

**PUBLIC CONTRACTING PERFORMANCE MEASUREMENT: A  
STUDY OF SOCIAL RELATIONS**

A Dissertation  
Presented to  
The Academic Faculty

by

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In Partial Fulfillment  
of the Requirements for the Degree  
DOCTOR OF PHILOSOPHY in the SCHOOL OF PUBLIC POLICY

Georgia Institute of Technology  
MAY 2013

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# **PUBLIC CONTRACTING PERFORMANCE: A STUDY OF SOCIAL RELATIONS**

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Date Approved: April 5, 2013

To Jayci, Rori and Hayley, thank you for your unfailing faith, hope and love.

## ACKNOWLEDGEMENTS

**Writing a dissertation is an individual, but not solitary task. It is impossible to reach this milestone without the help of others. I have read that one should never tire of well doing because in due season one will reap a reward, if one does not faint.**

**Dr. Gordon Kingsley, Dr. Susan Cozzens, Dr. Lisa Green, Dr. Cheryl Leggon and Dr. Juan Rogers. Thank you for not fainting. Thank you for never falling away.**

**It would be improper for me to imply that I would have made it to this point without the support of my brothers and sisters Alice, Bryon, Claudia, Dwayne, Gerrell and Jonette and our parents, Janet and Claude Wall.**

**I would like to make it perfectly clear that neither I nor my family would have survived without the love and support from Mrs. Priceberg, Kathy, Fannie, Kim, Donna, Dot, Curtis Jr., Willie and Valerie.**

**To that list I must add Latissia, Judy and Peter. On second thought, forget about Peter.**

**I owe a lifetime of kindness to Walter for his unwavering support.**

**Dr. Burggraf, thank you for advising me to just keep writing. It worked! To my 6 a.m. prayer group and the Truth Seekers of Big Bethel AME, this success belongs to us all.**

**To my husband and friend Scott, “what then shall we say to these things, if God is for us who can stand against us?”**

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## SUMMARY

This research questions whether there is evidence that contract performance measurement is influenced by the social structure in which it is embedded. I question whether the strong ties between a prime contractor and its subcontractors lead to higher performance scores in public contracting. I also question if prior relations between a Georgia Department of Transportation (GDOT) manager and the private firm project manager whose work is being evaluated lead to higher performance scores.

# **CHAPTER ONE**

## **INTRODUCTION**

Public contracting is a policy prescription designed to increase government efficiency and effectiveness, therefore it is reasonable that its performance is frequently discussed in efficiency and effectiveness terms. Performance measurement theory, however, pushes to expand the discussion beyond these terms. It seeks to capture the influence of all key factors that shape performance measurement, whether obvious or obscured. Herein lies the debatable proposition. There are claims that key influences, factors that determine if public contracting will be deemed successful, go unexamined. There are claims that the language, concepts and theory of transaction cost are not capable of fully explaining how performance scores for public contracting are determined. In this research I evaluate claims that transaction cost economics theory, with its focus on efficiency and effectiveness measures, omits or undervalues the influence social factors have on performance scores.

In particular, this research questions whether there is evidence that contract performance measurement is influenced by the social structure in which it is embedded. I question whether the strong ties between a prime contractor and its subcontractors lead to higher performance scores in public contracting. I also question if prior relations between a Georgia Department of Transportation (GDOT) manager and the private firm project manager whose work is being evaluated lead to higher performance scores.

There are a number of theoretical approaches that could be used in questioning the impact social relations has on performance measurement in public contracting. The question could be explored through propositions from governance, network structure, relational contracting or principle-agent theories. I choose, however, to approach the questions using performance measurement, transaction cost economics and embeddedness theories, combined with a bit of influence from network structure theory. I use performance measurement theory to establish the necessity of measuring all factors that play a significant role in determining where an organization is successfully moving toward goal attainment. Transaction cost economics is used to explain widely accepted practice in public contracting and embeddedness theory defines how the social structure exerts influence on performance scores and why this influence should not be ignored.

My work should tell us if transaction cost economics is correct in not accounting for social relations in contracting performance measurement, or if embeddedness theory is correct in accounting for them. I will do this by taking a closer look at the impact tie strength between prime contractors and their subcontractors has on performance scores and by observing the impact social relations between GDOT and its contractors has on performance scores. Then, I will be able to comment on how social relations fit into public contracting performance measurement theory.

I undertake this objective aware of Heinrich's caution that the stage has been set for inevitable measurement problems, when an inherently political process is superimposed with results-oriented managerial logic (2012).

### **Significance of the Study**

The significance of the study rests in its ability to identify if social relations play a role in improving and measuring government efficiency and effectiveness. Of specific interest to public administrators and policy scholars is understanding whether the relationship between prime contractors and subcontractors influence the performance scoring on public contracts. With this information, public managers can determine if these relations provide an avenue for improving performance.

Policy researchers and public managers are also interested in understanding how social relations might impact performance measurement. The influence of these relations is particularly important when the nature of the work performed cannot be evaluated by metrics such as dollars saved, jobs created or clients served. Special skills are not required to collect, measure or report these types of metrics. In situations involving highly skilled human capital such as the engineering design work in this study, performance has to be evaluated by public managers who have similar skills as the private firm employees they evaluate. Stakeholders rely on these specially skilled evaluators to deliver objective, unbiased and accurate descriptions of the work provided. This analysis will comment on whether elected officials, public administrators and citizens are safe in that reliance.

### **Delimitations of Study**

The primary limitation of the research is its generalizability. While propositions arising from this study may be causal, logical and predictive, they are not generalizable (Galaskiewicz 2007). Findings are limited to explaining the relationships as they occur in Georgia Department of Transportation (GDOT). The social relations in this study are between a small group of highly skilled individuals, who are involved in professional engineering design services. People employed in engineering design tend to be highly educated and skilled in engineering and other technical matters. As such the relationships they share may not be reflected in the general public.

Despite the stated limitations, the data do provide an interesting way to see what happens with performance measurement when specially trained individuals at GDOT work with, then evaluate, their similarly trained private firm peers.

### **Definition of Terms**

<i>GDOT-</i>	Georgia Department of Transportation
<i>OCD</i>	Office of Consultant Design  A department within the Georgia Department of Transportation, which is charged with managing engineering

	design work for roads and highway projects.
<i>Prime Contractor or Prime Consultant</i>	The firm that contracts directly with GDOT to perform engineering design related services. This firm is ultimately responsible for delivering contracted services. It also selects subcontractor firms that will participate on the project.
<i>Subcontractor</i>	Firm allocated a specific task by the prime contractor. It does not contract directly with OCD.

### **Organization of the Study**

The remainder of the study is organized into four chapters, bibliography and appendices as follows: Chapter Two provides a review of relevant literature influencing the research. Chapter Three details data collection and description of the data used. Chapter Four describes the model and methodology and presents results. Chapter Five reports findings, conclusions, implications for public policy and suggestions for future research. The study concludes with a bibliography and appendices.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **Overview**

In the literature review, we use an inverted pyramid approach to examine how different thought has defined of what is critical to successful contract performance measurement. We first discuss some of the basic requirements of good performance measurement. From there, we move to reviewing how New Institutional Economics (NIE) and Transaction Cost Economics (TCE) theories have come to define which factors are critical to successful contracting performance (Williamson, 1985, 1998). We then question whether approaches such as TCE fully capture all factors that influence performance measurement. We review claims that economic based thought undersocializes what is actually observed in economic activity. Specifically, we review embeddedness theory arguments that observed performance in any economic activity is much more complex than groups of economic factors interacting with each other to produce results (Granovetter, 1985). The goal is to understand how our thoughts will change if we observe that social relations have significant impact on performance measurement. This in turn, will help researchers and practitioners understand if performance scores can be managed by managing social relations.

## **Performance Measurement in the Public Sector**

The importance of reliable and valid performance measurement is firmly established in public management literature, as is the attendant ambiguity and uncertainty about what should be measured and which methodology should be used for measurement. The need to approach performance measurement as a part of administrative science can be traced back to Ridley and Simon (1938). Yet, it remains one of the big questions of public management, with concerns regarding how to employ ethical, objective and unbiased measurement to help public managers achieve organizational goals (Behn,1995, (Adnan, Jamil et al. 2012).

Stakeholders expect public managers to measure performance in ways that will help them increase achievements. The goal of performance measurement is not only to understand behavior, but also to provide indicators for improving performance (Behn 1995). These indicators are to produce rigorous evidence of the circumstances and environment under which government can be expected to deliver the desired level of performance (Heinrich 2007; Heinrich 2012). Performance measurements were to help citizens, public managers, elected officials and other stakeholders determine if a policy had made any difference at all or if the same level of achievement could have been obtained without the policy (Behn 1995).

Early research in public administration called for new standards of measurements for municipal government. These standards were to be practical tools, not theoretical concepts nor playthings for statisticians. The standards were to be based on observations

of real phenomena rather than hypothesized explanations of possible relationships (Ridley and Simon 1938).

The standards proposed by early proponents were intended to assess the competency and capability of public organizations to meet objectives or goals. The standards were to be practical tools, which met the practical need of choosing between alternate actions. They were to provide guidance for improving performance (Ridley and Simon 1938; Rubenstein, Schwarz et al. 2003). The standards and measurements were to provide evidence that government is effective. They are also intended to improve policy decisions (Wholey and Newcomer 1997), improve communication between citizens and government (Wholey and Hatry 1992), inform the budgetary process and promote accountability (Kravchuk and Schack 1996). The benefits of performance measurement can also reach beyond goal setting and influencing and evaluating delivery processes. Hatry extends the usefulness of performance measurement to ten different tasks including, responding to calls for accountability, internal budgeting, identifying performance problems, building public trust and contracting (Hatry 1999). Behn identifies eight purposes for performance measurement: to evaluate, control, budget, motivate, promote, celebrate, learn and improve. Behn then proposes that each purpose requires different measures (Behn 2003). This further establishes the need to design performance measurement to address specific information needs, rather than use a generic performance measurement process.

When appropriate standards are used in performance measurement, stakeholders will be able to determine what was really accomplished. For this reason, the measurements should focus on outcomes rather than inputs and outputs. Behn draws the distinction by pointing out that outcome is defined by the objective (Behn 1995). For example in public contracting, public managers could report that the number of contracts awarded to new firms was fifty-six. If there was no stated goal of changing the number of new firms awarded contracts, then that measurement is an output rather than an outcome. On the other hand if a stated goal was to double the number of firms from south Georgia that were awarded contracts, a report on how that number changed would be a measurement of outcome. There is an important difference in outputs and outcomes. This difference is reflected in a well-designed performance measurement process.

Although inherently useful to the public decision making process, it was not until the 1960s and 1970s that pressure to explain governmental performance ignited. Citizens demanded greater accountability from public managers and public managers desired additional information to support better decision making (Poister 1999). The pressures of meeting citizens' demands for lower taxes along with pressures from politicians for greater accountability and efficiency, repositioned performance measurement from a routine step in the policy process to a position of central importance. The pressure from citizens and decision makers compelled public managers to not only produce performance measurements, but to also produce ones that were reliable and relevant.

In general, it is agreed that performance measurement tools are intended to help improve decision making and ultimately improve organizational performance, by determining if an action has been effective and efficient in reaching objectives. What is in question is the specific information that would be helpful (Neely, 1995). Performance measurement should be practical, but practical in what sense? As mentioned, performance measurement in the public sector is required to respond to the information needs of citizens, elected officials and public managers. Stakeholders trust performance measurements as reliable purveyors of information they deem important. How then do public managers choose whose information needs to address?

The usefulness of information from performance measures is determined before the first measurement is taken because it depends on how well organizational goals and objectives are stated. It also depends on how appropriate they are for the existing environment (Bititci, 2000, Dixon, 1990). Lack of agreement on objectives will lead to inadequate performance measurement. Regardless of the methodology, it is impossible to meaningfully measure performance if performance is not preceded by a clear, coherent mission and strategy (Kravchuk and Schack 1996). Instead of delivering worthwhile measurements, without clear understanding of policy objectives, performance measurement will default to using readily available resources, and deliver simplistic evaluations (Behn 2003). For example, when explaining which dimensions of performance are selected for measurement and analysis, some public managers state that the organization's mission, goals and objectives determine selection. Yet, only 42 percent believe that their organization's performance measurement system focuses on

what is important (Poister, 1999). Instead, many public managers believe that in the final analysis, they end up measuring and describing whatever the available data allows them to measure and describe (Poister 1999). The realities of performance measurement systems is they can prevent public managers from zeroing in on areas that would deliver the greatest improvement in performances and offer the most impactful improvement in decision making (Morley 1983). This shortcoming frustrates stakeholders because regardless of whether they are clear in expressing their information needs, stakeholders want to know if the value of services rendered meet the value of services expected (Wang 2010).

When well conceptualized and accurately interpreted, performance measurements will provide the information stakeholders desire. However, it is important to note that determining what needs to be measured can be a complex task. As Brown and Potoski state, there are services where it is difficult to measure the quality of outcomes. When governments contract out such services, they run the risk of unseen vendor nonperformance or negligence (Brown and Potoski 2003). There are also measurement issues when successful measurement from one activity is instituted as measurement for another. This problem often arises in the public sector, when government agencies attempt to use financial ratios as measures of performance for a mission driven organization. This type of measurement is not appropriate for public sector organizations because they do not address many of the key objectives of such organizations (Behn 2003). If there is interest in using the measurements of efficiency and effectiveness found in the private sector, they need tweaking when applied to the public sector (Wang 2010).

Instead of relying on measurements from the private sector, public organizations should seek their own practical tools to meet their unique practical needs. Along with addressing organizational goals and objectives, performance measurements used in the public sector should reflect local customs and mores. They should reflect the knowledge and expert opinion of administrators, because these public managers have superior knowledge of and familiarity with the organization's operations, goals and objectives (Ridley 1938; Poister 1999). Measurements in the public sector have little need to mimic those of the private sector. Instead performance measurement in the public sector should measure what is important, even though that might not be immediately obvious. If that is the case, administrators should determine what information is important to all important stakeholders. They should abandon the search for one set of factors that will serve under all circumstances (Kravchuk and Schack 1996; Behn 2003).

Although efficiency ratios and measurement of effectiveness may fulfill information needs in the private sector, they may not have the same impact in the public sector. This is because efficiency and effectiveness measures are not designed to respond to the diverse information needs of citizens, elected officials and public managers (Lytton, 1961, Jackson, 1995 ). They are not designed to provide information helpful in improving communication between citizens and government, motivating public managers, or promoting agency's competence to legislators. Instead of relying on such measurements, public organizations are better served by abandoning the search for a perfect tool and creating practical performance measurement tools that measure what is

important to key stakeholders, reflect the superior knowledge and familiarity of administrators, reflect local culture and account for the hard to discover, hard to frame social factors that affect performance (Ridley and Simon 1938).

Although there is broad general agreement that the ultimate goal of performance measurement is improving organizational performance, differences of opinion remain with regards to what should be measured. As Behn (2003) indicated, meeting different objectives requires different measurements. If the purpose for measuring performance is to control the actions of employees, performance measurement will compare actions of employees versus clearly specified actions that employees are asked to take. If the objective is to motivate employees or stakeholders to improve performance, performance targets will be set and checked at interim points. For public contracting, this returns to having clear goals before the first measurement is taken. If the goal is to use GDOT contracting as an economic stimulus to underdeveloped sections of the state, or to bring in suppliers from underrepresented groups, these factors will be measured and reported.

Although public and private organizations both use performance measurements to address stakeholder information needs, it should be noted that information needs for public organizations' stakeholders differ from their private counterparts. For example, public organizations must address the information needs of elected officials who will determine future funding levels for the organizations, citizens who will influence elected officials' decision making and of public managers whose livelihood might very well depend on the performance measurements. A public organization's process for



performance measurement is also differs from the private sector because it is impacted by a legislative short-term decision- making cycle, the intangibility of services provided and monopsonist market positions (Wang, 2003).

These characteristics that are unique to the public sector lead Wang (2010) to argue that the definition of performance measurement as an indicator of efficiency and effectiveness needs tweaking when considering their role in the public sector. In the private sector, performance measurements such as revenue growth, cost savings and profitability are used as managerial tools for measuring organizational output. In addition, the time period for monitoring and evaluating performance may extend through several fiscal years. In the public sector, however, performance measurements are often used as quick feedback into the annual budgeting process which, is a short decision making cycle. Here, performance measurements will impact annual budget decisions.

Consequently, performance measurements in the public sector are often not set up to capture long term performances such as efficiency and effectiveness. Instead, shorter information cycles mean measurements are often geared to meet a more immediate need for information and may report on factors such as citizen satisfaction, service quality or number of clients served. Also, the short decision making cycle in public organizations means selection of performance measurement is dynamic. Where private sector firms may lock into a static set of measurements, public sector performance measurements are susceptible to policy changes that come about in the short term decision making cycle. Measurements in the public sector, then, are not only charged with capturing information

quickly, but also with adapting to changes in required information due to annual changes in policy direction.

These and other characteristics of information demands placed on public organizations create reporting performance measurements that can be noneconomic or the traditional effectiveness and efficiency measurements and supports the importance of understanding how factors outside the economic structure impact performance and performance measurement.

While critical performances in public sector economic activity are rightly evaluated in terms of cost savings, jobs created, revenue generated, taxes cut or other economic terms (Domberger and Hensher 1993; Domberger and Jensen 1997; Boyne 1998; Boyne 1998; Hodge 1998; Hodge 2000; Van Slyke 2003; Brown and Potoski 2004; Bennett and Iossa 2006), it is also true that some important policy goals conflict with such evaluation standards. For instance, public officials often want their constituents to participate in the contracting process and want their districts to benefit from the policy. At times these goals will conflict with the goal of improving government effectiveness and efficiency. Similarly, efficiency ratios that are used effectively in the private sector are not designed to measure progress toward citizens' demands for access and equity in the contracting process. At times, addressing the goal of equity and access will require decisions that might not pass muster, if evaluated on efficiency ratios. Citizens and elected officials want their preferences met even when they lower government efficiency and effectiveness. This characteristic of the public sector draws back to the central idea of

organizations using measurements that are specific to their needs and environment. It also suggests that public organizations should not be expected to use purely economic measures when evaluating performance.

Stakeholders expect the measures used to report public sector performance to fulfill citizen, public official and employee information requirements (Palumbo 1987; Wang 2010). In some circumstances, however, economic measures cannot meet this obligation. In these cases other variables such as citizens' response, quality of service delivered or client satisfaction are employed (Romzek and Johnston 1999; Romzek and Johnston 1999; Romzek and Johnston 2000; Burghardt and Schochet 2001; Romzek and Johnston 2002; Brown and Potoski 2003; Brown and Potoski 2004; Romzek and Johnston 2005; Brown and Potoski 2006) or the obligation is met using measurements such as quality of service delivery, citizen satisfaction or compliance statistics (Poister, McDavid et al. 1979; Poister 2003; Wang 2010).

In the public sector, it should also be expected that factors selected as performance measurements are influenced by short term budgeting and decision-making cycles. Collecting and reporting data for the annual budgeting cycle creates pressure for receiving information rapidly, and the shortness of funding cycles forced decision makers to demand quick feedback on the efficacy of policy decisions. If policy makers base funding and policy decisions on economic data covering short periods of observation, they run the risk that their decisions are based on performance information that is incomplete, inconclusive and misleading. Using economic measures covering short

observation periods as performance measurements also threatens the ability to accurately capture the impact of policy changes (Wang, 2010). Finally, when public organizations hold monopsonist market positions, the usefulness of measuring performances in purely economic terms is diminished. Where there is no competitive market of buyers and sellers, economic measures lose much of their meaningfulness. In some instances, a public agency is the only buyer for a service, for example, interstate highways, protection of ports or air traffic control. With only one buyer in a geographic area, there is no meaningful way to use interjurisdictional comparison of economic measures because the many social, political and geographical differences cannot be controlled (Wang 2010). In situations where there is no basis for benchmarking performances, the ability of economic factors to provide meaningful evaluation of policy performances is significantly weakened, and using only economic measures of performance is not an advisable option. Instead of a more basic economic articulation of performance, a broader view of performance is preferred.

Along with the objective of providing relevant and reliable information on performance measurement to stakeholders, comes the challenge of identifying an appropriate method for structuring a process to capture and report the required information. Many acceptable approaches to structuring the performance measurement process exist, but most well designed approaches share characteristics of good data collection, objective description and accurate interpretation. The initial step of a well-designed performance measurement process centers on identifying clear, objective, specific measures, which address the quality of performances. They will help explain what action needs to be taken to help

accomplish objectives (Behn 1995). These measures should provide indicators of progress towards program or policy goals. This key step is the foundation for ensuring that the performance measurement process reports necessary information. Without this step, it is very likely that interesting but irrelevant information will be collected (Poister, McDavid et al. 1979; McGowan and Poister 1985).

While it is not difficult to identify components of good performance measurement, there are numerous challenges to that task. The impact of these challenges is seen in the continued uncertainty that policy scholars have regarding performance measurement. There remains concern that meaningful performance measurements have not been established in local government. Using data collected in a survey of public managers, Poister reports that the majority of respondents found the performance measurements they used to be only “somewhat effective” rather than “very effective” (Poister 1999). A feeling of not having a fully effective performance measurement process is very likely attributable to another finding from that study, which found that only 30% of respondents accepted input from rank-in-file employees when developing the performance measurement system, and 60% of respondents reported problems getting lower level employees to support the system. Both managers and employees were found to resist performance measurement systems which they had no input in designing (Poister 1999).

## **Approaches to Understanding Public Contracting**

### **The Transaction Cost Approach**

Predominate understanding of public contracting is heavily influenced by transaction cost economics (TCE) propositions (Williamson 1985; Williamson 1998; Williamson 1999 ).

Consequently policy analyses are influenced by the proposition that the best way to understand the circumstances under which public contracting will occur is by examining the specifics of each transaction. Those specifics are to be examined using these fundamental dimensions: *specificity of assets* (Prager 1994; Domberger and Jensen 1997; Romzek and Johnston 1999; Romzek and Johnston 2002; Brown and Potoski 2003; Van Slyke 2003; Brown and Potoski 2004; Rangan, Samii et al. 2006) , *frequency of the transaction* and *environmental uncertainty* (Smith 1996; Lane 2001; Hefetz and Warner 2004; Brudney, Fernandez et al. 2005; Martin 2005; Romzek and Johnston 2005) .

