set of behaviors employed for "identifying and incorporating

the persons and resources needed to achieve program goals." Framing behaviors are used

to "arrange and integrate a network structure by facilitating agreement on participant's

roles, operating rules and network values." These two types of behaviors involve the

formation of the network structure. Other network management behaviors are mobilizing

behaviors to "develop commitment and support for network processes from network

participants and external stakeholders," and synthesizing behaviors used to "create an

environment and enhance the conditions for favorable, productive interaction among

network participants." These network behaviors are related to maintaining and

developing existing networks. Table 2 shows a summary of the network management

behaviors Agranoff and McGuire (2001) and Klijn and Koppenjan (1997) identified.

Table 2. Functions by Game and Networks

	Activation	Framing	Synthesizing	Mobilizing
Games	Directing attention of network participants to/away from game	Framing issue using existing "constructions" of dependence	Conflict resolution, "fixing," using existing network structures	Motivating active/ enhanced participation in games especially through mass mobilization
Networks	Directing attention of participants/ nonparticipants of network	Creating/updating "constructions" of dependence	Norm building, altering existing network structures	Integrating existing participants/sociali zing new participants

*Source: Rethemeyer & Hatmaker (2008, p. 637)

Despite its importance, there is an overall paucity of research that examines the actions and behaviors of network participants (McGuire & Silvia, 2009) and the impact of network management on performance (O'Toole & Meier, 2004), especially in PMNs. In their series of studies (Meier & O'Toole, 2001; O'Toole & Meier, 1999; 2004), O'Toole and Meier suggested a formal model to link between network management and performance and called for more empirical research on network management.

Diversity management has received great attention in the private sector (Maznevski, 1994). Many group diversity scholars also argue that, for successful collaborative networks, the assets and the liabilities related to diversity should be effectively managed (Jackson, 1996). Likewise, PMNs need to be guided to make constructive use of diversity to increase network performance.

In this research, network members' managerial actions are considered as moderating variables that affect the strength of association between the mediating effect of social capital and network performance. Hence, I hypothesize the following:

H7: Network management (mobilizing and synthesizing) moderates the mediating effects of social capital variables (internal density and external range) on the diversity-performance relationship, such that these effects are stronger when the use of network management is active than when it is not.

7-1: Network management behaviors positively increase the effect of internal density on network performance.

7-2: Network management behaviors positively increase the effect of external range on network performance.

2.4 Network Performance Research

Despite the growing necessity of examining the consequences of collaboration, efforts to evaluate networks have been largely lacking (Provan & Milward, 2001). There is a paucity of empirical literature assessing whether inter-organizational collaboration produces better performance (Chen, 2008; McGuire, 2006; Oliver & Ebers, 1998).

Measuring performance is difficult even in a single public organization and it requires a "complex mosaic of indicators" (Jackson, 1988). Ostrom (1999) indicated the difficulties of measuring the output of local public agencies and suggested multiple measures of output derived from multiple modes of data collection (e.g., survey, agency records and citizen interviews) to understand productivity of public agencies. Collaborative arrangements among multiple organizations may make the performance evaluation more intricate. The involvement of multiple organizations and their various needs and expectations may make resolving conflicts and evaluating network performance much more difficult (Mayne & Rieper, 2003). Reaching a consensus in "cross-sectoral collaborations are presumably even more difficult because the fundamentally different missions can create unexpected inter-organizational conflicts for partners" (Chen, 2008, p. 349).

Clearly, measuring network performance is fraught with complexities, especially in the public sector, but it is critical for decision makers in public policy. Such measurement is important to evaluate the current status of network for learning, allocating budget, motivating network members and improving overall performance (Behn, 2003). Therefore, while acknowledging the inherent difficulties in such attempts,

scholars have sought to determine "whether a network appears to be performing at a level that justifies continued public support" (Provan & Milward, 2001).

One effort to measure network performance was the five criteria proposed by Gray (2000). She suggested 1) goal achievement, 2) increased social capital, 3) shared meaning, 4) increased interaction among network members and 5) more equitable power allocation. Her first concentrates goal alignment. However, in network settings it is important to consider network members' diverging interests, their interactions and the difficulty of measuring shifting objectives (Klijn & Koppenjan, 2000). In this sense, the traditional top-down approach to organizational performance, focusing on goal achievement, is not well attuned to network performance because the goal achievement method does not center on the interaction process but on the initial problem of one actor (Klijn & Koppenjan, 2000; Provan & Milward, 1995). Thus, the literature on network management suggests *ex post* satisfying criteria instead of the *ex ante* approach as an evaluation criteria (Teisman, 1992, 1995; Klijn & Koppenjan, 2000). Bingham and colleagues (2003) further argued that, to determine the success or failure of collaboration, we should understand if the most important indicators show the same direction over time and across different contexts.

In networks, actors are likely to have different perceptions of a problem or objective in the early stages of a process. For example, network members from the private sector may not relate well to the public objectives sought (Gray, 2000). However, through interaction processes they can accommodate their opinion on the issue and arrive at collective decision making. Therefore, for network performance evaluation, the literature has emphasized individual actors' subjective judgments on the policy-making

process because the views of network actors reflect process elements such as learning behaviors. Chen's (2008) network effectiveness definition, "a perception among program staff that their collaborative efforts are achieving…" is consistent with this argument. In their book, Alter and Hage (1993) also suggested to measure network members' perceptions for assessing the effectiveness of inter-organizational networks.

Milward and Provan (2000) suggested that network evaluation can be viewed from the perspectives of at least four different parties: 1) individual clients and advocacy groups, 2) agency managers and network administrators, 3) local officials and community leaders and 4) funders and regulators. Provan and Milward (2001) developed a rationale for evaluating publicly funded, community-based inter-organizational networks. They argued that network evaluation should be considered at all three levels of participation: community, network and organization/participation levels.

Research Framework

In summary, this dissertation examines existing but largely separate theories concerning the affect of network member diversity on network performance. Specifically, this research explores the impact of network member diversity on performance through social capital variables (i.e., internal density and external range) and network management. Based on a review of current theories, I proposed several hypotheses corresponding to the following model. Figure 3 posits a research framework for the present research.

Figure 3. Proposed Model
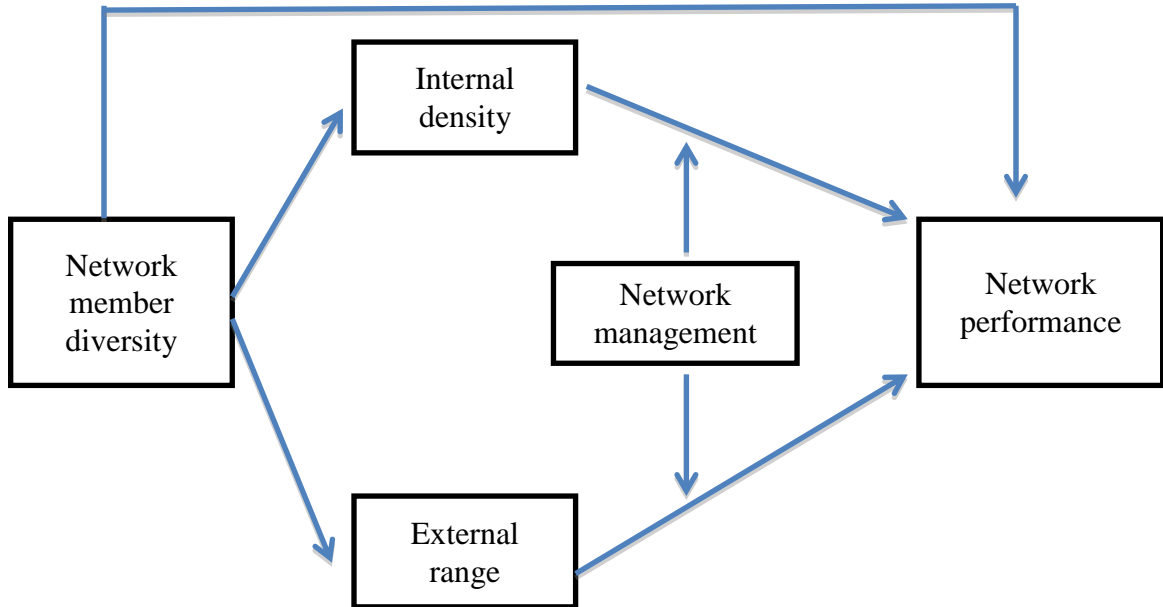
This proposed model was tested using MPOs in the United States. Chapter 3

further discusses the empirical context: the history of MPOs as well as MPO structures

and processes. Research findings are addressed in the following chapters.

CHAPTER 3. EMPIRICAL CONTEXT

"The metropolitan area is the best empirical referent for the development of theory having to do with changes underway in public administration…In the high fragmentation of the American metropolis one can find most of the disarticulated state – the declining salience of jurisdiction, the fuzziness of borders, a growing asymmetry in the relationship between the governed and those who govern, and an erosion of the capacity of the jurisdiction to contain and, thereby, manage complex social, economic, and political issues" (Frederickson, 1999, p.707).

Metropolitan areas have emerged as the prevalent economic and social units (Katz, 2000). They have grown rapidly with the spread of population around central cities, but they have also brought environmental and other problems that cannot be easily solved by existing governmental structures that reflect current jurisdictional lines. The policy sector on which this dissertation focuses is transportation, where collaboration plays a central role in solving complex problems. State and local governments face various transportation issues that directly affect citizens' lives. The U.S. federal government insists on regional transportation planning because U.S. roads and other transportation facilities cross and connect many communities. Traffic congestion in one area can lead to congestion in other areas (Genesee Transportation Council, 2010).

Figure 4. Federal Funds Apportioned for Metropolitan Transportation Planning, FY 2000-FY 2009 ($ Millions)

Figure 4. Federal Funds Apportioned for Metropolitan Transportation Planning, FY 2000-FY 2009 ($ Millions)
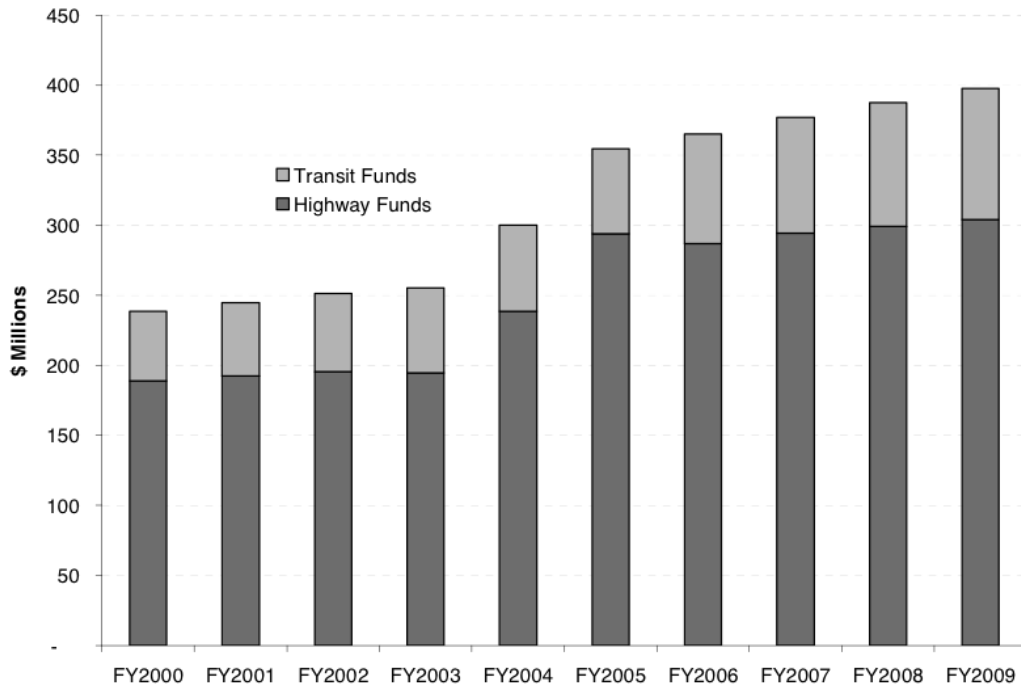
Source: Mallett (2010, p. 5)

The federal funds apportioned to metropolitan transportation planning have increased over time. In FY 2009, almost $400 million in federal transit and highway funds were distributed (Mallett, 2010). To ensure that taxes are spent wisely, regional outlook and collaborative approaches are perceived as innovative ways to address these transportation challenges by helping individuals with diverse perspectives work together, resulting in more sustainable transportation solutions (National Policy Consensus Center, 2003).

Table 3. Evolution of the Metropolitan Planning Between 1980 and 2020

	From 1980 to 2000	From 2000 to 2020
Emphasis Areas	Methods and data in support of capital programming	Improved information on a wide-ranging set of impacts for a variety of capital, operational, pricing, lifestyle and land use decisions
Efficiency	Highway networks and corresponding level of service (speed and travel time)	Multimodal system operation and broader performance measurement (accessibility and mobility)
Perspective	How to get from point 'A' to B'	Broader context of transportation role in community, and global, national, state and regional economic markets
Focus	Vehicle, passenger, or person movements	Broader viewpoint, including goods movement and productivity changes, as well as land use impacts
Technology	Vehicle and system technology viewed as a given	Innovative technologies used to influence system operation and substitute for travel
Land use	Acceptance of land use patterns as a given and not part of the solution set	Use of growth management and "smart growth" tools in connection with transportation policies as a major strategy
Environmental impacts	Seen as a project-level mitigation issue	Linkage between transportation decisions and a broader systems and sustainability framework
Plan evaluation and equity	Often defined by modal choices made by policymakers; political boundaries; aggregate user benefits and costs	Equitable distribution of benefits and costs within the concept of community; equity consideration
Approach	What can the MPO do to "solve" the transportation problem?	What can all of us do together (e.g., partnerships) to improve transportation?
Public participation	Narrowly defined interest/advocacy groups with specific objectives	More broadly defined groups with wider objectives; use of public opinion surveys and focused educational efforts

Source: Meyer (1999), cited in Rothblatt & Colman (2001)

The history of metropolitan transportation planning in the United States supports the need for the collaborative approach (Table 3). Surprisingly, however, scant research has been conducted on collaboration in the field of public administration focusing on the

transportation policy area, though some studies have tackled the transportation policy from the perspective of strategic planning and management (Bryson et al., 2009; Poister & Van Slyke, 2002). To fill this gap, this dissertation focuses on collaborative efforts in regional transportation planning, specifically MPOs in the United States. The MPO is an organization that collaboratively decides federal transportation fund investment within each metropolitan region. The role of an MPO is quite significant in that it develops a coordinated decision regarding the region's transportation needs.

Much of the spatial planning literature discusses the need for collaboration among different actors, such as municipal governments, transportation planners and state department of transportation (Scott et al., 2005). An MPO has been considered as one of the actors in such transportation planning networks, but insufficient attention has been paid to the MPO itself as a unit of analysis. Although some studies have raised concerns about the possibility that equity in MPO policy boards might lead to a transportation investment bias (e.g., Lewis, 1998; Nelson et al., 2004), the MPO has mainly been discussed regarding its history and role change as a planning actor by new legislations (e.g., McDowell, 1999).

Moreover, the MPO provides a good opportunity to study inter-organizational networks at the network level because it can easily specify the network boundary in terms of MPO board membership, despite the fact network boundary specification is often mentioned as an obstacle in network research. MPOs also provide useful empirical settings for a quantitative approach on collaboration, which has been extremely rare in previous literature (Thomson, 2008), because the basic components of MPOs are similar across states and exist throughout the country.

Although the MPO is called an "organization," it can more accurately be considered as a formalized inter-organizational network. The National Association of Regional Councils (NARC) identifies a MPO as "a *network* of experienced professionals dedicated to solving problems the regional way" (National Association of Regional Council, 2011). To follow the definition given by Agranoff (2007), PMNs are "collaborative structures that bring together representatives from public agencies" (p.3). The characteristics of the MPO (discussed below) meet the definition of a PMN. In his book, Agranoff (2007) took a MPO as an example of PMNs.

To put the MPO in context, it is important to understand the history of MPOs and the structures and processes of MPOs in regional transportation planning. Before my empirical data and method are presented in Chapter 4, this chapter provides a brief introduction to the MPO as the empirical setting of the research.

3.1 History of MPOs

The purposes of MPOs are set forth in 23 U.S.C. 104(f), 134; the Code of Federal Regulations, Part VI, voL.48, Part 450, subpart C; and other relevant federal and state laws and rules. Their responsibilities include:

> "…cooperatively carrying out transportation planning; coordinating the formal actions of government bodies at the local, regional, state and federal levels for the implementation of transportation policies, plans and programs; development and adoption of a regional plan for transportation improvements; and the biannual development of a multi-year program of projects to be funded with available federal assistance in accordance with that plan" (by-laws of GTC, p.1).

The Federal Aid Highway Act of 1962 included the federal requirement for transportation planning in urban areas, which encouraged "continuing comprehensive transportation planning process carried on cooperatively by states and local communities" (P.L.87-866), but the Federal Aid Highway Act of 1973 formally established MPOs for

metropolitan areas with populations greater than 50,000 (Mallett, 2010). MPOs have been designated to perform the federally mandated "three-C" (i.e., continuing, cooperative and coordinated) planning process to determine the local use of federal transportation funds. The local government officials participating in this planning process must consider the region's overall transportation needs. In practice, however, state officials often have dominated decision making in transportation planning and thus, MPOs have remained in a relatively weak position (Goldman & Deakin, 2000).

However, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) substantially strengthened the role of MPOs and their power over fund allocations. Goetz and colleagues (2002) summarized this change: "Beginning in 1991, MPOs were transformed from advisory institutions into institutions that directly influence the distribution of money – from voluntary planning organizations to organizations that have their fingers on some of the purse strings" (Goetz, Dempsey & Larson, 2002, p. 90).

A report by the Advisory Commission on Intergovernmental Relations (1995) indicated that ISTEA significantly broadened the responsibilities of MPOs in three fundamental ways:

- The MPO organization must be more inclusive and linked more strongly with other organizations and the public.

- The MPO planning process must be considerably broader in scope, fully inter-modal, more advanced technologically, more outcome oriented, and more open to interaction with decision makers and affected parties.

- A new implementation role is established for MPOs that are designated as Transportation Management Areas. These MPOs (about 137 of them, mostly with

populations over 200,000) will determine how to spend about 20 percent of

ISTEA funds, making them more responsible for making planning results. They

must be federally certified every three years (p. iii).

ISTEA added new activities to the functions of MPOs. It "broadens the content of

transportation planning, considers environmental factors more thoroughly, including

additional stakeholders, and allocates a portion of the federal-aid funds through regional

planning rather than by state decision making" (Gage & McDowell, 1995, p. 133). Under

ISTEA, the fiscal and planning authority that autonomous transit agencies and the

Federal Transit Administration (FTA) formerly held was passed to an MPO consisting

mostly of local government leaders (Boschken, 1998). MPO funding was increased to 1%

of the funding for the five core federal aid highway programs–the National Highway

System (NHS), Surface Transportation Program (STP), Congestion Mitigation and Air

Quality Improvement Program (CMAQ), Interstate Maintenance Program and the Bridge

Program (Hall, 2006). The fiscal constraint provisions required MPOs to cooperate with

the state and other transit agencies and develop fiscally feasible short-range

Transportation Improvement Plans (TIPs) and long-range Transportation Plans (LRTP).

Those plans include specific funding sources for all projects. In addition, the act required

more citizen involvement as well as the criteria for reviewing transportation programs

(Sanchez & Wolf, 1995). As a result, MPOs became more involved in regional

transportation planning and now have more interaction with state DOTs and local

governments.

ISTEA was reenacted by two subsequent acts: the Transportation Equity Act for

the 21st century of 1998 and the Safe, Accountable, Flexible, Efficient Transportation

Equity Act: A Legacy for Users of 2005. They reaffirmed ISTEA with some

modifications, but no substantive changes were made to the role and responsibilities of

MPOs or the level of funding they receive (Wolf & Farquahr, 2005).

3.2 MPO Structures and Processes

Although organizational structure and staff arrangements may vary depending on the agreement between state and local officials (Government Accountability Office, 2009; Mallett, 2010), MPOs typically have four basic components (see Figure 3): (1) a policy-making board (2) a technical advisory board, (3) a citizen's advisory board and (4) a MPO staffing arrangement (Advisory Commission Intergovernmental Relations, 1995). First, as a decision-making body, the policy board makes final decisions on funding allocation on regional transportation projects. The core membership of an MPO is described by federal law, and sometimes state law. The members include local elected or appointed officials, state government officials and other representatives from organizations such as the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA).

Transportation planning often requires complex technical knowledge on specific issues (e.g., Geographic Information System). Thus, the technical advisory board is charged with technical oversight of the MPO's work. The board is a working group composed of professional staff representatives of the organizations participating in the MPO. The board members regularly meet, review, and approve technical and planning reports. They also provide recommendations to the policy board members.

The citizen advisory board devotes their time to the task that informs the public of the MPO's programs and activities and encourages interested citizens to participate in them (DARTS, 2010). The MPO has been given the responsibility to involve the public through expanded citizen participation efforts. Finally, a staffing arrangement helps to maintain the process and carry out the required plans and programs.

Figure 5. Typical MPO Structure
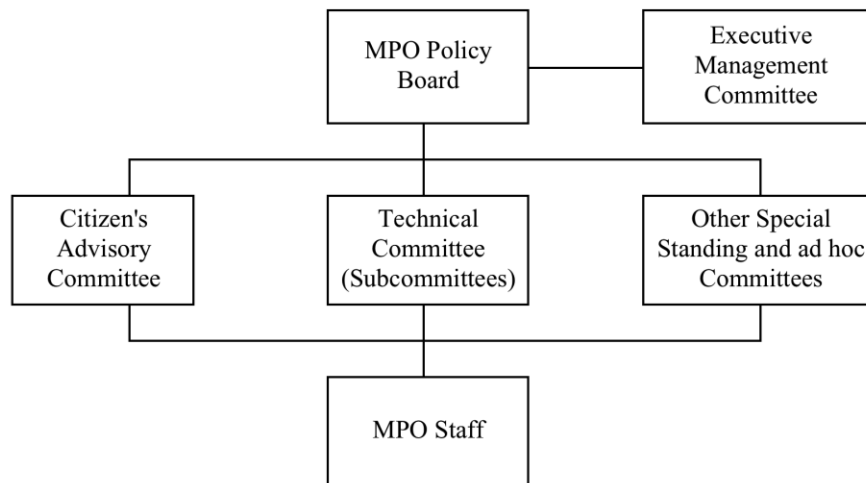
Source: Plumeau (2004, p. 21)

As of June 2011, 384 MPOs existed nationwide[2] in areas with populations over 50,000. To qualify and receive federal transportation funds, MPOs must meet the following basic requirements (Government Accountability Office, 2009).

- LRTPs (20 years): MPOs are responsible for carrying out federally mandated long-range transportation investment plans.

- Short-range (4 years) TIPs: MPOs develop the multiyear listings of transportation projects with priorities.

- Unified Planning Work Program (UPWP) annually describes transportation planning activities to be undertaken by the MPO. It is prepared by MPO professional staff in cooperation with member agencies. The purpose of the

---

[2] I obtained information on the total number of MPOs from www.planning.dot.gov/mpo.asp. [Data accessed in June 2011 at www. planning.dot.gov/mpo.asp.]

UPWP is to provide an overview of regional planning activities, funding sources for each planning project, and anticipated work products.

- Public Participation Plan (PPP): The SAFETEA-LU authorized in 2005 emphasized citizen participation by requiring MPO to release a PPP. This plan is intended to ensure broad public participation during the development of regional transportation planning. PPP is compliant with Title VI of the Civil Rights Act of 1964, which demonstrates "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance" (42 U.S.C. Section 2000d).

CHAPTER 4. RESEARCH METHODS

This chapter provides an overview of my sources of data as well as my research methods and procedure used in this empirical research. The first section discusses two sources of data: 1) a Web-based survey of the MPO policy board members and directors and 2) policy board meeting minutes. The second section includes measures, followed by descriptive statistics.

4.1 Survey Procedure and Instrument

Survey Procedure

To test my hypotheses, I relied primarily on survey data collected from MPOs. This section explains the survey sample and procedure. As noted in the previous section, each committee consists of representatives from different organizations such as local governments, regional transit agencies, and State Department of Transportation. The intended survey respondents were policy board members and directors in MPOs.

For data collection, I first obtained contact information for MPO directors from the U.S. Department of Transportation website (www.planning.dot.gov) and contacted 110 MPOs directors in the eastern region of the United States through direct email appeal, along with a brief description of this research. Once I obtained approval from the MPO executive director (or planning manager), I sent him or her two separate invitations containing Web survey links for both the director and policy board members so the director could forward the surveys to the board members. The survey took 10-15 minutes to complete, ensured confidentiality and included a concise explanation of the study.

Because this research focuses on the characteristics of the network (i.e., MPO) as a whole, data were collected from multiple network members ("informants") within each

network who could provide valid and reliable information about collaborative decision making. This was expected to help avoid mono-method bias. To increase the response rate, two follow-up reminders were sent to those directors and board members who had not completed the survey. The reminders for policy board members were sent through MPO directors. Unlike the survey methodology used in most prior studies that focused on ego networks, this research solicited responses from every committee member and director of each MPO. This approach made it possible to analyze diverse views on collaborative decision making even within the same MPO.

The survey distribution began in June 2011 and continued over multiple waves to its completion in October 2011. The survey was administered using the Syracuse University Maxwell School Web survey program tool (https://survey.maxwell.syr.edu). Of the 384 MPOs in the United States, I contacted 110 MPOs in the eastern region as a sample. Of these 110 MPOs, 34 participated in the survey (i.e., at least one person responded from each). Data were collected from 61 policy committee members and 33 directors in a total of 34 MPOs. The response rate for MPO directors was 30% (33/110), and the average response rate for policy board members was approximately 20%, ranging from 4.4 to 38.9 %. Although this response rate is relatively low, the fact that most policy board members were politicians and top-level local government officials should be taken into account. Researchers who approach top managers as respondents tend to obtain lower response rates than other researchers who study non-executive-level individuals (Baruch & Holtom, 2008). Simply put, top-level officials have less time and energy to complete surveys (Cooper & Payne, 1988).

Sample Characteristics

The sample included a total of 34 MPOs from 11 states in the eastern United

States. Table 4 describes MPO survey participation by population.

Table 4. Survey Participation by MPO Population Classification

Population classification	Survey sample	Total MPOs
Large population[a]	11% (4)	13% (50)
Medium population[b]	38% (13)	39% (149)
Small population[c]	50% (17)	48% (185)
Total	100% (34)	100% (384)

Note: The population category is based on GAO (2009).
a. Population of 1million and above
b. Population of 200,000 – 999,999
c. Population of 50,000 – 199,999

Because the sample was not drawn by random or stratified sampling, two

selection bias analyses were conducted at the network (i.e., MPO) level. If the sample is

not representative, drawing inference of the findings to the population may generate

biased results and the external validity is diminished (Werner, Praxedes, & Kim, 2007).

Because the data collection targeted mainly MPOs in the Eastern region of the United

States (non-random), there remains the possibility of selection bias, which would arise if

there are any systematic and unobservable differences in the characteristics between

those selected and those not selected (O'Sullivan, Rassel & Berner, 2003). Non-response

bias also needs to be considered because the response rate is relatively low. Therefore,

this section addresses non-response bias analysis to test the representativeness of the

sample used in this dissertation.

Non-response bias can be tested by comparing characteristics of respondents who

completed surveys with those of non-respondents who did not complete the surveys.

Drawing inference about the population from a sample with non-response may generate biased results. To examine such concerns, I ran two types of t-test analyses: (1) final sample versus population; and (2) final sample versus the MPOs I contacted. I first examined the characteristics of sample and all MPOs for substantial differences. Second, I compared my sample with the MPOs I initially contacted. T-test analyses revealed there were no statistically significant differences for both cases, in terms of population size and area (sq. miles). In both cases, the two sets of MPOs are considerably similar. Tables 5 and 6 show the results of t-tests.

Table 5. Two-Sample T-tests: Population

	Obs.	Mean	Std. Dev.
Total MPOs	384	636195.6	1498724
Sample MPOs	34	522850.2	1004435
Mean difference: p = 0.5505			
Contacted MPOs	110	599941.4	1403107
Sample MPOs	34	522850.2	1004435
Mean difference: p = 0.7247			

Table 6. Two-Sample T-tests: Area

	Obs.	Mean	Std. Dev.
Total MPOs	384	1135.003	2417.411
Sample MPOs	34	781.3235	786.2179
Mean difference: p = 0.3968			
Contacted MPOs	110	850.5636	960.1486
Sample MPOs	34	781.3235	786.2179
Mean difference: p = 0.7027			

As previously noted, this study collected responses from 61 policy board members. Policy board respondents were 18% female and 82% male. Over 80% had a college degree, and about half (52.4%) had attended graduate school. The average age of the respondents was 56. In terms of ethnicity, Caucasians dominated policy boards

(90.16%) in my sample, and this showed a consistent pattern with the concern that MPO

boards under represent racial minorities and over represent Caucasian constituents in the

literature (Lewis, 1998; Sanchez, 2006). This phenomenon is related to the fact that most

MPO boards adopt a one-seat-one-vote policy (Dempsey, Goetz, & Larson, 2000). It is

not surprising that 85% of MPOs in my sample operate a non-weighted voting structure,

while only four MPOs have a population-weighted voting structure.

Table 7. Demographics of Survey Sample: Policy Board Member Sample ($N = 61$)

Category	N (%)
Gender	
Male	50 (82%)
Female	11 (18%)
Age	
32-40	6 (9.84%)
41-50	11 (18.03%)
51-60	19 (31.15%)
61-70	22 (36.07%)
71+	3 (4.92%)
Education	
High school	8(13.11%)
College	21(34.43%)
Masters	30(49.18%)
Doctoral	2(3.28%)
Ethnicity	
African-American	1(1.64%)
Caucasian	55(90.16%)
Hispanic	3(4.92%)
Native American	2(3.28%)

Policy board members in my sample had an average tenure of 5.6 years in the

MPO board and 12.3 years at their home organizations. Board members consist of voting

and non-voting members. Non-voting members are entitled to join in the policy board

meetings. Many MPOs assigned non-voting membership to representatives from state

and federal government officials such as the Federal Highway Administration (FHWA)

and the Federal Transit Administration (FTA). In the sample, 77% of members were voting members and 23% were non-voting. Regarding the roles in the MPO policy board, 26% of respondents served as chair, vice-chair and secretary. On average, respondents spend 10% of their work time doing MPO related activities outside of their home organizations.

Survey Instrument

Two types of web survey instruments were used for data collection. The initial questionnaire was designed after a careful review of the diversity, collaboration, network and regionalism literature relevant to this research. Some questions were drawn from questions used in previous studies to ensure construct validity. To check that the items were clear, the survey was pilot tested on three MPO directors and transportation planners. They made several useful comments that helped to develop the final version of the survey questionnaire. The survey items were slightly modified to reflect the unique aspect of the MPO. For example, wording such as "policy board" were changed to "coordinating committee."

The following section briefly describes the surveys for MPO directors and policy committee members. However, the detailed measures are discussed in the "Measures" section below and a copy of the questionnaire used for the survey is provided in the Appendix.

Policy board member survey

The survey consisted of five sections. The first section of the questionnaire elicited general network member characteristics, including voting/non-voting member, tenure with MPO committee and home organization. The second section of the survey contained values (individualism-collectivism) and network behavior questions. The third dealt with the respondents' interactions with other committee members on transportation topics. Respondents were also asked to indicate their interactions with listed organizations outside the MPO table on transportation topics. The fourth section asked their views on collaborative decision-making performance, and the final part included demographic information, including gender, age, race and level of education.

For network data collection, a combination of sociometric roster and egocentric techniques was used (Wasserman & Faust 1994, p.45-50). Respondents were provided with a sociometric roster of all policy board members in their MPO. When collecting network data, the sociometric roster is preferred because it has proved to be reliable in "allowing individuals to report their recurring social interactions" (Marsden, 1990). However, if total policy board members exceed 50, a name generator question (up to 10 people) was used with a list of policy board members in the MPO to reduce excessive burdens and ambiguity about members' identity[3].

---

[3] I decided not to use the collected network data from my web-survey because I received a low response from policy board members in some MPOs. Because network data is especially sensitive to missing values, I alternatively used policy board meeting minutes to measure network relationships among network members. Also, MPO policy board members' gender and organizational membership were identified by archival sources to avoid potential bias resulting from low response rate.

Director survey

The questionnaire for directors consists of (1) general characteristics of the MPO such as the type of structures and planning area boundary, (2) policy board members' characteristics and their network behaviors, (3) collaborative decision-making process including the way in which consensus is made and the main criteria to choose among different projects, and (4) perceived effectiveness and fairness on the MPO collaborative decision-making process and a list of methods the MPO uses to involve the public.

4.2 Meeting Minutes

The term "affiliation" in social network analysis means the participation data on which actors have participated in which events (Borgatti & Halgin, 2011). The assumption is that co-presence in events indicates an underlying social tie. For instance, if people attend the same events more often, they are more likely to interact with each other and develop some type of relationship. Collecting affiliation data is especially useful to study people who are not easily accessible (for example, elites or celebrities) because the data can be obtained by archival sources, such as newspapers, government records and minutes of executive meetings without direct contacts.

Because MPO members consist of high level government officials, I analyzed MPO meeting minutes over the past 12 months from the point the surveys were completed to assess social proximity among MPO members. The meeting minutes contain the list of board members (and alternatives) present in each meeting. Using this information, I recorded the list of board meetings attended by policy board members (and alternatives). The data were set up as a policy board member-by-meeting matrix X in which x_{ij}=1 if the ith member attended the jth meeting, and x_{ij}=0 otherwise. Table 8 presents the data matrix for an MPO in North Carolina as an example. Given matrix X, I constructed XX, where ijth cell gives the number of meetings that both board member i and j attended. This value is interpreted as an index of the strength of social proximity of the two board members. Regarding the meaning of social proximity, Borgatti and Everett (1997, p. 246) explain:

> "What this index of social proximity means exactly is not always clear. In some cases we would be willing to assume that strong proximity reflects a positive affective tie. In other cases, we would recognize that certain pairs of highly

proximate member might not like each other at all (e.g., have a competitive relationship), but are still closely familiar with and influenced by each other. In still other cases, we would recognize the possibility that two board members could co-attend a series of the same (large) meetings and not ever have even met each other, in which case we might regard the large value of XX'ij as an index of the potential for some kind of tie to develop between a pair. In all of these cases, XX' is regarded as representing the valued graph of a social network, which could not be measured directly and was instead constructed from an intermediate data set X."

Table 8. Actor-by-Meeting Matrix

	Meeting 1	Meeting 2	Meeting 3	Meeting 4	Meeting 5	Meeting 6	Meeting 7	Meeting 8	Meeting 9
Actor 1	1	1	1	1	1	1	1	1	1
Actor 2	1	1	0	1	1	1	1	1	0
Actor 3	1	1	0	0	1	0	1	1	0
Actor 4	0	1	1	1	1	0	1	0	1
Actor 5	1	1	1	1	1	1	1	1	1
Actor 6	1	1	1	1	1	1	1	1	1
Actor 7	1	0	1	1	1	1	0	1	1
Actor 8	1	1	1	1	0	1	1	1	1
Actor 9	0	0	1	1	1	0	1	0	1
Actor 10	1	1	1	1	1	1	1	1	1
Actor 11	1	1	1	1	0	0	1	1	0
Actor 12	1	0	1	0	0	1	0	0	0
Actor 13	0	0	0	0	1	0	0	0	0

There is conventional wisdom that "network analysis is intolerant of missing data" and concern that "network measures become increasingly unreliable" if complete population data are not collected (Borgatti, Carley & Krackhardt, 2006; Costenbader & Valente, 2003). For this reason, researchers prefer collecting data from all members in a network, but their attempts have often been hampered by the costs of data collection. It is burdensome for researchers to collect full network data from all network members in multiple networks and response rates tend to decrease. This is an important difficulty when researchers conduct network research in a quantitative way (Provan, Huang & Milward, 2009). Network analyses with incomplete data are common in practice (Stork & Richards. 1992). It is assumed there is no foolproof solution to the missing data problem

in network analysis (Knoke & Kuklinski, 1982; Robins et al., 2004). However, in the literature, very little discussion has been found to evaluate under what conditions network data including missing values could be accurate to measure network properties (Borgatti et al., 2006). Therefore, to measure the ties among all the actors in the MPO, this research constructed network data from archival records. This is one commonly used methods in the network literature (Wasserman & Faust, 1994).

4.3 Measures

As previously mentioned, the primary data in this research consists of survey responses from MPO directors and policy board members. Most survey questions were drawn from previous studies to ensure the validity and reliability of the measures. The measures presented in this section focus on those employed for seemingly unrelated regressions (SURE) in Chapter 5. Other measures for additional analyses are included in each of the analysis sections.

Diversity

This research uses gender as surface-level diversity because it has been the primary focus of diversity research. Organizational membership is also employed as a proxy variable for cultural diversity, which is deep-level diversity. There are three popular approaches used to measure diversity–the coefficient of variation, the Blau index of heterogeneity and the entropy index. The coefficient of variation is appropriate for continuous variables such as age, while the Blau's and Teachman's index are widely used for categorical variables such as gender and race (Harrison & Klein, 2007; Choi & Rainey, 2010). As noted in various reviews of the literature, one of the reasons for inconsistent findings of group diversity research is perhaps a methodological issue. In much group diversity literature, a diversity score representing the group is calculated from attribute information in their employee survey data that usually include non-responses (i.e., missing data). A fundamental assumption of diversity measures is that they are on the basis of complete attribute data; hence, diversity scores based on incomplete attribute data may distort the impact of diversity on the outcome (Allen, Stanley, Williams & Ross, 2007). Let's assume that an MPO's board members consist of

80% men and 20%women. If most women board members in the MPO did not respond to the survey, the MPO's gender diversity score will be close to zero. Therefore, in this analysis, two types of diversity (i.e., gender and organizational membership) were used to test my theoretical model because gender and organizational membership of all group members were identified from documents and other sources.

Gender and organizational membership diversity

All MPO policy board members' gender and organizational membership were identified by archival sources. Because gender and organizational membership diversity are categorical variables, they both can be measured with Teachman's (1980) index of diversity. This index considers how work group members are distributed across the possible categories of a variable (Pelled et al., 1999).

$$TI = -\sum_{i=1}^{l} P_i(\ln P_i)$$

where Pi is the proportion of MPO members in the ith category. The higher the Teachman's index value, the greater the distribution of characteristics within the group.

Blau's index of heterogeneity was also used as an alternative measure. The Blau index is calculated by the formula: $1-\sum pi^2$, where p is the proportion of MPO members in a given category and i is the number of different categories (Blau, 1977). The ranges vary from 0 (indicating all MPO members belong to the same category) to 1(indicating that all MPO members belong to different categories).

Network Measures

All network measures were calculated using UCINET 6 software (Borgartti et al., 2002).

Network density

Density is defined as the sum of the ties divided by the number of possible ties. It measures the average degree to which all members are connected to other members. For valued data, it is the ratio of all total values (tie strength) that are actually present to the number of possible ties. Network density is measured as the average level of connection between any two members in the MPO (Uzzi, 1996).

$$\text{Density}_k = \frac{\sum_{i=1}^{N_k} \sum_{j=1}^{N_k} Z_{ijk}/\max{(Z_{ijk})}}{N_k(N_k-1)/2}, j \neq i$$, where Z_{ijk} is the degree of connection between member i and j of network $(MPO)_k$ and N is the number of policy board members in MPO_k. In the denominator, $N_k(N_k - 1)$ was divided by 2 because the network data I used did not include directions among ties. As an alternative measure of valued data, I calculated network density using binary data by converting all of the values greater than 1 to 1.