According to TCE propositions transactions involving highly specific assets, those that have little or no utilization outside their stated purpose should be governed by a hierarchy. If these assets are not controlled internally, the indirect costs of searching for vendors, bargaining with vendors and monitoring their performance will push total cost of contracting higher than the cost of keeping the work in-house. Contracting for these services will also increase the risk of vendor nonperformance, because nonperformance or negligence may be hard to detect. Additionally, contract performance is threatened

because when highly specific assets are involved, the original contract winner is typically locked into the contract and any benefits of a competitive market erode (Brown and Potoski 2003; Brown and Potoski 2003; Brown and Potoski 2003; Brown and Potoski 2004; Brown and Potoski 2004; Brown and Potoski 2006).

Transactions involving assets with low specificity can be executed in the market. TCE logic, which is rooted in minimizing indirect costs associated with contracting, explains that there is minimum cost in searching for contractors, bargaining with them and monitoring their performance when the work is routine and involves assets with low specificity. With this type of asset, there is also low risk associated with undetected vendor nonperformance.

When applied to public contracting, TCE presents the uncomplicated argument that effective performance in public contracting is achieved by ensuring that only tasks for which the bureau is not the appropriate governance structure are contracted out, and that the bureau has an effective monitoring process for the work it contracts out. Under these circumstances service delivery risks are reduced (Kettl 1993; Sclar 2000) and the likelihood of success increased (Brown and Potoski 2003; Brown and Potoski 2003; Brown and Potoski 2004; Brown and Potoski 2006).

In a TCE approach, asset specificity is of critical importance because it indicates the value parties stand to lose as a result of environmental or behavioral uncertainty in the exchange process. If an asset that is required to execute a function of the bureau is highly

specific and the bureau does not control the asset, the bureau is at risk for vendor nonperformance. For example if a municipality contracts out for fire protection services it has to accept the risk that when the courthouse is on fire, the vendor will not immediately respond to the call or will arrive with a poorly maintained hook and ladder truck. Using the TCE concept of contract performance, success depends on mitigating the risks of nonperformance, which in turn depends on assigning the task of fire protection to the organization most likely to show up, on time, with a working fire truck. On the other hand, contracts which can be executed using assets with low specificity, for example tree trimming, are less vulnerable to principal-agent problems, do not require intense agency oversight and can be addressed in the market (Prager 1994; Domberger and Jensen 1997; Romzek and Johnston 1999; Romzek and Johnston 2002; Brown and Potoski 2003; Van Slyke 2003; Brown and Potoski 2004; Rangan, Samii et al. 2006).

The TCE approach also proposes that contracting performance is determined, but to a lesser degree, by frequency of the transaction and environmental uncertainty. Again, the focus is on the individual transaction, and quality of performance is argued to be assured by assigning the transactions to the organization best capable of handling the frequency. In terms of public contracting, the frequency argument suggests the bureau should contract out routine, pedestrian functions (Smith 1996; Lane 2001; Hefetz and Warner 2004; Brudney, Fernandez et al. 2005; Martin 2005; Romzek and Johnston 2005).



TCE arguments provide direction on make or buy decisions. They propose that successful contracting is the result of correct make or buy decisions. The theory's propositions state that the decision to contract out depends on whether the assets required to complete the transaction are highly specific and how frequently the agency needs these assets employed ( Joskow, 1987, Klein, 1989 Masten, Meehan, & Snyder, 1989 Geyskens, Steenkamp, Kumar 2006, Chiou and Shen (2006), Sun, Kwon, 2006, Liao and Lin (2006), Nizquez et al (2007), Yu, Liao and Lin (2006), Nizquez et al (2007).

Transactions are to be sent to the market when the assets involved have low specificity and are easily replaceable. Transactions that are routine are also best executed in the market (Claro, Hagelaar, Omta 2003) Wang (2002) Nizquez, Iglesias Rodriguez-Del-Bosque (2007), Joshi and Stump (1999) (Brown and Potoski 2003; Brown and Potoski 2003; Brown, Falk et al. 2004; Brown and Potoski 2004; Brown and Potoski 2004).

When this approach is used in contracting decision making, public managers need to consider the dimensions of asset specificity, frequency and environment uncertainty. When correctly assessed, these dimensions will identify the type of governance best suited to deliver superior performance. TCE also proposes that when agencies make contracting decisions based on these dimensions, opportunism is controlled (Brown and Potoski 2003); inherent risk in contracting is mitigated (Brown and Potoski 2003); managerial capacity within the bureau is maintained (Brown and Potoski 2004; Brown and Potoski 2006) and stakeholder values are maintained (Brown and Potoski 2006).

TCE propositions are rooted in the concept of successful performance as a function of using asset specificity to assign transactions to the correct governance structure. An alternate way of expressing that concept is successful performance is a function of assigning transactions based on organizational capacity. TCE propositions can be restated as arguing that successful contracting performance results from assigning transactions to organizations that have the capability, knowledge and resources to complete the transaction and will do so with minimum monitoring. In other words, TCE propositions resemble an argument of organizational capacity.

If TCE arguments are viewed as propositions of organizational capacity, they are not hampered by the narrow focus on asset specificity. Brown and Potoski note, problems exist in determining the impact asset specificity has on contracting, when researchers cannot clearly define levels of asset specificity (2003). There is a continuum of asset specificity that does not have clear demarcation. How does a public manager decide the specificity of a water tank or a utility pole? Some even argue that the definition of asset specificity needs to be expanded beyond hard assets and revised to include highly specific human assets and intellectual capital (Subramani, and Venkatraman 2003, (Brown and Potoski 2003).

Understanding contract performance through a TCE focus on asset specificity is also problematic in certain industries. Aubert, Rivard and Patry (2004) used incomplete contract theory and transaction costs theory to test whether assets' specificity and environmental uncertainty influenced the level of outsourcing in 335 information

technology firms. They concluded that uncertainty is a deterrent to outsourcing, but could find no conclusive evidence on the role of asset specificity. Perry, Sengupta and Krapfel (2004) found that in high tech firms, trust and commitment, rather than asset specificity determined when hybrid governance structures such as alliances were formed. Similarly, Hsieh (2004) used transactional cost theory and relational exchange theory and found that successful partnerships are the result of parties sharing information, commitment and trust. Sheng, Brown et.al (2006) results found that inter-organizational communication, not asset specificity, is the critical determinant of relational governance.

Hsieh (2004), Aubert, Rivard and Patry (2004) reveal an important concern about the range of asset types over which TCE approaches are effective. Results from the studies indicate that the reliability of TCE propositions weaken in highly technical environments. Asset specificity was not performing as hypothesized. Rather than functioning as “the big locomotive” which drives successful performance, asset specificity assumed a more peripheral role and had less impact on performance than expected.

The reliability of TCE propositions are questioned with regard to asset type, industry type and also in terms of how they relate to the public sector. There is concern that public and private organizations are so different that TCE propositions are not applicable to the public sector. The proposition that good performance is the result of assigning transactions to the proper governance structure does not account for political factors found in the public sector. These factors can and will influence the make or buy decision, with little regard to TCE arguments. Another difference between the sectors that TCE

does not account for is the reality that no market option or alternative governance structure exists for many of the goods and services the public sector produces (Moe 1990). There is no make or buy decision where there are no alternative suppliers of government functions such as foreign diplomacy, national security or tax collection.

Moe (1990) questions whether TCE is reliable in an environment where deciding the governance structure for economic exchange is not as simple as having objective, unbiased managers evaluate assets, frequency and uncertainty. Instead Moe is concerned with TCE performance in an environment constrained by political considerations and how the theory addresses the impact of having political considerations direct transactions to preferred governance structures. TCE also fails to address the reality that in the public sector, there are often no options for governance structure. These unique characteristics of public sector transactions create difficulty for approaches based on the freedom to assign transactions to the best of several governance structure options.

In large part, TCE approaches are built on comparisons of how different governance structures minimize transaction costs. For TCE to work multiple governance structures must exist and transactions must be assigned to them without bias or subjectivity. It is only when these two prerequisites are met that contracting performances are predicted to be successful. These requirements underlie questions regarding the usefulness of transaction costs approaches in public contracting. There is no explanation of how the market would economize on transaction costs associated with national defense, foreign policy or interstate highway systems, for example. Nor do the transaction cost

approaches explain how markets would economize on local judicial systems or natural resource allocations. Such public functions involve economic exchange, yet there are no alternate governance structures.

Moe (1990) points out that even if it were possible to find market alternatives to such bureau functions, there is no way to transfer the accountability associated with the function. Public officials cannot sell or contract out their public authority. The accountability issue is unique to the public sector. Citizens and elected officials are going to hold public managers accountability for performance. Even if work is contracted out, the accountability remains in-house. This gives Moe more reason to disagree that transaction costs economics are generalizable to the public sector.

The accountability that remains in-house, the lack of alternative governance structures for some public services and the influence of political factors combine to undermine the transferability of TCE propositions to the public sector. They call the central tenet of TCE, unbiased assignment of transactions to the correct governance structure, into question. The realities of economic exchange in the public sector also reflect back to Coase's original divergence from neoclassical thought, when Coase argued that economic theory had to reflect the realities of the phenomena examined (Coase 1937). Moe's argument is in line with Coase's critique. Coase believed that if the theory does not reflect observable reality, then it is not the correct theory. Moe argues that TCE, although heavily relied upon in contracting literature, does not reflect observable reality

in the public sector and consequently something different is required to explain what is happening.

Williamson (1999) considered Moe's argument and responded that a transaction approach remains relevant and reliable when considering the public bureau as an alternate governance structure to the market and the firm. Williamson argued that asset specificity also functions as the “big locomotive” even when considering the public bureau's transactions. Williamson (1999) contends that the adjustment required for TCE to address unique characteristics of public sector transactions is considering that the important assets in the bureau are human rather than physical. The degree of specificity of a public bureau's human assets is what would determine the appropriate governance structure for public bureau transactions. Along with this modification in defining the critical assets, Williamson also introduces probity, a new hazard that must be considered. Probity or absolute integrity is the hazard that must be present in public bureau transactions, but also, in any transaction driven by human asset specificity.

The modification of TCE to include probity and specificity of human assets, was intended to address critics such as Moe (Moe 1990), who questioned the appropriateness of using TCE to analyze public bureau decisions. By adding requirements for personal integrity and consideration of specific human assets, the TCE modification attempted to address peculiarities and complexities of the bureau. However, the modification did not adequately address critical issues raised by Moe. Williamson argued that with the modifications, TCE accounted for specificity of human assets housed in public officials.

Williamson did not, however, acknowledge that those specific human assets were inseparable from a political structure fully capable of restricting their portability.

Williamson accounted for bureau assets being human rather than physical, but never quite address the argument that the assets were controlled by a political structure and could be assigned to a governance structure based on political expediency. Nor did Williamson acknowledge that some public sector human assets, such as some employed in national defense and national intelligence, are valuable only to the extent they have access to proprietary information, processes and equipment owned by the public sector.

Another area where transaction cost theory and public contracting are misaligned is in TCE theory's light treatment of intangible assets, such as public trust and accountability. These assets are essential to the public sector, but escape analysis in TCE theory. For example, consider that citizens give the public sector responsibility for national defense, public health, public safety and foreign policy, largely because they prefer such functions be addressed free from profit motivation. Citizens tend to believe that their best interests are served when the supplier of such services is not motivated by profit. In such situations, the intangible asset, public trust, dictates and restricts the governance structure selected to deliver the service. Since, in the public sector, intangible assets can dictate governance structure, they should be addressed in TCE theory. The fact that they are not sufficiently addressed, however, weakens TCE theory's generalizability to the public sector.

The key to transaction cost economics is its focus on assigning transactions to the governance structure best prepared to execute it, while minimizing search and monitoring costs. Its shortcomings, however, are particularly noticeable when applied in the public sector. Differences, such as being highly influenced by politics, which can either hamper or prevent freely assigning transactions, weaken TCE propositions. The presence and importance of intangible assets such as public trust and accountability also restrain the effectiveness of TCE propositions in explaining public contract performance. Added to these shortcomings is a somewhat cursory examination of human assets and their relational content. TCE explains that human assets should be valued according to their specificity and treated as other assets, but it does not delve into understanding how human assets, their connections to other human assets and the relational structure impacts performance. The combination of these shortcomings allows critique that TCE falls short of being a strong framework for understanding public contracting.

Had Williamson remained closer to the New Institutional Economics (NIE) framework from which TCE is derived human assets would have been accounted for, because NIE calls for relying on real world observation, not theoretical abstraction. Economists such as Davis and North chose to follow Coase's advice (1937). They evaluated, then confirmed the impact of social norms and influences or "rules of the game" on economic performances (Davis and North 1971; North 1990; North 1991). In contrast, Williamson and others stayed focused on evaluating the impact of governance structures on economic performances and importance of organizational capacity (Williamson 1985; Klein 1998; Williamson 2000). Because Williamson chose to go that route, TCE theory falls short in



determining how legal, political, religious or social influences impact contract performances.

A TCE logic model that more accurately reflected NIE concepts would tie economic performance to transaction costs and transaction costs to social and political influences. What is available however is a transaction costs approach proposing that the true cost of completing economic exchange depends on the amount of monitoring and oversight required to ensure successful completion. It does this without recognizing that the amount of monitoring and oversight required is influenced by the level of trust and the quality of communication between parties engaged in exchange. Reluctance to accept the benefits of trust might be a result of TCE being a cousin to principal agent theory, which is concerned with the risks of goal incongruence and information asymmetries between principals and vendors (Miller, 1992). Perhaps Williamson shares the belief that private firms are prone to opportunism (Light, 2000; Wise, 1990), will shirk responsibility and deliver a lower quality product in order to increase profits (Brown and Potoski, 2003). There must be a reason why Williamson chooses not to fully consider the benefits social relations can have on all contracts, as embeddedness theory suggests.

## **Socio-Economic Approaches to Contracting**

Socio-economic and legal theories offer alternative explanations of contracting performance. Both theories offer critique that economic approaches explain contracting outcomes without recognizing the full impact of social influence on performance. They present more explicit arguments that social structure and social relations impact economic performance. Where Williamson (1985) recognizes social influence when executing incomplete contracts, legal theorists argue that all economic exchange, including contracting, is rooted in a social matrix. They further argue that if any analysis of economic transactions is to be efficient, the analysis must include contextual analysis of relations influencing the transaction (MacNeil 1974; MacNeil 1985; MacNeil 2000; Brown, Falk et al. 2004; Rahman and Kumaraswamu 2004; Doornik 2006; Rahman and Kumaraswamu 2007). A key proposition of relational contracting theory is the argument that exchange between economic factors is seldom free of the artifacts of personal relations, and it is important to account for these artifacts when explaining contracting activity.

The argument that social artifacts must be accounted for is found in socio-economic and legal critiques of approaches that undersocialize economic performance. The heart of the argument is that although theorized, a strict demarcation between society and economy is not observed in economic exchange. Instead, what is observed is social structure exerting influence that shapes economic performances (Polanyi 1944; Polanyi 1945). The

necessity of theory that accurately reflects this *observed* behavior is the catalyst for arguments that performance must be analyzed within a social context (Polanyi 1944; Polanyi 2001). It is what creates a consistent demand for recognizing that relying on theoretical constructions, rather than observed behavior, creates an undersocialized view of economic behavior (Granovetter 1985).

Embeddedness theory asserts a need to view economic activity in context of the surrounding social structure. In contrast to economic approaches, it argues that social factors are essential to a full understanding of economic behavior. Embeddedness theory believes that economic activity should be examined through a lens that brings the connection between social structure and economic performances to the forefront. The goal of this theory is to increase understanding of economic phenomena by first recognizing that economic activity occurs within the greater social structure and second, by acknowledging that the impact of social organization on economic phenomena is central, rather than peripheral, to understanding economic behavior. To be clear, embeddedness theory proposes using analysis of social relations as a complement to economic analysis, not as a rival explanation (Polanyi 1944; Granovetter 1985).

The strength of embeddedness theory vis a vis economic theory is its grounding in observed behavior. Based on observations, embeddedness theory proposes that an economic actor's social network creates a system of incentives and disincentives which constrain malfeasance, limit opportunism and lead to successful economic performances (Granovetter 1985). In this sense, embeddedness and TCE concepts are somewhat

aligned. Both agree that structural influences affect economic success. The difference lies in the types of structures argued to influence performances. TCE argues that governance structures overseeing exchange will determine performance, while embeddedness approaches argue that the social structures in which economic activity are embedded will greatly influence performances. It is important to note that although an embeddedness argument places social relations in a central position, it does not present analysis of social relations as replacement of economic analysis. Rather, analysis of social relations is presented as a means of gaining additional understanding. The embeddedness argument does not state that social structure dominates economic structure nor does it argue that social structure governs economic behavior. Instead, the embeddedness theory is one of a symbiotic relationship between economic, social and other institutions (Polanyi 1944, 2001). Fully explaining one institution requires understanding the others.

#### Network Structure Approach

When social structure is discussed as an influence of market activity, it is often presented in terms that can be quantified. One of the more frequently used means of quantifying social influences is through the language of network analysis. This language formalizes social relations as a mappable structure then explains how structural characteristics of a social network, such as proximity and density, can be managed to improve performance (Prager 1994; Milward 1995; Provan and Milward 1995; Milward and Provan 1998; Milward and Provan 2000; Milward and Provan 2001; Provan and Milward 2001; Milward and Provan 2003; Provan, Vezaie et al. 2005; Provan and Fish 2007)

(Markovsky, Willer et al. 1988; Panet and Trebilcock 1998; Agranoff and McGuire 2001; Perry-Smith 2003).

Network studies rarely show any interest in examining the quality of the tie between actors or how the quality of ties influences performance or performance measurement (Burt 1983; Burt 1983; Burt 1983; Galaskiewicz 1985; Burt 1987; Markovsky, Willer et al. 1988; Burt 1992; Provan and Milward 1995; Milward and K.G> 1998; Human 2000; Agranoff and McGuire 2001; Provan and Milward 2001; Perry-Smith 2003; Isett and Provan 2005; Provan, Vezaie et al. 2005; Provan and Fish 2007; Tiwana 2008).

In a network structure approach, the concept of embeddedness is explained in term of social network density, size, position or stability. Network density identifies the number of connections an actor has, size indicates a count of network members, position describes how quickly a network member can reach other members and stability reflects the pattern of members entering and exiting the network. In other words, the focus is on how a collection of social relations impacts an individual actor's economic performance. The approach maintains that the relationship between social ties and economics is best explained by the arrangement of ties within a social network, rather than the nature of the tie.

To further explore the idea of structural influence on performances, consider Ostrom's work (1990) on the role played by network size. Ostrom theorized that the relationship between social structure and economic performances could be understood by examining

the size of the actor's social network. In the discussion of network size, Ostrom highlighted the importance of smaller networks. Ostrom found that when dyads were arranged in nonhierarchical structures or flat networks, smaller and more stable clusters formed. This flatter arrangement of social relations improves performances because it offers network members avenues to increase both frequency and intensity of interaction with network members. As these factors increase, trust and ease of communication also increase. Ostrom argued that if we want to understand how to improve performances from economic activity, we need to understand the frequency and intensity of interaction between economic partners.

In contrast, Burt (1992) agreed with Ostrom that size matters, but argued that bigger is better. Specifically, Burt found that large diverse networks were more likely to be rich in the resources necessary for successful performances; not because of the number of actors in the network, but due to the diversity of resources made available within larger networks. Bigger is better, but only if bigger means that a larger amount of desired resources are readily available to network members. In fact, Burt proposed that if bigger is simply increased homogeneity of resources, it could cripple a network with redundancy. As previously discussed, redundancy is associated with institutionalized routines which impede introducing new information and processes. The performance of a large, but redundant network of relations can be detrimental rather than beneficial to individual actors.

Further support for differentiating between network size and scope impacts performances is presented by Elango and Pattnaik's (2007) who found that smaller networks with broad scopes had greater access to exposure in international markets than small networks that were less broad. Similarly, Hung (2005) agreed that scope, not the size of networks matters. Hung found that diversity in networks was associated with relatively more freedom in organizational choices because networks with broader scopes were less tied to organizational routines and institutionalism, which opened networks up to benefits from new routines. The freedom to try new routines then opened paths for new information and knowledge transfer, which ultimately increased chances for successful performances.

When analyzing the relationship between social relations and performances from a structural approach, size of the network of social relations should be considered on two dimensions: diversity of resources available and ease of communication. The network's impact on performances is not determined by its size, but by the nature and number of resources contained within. In addition, activity that benefits from trust or easy communication between partners is expected to gain better performance from flatter networks that form small tight knit clusters. On the other hand, activity that profits from the freedom to introduce new routines, timely knowledge transfer and freedom from organizational institutionalism, will thrive in larger networks.

Another means of using social network structure theory to explain the relationship between social relations and economic performance involves identifying gaps or holes in the network. The concept of structural holes explains the absence of connection between

two different networks. Structural holes create competitive advantages for the actor who recognizes unconnected networks that have resources that might benefit the other, and have no conduit for exchange. The competitive advantage is realized when the actor inserts himself as a connection between disconnected networks and in turn, benefits from the resources available in both. The actor is guaranteed a place of importance, as long as resource exchanges can only happen through him. Being located in this network position places the advantaged actor in the function of a bridge, which means the actor has early access to reliable information from two separated groups. Information moving through the bridge is available to other network members only when delivered by the bridging actor (Burt 1992; Wasserman and Faust 1994)).

Reviews of structural holes and bridges support arguments that social connections are associated with improved performances, but only when the connection leads to improved access to desired resources. For example, in a study of Canadian mutual funds, Zaheer and Bell (2005) found that firms positioned as bridges were better innovators and delivered enhanced firm performance because they had access to new information and processes. Rhee (2004) added a qualification to the structural hole argument by finding that a position as a bridge leads to successful performances only when the bridges connected currently relevant actors; bridges were important only if the actors being bridged were important to each other. Tiwana (2008) confirmed that for social relations to impact economic performances, they needed to be between actors who possessed resources valuable to the other. Tiwana analyzed forty-two different innovation alliances between a major American firm and its alliance partners and confirmed that bridging ties



provide innovation potential by increasing access to a wider diversity of ideas and processes. The ties between actors were able to facilitate improved performances because they encouraged the exchange of valuable resources.

Although the relationship between bridged social relations and positive economic performances is fairly consistent, bridged relations are not a panacea. Similar to other aspects of social/economic relationships, bridges have shortcomings. In particular, Tiwana (2008) cautioned that while bridged relations facilitate access to new knowledge, they do not facilitate integration capacity. Bridged relations connect actors; the actors themselves, however, must transfer and absorb benefits. As a result of this finding, Tiwana proposed that the strength of the tie between actors must be considered. Specifically Tiwana argued that bridged ties were more effective when they are made with strong ties because having bridges made with strong ties enabled fuller utilization of each tie's specific benefit. Strong ties' ability to increase integration capacity between two organizations was combined with bridging ties' ability to provide access to new knowledge. This complementary relationship between strong ties and bridging ties increased a network's ambidexterity by providing access to new information and at the same time increasing the ability to integrate innovation into the network.