External range (Structural holes)

According to Burt (1992), to obtain benefits in networks, the number of non-redundant relationships is important. A structural hole exists when a contact is non-redundant. As the basis for the external range (structural hole), I used a reverse of Burt's (1992, 2000) constraint measure because a low structural constraint indicates many structural holes. In technical terms, $ER_k = 1 - C_k$. The range score for each MPO was calculated using the following formula:

$$C_k = \sum_{i=1}^{N_K} \sum_{j=1}^{N_K} \left(p_{ij} + \sum_{q=1}^{N} p_{iq} p_{qj} \right)^2 / N_K$$ Network constraint (C_k), where the constraint posed by *j* on ego (a focal individual) *i* and averaged over all network members. There are two components of constraints. The first component is the proportion of *i*'s network time and energy invested in contact *j*.

$$p_{ij} = z_{ij} / \sum_{q=1}^{N} z_{iq}$$

,where Zij is the strength of the relationship between i and j. The second

component is the strength of the indirect connection between i and j through mutual

contracts q. The external range varies from 0 to 1, with low values indicating the

existence of few structural holes and high values indicating the existence of many. An

external range with a high value indicates that the network actor spans many structural

holes, while low values notes that the network actor participating in the MPO policy

board is relatively well embedded by maintaining redundant connections.

Network Performance

As discussed in the previous chapter, a paucity of research has endeavored to develop evaluation measures for network performance. One assessment approach is "ex-post satisfying" criterion, which measures subjective judgment of network actors (Klijn & Koppenjan, 2000). The present research measured the perceptions of MPO directors and policy board members on network performance in terms of effectiveness and fairness. The MPO directors and policy board members were asked to rate the MPO's overall effectiveness and fairness. The questions were as follows: "Please rate the overall effectiveness of the MPO policy board as it relates to decision making" and "Please rate the overall fairness of the MPO policy board as it relates to decision making." Five-point Likert-type scales ranging from 1 (very ineffective) to 5 (very effective) and from 1(very unfair) to 5(fair) were used, respectively.

Network Management

Agranoff and McGuire (2001) offered a model to classify the behaviors of network participants into four categories of activation, framing, mobilizing and synthesizing (AFMS). Based on this framework, McGuire and Silvia (2009) created 34 questions describing the behaviors of network members. Among the four types of network management, this research focuses on mobilizing and synthesizing behaviors because of the characteristics of MPOs (their membership is defined by law) and adapted ten questions for mobilizing and synthesizing behaviors from McGuire and Silvia's (2009) questionnaire. Respondents were asked: "How often do you engage in the following behaviors in your metropolitan planning organization?" A 5-point Likert-type scale ranging from 1 (never) to 5 (very often) was used. Cronbach's alpha was 0.766 for

mobilizing behavior and 0.885 for synthesizing behavior, respectively. It shows high

reliability of both measures.

Table 9. List of Mobilizing Behaviors ($\alpha = 0.766$)

Inspiring board members' enthusiasm for a project
Establishing member commitment to the MPO's mission
Publicizing the MPO's goals and accomplishments

Table 10. List of Synthesizing Behaviors ($\alpha = 0.885$)

Freely sharing information with policy board members
Creating trust among policy board members
Brainstorming
Maintaining a closely knit policy board
Coordinating the work of the policy board
Keeping work moving at a rapid pace
Settling conflicts when they occur in the policy board

Network Size

MPO size was measured as the number of members in the MPO policy board. The

MPOs vary in terms of size, ranging from seven members to eighty members. Because

density and external range variables are sensitive—generally negative—to network size,

it is important to include size as a control in my analysis.

Number of Meetings

As another control variable, I considered the total number of policy board

meetings in the past 12 months from the point when the survey was sent. Because most

participants are politicians and government officials at the high level, they were expected

to interact with each other through regular meetings.

4.4 Descriptive Statistics

The survey data were collected from two types of respondents – director and policy board members, and the analyses presented in each section of Chapter 5 utilized different samples. This section provides descriptive statistics and correlations for variables, using the MPO director samples that are used for regression analyses as the main interest of analysis in Chapter 5.

Table 11. Descriptive Statistics for Variables: Director Sample

Variable	Mean	Std. Dev.	Min.	Max.
Diversity				
Gender (Blau)	0.317	0.16	0.039	0.692
Gender (Teachman)	0.463	0.119	0.179	0.673
Organizational membership (Blau)	0.845	0.139	0.172	0.964
Organizational membership (Teachman)	2.397	0.496	1.429	3.337
Social capital				
Internal density	0.216	0.139	0.048	0.559
External range (1-Constraint)	0.778	0.099	0.515	0.931
Network effectiveness	4.455	0.666	3	5
Network fairness	4.394	0.704	3	5
Network management				
Mobilizing behavior	3.677	0.669	2.333	5
Synthesizing behavior	3.983	0.602	2.429	5
MPO (network) characteristics				
# of meetings	5.625	1.93	3	10
Network size	29.059	18.526	7	80

    N=34 MPO directors

In my sample, the policy boards in the MPO ranged in size from 7 to 80. The mean for the gender diversity index[4] was 0.317, medium level. On average, 19.4% of MPO policy board members in the sample were female. The minimum percentage of female was 4.35 %, and the maximum value was 40 %. The MPO policy board with the largest number of female was in Ithaca, New York. The mean for the organizational membership index was 0.845, high level. As dependent variables, I examine both perceived effectiveness and perceived fairness from MPO directors. The average of perceived MPO effectiveness is 4.455 (out of 5), indicating a high score, but it shows substantial variation across MPOs ($s = .666$). The mean of perceived MPO fairness is 4.394 (out of 5) and it also shows considerable variation ($s = .704$). On average, MPO directors rated their policy board's decision-making effectiveness and fairness positively (scores ranged from 3 to 5). Given these results, it is important to know how their MPOs gauge overall effectiveness and fairness because that may reflect what the directors think about MPO's performance as well as the criteria the directors use to rate MPOs' performance in the survey (see Section 5.1, Chapter 5).

Table 12 presents the correlation matrix for study variables. Several relationships are noteworthy. First, the correlation result shows the importance of network size as a covariate. That is, large MPO policy boards have significantly more meetings and more external range than do small MPO boards. Large MPOs also tend to include a great diversity of organizations participating in the MPO.

Second, in a given empirical setting, density and external range were not significantly related with each other (-0.109), meaning no general positive or negative

---

[4] Gender and organizational diversity index were calculated here according to information from archival sources, such as the MPO's website and document, not from policy board member surveys.

relationship exists. The partial correlation, controlling for network size, was -0.099. This result is consistent with the literature such as Reagans and Zuckerman (2001, 2004), suggesting network density and external range are logically distinct. Third, correlation between gender diversity and internal density was non-significant. Correlation between network effectiveness and network fairness was 0.7391, suggesting strong relations of two assessments.

Table 12. Correlation matrix with main study variables

Variables	1	2	3	4	5	6	7	8	9
1. Network size	-								
2. Number of meetings	0.3282*	-							
3. Gender diversity	0.1167	0.268	-						
4. Organizational membership diversity	0.4175**	0.0084	0.1099	-					
5. Mobilizing behavior	-0.1422	0.0506	-0.2989	-0.0419	-				
6. Synthesizing behavior	0.1069	0.2013	-0.1134	-0.1125	0.6843***	-			
7. Internal density	-0.0655	-0.0407	0.2247	-0.0835	-0.1605	-0.0337	-		
8. External range	0.8351***	0.1124	0.0913	0.6323***	-0.1003	-0.057	-0.109	-	
9. Network effectiveness	-0.1736	-0.0033	0.0021	0.2075	0.2933*	0.3324	0.1335	-0.0864	-
10. Network fairness	-0.1326	-0.1669	0.101	0.2488	0.2123	0.2167	0.0384	-0.0714	0.7391***

$N = 34$ Metropolitan Planning Organizations
*p<.10 **p<0.05 ***p<0.01*

CHAPTER 5. ANALYSIS AND RESULTS

This chapter consists of three sections. The first reports the summary of survey findings on MPO governance and collaborative decision-making process. The second section provides preliminary analysis of the research model. The third tests an analytical model and hypotheses proposed in the previous chapters, using 34 MPOs at the MPO level.

5.1 MPO Governance and Collaborative Decision-Making Process

Although MPOs serve an important role in transportation planning in the regions, we know very little about how MPOs are governed and make collaborative decisions (Bond, Kramer & Seggerman, 2010). This section provides a discussion of the survey results regarding MPO governance structure and their collaborative decision-making process. There are few studies and reports dealing with MPO governance (e.g. Bond, Kramer & Seggerman, 2010; Dempsey, Goetz & Larson, 2000; Rothblatt & Colman, 2001; Goode et al., 2001). Although most studies solicited responses from MPO directors, the present study asked both directors and every member of the MPO policy board to respond the survey.

MPO Governance Structure[5]

There are two broad administrative categories of MPOs: hosted and independent (Bond, Kramer & Seggerman, 2010). According to Bond and colleagues' (2010) definitions, a hosted MPO refers to the situation where "another organization acts as the fiscal agent for the MPO and holds the power to hire and fire the MPO's employees" and

---

[5] MPO directors answered the questions regarding MPOs' administrative structure. These questions are mostly drawn from Bond et al.'s (2010) report.

an independent MPO refers to when "the MPO acts as its own fiscal agent and if the director can only be hired and fired by the MPO board" (Bond et al., 2010, p. 3-1). In my sample, nearly 80% of the MPOs operate from within another agency and a council of government is the most common type of hosting agency. Table 13 provides the proportion of hosted and independent MPOs by population category. Based on Chi-square test, I found no statistical differences between them (p = 0.323).

Figure 6. Percentage of Hosted and Independent MPOs
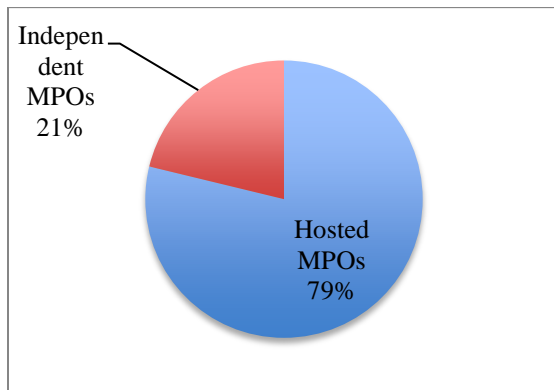
Table 13. Hosted and Independent MPOs by Population (N, %)

Population	Hosted MPOs	Independent MPOs
Large population[a]	14(54%)	3(43%)
Medium population[b]	10(38%)	2(29%)
Small population[c]	2(8%)	2(29%)

Note: The population category is based on GAO (2009).
d. Population of 1 million and above
e. Population of 200,000 – 999,999
f. Population of 50,000 – 199,999

Table 14. Types of Host Agency

Types of Host Agencies	Freq. (%)
Council of Government	9 (34.6)
County government	7 (26.9)
Municipal government	6 (23.1)
Modal authority	3 (11.5)
Joint city/county government	1 (3.9)

Table 15 shows the frequency of MPO policy board meetings. Because some documents MPOs are required to produce should be updated annually, MPO policy boards are expected to meet at least once a year (Bond, Kramer & Seggerman, 2010). The most common meeting frequency in the sample was bi-monthly and four MPOs reported "as needed" for this question.

Table 15. Frequency of MPO Policy Board Meetings

Meeting frequency	Freq. (%)
Monthly	9 (27.3)
Bi-monthly	10 (30.3)
Quarterly	9 (27.3)
Bi-annually	1 (3.0)
Annually	0
As needed	4 (12.1)

Collaborative Decision Making in MPOs

Consensus on policy decisions

The majority of MPOs (76%) makes their major policy decisions (such as the Long-Range Planning or Transportation Improvement Program) by simple majority. Other MPOs reported that they use super majority or unanimous agreement. Four respondents reported "Other," and stated in narrative form. One of them reported that

they adopt simple majority for consensus, but they must have 2 of 3 state representatives from each state vote affirmatively for an action to pass.

Project Selection Criteria

Because MPOs are expected to allocate transportation funds to a limited number of projects, they conduct a project selection process for their TIP and LRTP. This process is essential for MPO decision making, but the criteria MPOs use to choose among different projects have not been examined sufficiently in the literature. In fact, prioritizing projects is very difficult because MPO boards consist of representatives from local jurisdictions who are under pressure to remain loyal to their constituents; on the other hand, though, they must consider regional benefits as well (Dempsey, Goetz & Larson, 2000). MPO directors and policy board members are asked to answer the following open-ended question: "What are the main criteria used to choose among different projects?"

Selections are made in coordination with different project applicants seeking to maximize the benefit derived from limited funding resources. One MPO director described the project selection process as follows:

> "We have a call for projects process that helps build our TIP each year. Each MPO jurisdiction may submit project applications for either new projects or for additional funds for existing projects. Generally, we try to focus on funding and finishing existing projects before major new projects are added. It is rare that we have a set of projects from jurisdictions that are competing. We usually find a way to balance everyone's needs and have a unified set of projects to bring to the Policy Committee for final adoption by vote."

Most respondents answered that they employ a combination of multiple criteria. Overall, the result showed that the decision making hinges primarily on fund availability, jurisdiction needs and regional benefits. Other criteria include safety improvement,

economic development, air quality and environment, traffic flow improvements and multi-modal connections. There were few differences between responses from directors and those from board members.

When selecting projects, 21 MPOs (out of 34) in the sample utilize a ranking system (62%) to guide their decisions.[6] They utilize different point systems for their ranking criteria. Some MPOs develop their point systems cooperatively with technical and policy board members; however, in some cases, state DOTs (e.g., Georgia, New York) lead a data-driven process that scores projects relative to each other. In particular, it seemed that TIP projects are chosen largely by state DOTs and the policy boards have little opportunity to select among different projects. Furthermore, most MPOs in the sample use weighted criteria. Although each project is evaluated and a score is generated, one respondent noted that the score is not to be used rigidly because a few points in either direction do not indicate a significant difference in rank but rather an overall level of regional importance. In this view, the selection process is subjective.

Table 16. Examples of MPO Ranking System for Project Selection

| MPO	Content
Montgomery MPO	3 points for safety, traffic improvement, and regional significance 1 point for any other identified benefit, for a maximum of 10 points
Hampton Roads MPO	3-100 point scoring system by category of project such as project utility, economic vitality, and project viability

Public involvement

As noted in Chapter 4, MPOs are supposed to involve the public during their decision-making process. Figure 7 showed that MPOs use various methods for public

---

[6] Even MPOs that do not adopt a ranking system appear to use performance-based criteria for project selection (Montes de Oca & Levinson, 2006).

participation. Almost all MPOs in the sample (33 out of 34) have their MPO websites and use public information materials such as newsletters, brochures, advertisements and press releases.

Figure 7. The Methods for Public Involvement (frequency)
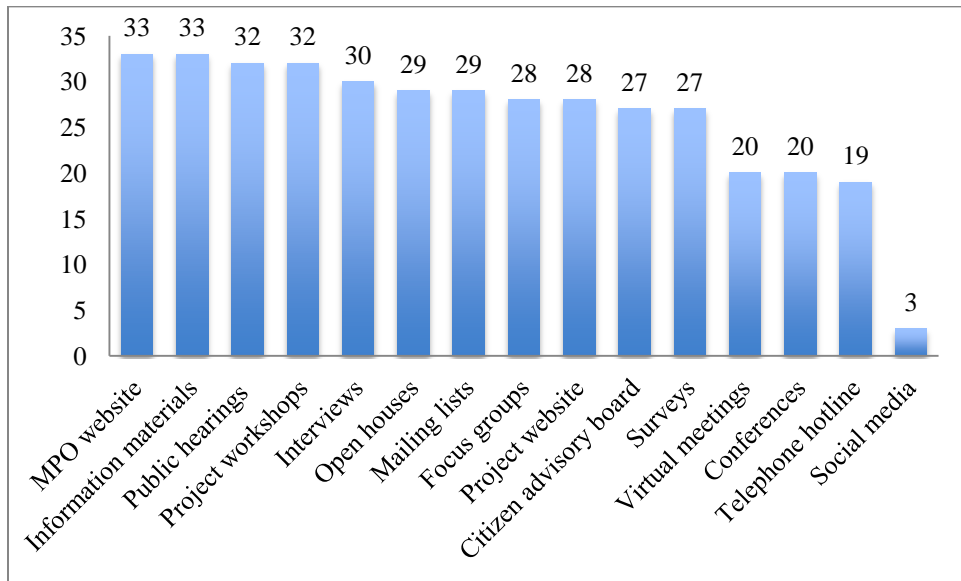
N = 33 MPOs

In addition, MPO directors indicated to what extent each public involvement activity influences MPO decision making, with a five-point scale (1 = no extent; 3= moderate extent; and 5 = very great extent). Figure 8 presents the average scores across 33 MPOs. Although only three MPOs use social media (i.e. Facebook), social media appeared as the most influential method to involve the public. As noted in Chapter 3, a citizen advisory board is typically included in a MPO's structure; but interestingly, its level of influence on MPO decision making was moderate. Rather, project workshops and interviews with key stakeholders/people are perceived as more effective public involvement tools than a citizen advisory board.

When asked if MPOs have specific evaluation criteria for public involvement activities, 52% of MPOs in the sample answered that they do. One respondent noted in a manner representative of more than 50 % of MPOs as follows: "Each public involvement activity is qualitatively evaluated in terms of reach/participation, variety of participants, extent and variety of input received, satisfaction of participants in the activity and influence of input gathered on plans/decisions."

Figure 8. The Influence of Public Involvement Method on MPO Decision Making (mean)
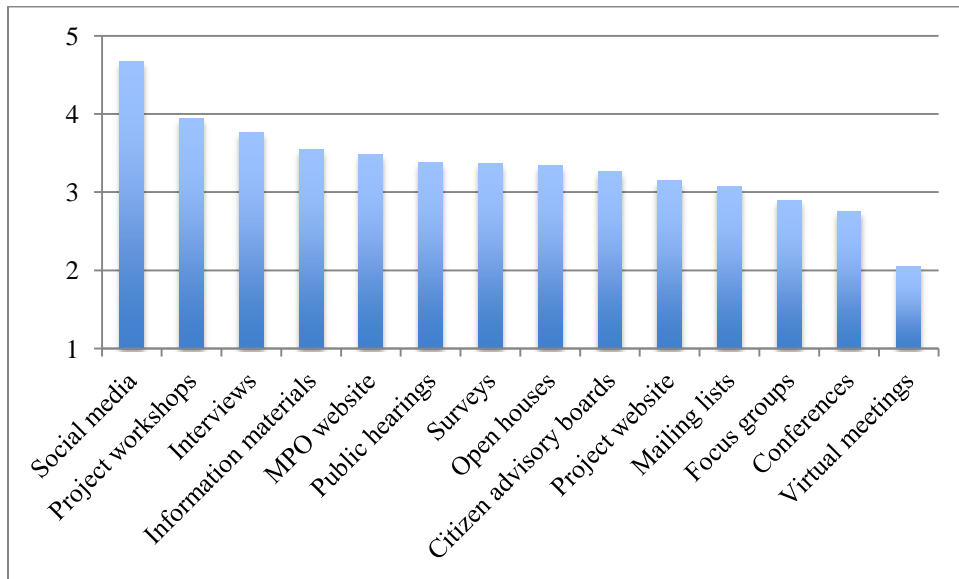
Evaluation of MPO decision-making process

Despite the importance of having a method for measuring MPO performance, one has not been actively developed. Although the studies in the field of planning have widely discussed a possible performance measurement for regional transportation, research in the context of MPOs is relatively rare (Pickrell & Neumann, 2001; Cambridge Systematics, 2010). GAO (2009) reported the problem arising from the lack of MPO performance measures and recommended that MPOs adopt a performance measurement

system. Hence, it is important to examine how MPOs evaluate their decision-making processes from their own perspectives.

This section is based on the responses of MPO directors and policy board members to two open-ended questions: "How does your MPO gauge the overall effectiveness of the MPO decision-making process?" and "How does your MPO gauge the overall fairness of the MPO decision-making process?" Regarding the question of effectiveness, 29% (i.e., 10 out of 34 MPOs) responded that there are no methods to evaluate their effectiveness. Furthermore, 32% of MPO directors (i.e., 11 out of 34 MPOs) answered that the effectiveness is based primarily on whether the funds are programmed and spent in a timely manner. Because funding is limited, board members feel pressure to implement an approved project; therefore, whether or not projects move from phase to phase and through to completion gauge the effectiveness of the MPO decision-making process. Eight MPOs measure effectiveness by using feedback from the public and the general satisfaction of its member jurisdictions regarding how well the process works.

With respect to fairness, almost half of the MPO directors in the sample indicated there are no specific measures for fairness. One respondent put it this way:

> "We don't have any formal measures to gauge fairness. I think this one is really in the eye of the beholder. On controversial issues, the determination of fairness may hinge on whether you got the result you wanted. I guess I look at it as making sure that the committees use a transparent, predictable process with ample public involvement to ensure that all voices have been heard. Then the vote on a particular issue should be considered fair regardless of the outcome."

The other responses include the amount of complaints and feedback received from the community and policy board members (e.g., the number of people who show up at their

meetings to complain). Only one respondent raised the issue of the geographic and

relative population balance of projects in terms of fairness in the decision-making process.

5.2 Preliminary Analysis

Before testing the hypotheses, this section provides the results of the preliminary analyses of the research framework (see Figure 3). Difference of means was used to examine first the relationship between network member diversity and social capital and second, that between social capital and network performance.

Relationship Between Diversity and Social Capital

To explore the relationship between network member diversity and social capital, t-tests were conducted. Based on the previous literature, the research framework in this dissertation would predict a negative relationship between diversity and internal density, but a positive one between diversity and external range. Based on a diversity index (Blau) ranging from 0 (homogeneous) to 1 (heterogeneous), expected directions are shown in Table 17, but only one difference was found to be statistically significant. The mean of external range at the low level of organizational membership diversity was 0.722 compared with 0.833 at the high level of membership diversity. Organizational membership diversity is positively associated with external range at the 0.001 level of significance. When policy board members' home organizations are more diverse, then the policy board has more structural holes, meaning that board members have more non-redundant ties.

Table 17. Comparison of Means for Low versus High Level of Diversity[7]

| | Gender diversity | | | | | Organizational membership diversity | | | | |
| | low level (n=17) | | high level (n=15) | | | low level (n=16) | | high level (n=16) | | |
	M	SD	M	SD	t	M	SD	M	SD	t
Internal density (valued)	0.226	0.156	0.204	0.12	0.4436	0.232	0.161	0.199	0.116	0.659
External range	0.756	0.099	0.803	0.1	-1.356	0.722	0.098	0.833	0.065	-3.76 ***

Note: Although I conducted t-tests using a different density measure (based on binary network data), I did not include the results here because it showed a pattern consistent with the density measure from the valued network data.
***Significant at 0.001 level

Relationship Between Social Capital and Network Performance

Difference tests were carried out to examine whether there were significant differences between high and low levels of social capital in network performance. Measuring network (i.e., MPO) performance, I used multiple measures – perceived network effectiveness, network fairness,[8] fund allocation fairness and the quality of the decision-making process–from board member and director survey responses.

Fund allocation fairness was measured with two questions (e.g., "the criteria for fund allocations are fair") and the quality of the decision-making process was measured with three questions for policy board members (e.g., "the distribution of transportation funds by the MPO is based on the transportation needs of the entire metropolitan area"). These questions were drawn from Dempsey et al.'s (2000) report to Congress, and responses were structured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Cronbach's alpha was 0.9131 and 0.8627 for fund allocation fairness and process

---

[7] I divided my sample into two groups based on the median value of diversity (low level = below the median, high level = above median)
[8] Because the measures of network effectiveness and fairness from the *MPO director* survey were already discussed in Chapter 4, I include the measures of fairness and the quality of decision making from the *policy board member* survey alone here.

quality, respectively, meaning there is a high level of internal reliability between two

measures.

Table 18. Comparison of Means for Low versus High Level of Social Capital[9]

| | Internal density (valued) | | | | | External range | | | | |
| | low level (n=16) | | high level (n=15) | | | low level (n=15) | | high level (n=16) | | |
	M	SD	M	SD	t	M	SD	M	SD	t
Perceived effectiveness (director)	4.438	0.727	4.477	0.64	-0.118	4.467	0.64	4.438	0.727	0.118
Perceived fairness (director)	4.375	0.806	4.4	0.63	-0.096	4.4	0.828	4.375	0.619	0.096
	Internal density (valued)					External range				
	low level (n=30)		high level (n=30)			low level (n=30)		high level (n=30)		
	M	SD	M	SD	t	M	SD	M	SD	t
Perceived effectiveness (policy board member)	4.3	0.877	3.8	0.95	2.105**	4.167	0.986	3.93	0.907	0.954
Fund allocation fairness(policy board member)	4.233	0.666	3.533	0.84	3.576***	4.083	0.658	3.683	0.942	1.907*
Process quality (policy board member)	4.3	0.621	3.656	0.81	3.447***	4.156	0.752	3.8	0.796	1.779*

Note: Although I conducted t-tests using different density measures (based on binary
network data), I didn't include the results here because it showed a consistent pattern
with the density measures from valued network data in Table 18.
*Significant at .10 level, **Significant at .05 level, ***Significant at .01 level

When I employed two network performance measures (i.e., perceived

effectiveness and fairness) from MPO directors' responses, the differences in social

capital variables were not significant. This result suggests that the differences were too

small to produce significant results in my small sample. With regard to MPO

performance based on policy board members' responses, there are statistically significant

differences between low and high levels of social capital variables, but contrary to the

expectation, there were negative relationships between social capital variables (i.e.,

density and external range) and network performance. This may be because of the

---

[9] The sample was divided into low and high level based on the median value of social capital.

possible non-response bias of policy boards. As noted in Chapter 4, the response rate of policy board members across MPOs ranged from 4.4 to 38.9%. To avoid this possible bias, network performance rated by MPO directors was used for subsequent regression analyses.

5.3 Regression Analysis

Although this study collected survey data from 94 individuals, the sample size for

the purpose of analysis is 34 MPOs because the unit of analysis is an MPO. This study

used multiple sources of data to avoid inflated correlations because of mono-method bias.

For example, MPO directors rated network management behavior and network

performance. Archival sources were used to find diversity measures. Network-based

social capital variables were based on the policy board meeting minutes. In the following

sections, I ran two types of regression analyses to test my hypotheses.

Ordinary Least Square (OLS) Regression Analysis

First, I used the OLS to estimate a system of simultaneous equations by

estimating each equation separately. Small sample size in this research may provide

limited information to estimate all the equations in a system simultaneously and may

result in biased estimates. Kennedy (2008) notes that, with acknowledging its asymptotic

bias, the OLS estimator can be used in small samples because:

> "(1) The OLS has minimum variance among alternative estimators, (2) the
> properties of the OLS are less sensitive than the alternatives to the presence of
> estimation problems including multicollinearity, errors in variables, or
> misspecifications, particularly in small samples, (3) Predictions from
> simultaneous equation models estimated by OLS often compare quite favorably
> with predictions from the same models estimated by alternatives, and (4) OLS can
> be useful as a preliminary or exploratory estimator" (p.177).

I examined the residuals to check whether they were normally distributed.

Although there were no severe outliers in the models, the Shapiro-Wilk tests rejected the

normality assumption for models 1, 4, and 5. This may affect the results of statistical

significance tests because it changed the standard of error. Thus, the results should be

interpreted with caution.

Table 19. Regression Analyses Predicting Social Capital and Network Performance

Dependent var. / Independent var.	Model1 Density	Model2 External range	Model3 Effectiveness	Model4 Fairness	Model5 Effectiveness	Model6 Fairness
Gender diversity	0.311	0.005	0.152	1.305	-1.074	-0.941
	(0.238)	(0.088)	(0.992)	(1.106)	(1.579)	(1.777)
Organizational membership diversity	-0.029	0.064***	0.545	0.659**	0.556	0.703**
	(0.053)	(0.017)	(0.356)	(0.281)	(0.321)	(0.305)
Network size	-0.000	0.004***	-0.016	-0.001	-0.013	0.014
	(0.002)	(0.001)	(0.016)	(0.015)	(0.015)	(0.016)
No. of meetings	-0.008	-0.007	-0.002	-0.108*	0.062	-0.063
	(0.016)	(0.006)	(0.079)	(0.060)	(0.090)	(0.066)
Density			0.725	0.010	-1.989	-6.827
			(0.687)	(0.762)	(5.420)	(4.347)
External range			0.832	-1.744	15.011*	27.829***
			(3.773)	(3.542)	(8.428)	(8.403)
Mobilizing behavior			-0.116	-0.029	-3.304	-6.388
			(0.317)	(0.309)	(3.269)	(4.566)
Synthesizing behavior			0.772**	0.630*	6.231*	12.063**
			(0.346)	(0.347)	(3.437)	(4.625)
ID*Mobilizing					-4.440	-1.742
					(2.731)	(3.171)
ID*Synthesizing					4.457	3.068
					(3.252)	(3.270)
ER*Mobilizing					4.851	7.779
					(3.734)	(4.924)
ER*Synthesizing					-7.961*	-15.021***
					(4.141)	(5.123)
_cons	0.189	0.538***	0.083	1.769	-9.855*	-18.668***
N	32	32	31	31	31	31
r2	0.074	0.811	0.426	0.360	0.586	0.626

Note: Robust standard errors in parentheses (*$p<0.1$, **$p<0.05$, ***$p<0.01$)

Table 19 reports the OLS results. All models contain two control variables (i.e. network size and number of meetings). I estimated Models 5 and 6 in Table 19 with added interaction terms between social capital variables and network management variables. Gender diversity had no significant effect on density and performance measures. Organizational membership showed expected directions on each dependent variable. As expected, it had a negative influence on internal density. If the policy board

consists of members from diverse home organizations, these members will tend to have less communication or interaction with each other. Organizational membership diversity had a positive relationship with range, and this relationship was found to be statistically significant. Also, this study found that when a policy board has members who are diverse in terms of their home organizations, the board is more likely to have more structural holes. This implies that diverse members would have different contacts, and those contacts would be more likely to be disconnected from each other. Organizational membership diversity was also found to be positively associated with both measures of network performance, but it showed a statistically significant effect only on network fairness.

Regarding network management behavior, synthesizing network management behavior had a significant and positive effect on both types of network performance. Mobilizing behavior showed negative relationships with network effectiveness and fairness, but they were not statistically significant. Four interaction terms showed consistent direction across Models 5 and 6, but only one interaction term between range (structural holes) and synthesizing behavior was significant.

Seemingly Unrelated Regression (SUR) Analysis

Tables 20 shows the results of the models tesing Hypotheses 1 through 7. In estimating the models, I used SURE, originally proposed by Arnold Zeller (1962), to improve efficiency.[10] SURE estimates several equations as a set, using a single regression and is appropriate "when a series of regression analyses is conducted and the dependent variable in one regression becomes an independent variable in subsequent analyses

---

[10] Because of the sample size, I did not use a LISREL as an alternative method.

because it allows for error covariances among the residuals" (Johnston, 1984, cited in Brown, Jones & Leigh, 2005, p. 975)[11]. Thus, it is appropriate to use SUREs in this research because the predictors for internal density ovelap with the predictors for external range. In addition, internal density and external range are dependent variables in the equations, but they also become independent variables in the equation with network performance as a dependent variable.

My research framework (Figure 3) consists of three types of relationships: 1) diversity and internal density 2) diversity and external range, and 3) social capital (i.e., density and range) and performance, but SURE includes four sets of multiple equations because I used two types of network performance (i.e., effectiveness and fairness) as dependent variables. That is, there are four equations representing $Y_i = X_i \beta_i + \varepsilon_i$, where i refers to the ith equation. These equations can be written as the following matrix.

$$\begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ Y_4 \end{bmatrix} = \begin{bmatrix} X_1 & 0 & 0 \\ 0 & X_2 & 0 \\ 0 & 0 & X_3 \\ 0 & 0 & X_3 \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \end{bmatrix}$$

Y_1 and Y_2 refer to internal density and external range, respectively, and X_1 and X_2 represent a set of regressors explaining the variation of each dependent variable. Y_3 and Y_4 denote network performance, which was measured as effectiveness and fairness, respectively. X_3 is a set of explanatory variables for network performance. If there is contemporaneous correlation between the error terms (for example, ε_1 and ε_2), the variance-covariance matrix of ε^* is not diagonal. "Estimating these error correlations and the diagonal elements should allow estimation of the variance-covariance matrix of ε^*

---

[11] On the other hand, the program evaluation literature is concerned about the possibility of estimates being biased because of endogeneity issues when simultaneous equations are used in the SUR (Cameron & Trivedi, 2009).

and generation of estimated generalized least square (GLS) estimates of β^*" (Kennedy, 2008, p.187).

To determine error independence and whether the variance–covariance is diagonal, I conducted a Breusch-Pagan Lagrange multiplier test, computed by using the chi-square distribution (Cameron & Trivedi, 2009). The results show a statistically significant correlation between errors in equations at the 0.1 level of significance (chi-square $= 11.639$, $Pr = 0.071$); thus, the residuals from the four equations are independent of one another and SURE produces efficiency gains. I used small sample adjustment option for analyses. I also checked potential collinearity effects with the variance inflation factor (VIF) because I found some significant correlations among several variables (e.g., network size and organizational membership diversity) (see Table 12), but the results indicated a limited effect of collinearity on models.

Table 20 presents the results of the SURE. Each of equation ($Y_1 = X_1\beta_1 + \varepsilon_1$, $Y_2 = X_2\beta_2 + \varepsilon_2$, $Y_3 = X_3\beta_3 + \varepsilon_3$, and $Y_4 = X_3\beta_4 + \varepsilon_4$) is explained by one of the columns in Tables 20 and 21.

Table 20. Results of Seemingly Unrelated Regression Models: Internal Density, External Range, and Network Performance Equations

	Internal Density (ID)		External Range (ER)		Network Performance			
					Network Effectiveness		Network Fairness	
Network size	0.000	(0.002)	0.004***	(0.000)	-0.013	(0.012)	0.014	(0.012)
Number of meetings	-0.008	(0.014)	-0.003	(0.004)	0.062	(0.053)	-0.063	(0.054)
Gender diversity[a]	0.316	(0.221)	-0.072	(0.056)	-1.074	(1.051)	-0.941	(1.058)
Organizational membership diversity[a]	-0.029	(0.055)	0.055***	(0.014)	0.556**	(0.223)	0.703***	(0.225)
Internal Density (ID)					-0.560	(0.721)	-1.012	(0.726)
External Range (ER)					1.142	(2.569)	-3.397	(2.587)
Mobilizing behavior					-0.489*	(0.254)	-0.712***	(0.255)
Synthesizing behavior					1.001***	(0.286)	1.039***	(0.288)
ID*Mobilizing					-4.44**	(1.893)	-1.742	(1.906)
ID*Synthesizing					4.457**	(2.197)	3.068	(2.212)
ER*Mobilizing					4.851	(3.079)	7.779**	(3.101)
ER*Synthesizing					-7.961**	(3.540)	-15.021***	(3.565)
R-Squared	0.072		0.850		0.586		0.626	

a. Teachman's (1980) index
b. Entries are unstandardized coefficients
c. Standard errors in parentheses, *$p < .10$, **$p <. 05$, ***$p < .01$

The first equation explains the impact of network member diversity on internal density. In the previous literature, as a group (or network) gains more diverse members, internal density is expected to decrease, but two types of diversity had no signifciant relationships with internal density. Organizational membership diversity had negative relationships with density as expected, but it was not statistically significant. This equation tests Hypothesis 2, which predicted a negative association between network member diversity and internal density. Neither the relationship between gender diversity and internal density nor the relationship between organizational membership diversity and density was significant. Therefore, these results do not support Hypothesis 2.

The second equation indicates the impact of diversity on external range. As expected, organizational membership diversity had a positive and significant impact on

range. This result means that as more diverse organizations participate in the MPO policy board, more structural holes appear and thus, the range of the network's external relations increase. However, gender diversity had nonsignificant associations with social capital variables in either direction. Thus, Hypothesis 3, predicting positive relationships between network member diversity and external range, was partially supported.

Because the effect of gender diversity was nonsignificant, I conducted additional analyses to test the robustness of the result. I used an alternative measure of diversity– Blau's index of heterogeneity–both for network effectiveness and fairness models (Table 21). The result revealed no significant effect of gender diversity again and it showed a similar pattern with previous results using Teachman's index in Table 20.

Table 21. Results of Seemingly Unrelated Regression Models:
Internal Density, External Range, and Network Performance Equations: Blau index

|	Internal Density (ID)	External Range (ER)	Network Performance	
			Network Effectiveness	Network Fairness
Network size	0.000 (0.001)	0.004*** (0.000)	-0.018 (0.012)	0.012 (0.011)
Number of meetings	-0.008 (0.016)	0.000 (0.005)	0.052 (0.057)	-0.040 (0.056)
Gender diversity[a]	-0.131 (0.167)	-0.053 (0.049)	0.391 (0.762)	-0.223 (0.752)
Organizational membership diversity[a]	-0.295 (0.212)	0.156** (0.063)	2.256** (1.045)	3.308*** (1.032)
Internal Density (ID)			0.451 (0.920)	0.008 (0.908)
External Range (ER)			2.360 (2.457)	-2.695 (2.425)
Mobilizing behavior			-0.248 (0.229)	-0.541** (0.226)
Synthesizing behavior			0.882*** (0.266)	0.958*** (0.263)
ID*Mobilizing			-3.079 (2.076)	0.005 (2.049)
ID*Synthesizing			4.269* (2.282)	3.210 (2.252)
ER*Mobilizing			2.241 (2.714)	6.415** (2.678)
ER*Synthesizing			-7.784** (3.214)	-16.563*** (3.172)
R-Squared	0.130	0.806	0.573	0.630

a. Blau's (1977) index
b. Entries are unstandardized coefficients
c. Standard errors in parentheses, *p < .10, **p <. 05, ***p < .01

Hypothesis 1 predicts that different types of diversity have different impacts on performance. Specifically, deep-level diversity will have a bigger impact on performance than diversity in terms of surface-level characteristics. To test the magnitude of different types of diversity on performance, standardized coefficients in the previous SURE model were calculated. The bar charts in Figure 9 show a comparison of the magnitudes of effects for different types of diversity. This figure shows that only organizational membership diversity significantly increased network performance. Also, the standardized coefficient of membership diversity was actually higher than that of gender diversity. Thus, Hypothesis 1 was supported.