#### Content of Social Ties Approach

Like other indicators of network structure, bridges and structural holes provide a meaningful way of understanding how social relations influence performances from economic activity. A strong case can be made that a structural form of analysis provides

sufficient insight into the relationship between economic activity and the social matrix into which it is embedded. However, there are caveats in relying on this form of analysis. For example, Rhee (2004) agrees that structural analysis is important, but argues that, in isolation, structural elements: size, density, bridges or holes are not *causal* factors in economic performances. Rhee offers that it is the qualitative aspect of ties that explains causality. In this argument, Rhee proposes that the location of network members is not the superior factor influencing performances. Instead it is the quality of the tie that determines how social relations come to impact economic performance.

Rhee's (2004) argument, favoring the quality of dyadic ties over network structural arrangements, is one of several critiquing a focus on network structural elements (Baker 1984; Granovetter 1985; Baker 1990; Burt 1992; Degenne and Michael 19991). The basis of the critique is that a focus on structural elements strays away from Polanyi's basic tenets that man's participation in the market was driven by a desire to safeguard: (1) social standing (2) social claims and (3) social assets (Polanyi 1944; Polanyi 1945; Krippner, Granovetter et al. 2004). Polanyi's stance is that the connection between social and economic is intentional; social man identifies the relations he believes will protect his social standing and economic performance is a function of those intentional choices. Consider a recent college graduate who is presented two housing options. The graduate can either purchase a home in a stable, moderate income housing development very close to his office or he can rent an apartment, twenty miles away, in a complex near restaurants, entertainment venues and shops favored by other young college graduates. Using the Polanyi argument, we would expect the young graduate to choose apartment

life, and based on this selection, create an economic scenario that foregoes building equity through homeownership and incurs increased transportation costs. The economic impact on the graduate's life is not a result of how the graduate is situated in a social network; it is the result of his safeguarding social assets. Another way of expressing this concept and the critique of network structure analysis is 'if you want to understand economic man, first understand social man'; and the best way to do so is through observation, rather than theoretical constructions (Polanyi 1944).

If analysis of structural elements such as size, position and bridges does not sufficiently explain what is observed in the relationship between the social matrix and performances, what is the preferred unit of analysis? Socio-economists who argue that the idea of studying only the structure of networks is "an extreme and foolish position" (Granovetter 2004, p.114) advance the idea of focusing on the *content* of social ties.

Using a *content* of ties approach rather than a *structural* approach changes the unit of analysis to the quality of the relation, rather than the pattern of how relations are configured within a network. Dyadic relations between actors are deconstructed into dimensions of frequency and intensity of interaction. An example of this approach is Granovetter's (1983) study of weak and strong ties, where tie strength is defined as a measurement of the "combination of the amount of time, emotional intensity, intimacy (mutual confiding), and reciprocal services which characterize the tie" (Granovetter, 1973, p.1361). There are two ideas to keep in mind in understanding the role tie strength plays in determining performances. First, the relationship is dependent on environmental

specifics; second, the nomenclature is not an indicator of effectiveness. Weak ties can be more effective than strong ties, given the right environment.

For example, weak ties connecting two groups which otherwise would have no path to each other can positively impact performances. Granovetter (1973) finds weak ties improve job seekers access to information about available positions. The Granovetter studies (1973, 1983) present counterintuitive evidence that infrequent and weak relations are more productive in delivering positive performances than intense and frequent ones. Actors who maintain weak ties have greater capacity to manage multiple ties than ones who maintain strong ties. Simply put, human emotional and physical limitations restrict the number of intense, frequent relations an actor can manage. Actors can; however, manage a much larger number of relations if they are less intense and less frequent. This indicates that actors maintaining a large number of weak ties will have access to larger amounts of diverse resources. In the case of Granovetter's' job seekers, the causal factor is not the weakness of the tie, but the freedom to have ties to a diversity of job searching resources. Langlois confirmed the role of weak ties, using frequency of recent contact as a measure of tie strength. Langlois also found that new jobs came through weak ties rather than strong ties (1977).

Studies on the relationship between innovation performances and content of network ties also confirm the importance of understanding the quality of the social tie. Recent studies (Dittrich, Duysters, deMan, 2007; Bell and Zaheer, 2007; Stanko, Bonner and Calantone, 2007) support earlier findings that weak ties influence performances. Dittrich, Dysters,

and deMan's study of the international firm, IBM, found that IBM transformed and reenergized itself when it executed a two pronged strategy of loosening ties with existing partners and forming weaker ties with new partners. This assisted IBM in transforming from a computer hardware company to a global technology service and software provider. Similar to findings in the IBM study, Tiwana (2008) finds weak ties increase exposure to new information and ultimately improve performances. When both weak and strong ties are present, weak ties continue to show evidence of significantly influencing performances. This is a dynamic that holds true even when strong ties are predominate. While studying the impact of the quality of social relations on knowledge transfer, Levin and Cross found that at times the influence of weak ties may be overshadowed by the influence of strong ones, but weak ties still exert influence on performances (2004).

The strength of weak ties is consistently found to reside in their ability to increase access to critical resources. In the IBM study (Dittrich, Duysters, deMan, 2007), weak ties were identified as a means of increasing access to new processes and information necessary for transformation. The Levin and Cross (2004) and Granovetter (1973) studies indicate that weak ties facilitate increased flows of new or unique information by opening the number of paths for them to reach actors.

Actors with weak ties are receptive to unique or new information because they have fewer social assets at risk. If the new information proves incorrect or unhelpful, those with weak ties suffer minimal loss of social assets. In other words, actors with weak ties are free to take risks by introducing novel information into their network, because they

have so little at stake (Granovetter, 1973). In some respect, they are in the enviable position of having little at risk with an opportunity for great reward.

In contrast to weak ties that increase access to resources, strong ties affect performances by improving absorptive capacity (Tiwana 2008). Relation ties that involve frequent or intense interaction create an ease of communication between actors. As actors come to understand each other's language better, more of what is being said is being correctly understood. Also, it is through repeated shared experiences that exchange partners gain insight into the cultural norms of each other. Understanding such norms helps exchange partners avoid missteps, which could hinder exchange.

Fukugawa (2006) explains that strong relational ties are actually a reflection of strong commitment, and it is mutual strong commitment that leads to positive performances. Establishing and maintaining strong ties requires actors to consistently commit time, energy and resources to each other. This continuous stream of mutual giving creates trust and provides actors the freedom to initiate changes and to quickly respond to changes, without fear of ruining the relationship.

Where Granovetter (1973) states that weak ties provide information on job leads, Fukugawa counters that strong ties create a commitment to help, and it is the commitment to help that facilitates successful performances. The difference between the two types of ties can be considered a difference in intentionality. Weak ties suggest

passive activity in passing along information which the receiver may chose to pursue, while strong ties suggest a more active commitment to arrive at a positive performance.

Fukugawa also presents findings that oppose Dittrich, Dysters and deMan (2007). Recall this study found that moving from strong alliances to weak ties led to IBM's successful corporate transformation. These studies of corporate partners found successful performances associated with the strong ties found in dense networks. Instead of finding benefits from increased information flows and access to new processes, Fukygawa and others found a connection that showed that partners with high levels of commitment, stability and predictability experienced successful performances (Fukugawa, 2006, Beugelskijk, Koen, and Noorderhave, 2006).

However, it should be noted that excessive amounts of strong ties can be counterproductive. McFadyen and Cannella (2004) examined the relationship between social capital and knowledge creation, and noted that as the number of strong relations increased, the returns to knowledge decreased. They found that the strength of the relation, defined as the number of interactions with the same actor, produced increasing returns to a point, then produced diminishing returns to knowledge creation. This finding is important as it indicates that the relationship between strong ties and performances is curvilinear. Similar to the results generated by small tight knit networks, an overabundance of strong ties institutionalizes routines. And at some point, regardless of the depth of mutual trust and commitment, the relationship will not have the breath of resources required for continued positive results.

### Combination of Structural and Content of Ties Approach

Social relations can be defined by the tie between actors, or formalized by the way they are structured into a network. Regardless of the way the concept is formalized, the essence of both structural and strength of tie approaches lies in explaining the capacity of parties to absorb benefits available through social relations. Not all find structural and strength of tie approaches mutually exclusive. Some find it beneficial to combine the two approaches into one comprehensive proposition. Tiwana (2008) combined the structural concept of bridging with the qualitative concept of strong ties to argue that social relations improve performances. Rhee (2004) supported this approach, advocating that analysis of network structure without considering the quality of the tie was insufficient.

Likewise, Uzzi's preference for a combined approach is evident in a study of the New York garment industry (1996). Using both network structure and social embeddedness variables, Uzzi creates a flexible model that isolates the impact and assesses the incremental value of both structural and qualitative variables. Specifically, Uzzi used control models that combined factors such as organization size and age with network structure variables e.g. network size and centrality to explain the likelihood of firms surviving in the garment industry. Uzzi then added variables that reflected the quality of the relationship between contractors and their sub-contractors to the model. Uzzi found the addition of embeddedness variables "significantly improve the fit of baseline control models" (Uzzi, 1996, p.690). The addition of the social relations variables, whether



structural or qualitative, increased the amount of variation explained and led to improved explanations of firms' ability to survive in a highly competitive market.

Uzzi's (1996) particularly relevant work addresses the relationship between social relations and economic activity in the context of contracting. Uzzi begins explaining the impact of embeddedness by first understanding how social relations in the market are structured, and how this structuring impacts whether a tie will be defined as embedded or arms-length. Uzzi analyzes these relations between clothing manufacturers and their contractors, and determines that nearly 80 percent of transactions between the garment manufactures and contractors use weak ties. Uzzi then explains that since ties in the market are marked by exchanges involving 10 percent or less of a manufacturers work, these ties are considered arms-length. These ties are routine in the industry and do not signify a special relationship between the manufacturer and the contractor. Uzzi explains that in the garment industry, it is not until a manufacturer sends at least 20-25 percent of its work to a principal contractor that the relations are defined as embedded ties or "special". However, once Uzzi locates embedded ties in the garment industry, Uzzi confirms that firms with socially founded embedded business ties have positive effects on organization outcomes.

The Uzzi approach shows that there is an option for explaining public contracting in a way that avoids some of the shortcomings of transactions cost approaches. Specifically, where TCE analysis undersocializes economic activity by arguing that controlling indirect costs by properly assigning work to either internal or external governance is the

key to successful performances, embeddedness theory argues that for such analysis to be complete, it must recognize the social structure in which the transaction is embedded and the influence that structure is exerting on performance. This theory proposes that regardless of the type of governance structure and its ability to minimize cost, the transaction occurs in a social structure which exerts its own influence on the outcome (Uzzi 1996; Uzzi 1999; Uzzi and Gillespie 2002; Uzzi and Lancaster 2003; Uzzi 2004).

### **Environmental Influences**

The number of conflicting claims found in the role network size, strength of tie and other characteristics suggest some type of unidentified, exogeneous influence is at work. These influences are most likely environmental. Along with the structure or strength of social ties, they shape the impact social relations have on performance. Uzzi explains the need to understand environmental context this way, “the performances of embeddedness are not unconditionally beneficial” (p. 694, 1996); while Mizruchi believes that the extent to which social connections matter varies according to circumstances (1996). Both acknowledge that something external to social relations is moderating how social relations affect performances. The influences might be as simple as which persons are involved in the exchange (Uzzi 2004) or something as complex as the level of uncertainty surrounding the actors and situations (Rogers 1962; Kerckhoff, Back et al. 1965; Mizruchi 1996; Simpson and McGrimmon 2008).

Revisiting the contradiction in the Burt (1992) and Ostrom (1990) findings, the need for considering environmental influences becomes clearer. The paradox of their arguments,

Burt arguing in favor of large networks and Ostrom in favor of small networks, supports the idea that exogenous factors exert their influence on the social/economic relationship, and need to be considered. It is not universally true that either large or small networks have the greater influence. Instead, the influence of network size is effected by environmental factors (Perry, Segunda 2004).

Rowley, et.al agree that environmental characteristics affect the direction and degree of influence that embedded ties have on performances. For example, the researchers found that the industry type influences the impact that tie strength has on performances. In the steel industry, strong ties are related to positive performances. While in the semiconductor industry weak ties are positively associated with successful performances. Whether the tie connects similar or different actors also matters. In a study of publications performances between teams composed of either heterogeneous or homogenous researchers, Porac, Fischer, et.al (2004) found that both heterogeneous and homogenous alliances increase publication performances, but alliances formed by researchers from different universities, with different backgrounds and disciplines published at higher rates than teams whose composition were more homogeneous. Reagans and McEvily (2003) reported similar findings on the relationship between heterogeneous ties and performances. While studying knowledge transfer processes the authors found that having relations with a diverse group of people allows for more effective communication to heterogeneous groups. The knowledge transfer process is improved by having a diverse range on inputs, and being able to absorb diverse inputs allows for more effective expression of outputs.

Similarly, the age of the relations influences how social relations affect performances. Social ties within a young or emerging network of ties tend to be stronger, while older, more mature networks consist of weak ties. The same is true based on the age of the market in which firms operate. Emerging markets are organized around strong ties; mature markets around weak ties. This pattern of using strong or weak ties reflects what is needed in the market. Young firms need the security and stability of strong ties to survive, while older firms need access to new ideas and knowledge to continue (Elfring and Hulsink 2003; Elango and Pattnaik 2007; Elfring and Hulsink 2007). The issue of age is also reflected when length of the relations is considered. Hwang points out that successfully managing cooperative relationships hinges on understanding both interpersonal and intertemporal dynamics; one is not to be explained without consideration of the other (2005). This is an important point because the nature of relations as well as its impact on performance is expected to change over time. Over time as more and more relations are added, the marginal improvement decreases and the ability to nurture strong ties decreases (McFayden and Cannella Jr. 2004). The point to consider here is that strong relations can become weak ones over time, so it is best to understand that the relations are dynamic and so is the impact they have on performances. Rutten (2004) reinforces this view, but goes further by stating that the temporal aspect is not the key. Instead, Rutten argues that it is not the length of the relation, but what happens in the relation that impacts performances. This argument parallels the network size debate as both argue that the stated characteristic, network size or longevity, is not the influencing characteristic. In the case of time, it is assumed that longer relationships

deliver greater access to resources or improved absorptive capacity. Ruten argues that neither is necessarily true. One may have less productive long lasting relations or highly productive relations with a short life span.

Geography and culture are other environmental contexts that significantly shape the interaction between social relations and performances. Piore and Sable point to small regional socioeconomic networks as models of success. The success of these small, closely knit and geographically based networks is argued to be derived from their ability to operate with production flexibility and the competitive advantage derived from exploiting unique regional strengths (Piore and Sable 1984; Scott 1986; Porter 1990). The advantage of geographically based social relations is derived from shared culture, language and business practices, which create an unforced ease in economic exchange.

Specific characteristics of local geography also impact social relations in other ways. For example, the number of in-migrants into the area influences how social relations impact performances. Areas with more in-migration tend to benefit from exposure to new ideas introduced by new residents, while areas with little in-migration have little access to new information and tend to suffer less successful performances (Atterton, 2007). Other studies confirm that “place matters” in determining how ties are embedded in a network structure and what performances are to be expected (Neal, 2008; Floysand and Sjøholt, 2007). Franklin and Lee (2007) explain the relationship between geography and culture on economic performances in this manner; cultural embeddedness leads to structural embeddedness, which then shapes economic relations. Specifically, Franklin and Lee

find that ties embedded in a sense of place and belonging can have more influence on economic performances than how ties are embedded in a network structure. Franklin and Lee would argue that Kansas City's Gates Barbeque Sauce continues to thrive in Kansas City despite the availability of Kraft and Heinz products because the Gates' franchise is culturally and geographically embedded in the region. Atlanta's music industry grows as artists flock to the area in hopes of taking advantage of knowledge diffusion from the number of talented industry producers, writers and promoter who call the city home.

Singh (2005) examined the interplay between geography, culture and knowledge diffusion and found that each plays a role in influencing economic performances. Sing analyzed different patterns of knowledge diffusion among firms and found a link between knowledge flows and geography. Sing found that knowledge flows within a region were greater than knowledge flows which crossed regions, partially because interregional knowledge flows moved on long geodesics, e.g. long paths through the network of relations, while intraregional knowledge flowed on shorter geodesics. Singh's work indicates that ties between actors in close geographical proximity operate as information superhighways that create a competitive advantage.

### **Summary of Literature Review**

The logic model of this research draws from a diverse group of theories to explain public contracting performance and performance measurement. Some of the logic comes from socio-economic theory, some from economic theory. Even legal theory makes a contribution. We are able to use all of these diverse approaches because they offer

something worthwhile individually and collectively. Although they conflict on some points, they do not conflict on all points.

Though diverse, there are similarities in the theories that help in the research design. For example, there is a fairly consistent plea to base our explanation on observed behavior.

When we consider which factors should be examined when we study performance, we are directed to measure factors that have been observed influencing performance. We are informed that it is important to understand that when economic activity is observed, it is influenced by the social structure in which it is embedded. Even the economists say that we should consider factors that reflect reality. These different theories insist that logic models be based on what is observed, not what is theorized.

Likewise the importance of staying focused on the particulars of the phenomena being examined is stressed in several of the theories. We are to choose performance measurement factors uniquely suited for the particular situation. We are to consider social, political and economic influences. Along that same line, we are to use multiple criteria to define performance. We are not to simply transfer a set of measures from one organization to another. The most serious critique of TCE, the prevailing explanation of contracting is that it is not effective in the public sector because it does not recognize variables that are unique to public contracting. The theories are different but they still agree that however factors influencing performance are conceptualized, they need to reflect the unique realities of the organization.

Finally, the theories agree on the importance of environmental influences. We expect performance in public organizations to have some influences that aren't significant in the private sector. We expect that strong ties will perform well in some circumstances, while weak ties perform well in others. The reviewed literatures support understanding performance from different vantage points, and the need to consider it with respect to environment context is consistent. There has to be some accounting for environmental factors such as age or geography. Age, though an indicator of firm survival, is also an indicator of organizational capacity. Long surviving firms have the capacity to successfully and consistently perform in the market. Similarly although location addresses the geographical environment, it can also impact the intensity and frequency of social relations and influence performance.

Overall, the various theories support a new conceptual model for understanding the factors that influence public contracting performance and performance measurement. The new concept combines TCE propositions of organizational capacity with embeddedness arguments of social relations capacity. Performance can be modeled as the combination of an organization's capacity to effectively and efficiently execute a contract combined with an organization's ability to access and absorb resources made available through social relations.

### **Gaps in the Literature**

The theories used in the research provide a broad base for explaining public contracting performance. The performance measurement literature discusses the importance of



having practical, relevant tools for measuring performance. Contracting literature contrasts the differences between contracting in public and private sector environments. Along with these studies is a sizable reserve of research that investigates relationships between embedded social relations and economic performances. Topics include buyer-supplier ties (Wynarczyk and Watson, 2005), firm to firm alliances (Bell and Zaheer, 2007; Bonner, Kim and Cavusgil, 2005), entrepreneurs, small businesses and new businesses (Jack, Dodd and Anderson, 2008; Elfring and Hulsink, 2007, Edward, Ram, Sen Gupta and Tsai, 2006), and innovation and knowledge transfer (Venkatramna and Lee, 2004; Bonner and Walker, 2004). Studies using embeddedness or network propositions to examine phenomena discuss managing inter-organizational networks between public and not for profit organizations (Isett and Provan, 2005; Provan and Milward, 1995; Provan, Milward and Isett, 2002) or dilemmas in coordinating networked resources (Herranz, 2007; Agranoff and McGuire, 2001; O'Toole, 1997).

The theories used in this research comment on a wide range of topics. At times two might comment on the same topic without referencing each other. For example, performance measurement theory discusses the need to find all factors that influence outcomes and does so without referencing embeddedness claims that tie strength is a factor of performance. New Institutional Economics and legal theories both comment on the need to consider the impact of social factors on performance, without pointing out the parallels in their propositions. This research addresses a gap in the literature that stems from theorists not issuing joint statements. The gap is not caused by a lack of comment on public contracting or performance measurement. Nor is it caused by a lack of

comment on the role of social relations play in economic outcomes or the impact of tie strengths. The gap occurs because there is no joint theoretical statement on the influence social relations exert on public contracting performance and performance measurement. The analysis that follows is designed to address questions left unanswered in the literature, and is guided by two separate research questions and hypotheses. The first question addresses the impact of a prime contractor's arrangements of social ties with its subcontractors:

## **Research Questions**

### *Research Question One*

***In a public contracting environment, does the strength of relations between a prime contractor and its subcontractors improve performance management scores?***

Drawing from the Uzzi study of the relationship between firm survival and social relations, this question will be explored by examining the following hypothesis:

H1 : Performance evaluation scores are positively associated with socially embedded business ties between a prime contractor and its subcontractors.

The second research question addresses the impact of having a public manager evaluate the same private firm peer on multiple occasions:

### *Research Question Two*

***Do social relations between a public manager evaluator and the private firm peer being evaluated influence performance scores?***

H2: Higher performance scores are achieved when the public manager evaluator and the private firm project manager have established prior social relations.

### **CHAPTER THREE**

#### **DATA COLLECTION AND DESCRIPTION**

This study explores whether social relations between actors influence performance evaluation scores. Social relations, or ties, are examined on two levels. Relations between organizations are modeled using ties between private firms, which serve as prime contractors or subcontractors on GDOT contracts. Relations between individuals are modeled using ties between GDOT project managers and the private firm managers, who oversee performance on GDOT contracts. Typically studies that examine the arrangement of social relations between actors are considered network studies. As such, it is common to collect data using survey and field research techniques. There are, however, instances where the advantages of archival data are preferred. This study uses GDOT contract and performance evaluation records, which offer the benefit of formal documentation of relations, as opposed to relying on individuals' recall. Additionally, the data reports the frequency of relations on two levels. It first reports the frequency of interaction between prime contractors and subcontractors. It also captures the frequency of relations between GDOT project managers and the private firm project managers overseeing the work being evaluated. As is common with archival data, the data were not specifically collected to support external research. Its collection was designed to meet internal information needs. Consequently there may be a number of interesting and helpful questions that this analysis will raise but which will remain unanswered simply because the archival data was not collected with such questions in mind. Instead the data was collected to address specific internal needs.