Figure 9. Effects of Network Member Diversity on Network Performance, by Type of Diversity
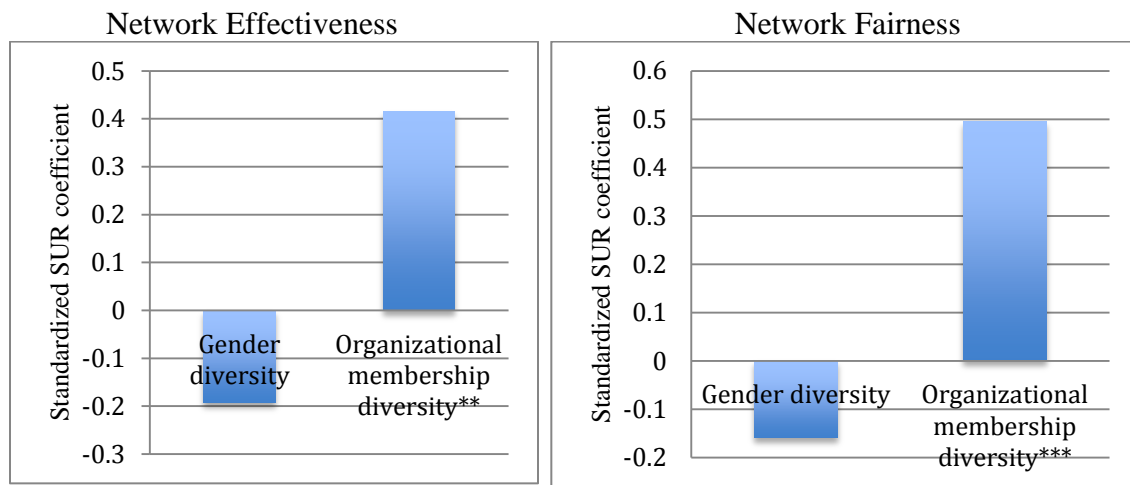
**p<.05 ***p<0.01

I analyzed the network performance model in two equations. Hypothesis 4 and 5 predict the direct effects of social capital on performance. Social capital variables were expected to have positive relationships with performance, but they were not statistically significant.

Hypothesis 6 posits that internal density and external range would act as mediators between network member diversity and performance. The results revealed that the conditions for mediation were partially satisfied for the relationship between range and network effectiveness and network fairness but not for the relationship between internal density and any performance measures. The indirect effects of internal density do not appear to mediate the relationship between gender diversity and network effectiveness (beta= -0.177, ns) and the relationship between organizational membership diversity and effectiveness (beta= 0.016, ns). For network fairness, internal density showed partial mediation effects. Although density had a significant effect on the gender-fairness relationship (beta = -0.320, $p < 0.1$), it had a nonsignificant effect on the membership diversity-fairness relationship (beta = 0.029, ns).

External range had partial indirect effects on the relationship between diversity and performance. I found the mediating effects of external range not on the relationship between gender diversity and network effectiveness (beta = -0.082, ns), but on the relationship between organizational membership diversity and effectiveness (beta = 0.063, $p < 0.1$). In the model using network fairness as a dependent variable, I found that external range did not mediate the effect of gender diversity on fairness (beta = 0.245, ns), but mediated the effect of organizational membership diversity on fairness (beta = -0.187, $p < 0.001$). Based on these results, both Hypothesis 6-1 and 6-2 were partially supported.

Hypothesis 7 concerned the moderating influence of network management behavior (mobilizing/synthesizing) on the relationship between social capital and network performance. As explained in Chapter 2, mobilizing behaviors are to "develop support for network processes from network participants and stakeholders" (e.g.,

publicizing the MPO's goals and accomplishments) and sythesizing behaviors are to

"enhance the conditions for favorable, productive interaction among network participants"

(e.g., creating trust among policy board members) (McGuire, 2002, pp. 602-603). The

third and fourth columns in Table 20 assess the interaction effects and explore whether

social capital variables and network management behaviors interact in terms of their

effects on network performance. Among four interaction variables, three interactions

were statistically significant for network effectiveness. The effect of internal density was

qualified by significant mobilizing x internal density interaction (beta = -4.44, $p < 0.05$)

and synthesizing x internal density interaction (beta = 4.457, $p < 0.05$) with respect to

network effectiveness. This has two implications: (1) when an MPO has both a dense

structure and more mobilizing management behaviors, there is a negative effect on

overall network effectiveness; and (2) when a MPO has a dense network structure among

board members and more mobilizing behaviors, there is an additional contribution to

effectiveness.

Although the mobilizing x external range interaction was nonsignificant (beta =

4.851, p = 0.115), the synthesizing x external range interaction was significant (beta = -

7.961, $p < 0.05$). Regarding network fairness, the results indicated significant interaction

effects between external range and network management behaviors (for mobilizing, beta

= 7.779, $p < 0.05$ and for synthesizing, beta = -15.021, $p < 0.01$).

In sum, although both types of network management behaviors matter for MPO

effectiveness (for mobilizing, beta= -0.489, $p < 0.1$ and for synthesizing, beta=1.001, $p <$

0.001) and fairness (for mobilizing, beta= -0.712, $p < 0.001$ and for synthesizing, beta=

1.039, $p < 0.001$), their influences are different when network structures are considered.

96

The impact of network structure (density and range) on performance diminishes or increases depending on the type of network management behaviors.

Each interaction showed consistent direction and pattern across two equations (i.e., effectiveness and fairness), but the results of interaction warranted further examination. For example, with respect to network effectiveness, three of four interactions were statistically significant but it was difficult to interpret the overall impact of network management behaviors because the signs of their coefficients were different. It is interesting to note that the results demonstrated positive interaction effects between synthesizing and internal density and between mobilizing and external range, but negative interactions between mobilizing and internal density and between synthesizing and external range. To better understand the meaning of each coefficient on these effects, I ran additional analytical procedures.

First, I plotted those interaction effects to further illustate the moderating effect of network management behavior (Figure 10). When synthesizing behavior in the MPO was high, internal density led to effectiveness, but when sythesizing behavior was low, external range (more structural holes) was more valuable. When mobilizing behavior was high, MPO effectiveness was higher with a high level of internal density than low.

Figure 10. Interactive Effect of Network Management Type (Mobilizing/Synthesizing) and Social Capital (Internal density/External range) on Network Effectiveness
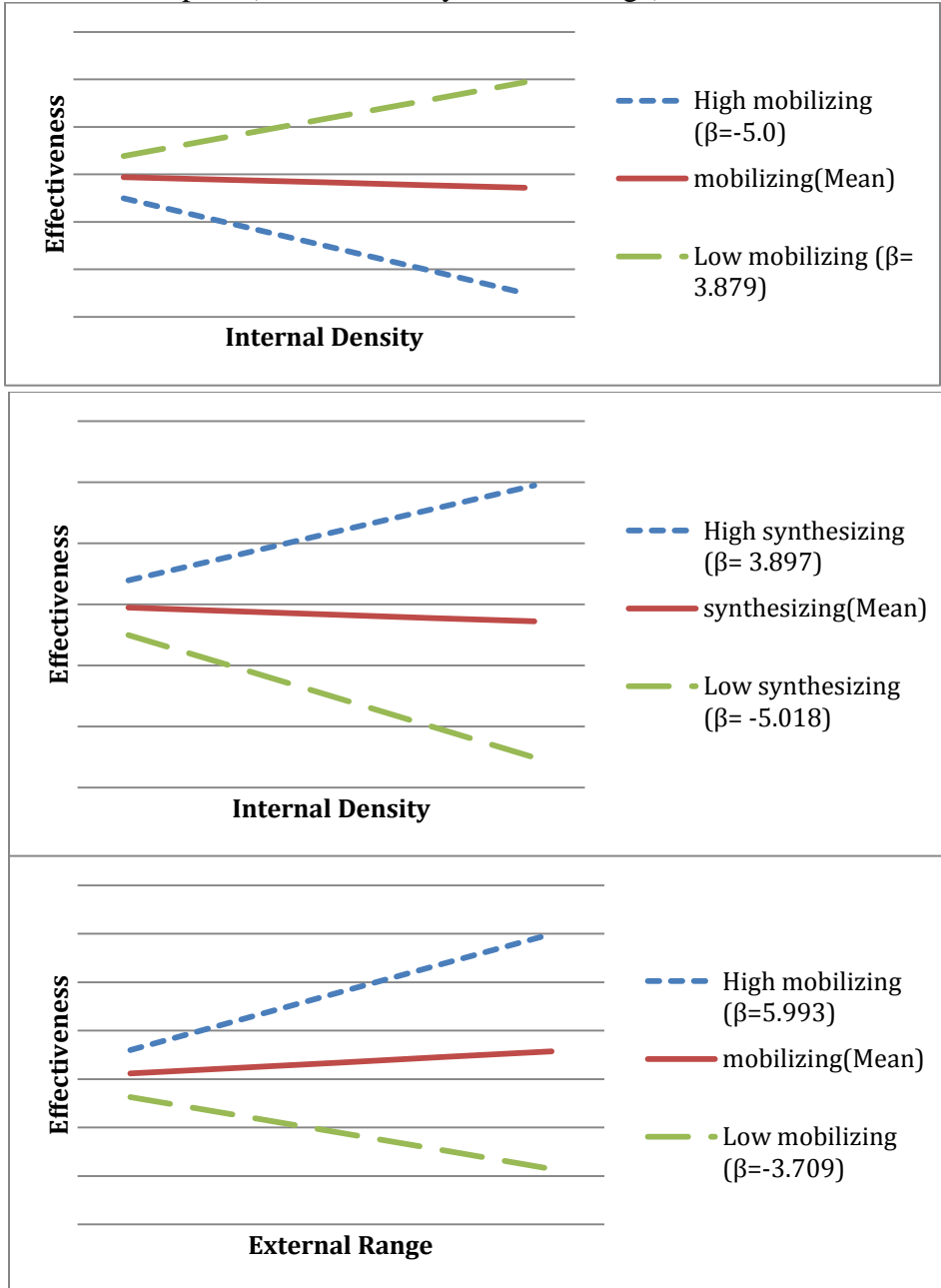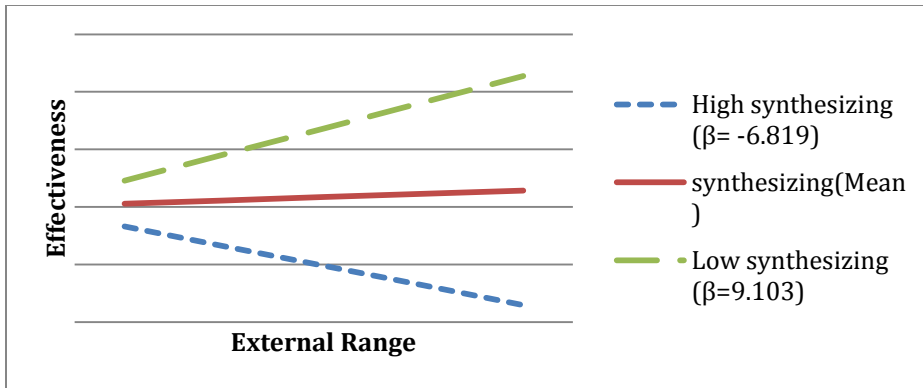
Figure 11. Interactive Effect of Network Management Type (Mobilizing/Synthesizing)and Social Capital (Internal density/External range) on Network Fairness
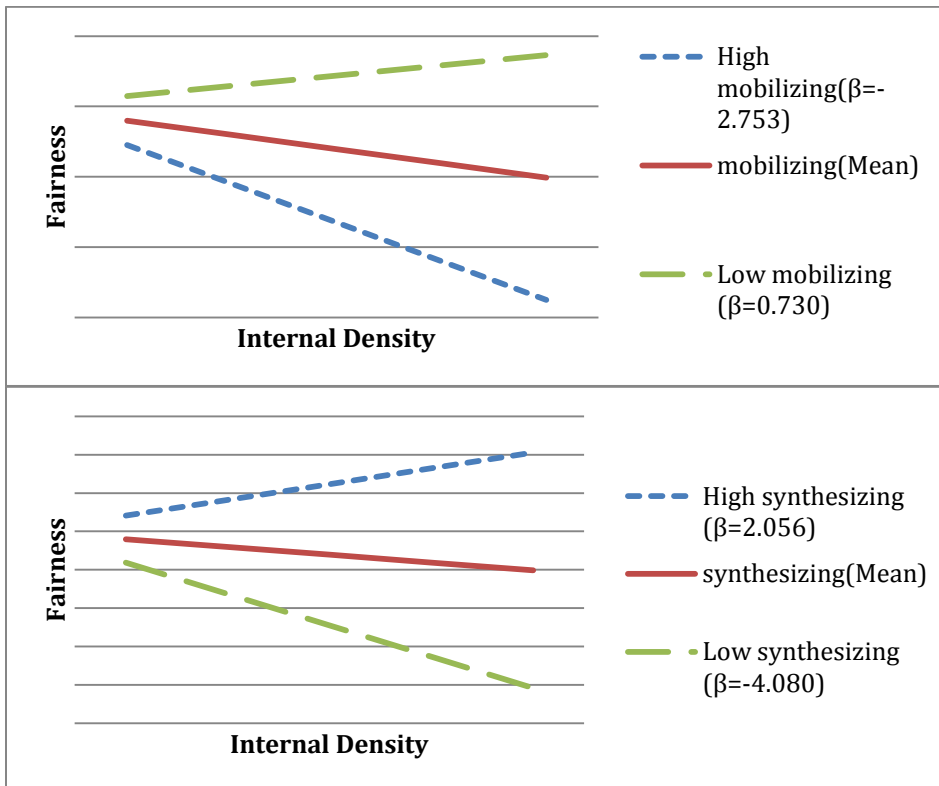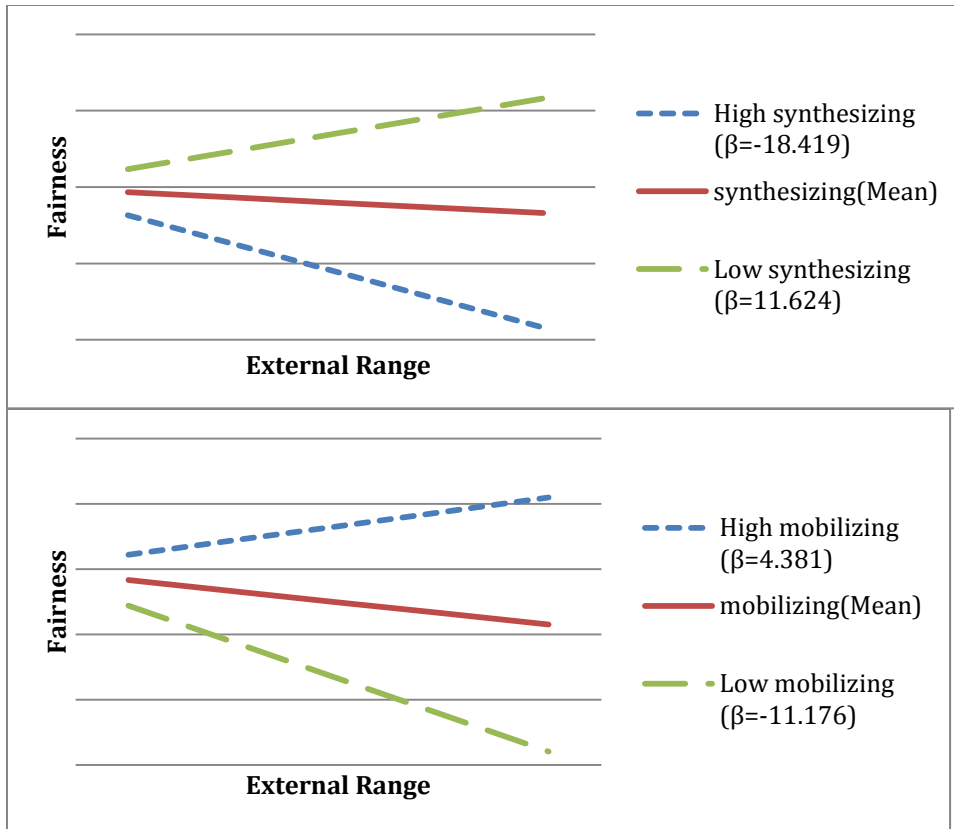
Second, although this was not directly hypothesized, one important and practical question here is which type of management behaviors would be more useful for MPO performance. I explored this question by comparing two scenarios:

Scenario1: When an MPO engages more in synthesizing behavior, how much is its performance changed?

Scenario2: When an MPO increases its mobilizing behavior, how much is its performance changed?

Figure 12 provides the results of simulations exploring this question. To calculate the impact of each type of network management behavior on network effectiveness, I reached Equation (1) using the coefficients of the previous SUR results. Equations (2) and (3) showed the marginal effect of each type of network management behavior. As

seen in the equations, the impact of network management depends on internal density and external range. Using the value of internal density and external range from each MPO in my sample, I calculated the impact of each type of management and then compared the two scores for better performance.

$$Y= -0.489M+1.001S-0.56ID+1.142ER-4.44ID*M+4.457ID*S+4.851ER*M-7.961ER*S \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\text{Equation (1)}$$

where *Y* (Network effectiveness), *ID* (Internal density), *ER* (External range), *M* (Moblizing behavior), *S* (Synthesizing behavior)

$$\frac{\P Y}{\P M} = -0.489 - 4.44 \ ´ ID + 4.851 \ ´ ER \ \ldots\ldots\ldots.. \text{ Equation (2)}$$

$$\frac{\P Y}{\P S} = 1.001 + 4.457 \ ´ ID - 7.961 \ ´ ER \ \ldots\ldots\ldots.. \text{ Equation (3)}$$

Figure 12. Impact of Network Management by Internal Density and External Range: Network Effectiveness
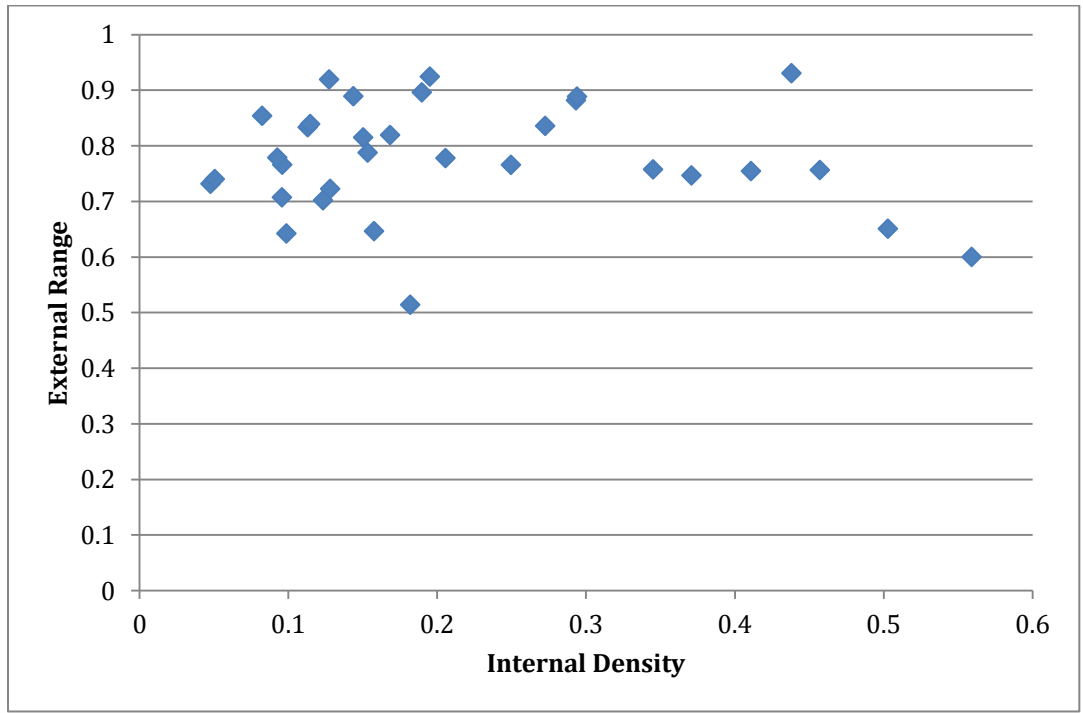
Note: Each circle and square represents a different MPO in the sample.

Figure 12 shows the result of comparison of each MPO in my sample. MPOs represented by squares are more effective when using mobilizing management behavior such as establishing member commitment to the MPO's mission and publicizing the MPO's goals and accomplishments. This figure demonstrates that mobilizing behavior would be more appropriate for MPOs in my sample. I followed the same procedure for calculating the impact of network management on fairness.

$$Y = -0.712M + 1.039S - 1.012ID - 3.397ER - 1.742ID*M + 3.068ID*S + 7.779ER*M - 15.021ER*S$$ …………..Equation (4)

where Y (Network fairness), ID (Internal density), ER (External range), M (Moblizing behavior), S (Synthesizing behavior)

$$\frac{\partial Y}{\partial M} = -6.388 - 1.742 \times ID + 7.779 \times ER$$ ………….. Equation (5)

$$\frac{\partial Y}{\partial S} = 12.063 + 3.068 \times ID - 15.021 \times ER$$ ………….. Equation (6)

The result revealed similar pattern with Figure 12. MPOs in the sample obtain higher level of fairness when engaging in mobilizing behavior. A summary of analysis results is presented in Table 22.