## **Background**

Until the 1990s, GDOT's in-house engineers handled the GDOT's need for engineering design work. The work was executed through departments such as Bridge Design, Road Design, Urban Projects Design as well as district transportation offices. However, two important environmental changes dictated adjustments in GDOT's approach to the engineering design function. First, GDOT's labor market changed due to private firms hiring GDOT engineers and the retiring of veteran employees. This change was accompanied by political changes, which called for increased privatization of nonessential government functions. Adjusting to the new environmental realities required modification in the allocation of work between private firms and GDOT. The balance of engineering design work shifted from internal production to external production. Engineering design work once performed by GDOT engineers was contracted out to private engineering design firms (Kingsley, Gen et al. 2003).

As GDOT contracted out more of its engineering design work, the role of GDOT engineers changed from executing engineering design work to managing and coordinating relations between GDOT and private firms. Due to this shift in responsibilities, GDOT administrators moved the oversight and evaluation functions out of individual departments and into a new office, the Office of Consultant Design (OCD). The data used in this study are from the Office of Consultant Design, which oversees the majority of GDOT's contracts for engineering design. The data are largely representative

of such contract work although the full scope of contracts executed out of GDOT offices is much wider.

The type of contracts executed by the Office of Consultant Design (OCD) cover a wide range of activity and complexity. For example, contracts from the Roads Department include such projects as a three-year contract to build a welcome center and a one year contract to produce a “Development of Drainage Manual.” Projects formerly managed by the Urban Department but now managed by OCD include a nine-year contract for work on high occupancy vehicle (HOV) lanes on Interstate 85. It is not uncommon for OCD to award turnkey contracts, which means that the prime contractor has the responsibility for the entire project from beginning to end. Projects of this type can be very complex undertakings and can include functions ranging from developing concepts and designs to completing bridge replacements. At the same time the description of some contracts prevents understanding the degree of relative complexity involved. For example there are contracts that are formally described as “deck rehab”, “County Line to Scott Rd.” or “Archeology Mitigation.” These descriptions defy categorizing work as relatively complex or simple. The ability to determine complexity is further compounded when they are awarded to large, international firms that have the capacity to execute even complex contracts in-house or with assistance from few subcontractors.

## **Data Sources**

### **Consultant Management System**

The creation of the new office also required transfer of data collection responsibility to

OCD, creating a challenge of combining data collection systems that shared little consistency. In response to this challenge, GDOT created the *Consultant Management System* (CMS). CMS was an early attempt to standardize data collection and progress reporting. GDOT employees believe that during the data transfer from individual departments to CMS, records of some contracts were lost. Records of contracts completed prior to the data transfer were intentionally not transferred. Also, because different departments collected different data, OCD decided which data were important as they moved forward, and some information previously collected by departments was determined less important and not transferred to the CMS database. The final data fields used in CMS collected information on each engineering design project including contract descriptions, contract amount, project locations and, important for this study, data on firms acting as prime contractors or subcontractors.

The CMS database represents one of the first attempts at unifying GDOT engineering design data, previously housed in different systems. Information in the CMS database is compiled in numerous tables. The CMS data used in this study was obtained primarily from the *Project Information* and *Subfinal* tables. These tables provided information on projects initiated between 1992-2004 and were heavily relied on in constructing the independent variables, particularly the variables of interest, which model relations associated with the contracting process.

### **Consultant Management Information System**

The second data source used in this study was the Consultant Management Information

System (CMIS), an improved version of the older CMS database. CMIS was created to provide enhanced managing and tracking capability for OCD project managers. CMIS data combines records of projects initially collected in the CMS database with records on newer projects. However, similar to the creation of CMS, records on completed projects were not transferred. Only historical records related to projects still in progress or those scheduled to begin were transferred from CMS into CMIS. In total CMIS maintained 365 records in the “CMIS\_Contract” table, of which 119 were transferred from the CMS database.

### **Performance Evaluation Database**

The third data source is the separately maintained records of performance evaluation. Performance evaluations are completed for projects exceeding 12 months duration. The evaluations occur once during each year of the project and have a final evaluation upon project completion. The GDOT project manager overseeing the project performs the evaluations.

### **Data Cleaning**

The data were cleaned with the end goal of creating a sample where there was contract data for each evaluation and an evaluation for each contract. Cleaning the data required multiple steps to eliminate duplicate and incomplete records and to eliminate those records where there was not a matched pair of contract detail and performance evaluation. When combining records from both CMS and CMIS, I organized contracts from both CMS and CMIS databases numerically and removed duplicates and records

without a project identification number. At this point, subcontractors and primes were matched when their names appeared on the same project number. For the CMS data, details on which subcontractors worked on projects were recorded in a separate Subfinal table. Finally observations indicating no use of subcontractors on the contract, either because of incomplete records or because of the nature of the contract did not require subcontractors, were removed. These observations were removed because formal documentation of relations between a prime contractor and a subcontractor were needed to construct one of the variables of interest.

The evaluations data were cleaned separately from the project information data. The evaluation database contained evaluations from multiple GDOT departments. As previously mentioned, the focus of this research are the relations between participants on contacts managed by, OCD, which is only one of many GDOT departments. Evaluations detailing performance on contracts managed by other GDOT departments were removed because they did not have general project information recorded in either CMS or CMIS, the contract databases for OCD projects.

Because OCD projects often cover multiple contract years, it is not uncommon to find one project with multiple evaluations. For example, if a project began in 2000 and concluded in 2004, it might have four annual evaluations in the database. When it was noted that multiple evaluations for a project were recorded and that the evaluations scores were the same or very similar, for example scores of 3.4, 3.4, 3.3 and 3.4, only the final evaluation was included in the sample data. If, however, multiple evaluations of the



same project were in the database and there was a change in either the project manager performing the evaluation or the project manager whose work was being evaluated, or if there were significant changes in period to period evaluation scores, exceptions were made as the presence of a different project manager pairing indicated the presence of different relations to be evaluated. At the end of the data cleaning, there were 122 evaluations matched to projects recorded in the cleaned contract data set. These are the observations used in the study.

### **Description of the Data**

Each observation used in the research has two components; an evaluation of a prime contractor's performance and records of embedded relations involving GDOT project managers, private firm project managers, and prime consultant and sub-consultant firms . Thirty-five different firms are represented in the sample set, with several firms evaluated multiple times, because of the number of projects they worked on and the different pairing of personnel they created. The four most frequently evaluated firms represent thirty-four different observations and account for over thirty-five percent of all observations in the sample. To note, these firms used several different individuals to work with GDOT, so although the firm is appearing multiple times, their personnel is different (See Table 3.1).

Table 3.1 Most Frequently Evaluated Firms

Firm Name	# Evaluations in Sample	# Different Projects	# Different Project Managers
Arcadis	10	8	5
Heath	10	7	7
Kimley Horn	10	9	5
PBQD	13	10	6
Most Frequent Total	43	34	23
Total Sample Observations	122	96	72
% Total Sample Observations	35.2	35.4	34.3

Twenty-four different GDOT project managers completed the sample set evaluations. These twenty-four managers evaluated the work of seventy-two different consultant project managers; however, similar to overrepresentation from private firms, several GDOT project managers are overrepresented in the sample observations. Recorded evaluations from five GDOT project managers are disproportionately represented in the data and account for sixty-eight percent of all evaluations. For example, Project Manager 16 accounts for over one-fifth of all evaluations and Project Manager 13 accounts for another fifteen percent. As a group, however, the average total weighted performance

evaluation scores awarded by these five project managers are not biased towards higher or lower scores. Three of the project managers; Project Manager 7, Project Manager 13, and Project Manager 15, award scores that on average are lower than the sample mean of 3.69, while the two other project managers; Project Manager 16 and Project Manager 20 awarded scores higher than the sample mean (Table 3.2). The overrepresentation of five project managers' evaluation is noted, but does not create great concern because collectively they do not introduce significant bias into the sample data.

Table 3.2 Project Manager Evaluation Frequency

GDOT Project Manager Code	Frequency	Percent of all Evaluations	Cumulative	Average Weighted Total Score
7	17	13.93	13.93	3.45
13	18	14.75	28.68	3.33
15	10	8.20	36.88	3.23
16	26	21.31	58.19	3.80
20	12	9.84	68.03	3.92
Total	83	68.03	68.03	3.69

Eighty-seven percent of the sample evaluations are for projects recorded as managed by the Office of Consultant Design (OCD). The remaining thirteen percent are recorded as managed by either Utilities, Urban Design, Road Design or various GDOT District

Offices. Sixty-three (52%) of the observations are first evaluations of projects. The remaining are second or third evaluations of existing projects. As stated in the discussion on cleaning the data, multiple evaluations of the same project were included only if there were changes in the private firm project manager or GDOT project manager assigned to the contract or if scores changed significantly from period to period. The majority, (92%) of the evaluations are annual rather than final evaluations, and the firms evaluated are prime contractors. The sample includes evaluations for years between 2000 and 2006. As with the firms evaluated and the project managers performing evaluations, there is overrepresentation in time periods. The early years have fewer evaluations, while the last two years in the study account for over eighty percent of sample observations, as shown in (Table 3.3).

Table 3.3 Evaluation Dates

Evaluation Date	Frequency	Percent	Cumulative
2002	5	4.10	4.10
2003	14	11.48	15.57
2004	3	2.46	18.03
2005	42	34.43	52.46
2006	58	47.54	100.00
Total	122	100.00	

## **Conceptual Model**

The research model is designed to model performance measurement as an outcome of relations occurring between parties involved in the contracting process. The model conceptualizes two different types of relations as key influences on performance scores; the relations between the team of private firms executing the contract and relations between the private firm project manager and the GDOT manager evaluating the work. The model does not seek to include all sociological and economic variables which contribute to performance scores, but it does control for arguments that place matters and organizational capacity matters (Uzzi 1996).

## **Dependent Variable**

The dependent variable, *total weighted score*, is drawn from GDOT's formal performance measurement documentation. As such, it is the practical tool used to meet the practical information needs of GDOT managers, elected officials and citizen stakeholders. The performance measurement instrument is designed with input from GDOT managers and reflects their superior knowledge and familiarity into the best way to measure performance of activity. Its design acknowledges that performance measurement of services, where it is difficult to measure outcomes, requires more than evaluating financial ratios. Instead it reviews a comprehensive review of multiple goals and objectives.

This conceptualization differs from dependent variables found in other studies examining the relationship between social relations and outcomes from economic activity. Such

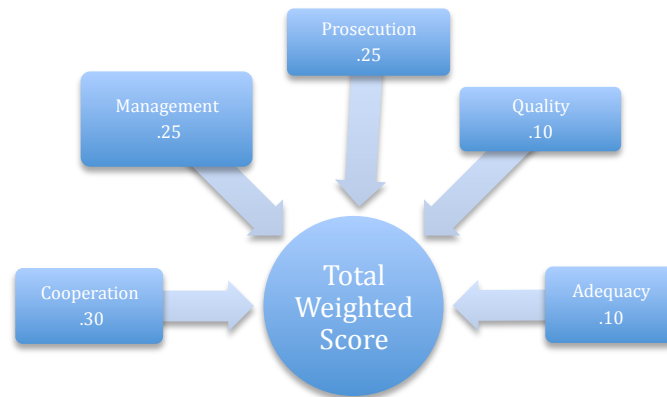
studies have used dependent variables such as fees charged, firm cost savings, jobs created, revenue generated, taxes cut or other economic terms (Domberger and Hensher 1993; Domberger and Jensen 1997; Boyne 1998; Boyne 1998; Hodge 1998; Hodge 2000; Van Slyke 2003; Brown and Potoski 2004; Bennett and Iossa 2006).

Rather than use financial ratios, GDOT project managers evaluate performance addressing five distinct areas of importance. After evaluation of all areas the project managers award a total score, based on their evaluation of contract performance in: Management, Prosecution, Quality, Adequacy and Cooperation. The scoring rubric allows for each category to be rated a whole number ranging from a minimum of 1 point to a maximum of 5 points. After the base score is awarded in each category, they are then weighted based on the established level of importance. The sum of weighted scores from all of the five categories is used to create the study's dependent variable.

According to GDOT evaluation documents, total weighted scores are based on the inputs shown in Figure 3.1.

Figure 3.1

### Performance Score Inputs

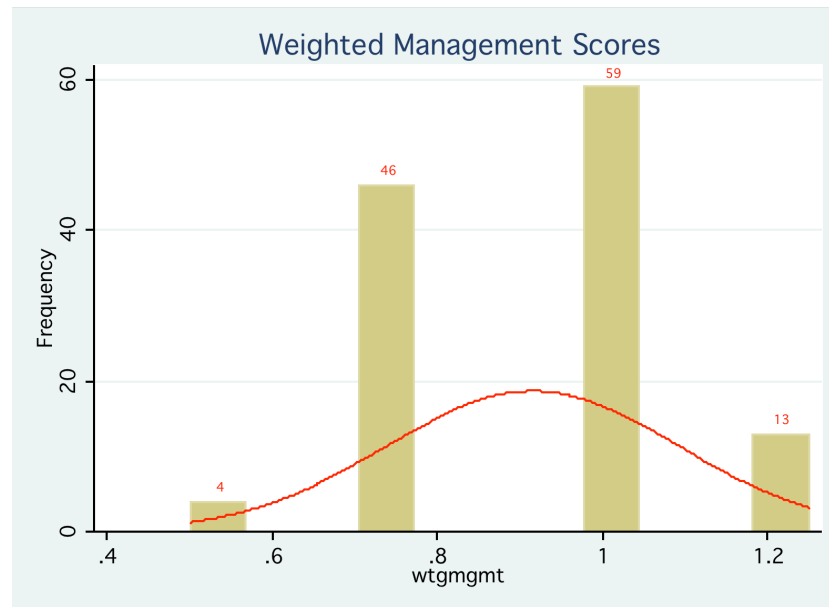


Each input is specifically targeted to measure an aspect of project progress, which GDOT considers essential. Additionally, GDOT delineates detailed and specific behaviors project managers are to consider when evaluating performance. These behaviors are explained as follows:

#### Management

The management score reflects how well the private firm understands and effectively manages the project contract. The score awarded considers but is not limited to the following: Accomplishes the intent and scope of the contracted services by managing appropriate documentation, Minimizes the involvement of DOT staff in the management of the consultant and subconsultant staff, Maintains appropriate cost records, logs, and other documentation. GDOT weights this area .25.

Graph 3.1 Weighted Management Scores Histogram



The mean weighted management score is .92. Performances on this factor were primarily assigned weighted values of .75 or 1.0, close to the mean, while thirteen percent of scores fell into one of the two tails. The variable's normality is confirmed by results from the Shapiro-Wilks test, which report at W-statistic of .99 with a 1.00 probability score. These indicate that, given our sample size, we cannot reject the null hypothesis that the variable is normally distributed.

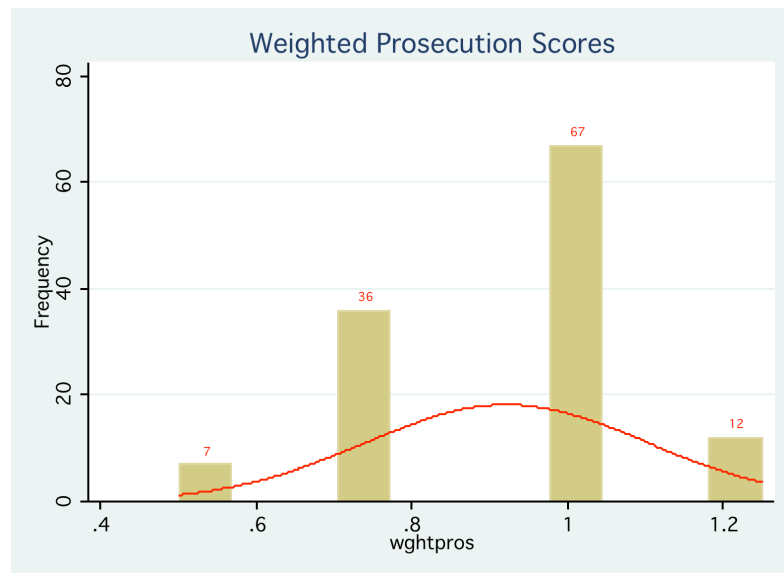
#### Prosecution and Progress

Prosecution and Progress measures how well the evaluated firm stays on schedule and accomplishes established milestones and completion dates. This area also captures how well the private firm adjusts resources in response to demands of the project delivery schedule. Additionally, Prosecution and Progress evaluates whether the firm provides



timely completion of tasks, including reviews, revisions, intermediate and final deliverables. Because this area specifically addresses the issue of how well the contractor adjusts resources to changing conditions, it is expected to be influenced by the quality of communications between GDOT and the firm, and consequently the relationship between the two project managers. It is also expected that this evaluation category captures the give and take of contractual relationships built on incomplete contracts. Scores in Prosecution and Progress are weighted .25, which indicates that GDOT finds this area equally important to Management.

Graph 3.2 Weighted Prosecution Scores Histogram



As shown in Graph 3.2, the weighted mean of .92 in this area is comparable to that for Management. Results from the Shapiro-Wilks test report a W-test statistic of .99 with a probability score of .94, which indicates that we cannot reject the null hypothesis that the

distribution is normal.

### Quality of Work

The Quality of Work evaluates whether the private firm consistently meets the Department's quality expectations and exercises quality control measures. It also evaluates how the private firm applies the Department's established guidelines, standards and procedures, design policies, studies, reports, test, calculations and /or other available information to produce accurate and technically correct design plans, reports, documents, studies tests and or other specified deliverables to the Department. This area is given one of the lower levels of weight, .10.

Graph 3.3



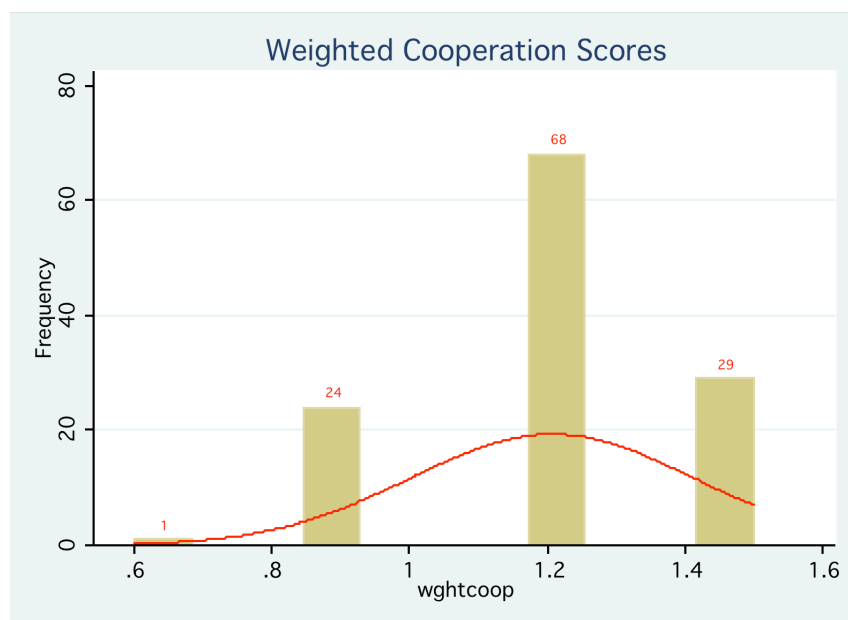
The distribution of scores is presented in Graph 3.3, and indicates that the scores are

normally distributed around the mean of .365. Normal distribution is further indicated by the Shapiro-Wilks W-test statistic of 1.0 and related p-value of 1.0. These test results indicate that we cannot reject the null that the sample data was drawn from a normal distribution.

### Cooperation/ Coordination

The Cooperation/Coordination category evaluates whether the private firm works cooperatively with DOT staff, other consultants, local state and federal agencies, utility companies and/or citizen stakeholders. It also evaluates whether the firm proactively coordinates all activities that may impact or interface with the project and communicates issues and information effectively. The firm is also evaluated on how it responds to the demands of the project, actively defines problems, suggests alternatives and recommends solutions. The importance of this factor is reflected in its assigned weight of .30, the heaviest weight assigned to any of the five evaluation areas.

*Graph 3.4 Weighted Cooperation Scores Histogram*

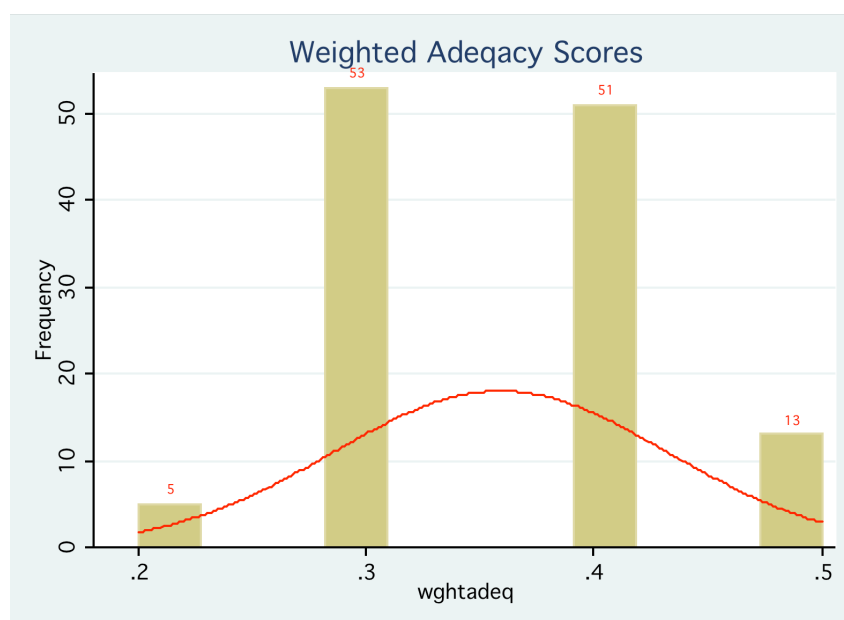


As shown in Graph 3.4, the mean score in this category is 1.2. An observation of the, the distribution appears to be somewhat skewed to the left, lower values with a normal distribution, based on the p-value of .21 and the Shapiro-Wilks W-test statistic of .99, which indicates that given the sample size, the null hypothesis that the sample was drawn from a normal distribution cannot be rejected.

### Adequacy/ Availability of Work Force

The final area evaluates whether the firm possesses and maintains adequate resources to meet the demands of the contract, including having sufficient numbers of qualified staff, who are properly equipped and available for the required tasks. Similar to the Quality rating, Adequacy is assigned a lesser role, given an importance weighting of .10.

Graph 3.5      Weighted Adequacy Scores Histogram



The data for this category are normally distributed around the mean of .359, as presented in Graph 3.5, and indicated by the Shapiro-Wilks W-test statistic of .997 and probability value of 1.0, which indicates that given our sample size we cannot reject the null hypothesis of a normal distribution of the data.

#### Total Rating

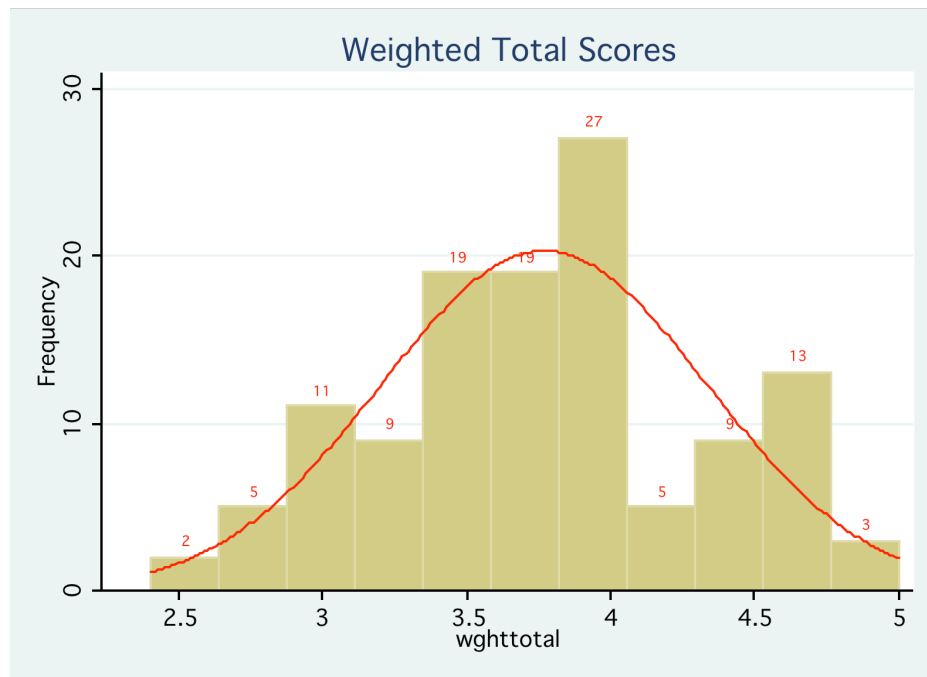
The total weighted average score, which is the dependent variable for the study, is compiled by summing the individual weighted scores for each of the five rating categories. The mean score in the sample data is 3.39, with a minimum value of 2.4 and a maximum value of 5.0.

Table 3.4 **Scoring Frequency**

<i>Total Weighted Score</i>	<i>Percent</i>	<i>Cumulative</i>
<i>0.0-2.99</i>	<i>6.56</i>	<i>6.56</i>
<i>3.00-3.99</i>	<i>52.46</i>	<i>59.02</i>
<i>4.00-4.99</i>	<i>38.52</i>	<i>97.54</i>
<i>5.00</i>	<i>2.46</i>	<i>100.00</i>

Performances in three observations were awarded perfect scores, with the score of 4.0 being awarded twenty-seven times. Ninety percent of total scores were between 3.0 and 4.0. Less than seven percent of all scores were less than 3.0, and only two and one half percent of scores were perfect (Table 3.4).

Graph 3.6 Weighted Total Scores Histogram



As indicated in Graph 3.6, the weighted total scores are normally distributed around the mean, with a Shapiro-Wilks W-test statistic of .995 and a probability value of .960, which indicates that given our sample size, we cannot reject the null hypothesis of normal data distribution.

### Correlation between Five Scoring Categories

The information provided by the five ratings category indicates that each is measuring a unique aspect of performance. Correlation levels between the five categories are within an acceptable range (Table 3.5).

Table 3.5 Correlations between Scoring Categories

Factor	Management	Prosecution	Quality	Cooperation	Adequacy	Total
Management	1.0000					
Prosecution	0.5142	1.0000				
Quality	0.5914	0.4093	1.0000			
Cooperation	0.4914	0.5449	0.4909	1.0000		
Adequacy	0.6032	0.5310	0.5539	.5278	1.0000	
Total Score	0.8121	0.7619	0.7761	.7698	0.8189	1.0000

As expected, there is high positive correlation between the total weighted score and each of the five categories contributing to the total. Management and Adequacy both have correlations with total scores that exceed .80. The remaining three rating categories have correlations with total scores that are greater than .75.

The relationships between individual categories, however, are not at a magnitude such that concern for multicollinearity is created. Adequacy, which has a .10 importance weight, is highly correlated with Management (.60) and Quality, which also has a low importance weight (.10) and has one of the higher correlations with Management (.59).

Given the low level of importance that Adequacy and Quality are assigned, higher correlation with Management is not expected to bias the role of Management in the dependent variable.

It is noted, however, that the combination of Management's .60 correlation with Adequacy, combined with a .59 correlation with the Quality rating indicates that all three categories are measuring some of the same performance characteristics. Overall, the levels of correlation between the ratings categories are acceptable and provide comfort that the performance evaluations are capturing different aspects of contract performance and not repeatedly measuring the same performance characteristic.

## **Independent Variables**

### The Social Relations Variables

The social relations variables are the variables of interest in the study. The first of two social relations variables is designed to model the strength of tie between a prime contractor and its subcontractors, engaged on a contract. This variable gives insight into the impact of relations between parties who actually execute a portion of the work. The construction of the variable draws from embeddedness theory, specifically arguing that performance is influenced by the strength of social ties between actors. Drawing from Uzzi (1996), the strength of tie variable is assigned the variable name, first order coupling. The variable is included in both linear and squared terms so that it can model a curvilinear relationship between tie strength and performance. Modeling the relationship between strength of tie and performance as curvilinear allows for expressing performance



as positively associated both weak and strong ties, given both relationships are argued in embeddedness literature. Although some arguments have established a relationship between weak ties and positive outcomes (Granovetter 1973; Cooper 2003; Atterton 2007) and others have established a relationship between strong ties and positive outcomes (Cooper 2003; Rodriguez-Pose and Storper 2006), I expect the strong ties benefits of increased trust and improved communication flows to positively impact outcomes in public contracting environment. The weak tie argument that success comes from access to multiple streams of information (Granovetter 1973; Krippner, Granovetter et al. 2004), can also be expected to exert some influence on outcomes, but I expect that the influence of access to multiple streams of information will be dampened by a structure where a prime contractor dictates the actions of other members. Given that public contracting involves long term commitments from a specific group of actors, we believe that success will be associated with actors' ability to trust, communicate and adjust to changes. These benefits are found in strong ties, more so than weak ties. The first social relations variables, first order coupling and its squared term, examines embedded relations between prime contractors and their subcontractors. These relations are necessitated by the nature of work covered under the contracts. The complex work detailed in GDOT engineering and design contracts often exceed the scope of most contractors' internal capacity. Work that must be executed can include diverse functions such as land and right of way acquisition, aerial mapping, surveying and construction. Such broad scope requires the prime contractor to fashion a network of firms so that the contract can be completed.

Embedded relations between prime contractors and their network of subcontractors were quantified following Uzzi's concentration of relations concept, which identifies a "special relationship" between firms by finding where firms concentrate transactions with a few trading partners (1996). Higher values indicate the prime contractor concentrates work among fewer subconsultants and forms a special relationship, while lower values indicate the prime contractor disperses work among a larger group of subconsultants and maintains a pattern of short lived, episodic and random relations, relations which are transactional and not socially embedded (Williamson 1985; Baker 1990).

Measures of concentration between exchange partners, such as *first-order network coupling*, are accepted as valid and reliable approaches for identifying the presence of embedded relations and determining the impact embedded relations have on performances in part because of their "face validity". In ethnographic studies of exchange partners, actors reported that decisions to concentrate or disperse exchange was socially influenced. Additionally, Uzzi (1996) argues that the concept of concentrated exchange reflecting special relationships is verified through interviews with people who fundamentally understand the nature of prime/subcontractor type relationships.

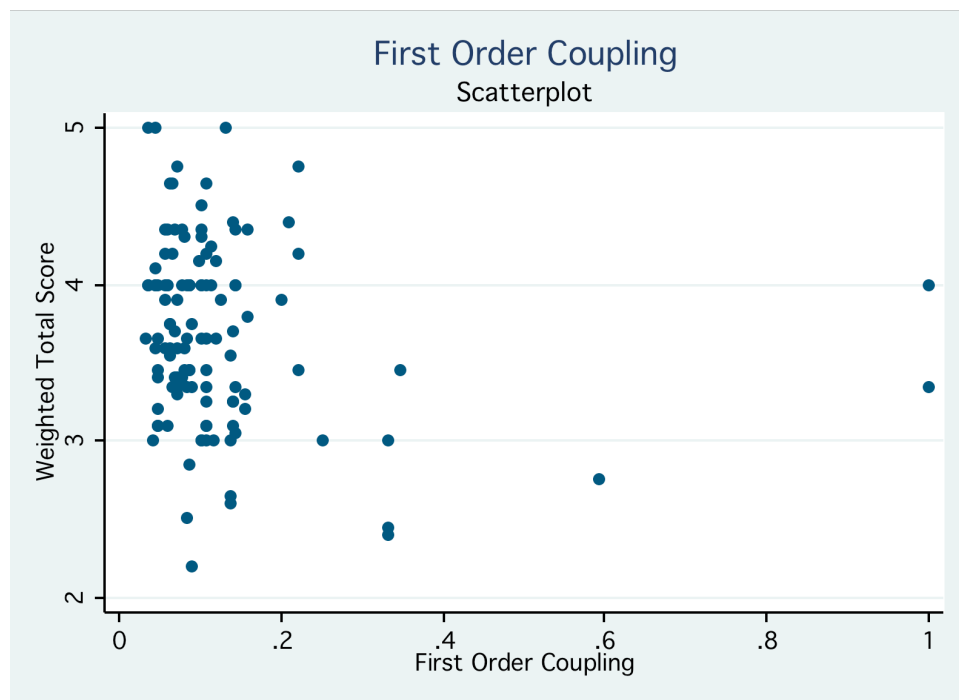
In a study of the New York garment industry, Uzzi found that interviewees believed the degree of concentration of work between a manufacturer and contractors was indicative of "special relationships" which impact performances (1996). A similar verification was found through interviews with GDOT personnel. Interviewees at OCD indicated that

they expected to see special relations where prime contractors form relations with particular subcontractors over time. OCD officials also expressed belief that these relationships lead to better performances. OCD personnel indicated that these special relationships and the associated frequent participation in exchange are used to inform GDOT that particular networks are healthy, in good condition and capable of producing high quality performances, “These niches help consultants work together. It also sends clear signals to GDOT about the soundness of consultant teams” (Weible 2007). A GDOT contract specialist also emphasized a belief that special relations between prime and subcontractors are important to performances by stating that in the selection process, “we approve a team, not a prime contractor” (Weible, 2007).

In addition to face validity, network coupling variables have empirical validity. Previous studies provide evidence that the level of trade concentration between parties indicates social embeddedness and also that levels of concentration in embedded ties impact the quality of performances. Network coupling variables have been successfully used to identify the connection between social relations and performances in investment banking and manufacturing industries (Baker 1990; Uzzi 1996). In analyzing the relationship between social relations and performances in the garment industry, Uzzi used network coupling variables and found embedded relations played a significant role in determining survival rates among firms working as subcontractors to clothing manufactures. Baker (1990) using coupling variables, found the pattern of ties between investment banks and their corporate clients influenced the total dollars raised and the total number of deals done.

These findings support arguments that market relations are not independent of social influences but are socially structured (Baker 1984; Faulkner and Anderson 1987; Etzioni 1988). Variables which operationalized concentration of social factors have also been used in industrial organizational economics and inter-organizational behavior studies in the private market (Scherer 1980; Baker 1990). In studies of private sector market activity, expressing social relations in terms of concentration have proved helpful. It is expected that in a study of public sector market activity, this approach will also proved helpful.

Graph 3.7



As in studies of the private sector, the relationship between embedded social relations and

performance in the public sector is not expected to be linear. Instead, the relationship is expected to be generally positive. At some point, however, the maximum benefit of concentrating relations will be achieved and any higher degrees of concentration will lead to lower performance performances. A review of a scatterplot of first order coupling levels on total weighted scores confirms a curvilinear relationship and indicates that concentration levels lower than .20 are positively associated with higher scores, but levels greater than .20 are negatively associated with higher scores. The negative relationship continues until the level of concentration exceeds .5. Above the .5 level the relationship between first order coupling scores and performance scores again turn positive (Graph 3.7). Modeling this relationship requires the introduction of a quadratic term; the first order coupling variable will appear in the model in both linear and squared terms.

Records from the CMS and CMIS databases were used to create the *first order network coupling variable*. The variable was computed individually for each member of the prime contractor's network, that worked on a particular contract. The concentration of relations between members of the network and the prime contractor was calculated for each contract team and reflects the cumulative efforts between a prime contractor and a subcontractor on OCD projects. The coupling variable captures joint efforts between the prime contractor and a team of subcontractors, occurring between 1992 and date of the performance evaluation.

As demonstration of the computation, in Table 3.6 prime contractor A and prime contractor B are each awarded three contracts. Each prime contractor decides how it will

engage its network of subcontracting firms, and create subcontracting opportunities. The prime contractor has a range of options for apportioning work between its own staff and subcontracting firms. Prime Contract A creates three teams, repeatedly using a configuration of the same three subcontractor firms. Prime A assigns work in the following manner; Subcontractor 1 works on two contracts; Subcontractor 2 works on one contract; and Subcontractor 3 is used on all three contracts. In total, Prime Contractor A creates six subcontracting opportunities.

In contrast, Prime Contractor B also has three contracts, but uses a much larger network of subcontractor firms to create its teams. Prime B's market interaction with subcontracting firms creates opportunities for ten different subcontractors. No single subcontracting firm is paired with Prime B more than 18.8% of the time.

Table 3.6

Example of First Order Coupling Computation

<b>Prime Contractor A (3 contracts)</b>						<b>Prime Contractor B (3 Contracts)</b>		
	b	b/c	(b/c) <sub>2</sub>			b	b/c	(b/c) <sub>2</sub>
Available Subs	Times Used	% of Prime's opportunities given to Subcontractor	Squared			Times Used	% Total Used	Squared
Sub 1	2	.33	.11			2	.125	.012
Sub 2	1	.167	.03			2	.125	.012
Sub 3	3	.5	.25			3	.188	.035
Sub 4	-	-	-			3	.188	.035
Sub 5	-	-	-			1	.0625	.004
Sub 6	-	-	-			1	.0625	.004
Sub 7	-	-	-			1	.0625	.004
Sub 8	-	-	-			1	.0625	.004
Sub 9	-	-	-			1	.0625	.004
Sub 10	-	-	-			1	.0625	.004
#Opportunities Prime Creates for Subs (c)	6					16		
1 <sup>st</sup> OrderCoupling Score			.389					.117

The contrast in the example above demonstrates how a first order coupling measure of embeddedness is constructed and how it is influenced by a prime contractor's decision making. Both prime contractors have three contracts, which may be used to create opportunities for subcontractors. Prime A decides to restrict opportunities to three firms, while Prime B enters the market and forms relations with ten firms. This decision making results in first order coupling factors of .389 and .117 for Prime A and Prime B respectively.

To further explain the concept, note the treatment of Subcontractor 3. Prime B created three opportunities for Subcontractors 3 and Prime A created three opportunities for Subcontractor 3, however, they represent very different relations with the prime contractor. Three contracts with Prime A represents fifty percent of all opportunities created, which suggests stronger ties and more socially embedded relations. On the other hand, three contracts with Prime B represent nineteen percent (.188) of all the opportunity Prime B created, indicating a more arms length relationship between the prime and its subcontractors.

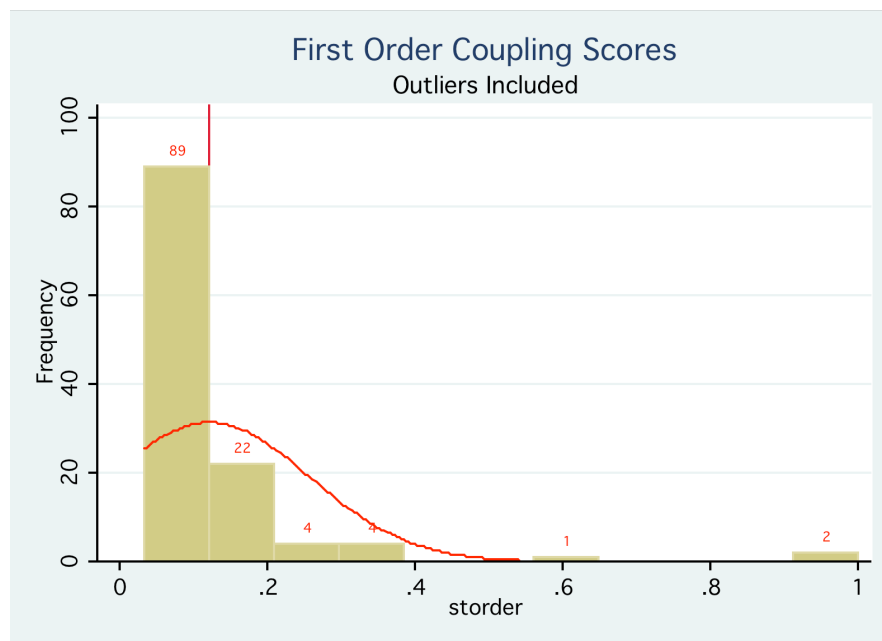
Continuing with the example, Prime A shows two forms of decision making that lead to higher *first order coupling* scores. First Prime A used a small number of subcontractors (intensity) and second, Prime A used Subcontractor 3 repeatedly (frequency). Either frequency or intensity can create socially embedded relations; and regardless of whether expressed through frequency or intensity, *first order coupling* captures the existence of “special” relations. Once this factor is computed for each member of the team, they are summed to create a measure of relations’ “specialness” for the team, whose joint efforts

are being evaluated. The closer the scores are to 1.0 the more special the relations; the closer the scores are to 0, the more arms length.

### Univariate Analysis

The *first order network coupling* variable centers around its mean of .122. The data is reported for all 119 cases and includes three outliers having values of .6, 1.0 and 1.0. The remaining scores range between .033 and .34. The inclusion of the three values greater than .05 slightly skews the data to the right as indicated in Graph 3.8. When all 122 observations are included, the mean value of the first order coupling variable is .122. If the three outliers are omitted from the sample data, the mean drops to .108 for the 119 remaining observations.

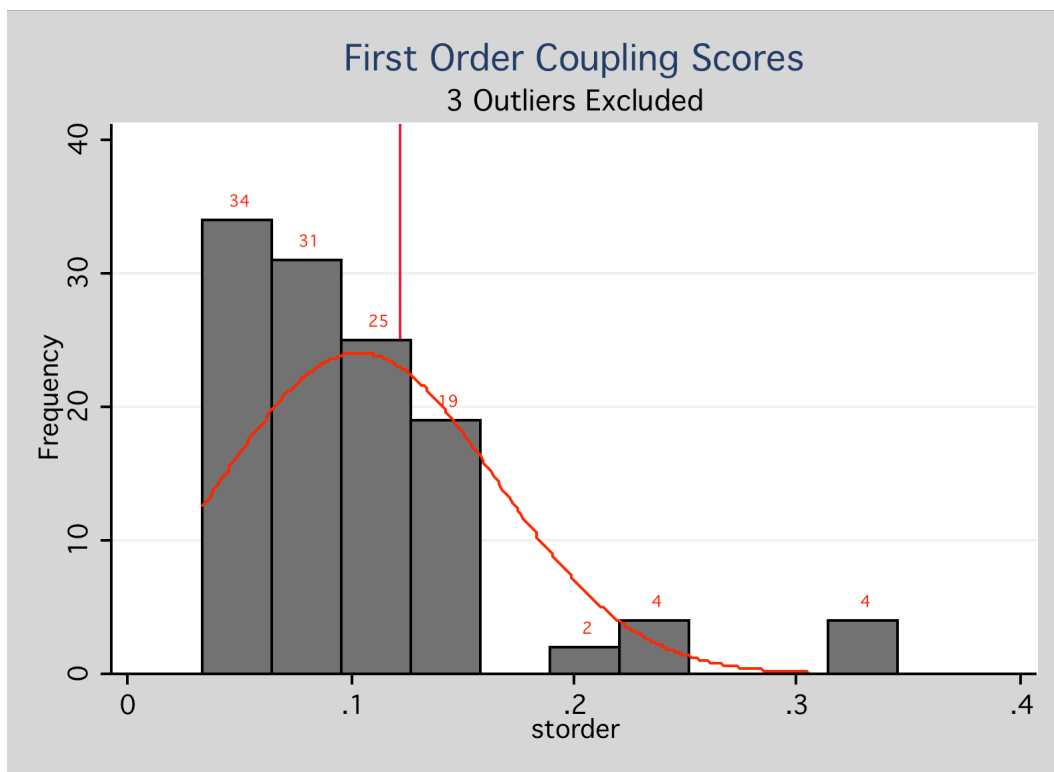
Graph 3.8





Graph 3.7 and Graph 3.8 provide graphical representation of the distribution of first order coupling scores. In both graphs a parametric estimation of the distribution, kernel density, is illustrated by the curvilinear line which smoothes out the boxes of the histogram.