Before proceeding to the next chapter, let me briefly consider some methodological issues that could bias these SUR results. SUR estimation is a type of General Least Square (GLS) estimation. The GLS estimator is expected to be consistent and thus it may be shown to have asymptotic properties (Kennedy, 2008). Because of the small number of samples used here, however, it might be hard to expect consistent coefficients from SUR. For a robustness check, I ran both OLS regression and SUR. Overall, the directions of coefficient signs across these two methods were the same

except for the gender diversity-external range relationship. In both estimations,

organizational membership diversity had statistically significant and positive

relationships with external range and network performance, while gender diversity had

nonsignificant effects on social capital and performance variables. Both OLS and SUR

results, however, had the potential for endogeneity problem. For example, if any of the

omitted variables explaining network performance were related with social capital

variables, then the estimates of social capital could generate biased coefficients.

Moreover, a set of equations in the SUR consists of simultaneous causal relations. For

instance, social capital variables are dependent variables in the first and second equation

as well as independent variables in the last equation. Thus, we should be cautious when

interpreting causal relation between social capital and network performance without

further identification strategy.

Table 22. Summary of Results

		Hypothesis	Supported?
Type of diveristy	H1	Different types of diversity have different influences on performance, in that deep-level diversity has a stronger relationship with performance than surface-level diversity does.	Supported
Diversity ⇒ Social capital	H2-1	The greater the surface-level diversity in networks, the lower network density in the networks.	No
	H2-2	The greater the deep-level diversity in networks, the lower network density in the networks.	No
	H3-1	The greater the surface-level diversity in networks, the higher the external range in the networks.	No
	H3-2	The greater the deep-level diversity in networks the higher the external range in the networks.	Supported
Social capital ⇒ Network performance	H4	The greater the density in a network, the higher its network performance.	No
	H5	The greater the external range in a network, the higher its network performance.	No
Mediating effects of social capital	H6-1	Network-based social capital variables mediate the effects of the surface-level diversity on performance.	Partially supported
	H6-2	Network-based social capital variables mediate the effects of the deep-level diversity on performance.	Partially supported
Moderating effects of Network management	H7	Network management moderates the mediating effects of social capital variables (internal density and external range) on the diversity-performance relationship, such that these effects are stronger when the use of network management is active than when it is not .	Partially supported

CHAPTER 6. DISCUSSION

Achieving network performance is a vital goal in response to the increase of inter-organizational networks public organizations involve. The primary aim of this research was to examine the factors that predict performance in public management networks by disentangling the idea that collaboration requires both diversity and unity. This contributes to both the diversity and the network literature by applying group diversity and social capital theory to inter-organizational networks to explain network performance.

Understanding diversity and structural characteristics that explain collaborative performance and their collaborative decision-making process help to increase collaborative performance. Although diversity, social capital and management behavior are expected to affect network performance in pivotal ways, the complexity of the relationships among the factors causes challenges for analysis (Larsson et al., 1998; Parkhe, 1993). Literatures that have developed relatively independently all need to be brought to bear on the problem (Faerman, McCaffrey & Van Slyke, 2001). Thus, this dissertation has examined how network members' diversity, social capital and network management behaviors influenced inter-organizational network performance by extending Reagans and Zuckerman's (2001) framework. The findings in this dissertation provide some preliminary evidence for addressing several important issues.

6.1 Findings and Implications

First, empirical results in this research showed that organizational membership diversity affects network performance, whereas gender diversity does not. MPOs diverse in organizational membership were more likely to have more structural holes (i.e., range).

Density and structural holes had important implications for performance because diversity in gender and organizational membership affect network performance through these network-based social capital variables. Thus, MPO directors and board members may seek to consider interaction patterns among MPO members to increase performance.

Interestingly, this research found that gender diversity had no significant impact on social capital variables and network performance. These results are contrary to those of conceptual studies in group diversity theory that considered gender diversity as a crucial determinant of group performance. As explained in the previous chapter, each MPO policy board member met regularly as a top-level representative of his/her organization and played a role as a final decision maker. Previous studies in group diversity tend to focus on work groups in organizations, as opposed to inter-organizational networks; however, the policy board members may not be characterized by the daily routine work interaction of groups in organizations. Hence, in this context, the importance of surface-level diversity (e.g., gender) may be less apparent than that of deep-level diversity (e.g., organizational culture).

Moreover, the results of this study are consistent with those of some previous empirical studies. For example, Reagans and Zuckerman (2001) found no effect for tenure diversity, although they found significant impacts for network variables. This adds support to the strategy of exploring the impact of the network processes that underlie theories of the diversity-performance relationship.

The findings also support the claim that the congruence assumption in the literature that needs to be better investigated. Previous literature has presumed that a network structure (i.e., interaction patterns among actors) necessarily reflects actors'

demographic characteristics (Burt, Horgarth & Michaud, 2000). In other words, demographic diversity and network patterns are treated as "congruent." However, Lawrence (1997) indicated this congruence assumption is not appropriate in most organizational settings. This research found gender composition in the policy boards is independent of the interaction among the board members.

Second, although the findings were partially supported, this research indicated the intervening impact of network-based social capital variables on the relationship between network member diversity and performance. This research was also able to demonstrate that network management behaviors influenced the strength of relationships between network-based social capital variables and network performance. For example, an MPO with dense structure is negatively associated with MPO performance. Its negative impact on performance increases when the MPO engages more in mobilizing behaviors to develop support for network processes from network actors and stakeholders. On the other hand, internal density plays a role in enhancing network performance when an MPO engages more in synthesizing behaviors. The direction of each interaction effect was consistent for both network performance measures (i.e., effectiveness and fairness). These observed interaction effects of mobilizing and synthesizing behavior supported the notion that the optimal network-based social capital is needed to decide managerial reaction in each MPO. To examine the overall impact of network management strategy on performance, I have provided the simulation results. In my sample, a mobilizing strategy was found to be more effective in improving performance than a synthesizing behavior is.

To date, a limited amount of research has investigated both structural and behavioral aspects of networks together to explain network performance (O'Toole & Meier, 2011). O'Toole and Meier (2011) viewed it as "important to take both into account in any comprehensive understanding of the network theme in public management. Inter-governmental management, in particular, involves a consideration of both" (p. 246). Although their research context is at the team level (rather than the network), Balkundi and colleagues (2006) further argued, "the network approach, to extent that it captures the social structure of the team, may contribute to a better understanding of team performance that is possible from the demography approach" (p. 254).

There are multiple types of diversity, which influence performance simultaneously (Jackson, Joshi, & Erhardt, 2003; Pelled et al., 1999; Jackson & Joshi, 2010). Most researchers in the field of group diversity have tended to focus on the isolated dimensions of diversity instead of differentiating among the types of diversity. This research takes a multi-dimensional approach; empirically assessing both surface- and deep-level diversity provides new insights and thereby, contributes to the existing diversity literature. In particular, this research provides understanding of when and how different types of diversity (i.e., gender and organizational membership) have more or less positive effects on network performance. Upon considering interaction patterns among MPO members and their network behaviors, this study found that organizational membership diversity had more effects than gender diversity. As mentioned before, this result may be related to the extent to which the network members work together. To the extent that MPO boards desire more MPO effective and fair decision-making processes, there may be advantages in mixing together individuals from more diverse organizations.

108

With respect to the network management literature, this research extends the attempts to better understand how different types of network management behaviors (both mobilizing and synthesizing behaviors) have moderating effects on network performance, and which types of network management behaviors would be more useful for metropolitan planning organizations. Although a considerable number of studies in the field of urban planning have discussed transportation planning issues, very few are interested in regional collaboration through the perspective of public management beyond the technical issues. This dissertation is a small step toward emphasizing the importance of participants' leadership and management strategies for successful regional collaborations. With examining conditional effects—social capital and network management—this research extends traditional main-effects research on diversity (i.e., diversity-performance relationship) in the inter-organizational setting. This understanding might provide metropolitan planning organizations with more insight into their organizations' functionality.

A great deal of recent social network research has focused on egocentric networks, but there has been less focus on the structural properties of bounded networks and performance (Cummings & Cross, 2003). This research focuses not on how individuals structure their networks for individual advantage but on how the composition of the network and interactions among individual organizations within the network affect network performance. Because this research takes the network (i.e., MPO) as the unit of analysis, we can address the question of how MPO performance is impacted by more or less density and structural holes among MPO policy board members. This question redirects attention from individuals' patterns of ties to the composition of the network.

109

Thus, the "whole network" approach of this research gives additional insights to existing knowledge.

6.2 Limitations and Future Directions

Because of the small sample size consisting of 34 MPOs, the findings of this research should be considered in the context of some methodological caveats. The statistical tests may be unstable, and the lack of statistical power may lead to the rejection of true hypotheses. Increasing the sample size would remedy this potential problem, although collecting data using this whole network approach requires extensive work (Provan, Fish & Sydow, 2007). The results of this dissertation are preliminary in the sense that more samples would be required to validate any of the present conclusions. I did perform several tests for normality distribution and used multiple sources of data to avoid inflated correlations because of mono-method bias, but interpretation of the findings should be made with caution. As briefly discussed in Chapter 5, the results have possible endogeneity problems of some explanatory variables. Future studies should draw attention to this issue and consider possible ways, such as instrumental variable estimation.

Second, although the model in this research included two MPO-level covariates as controls, those may not be comprehensive to control "unobserved heterogeneity" across MPOs. Because of the small number of observations, this study did not consider other possible control variables for parsimonious parameters. For example, the geographic density of metropolitan area governments may be included. To measure the geographic distribution of local governments, it is appropriate to use the distance between the center points of each local government in a metropolitan area calculated by geographic

information system (GIS). This measure is perceived as an ideal measure of local government density (Post, 2002).

As one respondent noted in the survey, the project selection process might be quite subjective when final selection occurs, although the project selection process uses data as a foundation by using a point ranking system. Seventy-three percent of MPO directors in the sample indicated there are no informal procedures for the decision-making process, but the rest indicated they have a number of informal meetings with the jurisdictions, or there are occasional workshops where the members digest information, discuss options and bring those discussions back to an official MPO meeting where decisions are made. Much of the negotiation that takes place might not be structured in a formal decision-making process. Thus, in-depth study on informal meetings of MPO boards is encouraged to investigate a complete picture on the collaborative decision-making process, in the future.

Because of data availability constraints, this research considered only two types of diversity—gender and organizational membership. Future research needs to include other kinds of surface- and deep-level diversity such as ethnicity, tenure and value, and examine how they affect social capital and performance at the network level.

This dissertation focused on the collaborative decision-making behaviors of MPO policy board members as final decision makers on transportation fund allocations, but future studies should be interested in the activities of other committees—technical advisory and citizen advisory committees—and how they (both directly and indirectly) participate in the decision-making process and how their behaviors affect MPO performance.

This research examined MPOs as networks at one point in time. Although survey data used in this research is cross-sectional, the fact that this research collected network data over a 12 month timeframe from the point when the surveys were completed lends some credence to the assumption that the findings are a reflection of the interplay of diversity and network-based social capital preceding performance. But reporting the same networks in a longitudinal setting and comparing the network characteristics and results would provide information on how the networks are evolved. For example, it would be interesting to know whether they show a static or dynamic pattern and when the MPOs change their network management strategies. This line of empirical studies is extremely under-researched in the literature (Provan, Huang & Milward, 2009).

In addition, this research focuses on only one policy setting, which limits the generalization of findings. Similar findings in another policy area or type of network would reinforce the findings of this research. Although I believe the results in this research are meaningful for other formalized inter-organizational networks, it might be difficult to argue that they would work the same for voluntary, less structured networks.

Finally, in their open-ended responses, MPO directors commented that they need workshop and educational training for policy board members on transportation planning procedures. Policy board members who answered the survey also wanted training opportunities for better decision making. Given this finding, it is important to investigate the role of training on MPO decision making in future research.

I view my results as preliminary. Nonetheless, this study suggests an important evidence of the interactive effects between network management behaviors and structural

properties of networks on performance; it also contributes to the existing knowledge of

inter-organizational dynamics in transportation planning networks.

APPENDIX A: SURVEY INSTRUMENT FOR MPO DIRECTORS

Maxwell School OF SYRACUSE UNIVERSITY

Collaborative Decision-Making in the Metropolitan Planning Organization (MPO)

Page 1 of 8

Welcome and thank you for your interest in this study.

The purpose of this survey is to learn about your thoughts and experiences on the **collaborative decision-making process of the Metropolitan Planning Organization (MPO).** This survey is designed to ask you about policy board characteristics and decision-making process in your MPO. Your participation will provide valuable information for this research as well as help advance the study of public administration.

All answers are strictly **confidential**: your responses will only be summarized and displayed in aggregate form along with the responses of others, anonymously. The results of the study will be used for scholarly purposes only.

This survey has been approved by the Institutional Review Board at Syracuse University. If you would like to be interviewed for this research, or have any questions regarding this research, please contact Yujin Choi, Ph.D. Candidate in Public Administration at ychoi08@maxwell.syr.edu. You may also contact Rosemary O'Leary, Distinguished Professor of Public Administration at roleary@maxwell.syr.edu.

Thank you again for sharing your insights. I truly appreciate your time.

Sincerely,

Yujin Choi
The Maxwell School of Syracuse University

<< Back   Save And Exit   Next >>

General Information

*1. Which of the following best describes your MPO's organizational structure?

    The MPO is hosted by another agency.

    The MPO is an independent agency.

1-1. If your MPO is hosted by another agency, which of the following type of agencies acts as the host for the MPO?

    Regional Council/Council of Governments

    County government

    Municipal or township government

    An independent authority

    State department of transportation, including district and regional offices

    University or center of expertise sponsored by a university

    Other (Please specify below.):

2. Please check all that apply regarding the MPO's planning area boundary.

    The MPO is multi-state.

    The MPO 's planning area encompasses more than one county.

    A neighboring MPO encompasses portions of the same urbanized area.

*3. How many years have you been in the MPO director position?

    [ ]

*4 How often do <u>you</u> engage in the following behaviors for the policy board of your MPO?

	Never		Sometimes		Very often
	1	2	3	4	5
Inspiring board members' enthusiasm for a project					
Establishing member commitment to the MPO's mission					
Publicizing the MPO's goals and accomplishments					
Freely sharing information with policy board members					
Creating trust among policy board members					
Brainstorming					
Maintaining a closely knit policy board					
Letting policy board members know what is expected of them					
Coordinating the work of the policy board					
Keeping work moving at a rapid pace					
Settling conflicts when they occur in the policy board					

<< Back   Save And Exit   Next >>

MPO Policy Board

5. How often does the MPO policy board meet?

Monthly

Bi-monthly

Quarterly

Bi-annually

Annually

As needed

Other: [   ]

*6. Does the policy board in your MPO have a provision for weighted voting?

No

Yes

6-1. If yes, please explain.
(for example, by population, by financial contributions..)

*7. Does the policy board in your MPO permit designated alternates for board members to vote at board meetings?

No

Yes

7-1. If yes, please explain.

*8. Could you explain how a chairperson of the policy board is selected?

<< Back   Save And Exit   Next >>

Policy Board Member Characteristics

*9. Please indicate how much you agree or disagree with the following statements.

	Strongly disagree		Neither agree nor disagree *		Strongly agree
	1	2	3	4	5
The policy board members vary widely in their areas of expertise.					
The policy board members have a variety of different backgrounds and experiences.					
The policy board members have skills and abilities that complement each other.					

*10. Please indicate how much you agree or disagree with the following statements.

	Strongly disagree		Neither agree nor disagree *		Strongly agree
	1	2	3	4	5
Policy board members are more interested in obtaining a good group decision than improving the position of their home organization.					
Policy board members are willing to let go of an idea for one that appears to have more merit.					
Policy board members have the communication skills necessary to help the group process.					
Policy board members are effective liaisons between their home organizations and the board.					
Policy board members are willing to devote whatever effort is necessary to achieve the goals.					
Policy board members monitor the effectiveness of the process.					
Policy board members trust each other sufficiently to honestly and accurately share information, perceptions, and feedback.					

Decision-Making Process

*11. How is consensus on major policy decisions (such as the LRP or TIP) made in your MPO?

By simple majority

By super majority

By unanimous agreement

Other (Please specify below.):

*12. What are the main criteria used to choose among different projects?

*13. Is there a ranking system used to select the projects?

No

Yes

13-1. If yes, please explain how this works.

*14. Are there any informal procedures for the decision-making process?

No

Yes

14-1. If yes, please explain.

<< Back   Save And Exit   Next >>

*15. Please rate the overall <u>effectiveness</u> of the MPO **policy board** as it relates to decision-making.

Very ineffective   Very effective
      1   2   3   4   5

*16. Please rate the overall <u>effectiveness</u> of the MPO **technical committee** as it relates to decision-making.

Very ineffective   Very effective

      1   2   3   4   5

*17. How does your MPO gauge the overall effectiveness of MPO decision-making process?

*18. Please rate the overall <u>fairness</u> of the MPO <u>policy board</u> as it relates to decision-making.
Very
unfair   Very fair

   1   2   3   4   5

*19. Please rate the overall <u>fairness</u> of the MPO <u>technical committee</u> as it relates to decision-making.
Very
unfair   Very fair

   1   2   3   4   5

*20. How does your MPO gauge the overall fairness of MPO decision-making process?

21. This question asks about public involvement. Below you will find a list of methods your MPO may use to involve the public. If there is any public involvement method not listed, please add it in the blank provided.

	To what extent does each public involvement activity influence MPO decision-making?					
	No extent		Moderate extent		Very great extent	
	1	2	3	4	5	N/A
Citizen advisory board						
Public hearings						
Open houses						
Project workshops/Meetings						
Focus groups						
Interviews with key stakeholders/people						
MPO website						
Project specific website						
Public information materials (e.g. posters, newsletters, brochures, advertisements, press releases…)						
Telephone hotline						

Project/Plan mailing lists
Virtual/Electronic town meetings

Conferences/Retreat

Surveys

*22. Does your MPO have specific evaluation criteria of the public involvement activities? If so, please explain.

23. If you have any additional comments concerning any of the topics covered in this questionnaire, please use the space below.

If you would like a copy of the results of this research, please type your mailing address (or email) below. A copy of the results will be sent to you when it is available.

Save And Exit   Finish

Thank you very much for completing this survey.
Your participation is very important in contributing to our understanding of collaboration in
the field of regional transportation. If you would like to be interviewed or have any
questions regarding this research, please contact Yujin Choi at ychoi08@maxwell.syr.edu.

Sincerely,

Yujin Choi
The Maxwell School of Syracuse University

APPENDIX B: SURVEY INSTRUMENT FOR POLICY BOARD MEMBERS

Collaborative Decision-Making in the Metropolitan Planning Organization (MPO)

Page 1 of 8

Welcome and thank you for your interest in this study.

The purpose of this survey is to learn about your thoughts and experiences on the **collaborative decision-making process of the Metropolitan Planning Organization (MPO) policy board.** This survey is designed to ask you about policy board member characteristics, interaction among board members, and decision-making process in your MPO. Your participation will provide valuable information for this research as well as help advance the study of public administration.

All answers are strictly **confidential**: your responses will only be summarized and displayed in aggregate form along with the responses of others, anonymously. The results of the study will be used for scholarly purposes only.

This survey has been approved by the Institutional Review Board at Syracuse University. If you would like to be interviewed for this research, or have any questions regarding this research, please contact Yujin Choi, Ph.D. Candidate in Public Administration at ychoi08@maxwell.syr.edu. You may also contact Rosemary O'Leary, Distinguished Professor of Public Administration at roleary@maxwell.syr.edu.