Graph 3.9

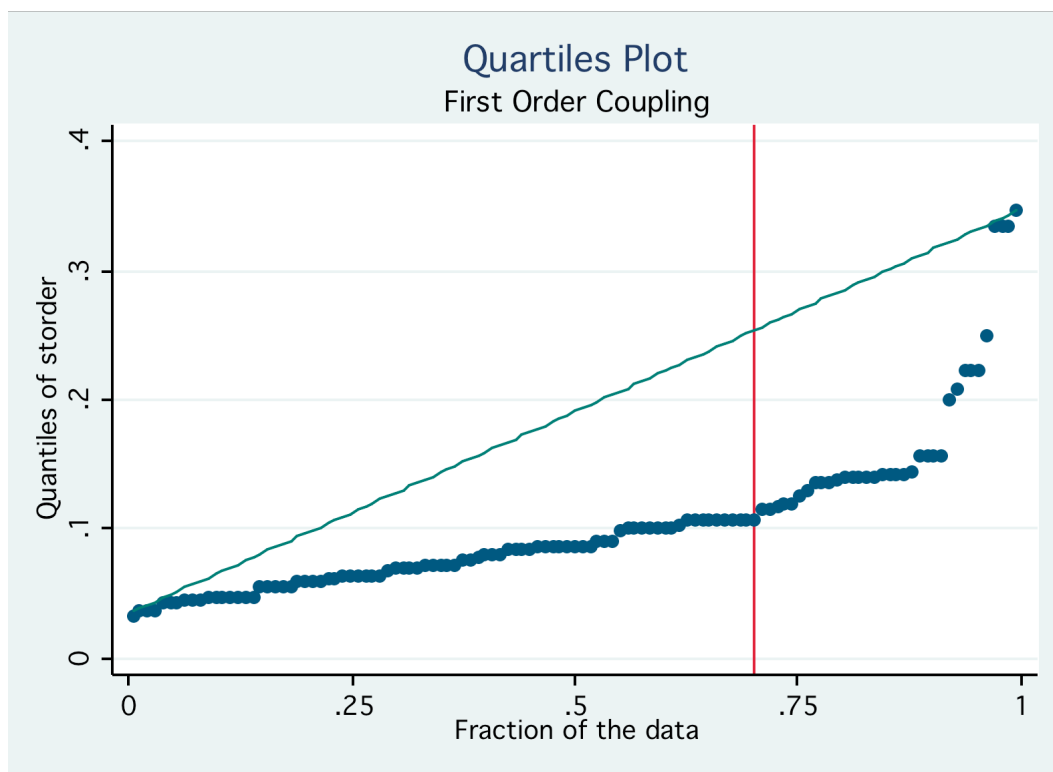


Examining either the histogram or the kernel density estimation indicates the possibility of a bimodal distribution, with the mode for the majority of data points centered near a first order coupling value of .10 when outliers are removed, and .122 when all 122 observations are included. A second much smaller mode is centered near a value of .3, when outliers are excluded and .8 when they are included. A Shapiro-Wilk test for normal distribution results in a W-test score of .4712, and a probability score of .0000,

indicating that we can reject the null hypothesis that the sample observations were drawn from a normally distributed population.

The distribution of first order coupling factors also shapes the determination of how arms length and embedded relations are defined. Uzzi suggests that “special” or embedded relations occur at the point where relations begin to be noticeably different from the majority of relations.

Graph 3.10



Uzzi proposes taking a conservative look at the cumulative distribution and determining at what point the curvature of the line indicates that relations are beginning to look

different from the majority, or “special” (Uzzi 1996). This approach to defining relations as either embedded or arms length operates on the premise that each set of relations between actors have a unique demarcation of specialness. The demarcation in New York’s fashion industry can differ from the demarcation in Georgia’s road and bridges industry.

A conservative reading of the quartile plot shown Graph 3.10, with the three outliers omitted, indicates that 70-75% of first order coupling factors fall within the first quartile, which translates to first order coupling scores between .107-.125. Because 70-75% of relations fall within in this range, a lack of “specialness” is indicated. With this distinction, parameters are set to define arms- length transactions as those whose first order coupling scores fall at or below .125. Relations, associated with first order coupling scores greater than .125, are defined as socially embedded relations. First order coupling scores, deeper into the second, third and fourth quartiles reflect “specialness” or embedded relations. Using these definitions of arms length and embeddedness points out that the structure of the market between prime contractors and subcontractors is best described as competitive and arms length. Additionally, these definitions split the sample set into thirty-two “special” or embedded transactions and ninety arms length transactions.

The second social relations variable, PMPartners, captures influence on performance scores arising from relations between project managers. This variable identifies whether there are prior relations between the firm project manager directing the project and the GDOT project manager who evaluates the quality of performance. It is expected that

prior relations indicate greater intensity of relations between individuals and will be positively associated with higher performance evaluation scores.

The second measure of embeddedness introduces a new operationalization of social relations into contracting studies. The variable *project manager partners (PMPartners)*, is introduced to extend analysis to the individual level. Where Uzzi and others (Baker 1984; Baker 1990; Provan and Milward 1995; Uzzi 1996; Uzzi 1999; Provan and Milward 2001; Uzzi and Gillespie 2002; Uzzi and Lancaster 2003; Uzzi 2004; Rajdeep and J. 2007) conducted analyses at the organizational level, the variable indentifying relations between individuals allows examination of the impact of project manager dyads. This additional step will provide insight into whether the existence of prior relations between the GDOT project manager performing the evaluation and the private firm's project manager for the performance being evaluated is associated with higher performance evaluation scores.

Analysis of relations between individuals provides information distinct from organizational level analysis. Measurement of relations at the organizational level reports summation of relations between multiple individuals, within multiple organizations. When such relations are viewed in the aggregate, any "specialness" of relations between individuals is lost. Summing relations causes combined effects to be captured and individual distinction lost. Including individual actor-to-actor relations in the model

allows recapturing of relations on the individual level. As with the other social relations variable, we believe that the presence of existing ties between the project managers indicates the presence of trust, communication and the ability of actors to absorb benefits from social ties. Again the ability to absorb benefits is a characteristic of strong ties. We anticipate that prior relations between project managers will be associated with higher performance scores.

The data used to create the dichotomous variable for project manager to project manager relation, shows forty-nine percent of projects were staffed with project managers dyads with neither prior nor concurrent relations. The remaining fifty-one percent of projects had project manager dyads with established social relations. Using a dummy variable, dyads with established social relations are coded “1” for the *PMPartners* variable; all others are coded “0”.

### **Control Variables**

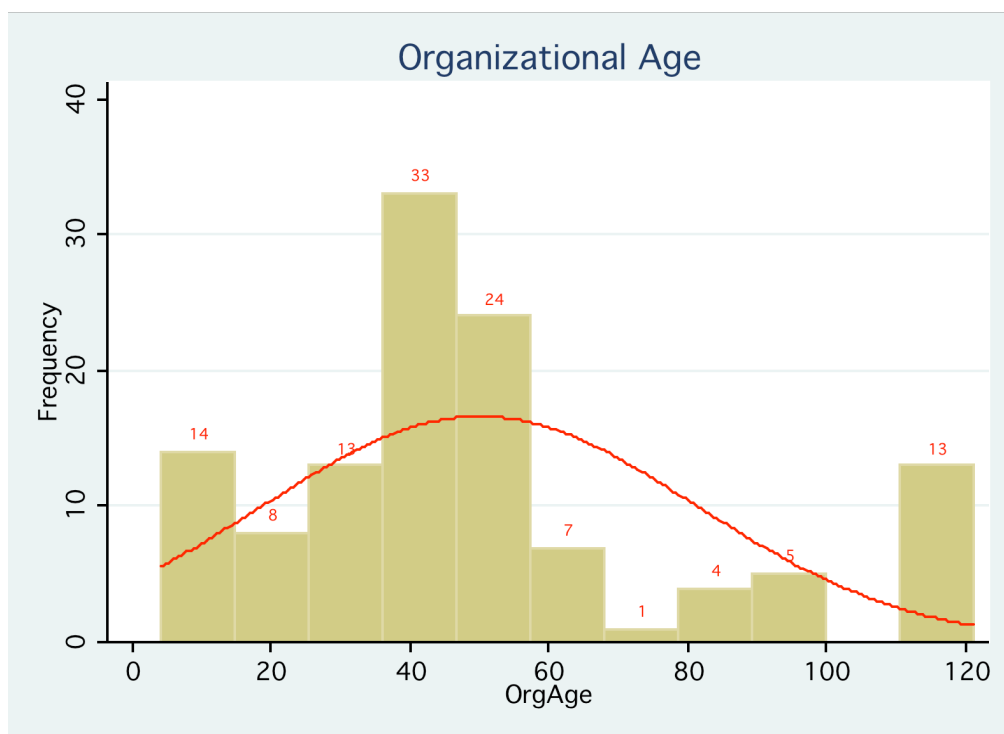
The control variables are drawn from both transaction costs and embeddedness theory. From transaction cost theory, we attempt to control for the impact of the firms’ capacity to control indirect costs. As relates to contract performance, transaction costs theory submits that contract performance is based on assigning work to the organization most capable of minimizing direct and indirect costs. Recall, this proposition argues that performance is an outcome of an organization’s capacity to execute the contract without a great deal of search costs, bargaining costs or monitoring costs. Properly specifying the model, then, requires a variable representing a firm’s capacity to address TCE the

concept that some organizations are better than others at controlling costs. It requires a factor that controls for the firm's capacity to being found, to be reasonable in contract negotiations and to not present excessive moral hazard. To control for firm's ability to be found, to negotiate reasonably and to control excessive opportunism the model uses the variable *firm age* as a proxy indicator. *Firm age* is selected as a proxy indicator of the firms capability in terms of TCE requirements because it indicates firm survival in the competitive marketplace; survival which necessitates the ability to control costs, to be found, to bargain reasonably and to present acceptable moral hazard. Including this variable parallels Uzzi's usage of organization age in contracting as an indicator of an organization's overall health and ability to effectively and efficiently use resources (Uzzi, 1996 Franklin and Lee, 2007). Again, following Uzzi (1996) we model Organization Age in linear and squared terms, indicating a curvilinear relationship between organization age and performance evaluation scores. We expect performance scores to increase as age increases, up to a maximum point. At some age, institutional routines are expected to set in, cutting off access to new information and new processes. Once the firm reaches the age where institutional routines began to exert a negative influence, we expect the relationship between Organization Age and performance to become negative.

*Organizational age* is defined as the evaluated firm's organizational age at the evaluation date. The majority of information on organizational age was obtained from the History or Profile section on each firm's website. Where this information was not available on the website or was unclear because of business combination through either merger or acquisition, informal telephone interviews were conducted with firm personnel. The

variable reports age as the difference between the year the firm was founded and the year of evaluation. If the evaluated firm is the result of a merger or acquisition between U.S. firms, the age is computed as of the age of the older entity. If the firm is the result of a merger or acquisition between a U.S. firm and a foreign firm, the age is computed using the founding date of the U.S. firm.

Graph 3.11 Organizational Age Histogram



Organizational age is reported for all 122 observations. As of the evaluation date, organizational age ranges from 4 to 121 years and is normally distributed around its mean of 50 years. The mean is influenced by the inclusion of firms such as PBQD and URS, founded in 1885 and 1912 respectively, which appear multiple times in the dataset. The W-test statistic of .87 and probability factor of .0000 indicate that given the sample size,

the null hypothesis of a normal distribution can be rejected. A review of Graph 3.11 indicates that the data is skewed towards higher ages, meaning there are more firms than expected which have existed more than fifty years.

The second control variable addresses the influence of place on performance, and is also drawn from embeddedness theory. Geography operates on the premise “place matters.” Although embeddedness theory considers geography one of a multitude of environmental influences to consider, it is considered highly impactful in other theory. For example in regional economics studies geographic location is argued to impact indicates a firm’s ability to access quality managerial talent, knowledge, financial capital, and tacit information, however in studies of social relations geography is recognized as an indicator of the impact local customs and mores have on performance. The closer two actors are geographically, the better they communicate, and the more likely they are to absorb the benefits of social relations (Piore and Sable 1984; Romer 1986; Romer 1994; Saxenian 1994; Malizia and Feser 1999; Cortright 2001; Florida 2002).

Geography is operationalized as two dichotomous variables. The first, *gafirm*, denotes whether the evaluated firm is headquartered in Georgia. Firms with international or U.S. headquarters in Georgia are assigned a value of 1. All other headquarter locations are assigned a value of 0. The second geography variable, *AtlantaFirm*, zeros in on a firm location inside the counties surrounding the city of Atlanta. The relationship between the geography variables and performance scores is expected to be positive, with Georgia based firms having higher performance scores than firms headquartered outside of Georgia.



In the sample data there are 11 observations of evaluated firms having headquarters within the state of Georgia, but outside of the Atlanta metropolitan area. Additionally, there are 26 instances where the evaluated firm is headquartered within one of the counties surrounding the city of Atlanta.

The final control variables are the categorical variables for each of GDOT's twenty-four managers, who completed performance evaluations. These variables are included to control for each evaluator's personal tendencies in scoring and the related bias these tendencies introduce into the model.

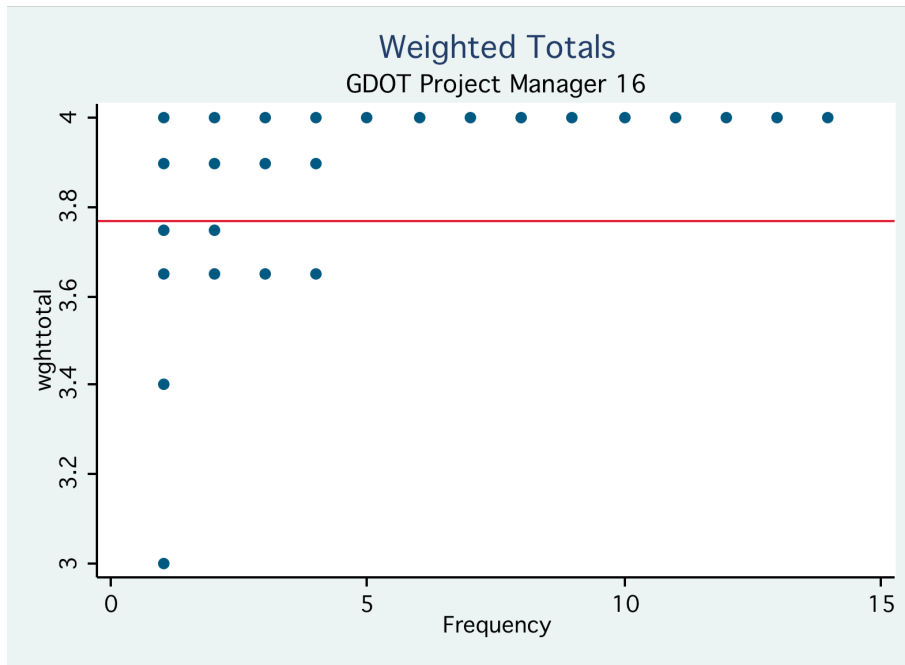
Table 3.7 Project Managers' Scoring Tendencies

Weighted Total Scores	Mean	# Observations ≥ 4.0	Observations in Sample Data	Percent Of Observations
Sample Total	3.69	50	122	41
Project Manager 15	3.23	1	10	10
Project Manager 16	3.8	14	26	53.8

The figures above (Table 3.7) illustrate the potential problem created by individual managers' scoring tendencies. The difference in scoring means between two project managers suggests that either Project Manager 16 gets more than a fair share of high performing firms and Project Manager 15 gets less than a fair share or they simply evaluate based on different standards.

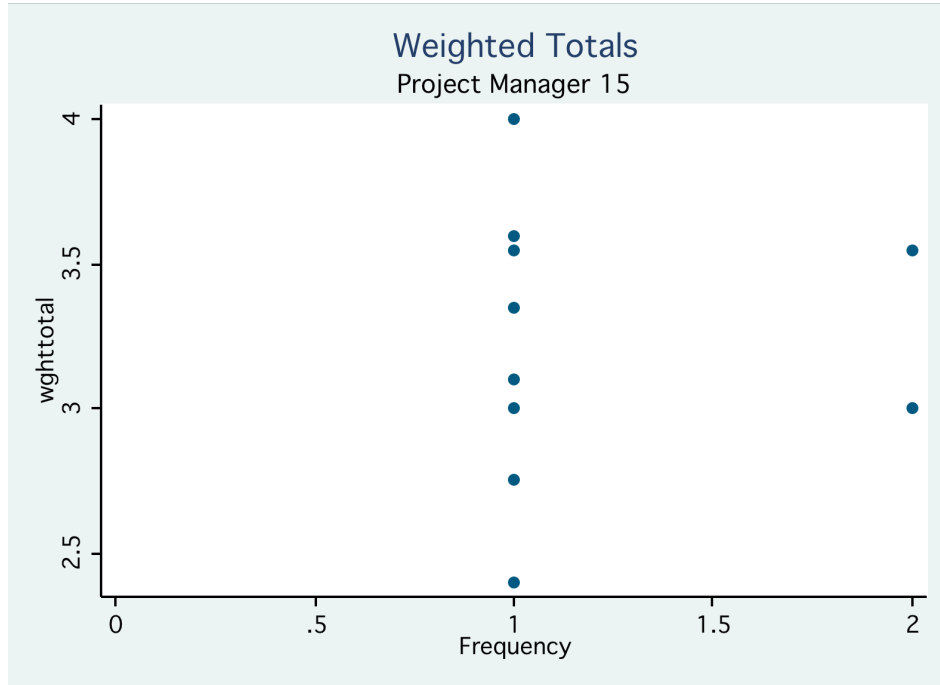
Graph 3.12

Dot Distribution of Weighted Total Scores (Project Manager 16)



Graph 3.12 uses a dot distribution of Weighted Total Scores awarded by Project Manager 16 to show that this project manager tends to award scores that are higher than the sample mean. The distribution of Project Manager 16's scores are centered on a mean of 3.8, which exceeds the sample mean of 3.69. Overall, approximately fifty-four percent of projects evaluated by Manager 16 received a rating of 4, compared to forty-one percent in the sample.

Graph 3.13



In comparison, Project Manager 15 scores (Graph 3.13) are distributed around a mean of 3.23, and only one of the ten evaluations recorded by this Project Manager was awarded a total weighted score of 4.0 or above. Comparing the scoring tendencies of Project Manager 15 and Project Manager 16 shows that some of the variation in scores is created by fiat. Being assigned to Project Manager 16 is likely to result in above average scores, while being assigned to Project Manager 15 is likely to generate the opposite result. The categorical variables for project managers are created to control for this potential bias.

### Sample Limitations

The limitations that impact the study are those common to studies which rely on archival data. Specifically, the data were collected for internal reporting, not to facilitate external

research interests. The data were not collected and recorded with the intent of furthering ongoing interest in GDOT's contracting process. Consequently, the observations do not fully capture the relationship between embedded relations between parties to OCD contracts and performance evaluation. Studies examining performance from social ties are improved when the frequency and intensity of professional, political, social and religious interaction is fully captured. The sample data captures only officially archived, professional interaction, and includes only data that federal and state regulations allow to be archived. Such regulations prohibit GDOT from maintaining records on private firm employees, which were submitted as part of the award process. These records would greatly enhance an embeddedness study because they detail the private firm employees' educational and professional backgrounds and would allow other linkages between them and OCD project managers to be observed.

In an effort to overcome this sample limitation, measures that provide indirect evidence of a given variable were introduced as allowed in social research (Singleton and Straits 1999). It is acknowledged that the embeddedness variables are not capturing the full extent of embedded relations between prime contractors, subcontractors and OCD, but they are providing formal evidence that the social relations exist.

Finally, contracts included in the sample set differ on several dimensions, including duration, complexity and number of relations. Each of these characteristics offers interesting and valid approaches to assessing influences, which may affect how OCD managers evaluate performance. Given the limited number of observations in the sample, all interesting approaches available through the data cannot be meaningfully explored in a

single study. This study uses the data to examine the impact of social relations on performance evaluation and foregoes the opportunity of understanding the role of factors such as complexity and time.

## **CHAPTER FOUR**

### **MODEL AND METHODOLOGY**

To explore answers to the research questions we use a multiple methodological approach. The foundation of the methodology relies on an ordinary least squares (OLS) regression model, which is then followed with analysis of variance (ANOVA).

The goal of the methodology is to create a process that allows testing or examination of the propositions laid out in the two research questions. The first proposition proposes that the strength of tie between a prime contractor and its subcontractors will impact the quality of performance in a public contracting environment. Specifically, I propose that strong ties between the two result in better performance. Along with this proposition, the methodology intends to test the proposition that higher performance evaluation scores are awarded when a private firm's project manager has established relations with the GDOT manager, evaluating his work.

At the heart of this dissertation and methodology are two basic questions: When performance in public contracting is measured, are all important factors being considered and are performance factors being evaluated objectively? To answer these questions, we turn to embeddedness theory that argues that traditional explanations of market based activity fail to properly account for the influence of social relations. This theory proposes

that important social influence is not being considered. In other words explanations of market activity are undersocialized.

In contrast to approaches that rely on economic factors to explain market activity, embeddedness theory proposes that accurately modeled economic activity include indicators of social influence. It follows then that just as explanations of market activity are undersocialized, explanations of performance outcomes are similarly undersocialized and likewise should include analysis of influence from the social structure.

I follow an embeddedness theory line of argument and present an ordinary least squares regression model of performance as an outcome of social relations and organizational factors. This model is derived from earlier studies of the impact of social relations on outcomes from market activity (Uzzi, 1996)

Similar to Uzzi's model (1996), my model includes variables designed to capture the influence of social relations on performance. The model, however, differs from Uzzi in that Uzzi used logit models and dichotomous dependent variables. Uzzi was interested in an either/or proposition. Uzzi focused on knowing whether the strength of social ties between prime contractors and their subcontractors was associated with a firm either staying in business or closing. I selected an ordinary least squares regression model rather than an ordered logit model because the dependent variable is a continuous, ranging between 0 and 5. This approach is fairly straightforward, easily understandable and can

be used without creating distortion. The OLS model specified below is used to test the previously stated hypotheses :

### Embeddedness Model

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \dots b_{28}x_{28} + \partial_1 + \partial_2 + \partial_3$$

Where

Y=	Weighted Total Performance Score
x <sub>1</sub> =	Organization Age
x <sub>2</sub> =	Organization Age Squared
x <sub>3</sub> =	Georgia Firm
x <sub>4</sub> =	Atlanta Firm
x <sub>5</sub> ...x <sub>29</sub>	24 GDOT evaluators
∂ <sub>1</sub> =	First Order Network Coupling Score
∂ <sub>2</sub> =	First Order Network Coupling Score Squared
∂ <sub>3</sub> =	Project Manager Dyad

The model returned the following regression results, which provide the first indicator of whether there is any usefulness in considering social relations as a key factor in performance outcome.

**Table 4.1 Regression Results**

Observations	F- test	Probability F-test	R <sup>2</sup>	Adj R <sup>2</sup>	Degrees of Freedom	Root MSE
119	4.10	.0000	.5366	.4056	26	.4459

Based on 119 observations and 26 degrees of freedom, the F-test returned a factor of 4.10 with a probability of .0000. The F-test gives an initial report of whether the model has



any explanatory value. The results do not offer explicit comment on any specific variable, but the p-value of .0000 does indicate that at least one of the variables in the model is useful in explaining some portion of the variation in the dependent variable.

The model's R-square of .5366 indicates that nearly 54% of the variation in the dependent variable is explained through the predictor variables. The power of the model is increased by the inclusion of categorical variables that control for the individual scoring tendencies of each GDOT evaluator. The large number of predictor variables, created by the addition this categorical variable, relative to the number of sample observations does boost the model's explanatory power, however when the power of the model is adjusted to moderate the influence of the large number of predictor variables, an adjusted R-squared value of .4056 is returned. Whether the adjusted r-square or base r-square is considered, the model shows it has power to predict the impact of social relations on performance evaluations.

The full model returns the following results:

Table 4.2 Model Results

Variable	Coefficient	Std. Error	t	P> t	95% CI
PMPartners	.2621009	.1083396	2.42	0.018	.0469292 - .4772727
1 <sup>st</sup> Order Coupling	-1.925601	1.072819	-1.79	0.076	-4.056313 .2051103
(1 <sup>st</sup> Order Coupling) <sup>2</sup>	1.874751	1.093563	1.71	0.090	-.2971586 4.046661
Organization Age	-.0027349	.0047863	-0.57	0.569	-.0122409 .0067712
(Organization Age) <sup>2</sup>	2.45e-06	.0000318	0.08	0.939	-.0000608 .0000657
Georgia Firm	-.2456358	.1933673	-1.27	0.207	-.62968 .1384084
Atlanta Firm	-.1261727	.1302952	-0.97	0.335	-.3849502 .1326048

The relationship between individual factors and performance scores are explained below

### The Social Relations Variables

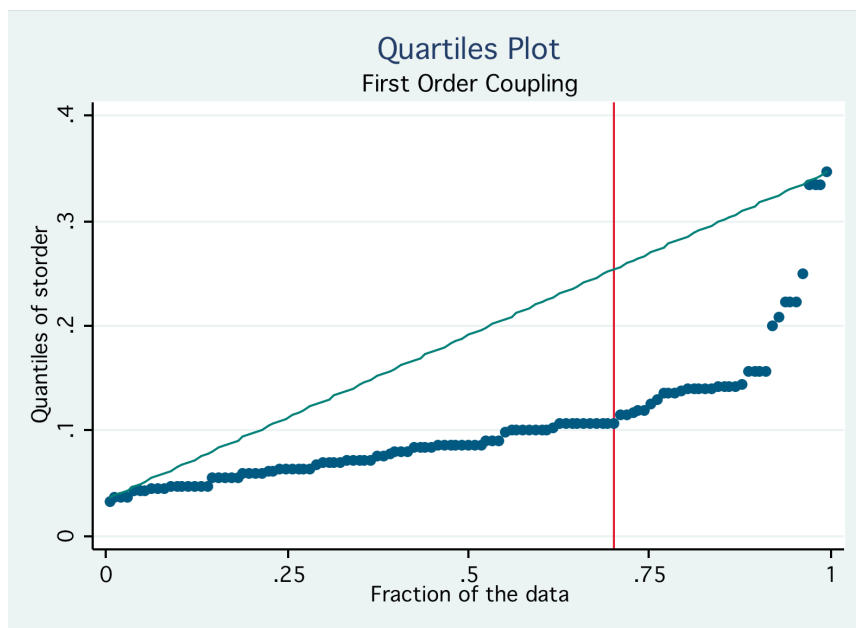
#### First Order Coupling

The purpose of considering the first order coupling variable is to provide insight into the impact of embedded ties on performance measures. The first step is to define them in the data. To do that, we examine how different tie strengths are distributed within the data.

The goal is to identify a point of bifurcation where ties can be allocated to one of two groups. One group will define the typical tie found among relations between prime contractors and their subcontractors; the second group will identify “special” or embedded strong ties.

The identification of strong ties relies on Uzzi’s (1996) proposal that strong ties are those that can be characterized as being “special” or different. In the study of the garment industry Uzzi (1996) proposed a means of identifying “specialness” in relationships. Uzzi proposed that “special” relations are outlier relations; relations that fall outside the range where the majority of relations can be located. In the garment industry study, “specialness was observed when the strength of tie between manufacturers and contractors reached the .20-.25 range.

Graph 4.1



To identify “specialness” in our data, we place the data in quartiles and examine the distribution of tie strength among the quartiles. Graph 4.1 shows the quartiles and

indicates that 73 percent of all ties between prime contractors and their subs fall in the first quartile (see horizontal axis). Another 17 percent fall in the second quartile and the remaining 10 percent are found in the third and fourth quartiles. This breakdown shows that only 10 percent of the relations between GDOT prime contractors and their subcontractors is made up of socially embedded “special” relations, the strong ties we are interested in understanding. The majority of transactions between prime contractors and their subcontractors are better characterized as arms length transactions. Prime contractors are not concentrating work among preferred groups of subcontractors and forming strong tie strengths. Instead, GDOT’s prime contractors are spreading work among many different subcontractors, and engaging in arms length relations.

Given that only 10 percent of the social relations between GDOT prime contractors and their subcontractors have the specialness to qualify as embedded or strong ties, it follows that the relationship between tie strength between prime contractors and their subcontractors and performance is not statistically significant at the .05 probability level. We hypothesized that we would see stronger ties associated with better performance. That hypothesis, however, is not supported by the regression results.

A review of a quadratic prediction graph plotting the first order coupling variables against performance scores helps to explain the relationship between tie strength and performance. In the model I allow for a curvilinear relationship between tie strength and performance scores. I include a linear and a squared term for the coupling or tie strength variable. This treatment of the relationship between tie strength between prime and

subcontractors allows for directional change in the relationship between the strength of tie between prime contractors and their subcontractors and contract performance. It assumes, as Uzzi (1996) discovered that the relationship is not linear. As a result of this treatment, the regression results for the tie strength, first order coupling, variables are interpreted using a quadratic formula, rather than explained in terms of how a one unit change in the independent variable impacts the dependent variable. Instead of understanding how a change in the coefficient on the tie strength variable changes the performance score, the coefficients on the tie strength variables are used to find the point at which the direction of the relationship between tie strength and performance scores changes.

Substituting the coefficients of the linear and squared terms into the quadratic formula  $(-b/2b^2)$

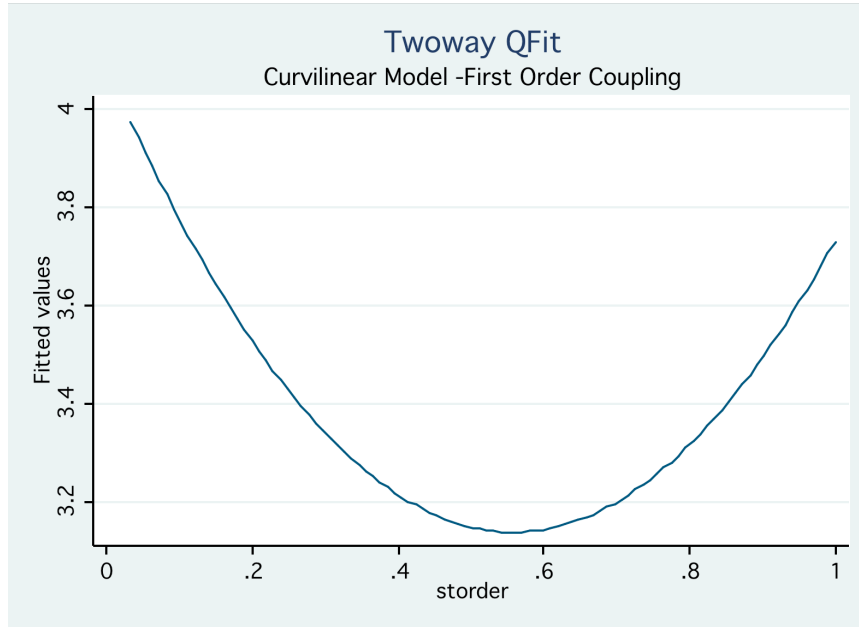
Where:

$-b = 1.9256$ ; the opposite of the coefficient on the linear term

$2b^2 = 2(1.874751)$  the coefficient on the squared term

We find the direction of the relationship changes at the curve's minimum point of approximately .5136 (see Graph 4.2).

Graph 4.2



Initially, as the strength of tie between a prime contractor and its subcontractors increases, the performance score decreases. The trend is estimated to continue until the tie strength reaches a value of .51 and the associated performance score falls below 3.2. At this point, the nature of the relationship is predicted to change. As prime contractors limit work to fewer subcontractors and increase the tie strength, their performance scores rise.

The graphical estimation of the relationship between contractor relations and performance scores indicates that prime contractors are equally successful in receiving high performance scores when they maintain either strong or weak ties with their subcontractors. Ties that cannot be characterized as either weak or strong are typically not associated with high performance scores.

The actual observations confirm the graphical estimation. The sample's top quartile of tie strength is composed of 13 cases of ties greater than or equal to .20, the tie strength Uzzi (1996) uses to indicate the presences of strong ties. These 13 cases represent 10.7% of sample observations. The sample's top quartile of performance scores is composed of twenty-eight cases where performance scores are greater than 4.0. Of the twenty-eight cases in the top quartile of performance scores, four are associated with strong ties. These four strong tie observations represent 14% of high performance scores. While strong ties account for only 10.7% of all observations, they represent 14% of all high performance score observations. This indicates that strong ties are overrepresented in the sample's top quartile of performance scores. Another way to evaluate the impact of strong ties is to say that of the thirteen observations, 31% were associated with performance scores higher than 4.0. The small number of observations of strong ties do not allow for statistical inference of the impact strong ties have on performance, however both the graphical estimation and regression results suggest the quality of performance in public contracting is higher when strong ties between a prime contractor and its subcontractors exists.

#### PMPartners

In the sample, prior relations between a private firm project manager and its GDOT evaluator influenced performance scores. The relationship is positive and statistically significant. Performance scores on projects where the two project managers have worked together previously are expected to be .26 points higher than performance scores where

the two project managers have not worked together previously, when all other factors are held constant. In terms of magnitude, the coefficient .26 on PMPartners indicates that the relationship between prior relations and performance scores is weak but the p-value of .018 for the sample data indicates that this relation is highly significant and is expected to be found consistently in the population.

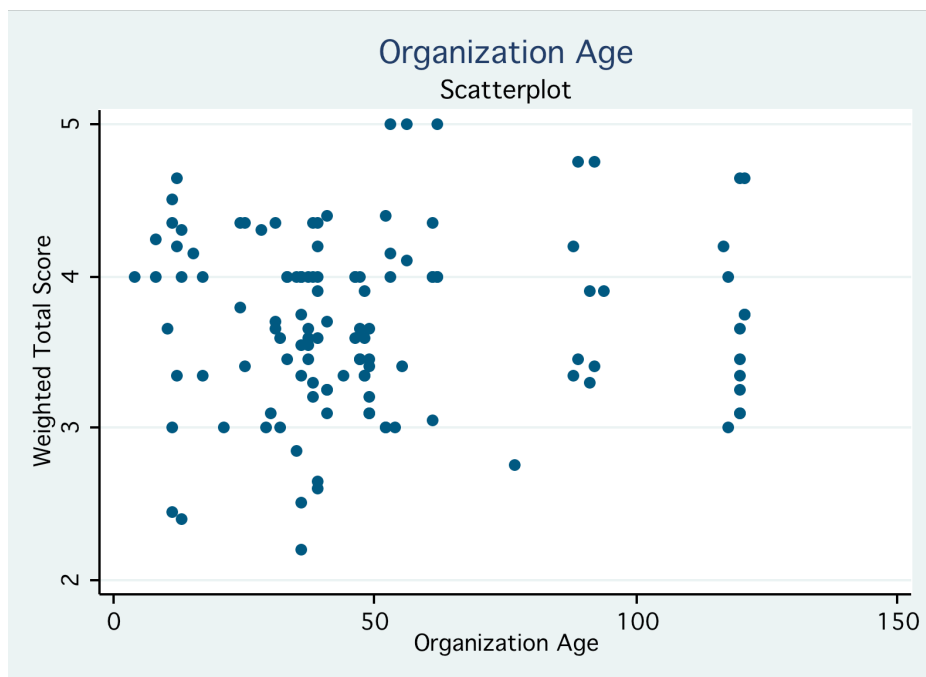
The contrast between the variable's high statistical significance and low impact on performance scores may be isolated to the public sector, because of demands for clear boundaries between official behavior and social relations. GDOT evaluators may consciously work to limit the influence social relations have on performance evaluation. The small coefficient on the relationship suggests that the extent of the influence is moderate and tempered from delivering an even greater advantage. The influence might be constrained by rules and regulations governing GDOT officials.

GDOT employees operate under an umbrella of federal prohibitions, restrictions and requirements detailed in the Federal Procurement Integrity Act (1998) which discourages officials employed in agencies receiving federal funds from allowing personal relations to influence any aspect of the procurement process. Violations of the federal restrictions can result in civil and criminal charges against offending employees. The federal disincentives are supported by disincentives specific to Georgia officials. The Georgia Code of Ethics calls for refraining from *any* behavior which might create the appearance that official conduct or ability to protect the public interest has been unduly influenced (Ethics 1982).



### Organization Age

Similar to the tie strength variables, the organizational age variables' construction follows Uzzi(1996) and are designed to allow for directional changes in its impact on performance scores. The negligible coefficients on both the linear and squared terms indicate that the length of time the prime contractor has existed bears no influence on performance. Organization Age was conceptualized a proxy indicator for TCE claims that the ability to control direct and indirect costs defines successful contract performance. If this variable is a good conceptualization of that concept, the regression results indicate that when contract performance is defined in terms that are not financial ratios, the ability to minimize search, bargaining and monitoring costs are not important.



The variable is included in its linear and squared terms to model a curvilinear relationship. The scatterplot above indicates that if the relationship between Organization Age and performance is studied, the relationship should be modeled as curvilinear (See Graph 4.3)

### Geography Variables

When all other factors are held constant, firms headquartered in Atlanta or the State of Georgia have no advantage over firms that are located farther away from GDOT offices. Having a headquarters close to GDOT does not result in helpful tacit information being passed between prime contractors and GDOT officials. There is no indication that the benefits of sharing local customs and mores that are found in studies of private firms are present between GDOT officials and private firm project managers.

### Evaluator Scoring Tendencies

The final control variables are the categorical variables for each GDOT Manager who completed a performance evaluation in the sample. Interpreted individually, the variables allow comparison of how each GDOT project manager scores in relation to the control manager, whose scores are omitted from the regression. The control manager's scores are the basis at which all other scoring tendencies are held constant.

The results indicate that only three project managers' scoring tendencies were statistically different than the control project manager (see Table 4.4). The coefficients on the categorical variables for Project Manager 3 (1.3504), Project Manager 18 (1.1244) and

Project Manager 19 (1.1182) show that on average their projects are rated one point higher than the control managers. Although statistically significant, the three scoring tendency differences can only be interpreted as three GDOT managers typically award points higher than the one specific manager whose scores served as the control.

Analyzing this variable by breaking it down into a level for each GDOT project manager gives information on the tendencies of scorers, however, it is important to remember that the model incorporates the GDOT project manager variable as one variable divided into twenty-four levels, however only when all twenty-four levels are combined is the full variable presented (UCLA: Academic Technology Services 2012). Understanding the relationship between the full variable and the dependent variable, requires understanding how the variable operates when all of its parts are combined. Stata allows testing of the impact of this variable by testing all of the levels combined. Testing in this manner yielded an F-statistic of 4.71 and a P-value of .0000, which indicates that in the population of OCD performance evaluation scores, there is great likelihood that a relationship exists between who is giving the performance scores and the performance score awarded . In other words, the performance measurement is not completely objective, and in some sense is dependent on which project manager is doing the measuring.

To understand the impact of “ who is giving the score” on the total weighted score, we first determine if GDOT project managers are participating equally in the performance

measurement process. In the sample data, five managers account for approximately 68% of all evaluations (See Table below)

Table 4.3

Most Frequent Evaluators in Measurement Process

Evaluator Identifier	Year of First Evaluation	% of Total Evaluations In the Sample	Cumulative
7	2005	13.93	13.93
13	2002	14.75	28.68
15	2005	8.20	36.88
16	2003	21.30	58.18
20	2005	9.84	68.02

The impact of this group of managers can also be seen in their predominance when the role of prior relations between a firm project manager and a GDOT project manager is considered. In the sample, fifty of the observations where prior relations between project managers occurred, involved one of these five GDOT project managers. This accounts for approximately 82% of such occurrences, although these five represent only 21% of the total number of GDOT managers submitting performance evaluations. These five managers are in a position to exert a disproportionate amount of influence on performance measurement in the Office of Consultant Design. An analysis of variance (ANOVA) provides insight into how this group's influence impacts performance

measurement and more importantly if they impact scores differently than the other nineteen evaluators.

## **ANOVA**

Results from the regression indicate that performance scores are influenced by the absence or presence of prior relations between the GDOT evaluator and the private firm project manager whose work is being evaluated.

A review of the observations in the sample shows that evaluations by five GDOT managers (The Five) are overrepresented in the sample. Because of this overrepresentation, it is important to understand the impact these five are having on the sample data. Specifically, we need to understand if these five managers rate performance in a manner similar to their peers. I use an ANOVA to analyze how performance scores awarded by the five overrepresented GDOT managers compare to those awarded by their peers. A one way ANOVA provides a means of determining if the means of two different groups are the same.

I created an ANOVA to divide GDOT project managers into two different groups based on their frequency of submitting performance evaluations. The first group consisted of The Five and the second group was composed of all other evaluators. The first ANOVA analysis measured whether there was a difference in the mean of total weighted score, the dependent variable, based on whether the evaluator was a frequent participant in the evaluation process. As presented in the table below, between the two groups with one

degree of freedom, the analysis returned an F-statistic of 11.78 and a p-value of .0008.

The results indicate that the null hypothesis of equal means between the two groups must be rejected. There is a statistically significant difference between the scores given by The Five and their peers.

#### ANOVA Weighted Performance Scores (by Frequency Group)

Source	Analysis of Variance			F	Prob > F
	SS	df	MS		
Between groups	3.57530597	1	3.57530597	11.78	0.0008
Within groups	36.4225838	120	.303521532		
Total	39.9978898	121	.330561073		

Bartlett's test for equal variances:  $\chi^2(1) = 7.4390$  Prob> $\chi^2 = 0.006$

A review of mean performance scores confirms this finding. The mean score awarded by The Five was 3.58, compared to a mean of 3.94 for all other evaluators. Firms that are not evaluated by one of the five frequent evaluators, on average, will receive higher performance scores than those firms evaluated by one of The Five.

The table below provides a closer view of The Five's scoring tendencies and shows that even among The Five, scoring tendencies vary. Being evaluated by GDOT managers, 7, 13, or 15 would likely result in scores lower than the mean but being evaluated by GDOT manager 16 or 20 would lead to higher scores. Even when they evaluate the same private firm project manager the scoring tendencies remain. Both GDOT manager 7 and 16 evaluated the same project manager from the firm HNBT. The mean score given this manager from manager 7 was 3.35, compared to a 3.9 rating by manager 16. The results were similar for a manager from Kimley-Horn, who received mean scores of 3.6 and 4.0 from managers 7 and 16 respectively.

Table 4.4

## Top Five Scorers

GDOT Manager	# Evaluations	Mean Score	Min	Max
7	17	3.45	2.85	4.00
13	18	3.33	2.45	4.35
15	10	3.23	2.40	4.00
16	26	3.80	3.00	4.00
20	12	3.92	2.60	4.35

The second ANOVA was designed to allow additional analysis into the relationship between prior relations between project managers and performance scores. Recall, the regression delivered two inferences about the impact prior relations have on performance scores to explore further. On one hand the highly significant .018 p-value indicates that the observed positive relationship between prior relations and higher performance scores are an accurate representation of what would be found in the population. At the same time, the small coefficient on the variable indicated that the relationship is not very strong. From the results, we can infer that prior relations between the GDOT evaluator and the private firm manager whose work is being evaluated lead to higher performance scores. At the same time, we can infer that the impact this relationship has on performance scores, though positive, is minimal.

The second ANOVA takes the prior relations variable used in the regression analysis and compares means between performance scores awarded when a prior relation exists and when one does not. The two groups created are those with prior relations and those without prior relations. The results of the analysis indicate no statistical difference in the mean performance score awarded by the two groups. The analysis returned an F-statistic of 2.01 and a p-value of .1594, meaning the null hypothesis that the two groups will have the same mean cannot be rejected. The relationship exists but its impact on performance scores is so minimal that it is difficult to capture. This result supports the regression finding of a relationship between prior relations and performance scores that exists but has little bearing on the performance score awarded. See results in the table below.

#### ANOVA of Total Weighted Performance Scores (based on Prior Relations)

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	.665298828	1	.665298828	2.01	0.1594
Within groups	38.8143655	117	.331746713		
Total	39.4796643	118	.334573426		

A third ANOVA analyzed what happens at the intersection of frequent evaluators and prior relations. This ANOVA tested the null hypothesis that frequent evaluators and nonfrequent evaluators participate equally in having prior relations with the private firm managers they evaluate. The results of this analysis, however, indicate that the two



groups do not have the same rate of participation in prior relations with their private firm peers. As the table below shows, the ANOVA returned an F-statistic of 13.54 with a p-value of .0004, indicating the two groups do not have the same mean of participation in prior relations with evaluated peers. This is also evident by counting the sample observations. In the sample observations 49% of all cases were between parties with no prior relations however, 62% of observations involving The Five were between parties with prior relations. The Five GDOT managers are more likely to have repeated evaluations of their private firm peers than the other GDOT evaluators.

ANOVA of Equal Participation in Prior Relations (by Frequency Group)

Source	Analysis of Variance			F	Prob > F
	SS	df	MS		
Between groups	3.08365654	1	3.08365654	13.54	0.0004
Within groups	26.6474359	117	.227755862		
Total	29.7310924	118	.25195841		

Bartlett's test for equal variances:  $\chi^2(1) = 0.2204$  Prob> $\chi^2 = 0.639$

From the three ANOVAs we determine that The Five evaluators give lower performance evaluation scores, and they are more likely to have prior relations with the private firm manager they are evaluating. We also see that the impact of prior relations on performance scores exists but is minimal that and hard to detect in an ANOVA. I did not expect to see the relationship between prior relations and performance scores behaving in this manner. Instead, I expected to see the benefits of better communication and trust associated with higher performance scores.

A possible explanation for the negligible impact of prior relations on performance scores is that the low scoring tendency of The Five is somehow interacting with the relationship

between prior relations and performance scores and suppressing the impact of that relationship.