Thank you again for sharing your insights. I truly appreciate your time.

Sincerely,

Yujin Choi
The Maxwell School of Syracuse University

<< Back   Save And Exit   Next >>

Policy Board Member Characteristics

*1. Are you a voting or non-voting member in your MPO policy board?

    Voting member
    Non-voting member

*2. Do you serve in any of the following roles on your MPO policy board?

    Chair

    Vice-chair

    Secretary

    None of above

*3. How many years have you been involved with your **MPO policy board**?

[   ]

*4. How many years have you been involved with your current **home organization**?

[   ]

*5. What percentage of your work time is spent doing MPO related activities outside of your home organization?

[(%)]

*6. Please indicate how much you agree or disagree with the following statements.

	Strongly disagree		* Neither agree nor disagree		Strongly agree
	1	2	3	4	5
I prefer to work with others in a group rather than working alone.					
A group is more productive when its members follow their own interests and concerns.					
People in a group should realize that they sometimes are going to have to make sacrifices for the sake of the group as a whole.					
A group is most efficient when its members do what they think is best rather than doing what the group wants them to do.					
I like it when members in a group do things on their own, rather than working with others all the time.					
People in a group should do their best to cooperate with each other instead of trying to work things out on their own.					

*7. How often do **you** engage in the following behaviors in the policy board of your MPO?

	Never		Sometimes		Very often
	1	2	3	4	5
Inspiring board member's enthusiasm for a project					
Establishing member commitment to the MPO's mission					
Publicizing the MPO's goals and accomplishments					
Freely sharing information among policy board members					
Creating trust among policy board members					
Brainstorming					
Maintaining a closely knit policy board					
Coordinating the work of the policy board					
Keeping work moving at a rapid pace					
Settling conflicts when they occur in the policy board					

Policy Board Member Interaction
This question is designed to understand your interaction with other policy board members in your MPO by measuring the frequency of communication. Below you will find a list of names of policy board members that you work with.

*8. Please indicate the **frequency with which you typically communicated** with each person below on **transportation topics** over the past 12 months. If there is any person not listed, please add the person in the blank provided.

	Don't know this person.	Never	Yearly	Biyearly	Quarterly	Monthly	Weekly	Daily
Lamar Scroggs								
Mike Miller								
Ruth Bruner								
Alan Wayne								
Matthew Fowler								
Carlos Gonzalez								
Robert Buckley								
Srikanth Yamala								
James Nix								
James Riker								
Todd McDuffie								
Steve Kish								
Phillippa Lewis Moss								
[ ]								
[ ]								
[ ]								

*8-1. Please indicate the **frequency with which you typically communicated** with the following types of organizations **outside of the MPO table** on **transportation topics** over the past 12 months. If there is any agency not listed, please add the agency in the blank provided.

	* Never Yearly Biyearly Quarterly Monthly Weekly Daily
Federal DOT (FHWA and FTA)	
State DOT	
City and county entities (e.g., planning boards)	
Adjacent MPO(s)	
Councils of government/regional council	
Regional transit operators	
Environmental agency (e.g., EPA)	
Air quality organization	
Regional civic organization(s)	
Advocacy group(s) (e.g., business-oriented or environmental-oriented interest groups)	
☐	
☐	
☐	
☐	
☐	

*8-2. What is your first name and last initial?
(Your name is requested for the sole purpose of understanding your network in this question. Please note your responses are anonymous. When summarizing the results, I will _not_ attribute survey responses to any specific person and everyone's response will be counted and grouped together.)

☐

*9. How often did you contact the technical committee members over the past 12 months?

Never   Yearly   Biyearly   Quarterly   Monthly   Weekly   Daily

Decision Making Process

*10. Please indicate how much you agree or disagree with each statement.

	Strongly disagree 1	2	* Neither agree nor disagree 3	4	Strongly agree 5
The policy board members usually are focused on broader goals, rather than individual agendas.					
The criteria for fund allocations are fair.					
The criteria for fund allocations are fairly applied.					
In discussions about decisions, some people are discounted because of the organization they represent.					
The decisions made in the MPO process are consistent.					
MPO decisions are based on accurate information.					
The distribution of transportation funds by the MPO is based on the transportation needs of the entire metropolitan area.					

*11. What are the main criteria used to choose among different projects?

*12. Please rate the overall effectiveness of the MPO policy board as it relates to decision-making.

Very ineffective   Very effective

          1   2   3   4   5

*13. Do you have any suggestion to make the MPO's decision-making process more effective?

Demographic Information

*14. What is your age?

*15. What is your gender?
    Male
    Female

*16. Which racial/ethnic category would you place yourself?
    African-American
    Asian
    Caucasian
    Hispanic
    Native American
    Other:

*17. Please indicate the highest level of education you have completed.
    High school degree
    College degree
    Masters degree
    Doctoral degree

18. If you have any additional comments concerning any of the topics covered in this questionnaire, please use the space below.

If you would like a copy of the results of this research, please type your mailing address (or email) below.
A copy of the results will be sent to you when it is available.

Thank you very much for completing this survey.
Your participation is very important in contributing to our understanding of collaboration in the field of regional transportation. If you would like to be interviewed or have any questions regarding this research, please contact Yujin Choi at ychoi08@maxwell.syr.edu.

Sincerely,

Yujin Choi
The Maxwell School of Syracuse University

125

REFERENCES

Adler, P., & Kwon, S. (2000). Social capital: the good, the bad and the ugly, In E.L. Lesser (Ed.), *Knowledge and social capital* (pp.89-118). Boston: Butterworth-Heinemann.

Advisory Commission on Intergovernmental Relations (ACIR) (1995). *MPO capacity: Improving the capacity of metropolitan planning organizations to help implement National Transportation Policies.* Washington, DC: ACIR.

Agranoff, R. (1986). *Intergovernmental Management: Human Service Problem Solving in Six Metropolitan Areas.* Albany, NY: State University of New York Press.

Agranoff, R. (2004). Leveraging networks: A guide for public managers working across organizations. In J. Kamensky, & T. Burlin (Eds.), *Collaboration: Using networks and partnerships*. Lanham, MD: Rowman & Littlefield Publishers, Inc.

Agranoff, R. (2007). *Managing within networks: Adding value to public organizations.* Washington, DC: Georgetown University Press.

Agranoff, R. (2008). Enhancing performance through public sector networks: Mobilizing human capital in communities of practice. *Public Performance & Management Review, 31*(3), 320-347.

Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. *Journal of Public Administration Research and Theory*, *11*(3), 295–326.

Agranoff, R., & McGuire, M. (2003). *Collaborative public management: New strategies for local governments.* Washington, DC: Georgetown University Press.

Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, 425-455.

Allen, N. J., Stanley, D. J., Williams, H. M., & Ross, S. J. (2007). Assessing the impact of nonresponse on work group diversity effects. *Organizational Research Methods, 10*(2), 262-286.

Alter, C., & Hage, J. (1993). *Organizations working together*. Newbury Park, CA: Sage Publications.

Ansell, C. (2000). The networked polity: Regional development in western europe. *Governance: An International Journal of Policy and Administration, 13*(3), 303-333.

Balkundi, P., Kilduff, M., Barsness, Z. I., & Michael, J. H. (2007). Demographic antecedents and performance consequences of structural holes in work teams. *Journal of Organizational Behavior, 28*(2), 241-260.

Bantel, K. A., & Jackson, S.E. (1989). Top management and innovations in banking: does the composition of the top team make a difference? *Strategic Management Journal*, 107-124.

Bardach, E. (1998). *Getting agencies to work together*. Brookings Institution Press Washington, DC.

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations, 61*(8), 1139-1160.

Behn, R.D. (2003). Why measure performance? Different purposes require different measures. *Public Administration Review, 63*(5), 586-606.

Berry, F. S., Brower, R. S., Choi, S. O., Goa, W. X., Jang, H. S., & Kwon, M. (2004). Three traditions of network research: What the public management research agenda can learn from other research communities. *Public Administration Review, 64*(5), 539-552.

Bingham, L., O'Leary, R, & Carlson, C. (2008). Frameshifting: Lateral Thinking for Collaborative Public Management. In L. Bingham, & R. O'Leary (Eds.), *Big Ideas in Collaborative Public Management* (pp. 3-16). New York: M.E. Sharpe.

Blau, P. (1977). *Inequality and heterogeneity*. New York: Free Press.

Bond, A., Kramer, J., & Seggerman, K. (2010). *Staffing and administrative capacity of metropolitan planning organizations.* Federal Highway Administration. Retrieved from http://www.mposurvey.com/Staffing_and_Administrative_Capacity_of_MPOs.pdf.

Borgatti, S., Everett, M. (1997). Network analysis of 2-mode data. *Social Networks, 19*(3), 243-269.

Borgatti, S., Everett, M., & Freeman, L. (2002). *Ucinet for Windows: Software for Social Network Analysis.* Harvard, MA: Analytic Technologies.

Borgatti, S., Carley, K. M., & Krackhardt, D. (2006). On the robustness of centrality measures under conditions of imperfect data. *Social Networks, 28*(2), 124-136.

Borgatti, S. P., & Halgin, D. S. (2011). Analyzing affiliation networks. *The SAGE Handbook of Social Network Analysis*, 417.

Boschken, H. (1998). Institutionalism: Intergovernmental exchange, administration-centered behavior, and policy outcomes in urban agencies. *Journal of Public Administration Research and Theory, 8*(4), 585-614.

Brass, D. J., Galaskiewicz, J, Greve, H. R., & Tsai, W. (2004). Taking Stock of Networks and Organizations: A Multilevel Perspective. *Academy of Management Journal, 47,* 795-817.

Brown, S., Jones, E., & Leigh, T. (2005). The attenuating effect of role overload on relationships linking self-efficacy and goal level to work performance. *Journal of Applied Psychology, 90*(5), 972-979.

Bryson, J., Crosby, B., Stone, M., & Saunoi-Sandgren, E. (2009). *Designing and managing cross-sector collaboration: A case study in reducing traffic congestion.* Washington, DC: IBM Center for the Business of Government.

Bunderson, J. S., & Sutcliffe, K. M. (2002). Comparing alternative conceptualizations of functional diversity in management teams: Process and performance effects. *Academy of Management Journal*, *90*(5), 875-893.

Burt, R. S. (1982). *Toward a Structural Theory of Action*. New York: Academic Press.

Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior, 22*, 345-423.

Burt, R. S. (2001). The social capital of structural holes. In M.F.Guillen & R. Collins (Eds.), *New Directions in Economic Sociology* (pp. 201-247). New York: Russell Sage Foution.

Burt, R. S. (2001). Structure Holes versus Network Closure as Social Capital, In N. Lin, K. Cook, and R. Burt (Eds.) *Social Capital: Theory and Research*. New York: Aldine de Gruyter.

Burt, R. S. (2005). *Brokerage and closure: an introduction to social capital.* Oxford, New York: Oxford University Press.

Burt, R. S., Horgarth, R., & Michaud, C. (2000). The social capital of French and American managers. *Organization Science, 11*, 123-147.

Cambridge Systematics (2010). *Measuring Transportation Network Performance*. NCHRP 664, TRB (www.trb.org). Retried from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_664.pdf

Cameron, A.C. & Trivedi, P.K. (2009). *Microeconomics: Methods and Applications.* New York, NY: Cambridge University Press.

Chang, B. (2009). *Examining links between diversity and outcomes in work groups: Effects of different levels of diversity and social networks* (Doctoral dissertation, The University of Akron).

Chen, B. (2008). Assesing Interorganizational Networks for Public Service Delivery: A Process-Perceived Effectiveness Framework. *Public Performance & Management Review, 31*(3), 348-363.

Choi, S., & Rainey, H. (2010). Managing diversity in U.S. federal agencies: Effects of diversity and diversity management on employee perceptions of organizational performance. *Public Administration Review, 71*(1), 109-121.

Chisholm, R. (2001). Bringing about change in a public school system: An interorganizational network approach. In M.P. Mandell (Ed.), *Getting results through collaboration: Networks and network structures for public policy and management* (pp.103-128). Westport, CT: Quorum Books.

Coleman, J. S. (1990). *Foundations of social theory*. Cambridge. MA: Harvard University Press.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94,* S95 –S120.

Connelly, D., Zhang, J., & Faerman, S. (2008). The paradoxical nature of collaboration. In L. Bingham & R. O'Leary (Eds.), *Big Ideas in Collaborative Public Management* (pp. 17-35). New York: M.E. Sharpe.

Cooper, C.L., & Payne, R. (1988). *Causes, coping and consequences of stress at work.* New York: John Wiley.

Costenbader, E., & Valente, T. W. (2003). The stability of centrality measures when networks are sampled. *Social Networks, 25*(4), 283-307.

Cox, T. (1993). *Cultural diversity in organizations*. San Francisco, CA: Berrett-Koehler Publishers.

Cox, T. (1995). The complexity of diversity: Challenges and directions for future research. In S. E. Jackson (Ed.), *Diversity in work teams: Research paradigms for a changing workplace* (pp. 235-246). Washington, DC: American Psychological Association.

Cummings, J. N., & Cross, R. (2003). Structural properties of work groups and their consequences for performance. *Social Networks, 25*(3), 197-210.

Daley, D. M. (2009). Interdisciplinary Problems and Agency Boundaries: Exploring Effective Cross-Agency Collaboration. *Journal of Public Administration Research and Theory,* 19(3), 477-493.

Dougherty Area Regional Transportation Study. (2010). *DARTS MPO transportation planning handbook*. Retrieved from http://dartsmpo.org/wp-content/uploads/2010/06/DARTSPlanningHandbook.pdf

Montes De Oca, N., & Levinson, D. (2006). Network expansion decision-making in the twin cities. *Transportation Research Record, 1981*, 1-11.

Dempsey, P., Goetz, A., & Larson, C. (2000). *Metropolitan planning organizations: An assessment of the transportation planning process: A report to Congress.* University of Denver Intermodal Transportation Institute & the National Center for Intermodal Transportation. Retrieved from http://www.du.edu/transportation/mpo_study.html.

Edmondson, A. C., & Roloff, K.S. (2008). Overcoming Barriers to Collaboration: Psychological Safety and Learning in Diverse Teams. In E. Sales, G. Goodwin, & C.S. Burke (Eds.), *Team Effectiveness in Complex Organizations: Cross-*

Disciplinary Perspectives and Approaches (pp.183-208). Mahwah, NJ: Lawrence Eribaum Associates.

Ely, R. J., & Thomas, D.A. (2001). Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes. *Administrative Science Quarterly*, *46*(2), 229-273.

Faerman, S., McCaffrey, D., & Van Slyke, D. (2001). Understanding Interorganizational Cooperation: Public-Private Cooperation in Regulating Financial Market Innovation. *Organization Science, 12*(3): 372-388.

Frederickson, H. G. (1999). The Repositioning of American Public Administration. *PS 32*(4), 701-711.

Fukuyama, F. (1995). *Trust: social virtues and the creation of prosperity*. London: Hamish Hamilton.

Gabbay, S. M., and E.W. Zuckerman. (1998). Social capital and opportunity in corporate R&D: The contingent effect of contact density on mobility expectations. *Social Science Research* 27, 189-217.

Gage, R.W., & McDowell, B.D. (1995). ISTEA and the role of MPOs in the new transportation environment: A midterm assessment. *Publius. 25*(3), 133-154.

Gage, R.W., & Mandell, M.P. (1990). *Strategies for Managing Intergovernmental Policies and Networks*. New York: Praeger.

Genesee Transportation Council (2010) *Citizen's guide to transportation planning in the Genesee-Finger Lakes Region*.

Goetz, A., Dempsey, P., & Larson, C. (2002). Metropolitan Planning Organizations: Findings and recommendations for improving transportation planning. *Publius, 32*(1), 87-105.

Goldman, T., & Deakin, E. (2000). Regionalism through partnerships? Metropolitan planning since ISTEA, *Berkeley Planning Journal, 14,* 46-75.

Gomez-Mejia, L. R., & Palich, L.E. (1997). Cultural Diversity and the Performance of Multinational Firms. *Journal of International Business Studies*, *28*(2), 309-335.

Goode, L., Milazzo, J.S., & McCurry, J.B. (2001). *Analysis of the Governance of Metropolitan Planning Organizations (MPOs) in the United States for Potential Application to North Carolina.* Raleigh, NC: Institute for Transportation Research and Education, North Carolina State University. Retrieved from http://www.ncdot.org/doh/preconstruct/tpb/research/download/PPF-0100FinalReport.pdf.

Gray, B. (1989). *Collaborating: Finding common ground for multiparty problems.* San Francisco, CA: Jossey-Bass Inc., Publishers.

Gray, B. (2000). Assessing interorganizational collaboration: Multiple conceptions and multiple methods. In D. Faulkner, & M. de Rond (Eds.), *Cooperative strategy: Economics, business, and organization issues* (pp. 243–260). London: Oxford University Press.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, *9*(2), 193-206.

Harrison, D.A., & Klein, K.J. (2007). What's the difference? Diversity constructs and separation, variety, or disparity in organizations. *Academy of Management Review, 32*(4), 1199-1228.

Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: Time and the effects of surface-and deep-level diversity on work group cohesion. *Academy of management journal*, 96-107.

Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task performance: Changing effects of surface-and deep-level diversity on group functioning. *Academy of management journal*, 1029-1045.

Heranz, J. (2010). Network Performance and Coordination. *Public Performance & Management Review*, *33*(3), 311-341.

Hill, G. W. (1982). Group versus individual performance: Are N+1 heads better than one? *Psychological Bulletin, 91,* 517-539.

Hofstede, G., B., Neuijen, D. Ohayv, & Sanders, G. (1990). Measuring organizational cultures. *Administrative Science Quarterly, 35*, 286-316.

Hollenbeck, J. R., DeRue, D. S., & Guzzo, R. (2004). Bridging the gap between I/O research and HR practice: Improving team composition, team training, and team task design. *Human Resource Management, 43,* 353–366.

Horwitz, S. K. (2005). The compositional impact of team diversity on performance: Theoretical considerations. *Human Resource Development Review, 4*(2), 219-245.

Horwitz, S. K., & Horwitz, I. B. (2007). The effects of team diversity on team outcomes: A meta-analytic review of team demography. *Journal of Management, 33*(6), 987-.

Huxham, C. (1996). *Creating Collaborative Advantage.* Thousand Oaks, CA: Sage Publications Ltd.

Ingraham, P.W., & Getha-Tayler, H. (2008). Incentivizing Collaborative Performance: Aligning Policy Intent, Design, and Impact. In L. Bingham, & R. O'Leary (Eds.), *Big Ideas in Collaborative Public Management* (pp.79-96). New York: M.E. Sharpe.

Jackson, P. (1988). The management of performance in the public sector. *Public Money & Management, 8*(4), 11-16.

Jackson, S. E. (1996). The consequences of diversity in multidisciplinary work teams. In M.A. West (Ed.), *Handbook of work group psychology* (pp. 53-75). John Wiley & Sons Ltd: UK.

Jackson, S., May, K., & Whitney, K. (1995). Understanding the dynamics of diversity in decision-making teams. In R.A. Guzzo, & E. Salas (Eds.), *Team effectiveness and decision: Making in organizations* (pp.204-261). San Francisco: Jossey-Bass.

Jackson, S., & Ruderman, M. (1995). Introduction: Perspectives for understanding diverse work teams. In S. Jackson, & M. Ruderman (Eds.), *Diversity in work teams* (pp.1-16). Washington DC: American Psychological Association.

Jackson, S., Joshi, A., & Erhardt, N. (2003). Recent research on team and organizational diversity: SWOT analysis and implications. *Journal of Management, 29*(6): 801-830.

133

Jackson, S. E., & Joshi, A. (2010). Work team diversity. In S. Zedeck (Ed.), *Handbook of Industrial and Organizational Psychology* (pp. 651-686). Washington: American Psychological Association.

Jehn, K. A., & Mannix. E.A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. *Academy of Management Journal*, *44*(2), 238-251.

Joshi, A. (2006). The influence of organizational demography on the external networking behavior of teams. *Academy of Management Review, 31*(3), 583-595.

Joshi, A. & Jackson, S. (2003). Managing workforce diversity to enhance cooperation in organizations, In M. West, D. Tjosvold, & K. Smith (Eds.), *International handbook of organizational teamwork and cooperative working*. West Sussex, England: John Wiley & Sons Ltd.

Joshi, A., & Roh, H. (2008). A contextual reexamination of work team diversity research: Review and future agenda. In K. W. Phillips (Ed.), *Diversity and Groups (Research on Managing Groups and Teams, Volume 11)* (pp.27-53). U.K.: Emerald Group Publishing Limited.

Kabanoff, B. (1985). Potential influence structures as sources of interpersonal conflict in groups and organizations. *Organizational Behavior and Human Decision Processes, 36*(1), 113-141.

Kennedy, P. (2008). *A guide to econometrics*. Malden, MA: Blackwell Publishing

Khademian, A.M. (2002). *Working with culture: the way the job gets done in public organizations*. Washington, DC: CQ Press.

Kramer, R. (1991). Intergroup relations and organizational dilemmas: the role of categorization processes. In L.L. Cummings, & B.M. Staw (Eds.), *Research in Organizational Behavior* (pp.191-228). Greenwich, CT: JAI Press.

Kickert, W. J. M., Klijn, E. H., & Koppenjan, J. F. M. (1997). *Managing complex networks: strategies for the public sector*. Thousand Oaks, CA: Sage Publications.

Kilduff, M., &Tsai, W. (2003). *Social Networks and Organizations.* Thousand Oaks, CA: SAGE Publications Ltd.

Klein, K., Knight, A., Ziegert, J., Lim, B. Saltz, J. (2011). When team members' values differ: The moderating role of team leadership. *Organizational Behavior and Human Decision Processes, 114,* 25-36.

Klijn, E. H., & Koppenjan, J. F. M. (1997). Public Management and network management: An overview. In W. Kickert, E. Klijn, & J. Koppenjan (Eds.), *Managing complex networks: Strategies for the public sector* (pp. 35-61). Thousand Oaks, Calif.: Sage Publications.

Klijn, E. H., & Koppenjan, J. F. M. (2000). Public management and policy networks. *Public Management, 2*(2), 135-158.

Knoke, D., & Kuklinski, J. (1982). *Network analysis*. Beverley Hills: Sage Publications.

Koliba, C., Meek, J., & Zia, A. (2011). *Governance networks in public administration and public policy.* Boca Raton, FL: CRC Press.

Koontz, Tomas M. (2005). We Finished the Plan, so Now What? Impacts of Collaborative Stakeholder Participation on Land Use Policy. *Policy Studies Journal*, *33*(3), 459-481.

Larsson, R., Bengtsson, L., Henriksson, K., & Sparks, J. (1998). The interorganizational learning dilemma: collective knowledge development in strategic alliances. *Organization Science, 9,* 285–305.

Leana, C., & Van Buren, H. (1999). Organizational social capital and employment practices. *Academy of Management Review, 24*(3), 538-555.

Lesser, E. (2000). Leveraging Social Capital in Organizations, In E.L. Lesser (Ed.), *Knowledge and social capital* (pp.3-16). Boston: Butterworth-Heinemann.

Lin, Nan. (1999). Building a Network Theory of Social Capital. *Connections, 22*(1), 28-51.

Linden, R. M. (2002). *Working across boundaries: Making collaboration work in government and nonprofit organizations*. Jossey-Bass.

Lasker, R., Weiss, E. & Miller, R. (2001). Partnership synergy: a practical framework for studying and strengthening the collaborative advantage. *The Milbank Quarterly 79*(2), 179-205.

Lawrence, B. S. (1997). The black box of organizational demography. *Organization Science, 8*(1), 1-22.

Lewis, P.G. (1998). Regionalism and representation: Measuring and assessing representation in metropolitan planning organizations. *Urban Affairs Review, 33*, 839-853.

Mallett, W. (2010). *Metropolitan transportation planning*. DIANE Publishing.

Marsden, P. (1990). Network data and measurement. *Annual Review of Sociology, 16*, 435-63.

Mattessich, P. W., Murray-Close, M., Monsey, B. R., & Foundation, A. H. W. (2001). *Collaboration: What makes it work*. St. Paul, MN: Amherst H. Wilder Foundation.

Mayne, J., & Rieper, O. (2003). Collaborating for public service quality: the implications for evaluation. In B. Gray (Ed.), *Collaboration in public services* (pp.105-130). Transaction Publisher.

Maznevski, M. L. (1994). Understanding our differences: Performance in decision-making groups with diverse members. *Human Relations, 47*, 531-552.

McDowell, B. (1999). *Improving regional transportation decisions: MPOs and certification.* Washington, DC: Brookings Center on Urban and Metropolitan Policy.

McGrath, J. E., Berdahl, J. L., & Arrow, H. (1995). Traits, expectations, culture, and clout: The dynamics of diversity in work groups. In S. E. Jackson & M. N. Ruderman (Eds.), *Diversity in work teams: Research paradigms for a changing workplace* (pp.17– 45). Washington, DC: American Psychological Association.

McGuire, M. (2002). Managing networks: Propositions on what managers do and why they do it. *Public Administration Review*, *62*(5), 426–433.

McGuire, M. (2003). Is it really so strange? A critical look at "network management is different from hierarchical management" perspective. Paper presented at the 7th National Public Management Research Conference, Washington, DC. October 9-11.

McGuire, M. (2006). Collaborative public management: Assessing what we know and how we know it. *Public Administration Review, 66* (1), 33–43.

McGuire, M., & Silvia, C. (2009). Does leadership in networks matter? *Public Performance & Management Review, 33*(1), 34-62.

Meglino, B. M., & Ravlin, E. C. (1998). Individual values in organizations: Concepts, controversies, and research. *Journal of Management, 24*, 351–389.

Meglino, B. M., Ravlin, E. C., & Adkins, C. L. (1989). A work values approach to corporate culture: A field test of the value congruence process and its relationship to individual outcomes. *Journal of Applied Psychology, 74*(3), 424-432.

Meier, K., & O'Toole, L. (2001). Managerial strategies and behavior in networks: a model with evidence from US public education. *Journal of Public Administration Research and Theory, 11*(3), 271-95.

Meier, K., & O'Toole, L. (2005). Managerial networking. *Administration and Society*, *37*(5), 523-541.

Miller, C. C., Burke, L. M., & Glick, W. H. (1998). Cognitive diversity among upper-echelon executives: Implications for strategic decision processes. *Strategic Management Journal, 19,* 39-58.

Milliken, F., & Martins, L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review*, *21,* 402–433.

Milward, H & Provan, K. (2000). Governing the Hollow State. *Journal of Public Administration Research and Theory, 10*, 359-380.

Mohammed, S., & Angell, L. C. (2004). Surface- and deep-level diversity in workgroups: Examining the moderating effects of team orientation and team process on relationship conflict. *Journal of Organizational Behavior, 25*, 1015 – 1039.

Moore, G., Sobieraj, S., Whitt, J. A., Mayorova, O., & Beaulieu, D. (2002). Elite interlocks in three US sectors: Nonprofit, corporate, and government. *Social science quarterly, 83*(3), 726-744.

Moseley, A., & Oliver. J. (2008). Central state steering of local collaboration: assessing the impact of tools of meta-governance in homelessness services in England. *Public Organization Review, 8*, 117-136.

National Association of Regional Council. (2011). *NARC history.* Retrieved from http://narc.org/about-narc/narc-history.html

National Policy Consensus Center. (2003). *Transportation Solutions: Collaborative Problem solving for states and communities*. Retrieved from http://www.policyconsensus.org/publications/reports/docs/TransportationSolutions.pdf.

Nelson, A., Sanchez, T., Wolf, J., & Farquhar, M. (2004). Metropolitan planning organization voting structure and transit investment bias: Preliminary analysis with social equity implications. *Journal of the Transportation Research Board, 1895,*1-7.

Northcraft, G., Polzer, J., Neale, M., & Kramer, R. (1995). Diversity, social identity, and performance: Emergent social dynamics in cross-functional teams. In S. E. Jackson & M. Ruderman (Eds.), *Diversity in work teams: Research paradigms for a changing workplace* (pp.69–96). Washington, DC: American Psychological Association.

Nylen, U. (2007). Interagency Collaboration in Human Services: Impact of Formalization and Intensity on Effectiveness. *Public Administration, 85*(1), 143-166.

Oh, H., Labianca, G., & Chung, M. H. (2006). A multilevel model of group social capital. *The Academy of Management Review, 31*(3), 569-582.

Oliver, A. L., & Ebers, M. (1998). Networking network studies: an analysis of conceptual configurations in the study of inter-organizational relationships. *Organization Studies, 19*(4), 549-583.

Olson, B. J., Parayitam, S., & Bao, Y. (2007). Strategic decision making: The effects of cognitive diversity, conflict, and trust on decision outcomes. *Journal of Management, 33*(2), 196-222.

Ospina, S. (1996). Realizing the Promise of Diversity. In J. Perry (Ed.), *Handbook of Public Administration* (pp. 441–59). San Francisco: Jossey-Bass.

Ostrom, El. (1999). Why Do We Need Multiple Indicators of Public Service Outputs? In M. McGinnis (Ed.), *Polycentricity and Local Public Economies: Readings from the Workshop in Political Theory and Policy Analysis* (pp.163-175). University of Michigan Press.

O'Sullivan, E., Rassel, G., & Berner, M. (2003). *Research methods for public administrators.* New York: Longman.

O'Toole, L. J. (1988) Strategies for Intergovernmental Management: Implementing Programs in Interorganisational Networks. *Journal of Public Administration, 25*(1), 43–57.

O'Toole, L. J. (1997). Treating Networks Seriously: Practical and Research-Based Agendas in Public Administration. *Public administration review, 57*(1), 45-52.

O'Toole, L. J., & Meier, K. (1999). Modeling the impact of public management: Implications of structural context. *Journal of Public Administrative Research and Theor*y, *9*(4), 505-26.

O'Toole, L. J., & Meier, K. (2000). Networks, Hierarchies, and Public Management: Modeling the Nonlinearities. In C. Heinrich & L. Lynn (Eds.), *Governance and Performance: New Perspective.* Washington DC: Georgetown University Press.

O'Toole, L. J., & Meier, K. (2004). Public management in intergovernmental networks: matching structural networks and managerial networking. *Journal of Public Administrative Research and Theory*, *14*(4), 469-494.

O'Toole, L. J., & Meier, K. (2011). *Public management: organizations, governance, and performance.* New York: Cambridge University Press.

Parkhe, A. (1993). Strategic Alliances Structuring: A Game Theoretic and Transactional Cost Examination of Interfirm Cooperation. *Academy of Management Journal, 36,* 794-829.

Pfeffer, J. (1982). Organizational demography. In L.L. Cummings & B.M. Staw (Eds.), *Research in organizational behavior* (pp. 299-357). Greenwich, CT: JAI Press.

Pelled, L.K., Eisenhardt, K., & Xin, K. (1999). Exploring the blackbox: an analysis of work group diversity, conflict, and performance. *Administrative Science Quarterly, 44,* 1-28.

Pickrell, S., & Neumann, L. (2001). Use of performance measures in transportation decision making. *Conference Proceedings 26: Performance measures to improve transportation system and agency operations* (pp. 17-33). Washington, DC: National Academies Press.

Pitts, D. W., & Jarry, E. M. (2009). Getting to know you: Ethnic diversity, time and performance in public organizations. *Public Administration, 87*(3), 503-518.

Poister, T.H., & Van Slyke, D. (2002). Strategic Management Innovations in State Transportation Departments. *Public Performance and Management Review*, *26*(1): 58-74.

Post, S. (2002). Local government cooperation: the relationship between metropolitan area government geography and service provision. Paper presented at APSA conference.

Prell, C. (2006). Social capital as network capital: Looking at the role of social networks among not-for-profits. *Sociological Research Online, 11*(4).

Provan, K.G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: a review of the empirical literature on whole networks. *Journal of Management,* 33(3), 479-516.

Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative Science Quarterly*, 1-33.

Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public Administration Review*, 414-423.

Provan, K. G., Huang, K., & Milward, H. B. (2009). The evolution of structural embeddedness and organizational social outcomes in a centrally governed health and human services network. *Journal of public administration research and theory, 19*(4), 873-893.

Plumeau, P. (2004). MPO 101: Introduction to the Purpose & Function of a Metropolitan Planning Organization. Presented at AMPO Annual Conference, October, Denver. Retrieved from http://www.ampo.org/events/2004/presentations/MPO%20101.ppt.

Putnam, R.D. (1993). The prosperous community: social capital and public life. *American Prospect, 13*, 35-42.

Putnam, R.D. (2000) Bowling Alone: The Collapse and Revival of American Community. New York: Simon and Schuster.

Raab, J. & Kennis, P. (2009). Heading Toward a Society of Networks. *Journal of Management Inquiry, 18*(3), 198-210.

Rainey, H. (2003). *Understanding and managing public organizations*. San Francisco, CA: The Jossey-Bass.

Reagans, R., & Zuckerman, E. W. (2001). Networks, diversity, and productivity: The social capital of corporate R&D teams. *Organization Science*, *12*(4), 502-517.

Reagans, R., Zuckerman, E., & McEvily, B. (2004). How to make the team: Social networks vs. demography as criteria for designing effective teams. *Administrative Science Quarterly*, *49*(1), 101-133.

Rethemeyer, R. K., & Hatmaker, D. M. (2008). Network management reconsidered: An inquiry into management of network structures in public sector service provision. *Journal of Public Administration Research and Theory, 18*(4), 617-646.

Riordan, C. M. (2000). Relational demography within groups: Past developments, contradictions, and new directions. *Research in Personnel and Human Resource Management*, *19*, 131–174.

Robins, G., Pattison, P., & Wollcock, J. (2004). Missing data in networks: exponential random graph models for networks with non-respondents. *Social Networks*, *26*(3), 257-283.

Rodan, S., & Galunic, C. (2004). More than networks structure: How knowledge heterogeneity influences managerial performance and innovativeness. *Strategic Management Journal, 25*(6), 541-562.

Rodríguez, C., Langley, A., Béland, F., & Denis, J. L. (2007). Governance, power, and mandated collaboration in an interorganizational network. *Administration & Society, 39*(2), 150.

Rosenthal, S. R. (1984). New Directions for Evaluating Intergovernmental Programs. *Public Administration Review*, *44*(6), 469-476.

Rothblatt, D., & Colman, S. (2001). *Best practices in developing regional transportation plans.* San Jose, CA: San Jose State University, Mineta Transportation Institute

Sanchez, T. (2006). *An inherent bias? Geographic and racial-ethnic patterns of metropolitan planning organization boards.* Washington, DC: The Brookings Institution.

Sauer, J., T. Fesling, H. Franke, and B. Ruttinger. (2006). Cognitive diversity and team performance in a complex multiple task environment. *Ergonomics, 49*(20), 934-954.

Schruijer, S. (2008). The social psychology of interorganizational relations. In S. Cropper, M. Ebers, & C.Huxham (Eds.), *The Oxford Handbook of Interorganizational Relations* (pp.417-440). New York: Oxford University Press.

Scott, D.M., Novak, D., Aultman-Hall, L., & Guo, F. (2005). Network robustness index: A new method for identifying critical links and evaluating the performance of transportation networks. Working paper.

Selden, S., Sowa, J., & Sanfort, J. (2006). The Impact of Nonprofit Collaboration in Early Child Care and Education on Management and Program Outcomes. *Public Administration Review, 66*(3), 412-425.

Silvia, C. (2010). *An Examination of Managerial and Leadership Behavior in Intersectoral Networks.* (Doctoral dissertation, Indiana University)

Simons, T., Pelled, L. H., & Smith, K. A. (1999). Making use of difference: Diversity, debate, and decision comprehensiveness in top management teams. *Academy of Management Journal*, *42*, 662–673.

Stork, D., & Richards, W. D. (1992). Nonrespondents in communication network studies: Problems and possibilities. *Group & Organization Management, 17*(2), 193.

Schwartz, S. H. (1999). A theory of cultural values and some implications for work. *Applied Psychology: An International Review, 48*, 23-47.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W.G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7−24). Chicago: Nelson-Hall.

Teachman, J. D. (1980). Analysis of Population Diversity. *Sociological Methods and Research, 8*, 341-362.

Thomas, D. C. (1999). Cultural diversity and work group effectiveness: An experimental study. *Journal of cross-cultural psychology, 30*(2), 242-263.

Thomson, A., & Perry, J. L. (2006). Collaboration processes: inside the black box. Public administration review, 66(6), 20-31.

Thomson, A., Perry, J. L., & Miller, T. K. (2008). Linking Collaboration Processes and Outcomes. In L. B. Bingham & R. O'Leary (Eds.), *Big Ideas in Collaborative Public Management* (pp. 97-120).

Tolbert, P., A. Andrews, and T. Simons. (1995). The effects of group proportions on group dynamics. In *Diversity in work teams*, edited by Susan Jackson, and Marian Ruderman, 131-159. Washington DC: American Psychological Association.

Tsui, A.S., & Gutek, B.A. (1999). *Demographic differences in organizations: Current research and future directions.* Lexington Books.

Tsui, A.S., & O'Reilly, C.A. (1989). Beyond simple demographic effects: The importance of relational demography in superior-subordinate dyads. *Academy of Management Journal*, *32*(2), 402-423.

U.S. Government Accountability Office. (2009). *Metropolitan Planning Organizations: Options Exist to Enhance Transportation Planning Capacity and Federal Oversight*: Report to the Ranking Member, Committee on Environment and Public Works, U.S. Senate. (GAO Publication No.GAO -09-868). Washington, DC: U.S. Government Printing Office.

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *Amer. Sociological Review, 61*, 674-698.

Van Bueren, E. M., Klijn, E. H., & Koppenjan J. F. M. (2003). Dealing with wicked problems in networks: Analyzing an environmental debate from a network perspective. *Journal of Public Administration Research and Theory*, *13*(2), 193-212.

Van Emmerik, IJ.H. & Brenninkmeijer, V. (2009). Deep-level similarity and group social capital: associations with team functioning. *Small group research, 40*(6), 650-669.

Van Knippenberg, D., De Dreu, C., & Homan, A. (2004). Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology*, *89*, 1008–1022.

Van Knippenberg, D., & Schippers, M. C. (2007).Work group diversity. *Annual Review of Psychology, 58*, 515-41.

Vigoda-Gadot, E. (2003). *Managing collaboration in public administration: the promise of alliance among governance, citizens, and businesses.* Westport, Conn.: Praeger.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, UK: Cambridge University Press.

Watson, W. E., Kumar, K., & Michaelsen, L.K. (1993). Cultural diversity's impact on interaction process and performance: Comparing homogeneous and diverse task groups. *Academy of Management Journal*, *36*(3), 590-602.

Werner, S., Praxedes, M., & Kim, H. (2007). The reporting of nonresponse analyses in survey research. *Organizational Research Methods, 10*(2), 287-295.

Williams, K. Y., & O'Reilly, C.A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in organizational behavior*, *20*,77-140.

Wolf, J., & Farquahr, M. (2005). Assessing progress: The State of Metropolitan Planning Organizations under ISTEA and TEA-21. *International Journal of Public Administration, 28*, 1057-1079.

Yuan, Y. C., & Gay, G. (2006). Homophily of Network Ties and Bonding and Bridging Social Capital in Computer‐Mediated Distributed Teams. *Journal of Computer‐Mediated Communication, 11*(4), 1062-1084.

VITA

NAME OF AUTHOR: Yujin Choi

PLACE OF BIRTH: Seoul, Korea

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Georgia, Athens, Georgia

Seoul National University, Seoul, Korea

Ewha Womans University, Seoul, Korea

DEGREES AWARDED:

Master of Public Administration, 2007, University of Georgia

Master of Public Administration, 2005, Seoul National University

Bachelor of Arts, 2003, Ewha Womans University