To understand if the low scoring tendency of The Five was interfering with the impact of prior relations on performance scores, I used a two way analysis of variance (ANOVA) to determine if an interactive relationship existed. I divided GDOT evaluators into two frequency groups: The Five high frequency evaluators and all others. Likewise I divided all cases into two prior relations groups: existing and not existing, I ran a ANOVA and included an interaction term for The Five and the prior relations variables.

ANOVA Test For Interaction Between Variables

Source	Partial SS	df	MS	F	Prob > F
Model	6.22165806	3	2.07388602	7.17	0.0002
BigFive	5.49715535	1	5.49715535	19.01	0.0000
PMPartners	2.81508071	1	2.81508071	9.73	0.0023
BigFive*PMPartners	.611592998	1	.611592998	2.11	0.1486
Residual	33.2580062	115	.289200054		
Total	39.4796643	118	.334573426		

Examination of p-values in the twoway ANOVA results table above again shows that the means of performance scores for The Five evaluators and all other evaluators (pvalue=.0000) are not the same and the mean of performance scores differs depending on the existence of prior relations (p-value=.0023). Of primary interest, the results also show the impact of the interaction term. The interaction term *BigFive\*PMPartners* identifies that there is interaction between The Five and the effect prior relations has on performance scores. The .1486 p-value on the interaction term indicates that we cannot reject the null hypothesis that these two variables are not interacting with each other and

changing the effect on performance scores. The results indicate that the scoring tendencies of The Five frequent GDOT evaluators is impacting the effect of the prior relations variable on performance scores. Given that The Five award lower performance scores, it is reasonable that their tendency is suppressing the positive impact of prior relations on performance scores.

### **Summary of Analysis**

The sample data were analyzed using multiple techniques including ordinary least squares (OLS) regression, one-way analysis of variance (ANOVA) and twoway analysis of variance (ANOVA). Regression results presented no statistically significant support for the hypothesis that strong ties between prime and subcontractors lead to better performance. In part this finding is due to the small number of strong ties found in the sample data. Results do indicate, however, that where strong ties did exist they were more likely to be associated with performance scores greater than 4.0.

Regression results did confirm the second hypothesis of a positive relationship between performance scores and prior relations between GDOT project managers and the private firm project manager whose work was being evaluated. The results indicate that there is high reliability that this relationship will be observed in the population of engineering design contracts managed by OCD. The results also indicate that the magnitude of this relationship is weak. The relationship between performance scores and prior relations between project managers was examined further using analysis of variance.

Of particular note, the ANOVA indicated that performance scores are impacted by the

scoring tendencies of the GDOT manager. The impact is seen in the ANOVA finding of lower scoring mean by managers who are frequent evaluators compared to GDOT managers who are not frequent evaluators. The impact is further evident in the finding that the effect of prior relations on performance scores is changed based on whether the scorer is one of The Five frequent scorers.

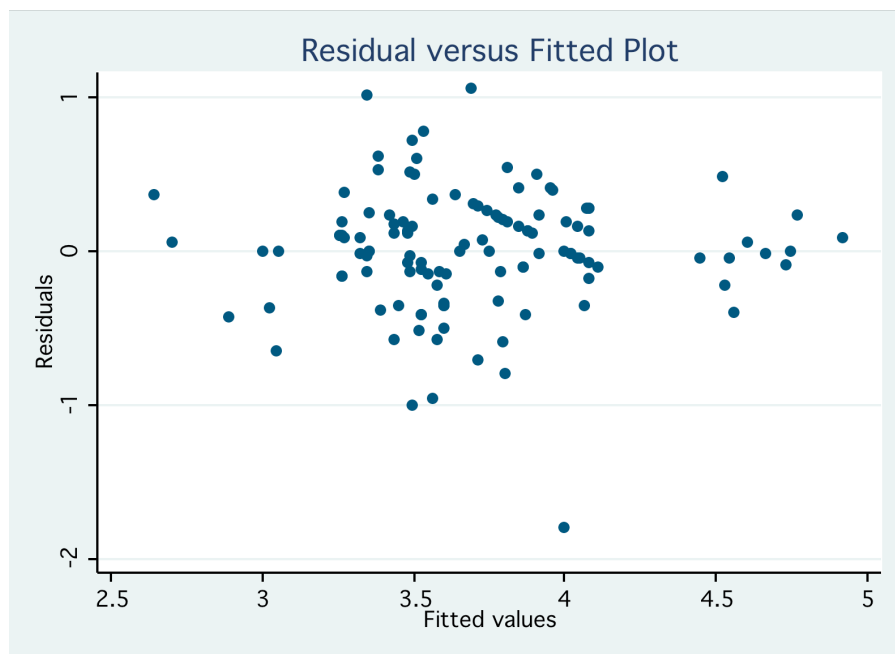
The ANOVAs brought to light the impact of the five frequent evaluators' influence. Their influence did not come through clearly in the regression results because their impact was controlled for by a categorical variable. This variable was designed to capture the individual impact of each evaluator and did not capture the impact of any grouping of evaluators. By combining the five frequent evaluators together in an ANOVA, their collective impact became clear and was shown to influence the mean performance score and to exert influence on the relationship between prior relations and performance scores. Understanding that the regression was capturing, but not reporting, the impact of a group of frequent evaluators' scoring tendencies helps explain how a model with small coefficients on key variables appears to be a very fit model and a good predictor of performance scores.

### Fitness of the Model

The model's fitness is tested to assure that the difference between the model's predicted values and actual values is random, and is random and unpredictable at all values of performance scores. With this assurance we can be comfortable that our predictors are good at explaining the relationship between our predictor variables and performance scores and that any unexplained error is a result of uncontrollable chaos. A visible representation of the error terms provides a good way of quickly understanding if the residuals are random or patterned.

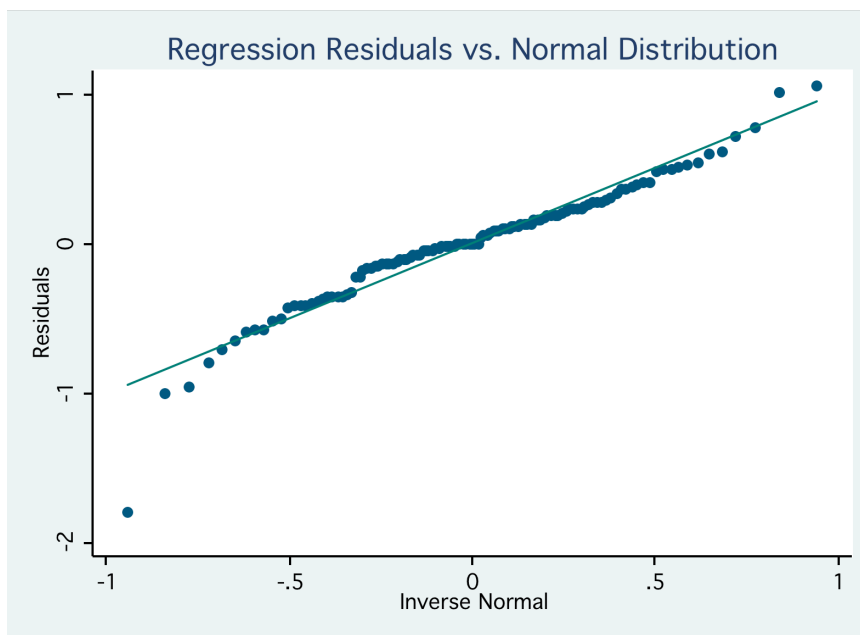
### Visual Tests

Graph 4.4



Initial validation of the model's fitness is obtained by visually scanning the plot of residuals versus the fitted values (Graph 4.4). The plot showing the residuals associated with predicted values indicates that at all values of predicted performance scores, the residuals vary within plus or minus one point. At every point the predicted value can be either higher or lower than the actual the performance score. For example, the cluster of fitted values between performance scores of 3.5 and 4.0 show residuals randomly scattered above and below the zero mark. The error term fluctuates in both directions. The model is as likely to overestimate the performance score as it is to underestimate the performance score. There is no indication that the direction or absolute value of residuals change based on the predicted value of performance score. The fitness of the model is further confirmed in a visual of regression residual versus the normal distribution.

Graph 4.5 Regression Residual vs. Normal Distribution



A qnorm plot of the residuals (Graph 4.4) provides additional visual indication of the model's fitness. The graph of residual versus a normal distribution shows that the distribution of residuals very closely mirrors a normal distribution. The normal distribution expected of residual is plotted on the solid line with the models returned residuals represented by individual dots. The comparison of the model's residuals to a normal distribution of residuals shows residuals from the model to reflect the stochastic noise found in a normal distribution

### **Tests for Homoskedasticity**

Homoskedasticity is the first test of fitness. The test determines if the standard deviations of the residuals are related to the value of the variables. The Cook-Weisberg test is used to test whether the error variances are consistent across all values of performance score or change according to the value of the dependent variable. In other words, it informs if the model's predictive ability is consistent across all levels of performance score or is better at predicting a particular range of values in the dependent variable. The chi-square value .38, coupled with the large significance value .5397, indicate that we cannot reject the null hypothesis that the error variances are equal across all values of Y. This indicates that the model's ability to predict Y does vary based on the value of the dependent variable.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of wghttotal

chi2(1) = 0.38

Prob > chi2 = 0.5397

### Test for Multicollinearity

The model was also tested for multicollinearity between predictor variables. As expected there is high correlation in the variables presented in quadratic terms. No other variables showed high levels of correlations.

Table 4.5 Correlations between Variables

	wghtto~1	storder	storde~q	OrgAge	OrgAgesq	gafirm	Atlant~m
wghttotal	1.0000						
storder	-0.1584	1.0000					
stordersq	-0.0801	0.9446	1.0000				
OrgAge	0.0295	-0.1353	-0.1567	1.0000			
OrgAgesq	0.0466	-0.0816	-0.0995	0.9437	1.0000		
gafirm	-0.0016	0.0433	-0.0208	-0.2505	-0.1920	1.0000	
AtlantaFirm	-0.0958	0.2704	0.2595	-0.3492	-0.2974	-0.1638	1.0000

### Variance Inflation Factor

The variance inflation factor, VIF provides an indicator of the level of intercorrelation between predictor variables. As expected VIF scores from the model's predictor



variables indicate high levels of correlation between the linear and squared terms of the variables included in quadratic form and low levels for other variables. Higher VIF were also recorded for four of the categorical variables representing GDOT project managers. None of the results of the VIF analysis suggest a level of multicollinearity that should be of undermine the model's effectiveness.

### **Summary of Model Fitness**

In summary the model, as tested, clears tests for multicollinearity between predictor variables, significant influence from outliers in the sample data, normal distribution of residuals and ability to predict values at any given value of Y. It is sufficiently specified expected to provide a reliable and valid representation of the relationship between independent variables and performance evaluation scores.

Table 4.6 Regression Results for Project Manager Categorical Variable

gdotpm_code1		(dropped)					
gdotpm_code2		.973525	.5641086	1.73	0.088	-.1468435	2.093893
gdotpm_code3		1.350443	.6551749	2.06	0.042	.0492089	2.651677
gdotpm_code4		.2439883	.6533456	0.37	0.710	-1.053612	1.541589
gdotpm_code5		-.309199	.6804316	-0.45	0.651	-1.660595	1.042197
gdotpm_code6		.594972	.5814146	1.02	0.309	-.5597677	1.749712
gdotpm_code7		-.078681	.4775792	-0.16	0.870	-1.027195	.8698325
gdotpm_code8		-.3148278	.6535441	-0.48	0.631	-1.612823	.9831672
gdotpm_code9		.4936585	.5019636	0.98	0.328	-.5032845	1.490602
gdotpm_co~10		.0550539	.5356708	0.10	0.918	-1.008835	1.118942
gdotpm_co~11		-.2838303	.4662491	-0.61	0.544	-1.209841	.6421807
gdotpm_co~12		-.3804391	.4857065	-0.78	0.435	-1.345094	.5842158
gdotpm_co~13		.2479009	.4695507	0.53	0.599	-.6846674	1.180469
gdotpm_co~14		.4283333	.6639409	0.65	0.520	-.8903106	1.746977
gdotpm_co~15		.2901189	.5048616	0.57	0.567	-.7125798	1.292818
gdotpm_co~16		.2142079	.5810879	0.37	0.713	-.9398828	1.368299
gdotpm_co~17		.2600158	.47705	0.55	0.587	-.6874467	1.207478
gdotpm_co~18		1.124351	.5008458	2.24	0.027	.1296286	2.119074
gdotpm_co~19		1.118179	.5651514	1.98	0.051	-.0042607	2.240618
gdotpm_co~20		.1081176	.5362195	0.20	0.841	-.9568606	1.173096
_cons		3.759351	.5122202	7.34	0.000	2.742037	4.776664

## **Chapter Five**

### **Discussion**

#### **Problem Review**

Public contracting is a policy targeted towards improving government performance by improving its efficiency and effectiveness. As public policy, a contracting strategy is intended to improve performance by having government agencies execute activities they are uniquely suited to execute and to contract out all others. This strategy of improving government performance through increased effectiveness and efficiency helped shape how theorists defined which factors would be included in performance scores. As a result public managers and policy scientists frequently rely on effectiveness and efficiency propositions when deciding how to measure government performance.

A key critique of this approach, however, claims that efficiency and effectiveness approaches such as TCE offer an incomplete understanding of public contracting and consequently will misstate the factors that drive successful outcomes and should be included in performance measurements. In particular, critics often claim that TCE and doesn't consider the impact social relations have on performance and ultimately performance scores.

Critics point out that the factors that are identified as being key to determining outcomes from economic behavior are often undersocialized. If it is true that theories focused on economic efficiency and effectiveness do not adequately express the connection between outcomes from economic activity and social influences, then there is an associated problem of having performance measurement processes that do not capture the influence of social factors either. To address the omission of recognizing the impact of social influences on performance and performance measurement critics present a theory based on observation, where they assert they have observed social influences impacting economic performance.

This claim by sociologists and legal theorists, if correct, creates a problem in theory and in practice. If social factors influence contracting performance they must be accounted for in the measurement and scoring process, otherwise problems will result from omitting factors that significantly influence goal attainment.

## **Findings**

### **Overview**

The goal of the research was to determine if evidence existed that public contracting performance measurement was impacted by social influences. I narrowed the broad definition of social influence to relations between parties involved in GDOT contracting. I constructed two social relations variables. Using the Uzzi model (1996), I designed the first variable to capture the influence that ties between prime contractors and their

subcontractors have on performance scores assigned by GDOT project managers. I analyzed contract and performance evaluation data to determine if strong ties between prime contractors and their subcontractors resulted in higher performance scores. I also used the data to construct the second social relations variable. This variable was designed to determine if the scores GDOT managers awarded were influenced by prior relations between the GDOT project manager and the private firm peer whose work was being evaluated.

A review of the sample data shows that prime contractors primarily use networks of weak ties to execute GDOT contracts. Of 122 observations, eleven showed enough frequency of relations between a prime contractor and its subcontractors to be considered a “special” relationship. All other observations showed prime contractors spreading work among many subcontractors and not concentrating work among a few subcontractors. This overwhelming prevalence of weak ties was also reflected in the regression results. Because the variable measuring tie strength lacked enough variation, the regression returned results that found no statistically significant relationship between performance and strength of tie between a prime contractor and its subcontractors. High performance scores were found when prime contractors used a weak tie strategy and also when they used a strong tie strategy. I plotted the relationship between tie strength and performance score that the regression model predicted, the resulting graph showed a curvilinear relationship between the two factors. In some observations high performance scores were predicted to be associated with weak ties and in other cases predicted to be associated with strong ties. There appears to be an intervening variable that influences

which tie strength is associated with higher performance scores. This suggests that embeddedness theory rightly claims that environmental factors help determine whether strong ties or weak ties result in better outcomes.

The findings confirm that prior social relations between public and private firm project managers leads to higher performance scores. The regression results indicate that these prior relations have a positive and statistically significant impact on performance scores. The results support propositions that when prior relations exists, private firm project managers understand that maintaining social standing within the contracting community and receiving loyalty from GDOT evaluators requires high performance on projects. There is a desire to meet community standards and improved communication and trust between the project managers. The relationship is performing as hypothesized the higher scores result from the parties' absorbing the benefits from trust based relations.

Although the model results support a hypothesis that prior relations are associated with higher performance scores, there is evidence that the amount of impact is influenced by individual scorer tendencies. In the sample there is an overrepresentation of evaluations from five GDOT managers, three of them have mean scores lower than the other evaluators' mean score and two have mean scores higher than the 3.69 sample mean. These five managers also have a greater incidence of prior relations with the private firm peer, whose work is being evaluated. With two of the frequent scorers the relationship between prior relations and higher performance scores is as hypothesized, but this is not true with the other three frequent scorers. The instances where performance scores are

not responding to prior social relations suggest the possibility that either environmental influences or personal scoring tendencies are changing the affect of prior relations on performance scores.

Results from the study also provide some evidence that not all GDOT project managers are participating equally in the measurement process. I found that five GDOT project managers were responsible for 68% of all the evaluations in the sample data. This rate of participation causes concern because it signals that there are other managers who are not participating at an equivalent rate. A review of the observations indicated that these five managers were no more senior than their GDOT peers and the type of contracts they evaluated did not appear to be very different, in length or description, from those evaluated by the other GDOT project managers. This finding raises a concern because employees and managers tend not to participate in the performance measurement process when they feel they have not had adequate input in the performance scoring or measurement design (Behn, 1995).

Analysis of the data also indicated that the performance scores given by GDOT managers is focused more on the process of executing the contract than the quality of the final goods or services delivered. The performance scoring system assigns 30% of total value to how well contractors cooperate with GDOT, elected officials, federal agencies, and other stakeholders. It assigns another 25% of total value to how well the prime contractor manages its subcontractors and assigns only 10% of total value to the overall quality of the good or service delivered. This scoring system is one that raises the questions, “what

are we really trying to accomplish” and “ is this system telling us if we met the policy goals?” Based on what is being measured and the value assigned to each factor, one might surmise that the policy goal associated with GDOT’s public contracting is to contract out work to firms that work well with GDOT and do not require GDOT managers to supervise subcontractors.

## **Discussion**

Propositions from multiple theories were combined to shape the research logic model. Although performance measurement, transaction cost economics and embeddedness theories are distinctly different approaches, they share a common goal of identifying the factors that significantly influence performance. Each made an individual contribution that helped shape the logic model and in return, the findings contribute to each of them individually.

To review the impact of my findings, I created a discussion section for each theory. I first address performance measurement theory and present my theoretical contribution based on the research results. In the same section, I add the related policy implications. This format is used to address my contribution to embeddedness and transaction cost economics theories respectively.



## **Performance Measurement**

### Theoretical Contribution

Performance measurement theory is consistent in saying that a first step in a good process is identifying the factors that lead to goal attainment. The factors are expected to vary from organization to organization. Whether the factor is economic, political or social is not important. For a factor to be included as a part of performance measurement, it is only important that the factor exerts significant influence on performance. The results of this study provide evidence that social relations impact public contracting performance scores and should be included in future discussions of performance measurement theory. Although public administrators frequently rely on theories that direct attention to improving performance scores by managing changes in resources, regulation, organization or management, managing social relations can also lead to improved performance scores. This research shows that vendors can use social relations as an avenue for improving public contracting performance scores. Building relationships between public managers and their private firm peers can establish mutual trust and commitment and will contribute to higher performance scores.

A second step in performance measurement calls for measuring factors objectively and without bias. While reasonable, this goal is problematic. In the analysis I found scorer tendency seeping into measurements. It was impacting performance measurement in two ways. First, scorer tendency was effecting whether the score was above or below the mean. Firms evaluated by Manager 7, 13 or 15 were more likely to receive scores below

the mean than were firms evaluated by other managers. This trend held even when Managers 7, 13 or 15 evaluated private firm managers who were also evaluated by other GDOT managers. Along with its direct influence on scores, scorer tendency was also shown to interact with the prior relations variable and change its affect on performance scores. The tendency of a manager to give a low score decreases the positive affect prior relations had on performance scores. This influence results in a measurement that reflects some combination of actual performance and scorer tendency as opposed to representing only the quality of the actual performance. In this sense the influence of scorer tendency violates the performance measurement requirement that calls for objective and unbiased measurement. If this tenet is violated, it decreases the value of indentifying all the important influences and undermines performance measurement goals. So, while there is great energy around identifying influencing factors and finding the correct measures to inform citizens, elected officials and public managers about the efficiency and effectiveness of government, there needs to be energy around ensuring that what they receive is an accurate assessment of performance.

### Policy Implications

The association of better performance scores with social relations between a public manager and the private sector peer being evaluated may have little impact on public managers' decision making. They might find the idea of exploring these relations with vendors problematic, fearing the discovery of vendor opportunism and goal incongruence that are sometimes found in principal-agent relationships. Similarly, public managers might be hesitant to explore this avenue if their perceptions are shaped by fears

of agency capture. Although there is evidence of principal-agent and agency capture problems to consider, the benefits of knowing how social relations with vendors impact performance scores should also be considered. Network and embeddedness theories provide a bit of comfort to public managers when they point out that firms might avoid using these relations opportunistically because to do so would mean they would risk losing access to network resources, including participation on GDOT contracts.

With regard to the impact of scorer tendency, policy makers should first note that there is no single, universally superior solution to measurement problems (Behn, 1995). With that understanding public managers need to focus on ferreting out how much of performance scores is a reflection of scorer tendency versus an accurate depiction of quality because the part of the score which is scorer tendency adds little that is meaningful for decision-making and understanding if a policy is moving toward goal attainment. Instead, the influence of scorer tendency is a distortion that needs a filter to minimize its impact.

GDOT has the option of tackling this issue by restructuring the evaluations process. A revised process would have the pool of evaluators reviewed and their tendencies noted. This might be no more than an annual review of the overall average scores awarded and a report of where each project manager's average is in relation to the group mean. A step further would be to develop a scoring distribution system that restricts performance scores to a normal distribution, unless specific reasons for non-normal distribution are documented. These recommendations will not eliminate the influence of scorer tendency

on performance evaluations, but they can help minimize the threat it presents to a fair and objective evaluation process.

GDOT should also work to understand why five managers are contributing much to the measurement process, while others contribute less. This pattern might be a result of work allocation but it could also signal a lack of buy-in by some managers. If there is a lack of buy-in, there needs to be analysis and discussion of why some managers choose not to participate in the process. Managers may opt not to support GDOT's performance measurement process because they had little input into its design. They might have little buy-in because they do not see the connection between what is being measured and the policy goals. Regardless of their reasons for not participating, GDOT needs to investigate.

## **Embeddedness Theory**

### Theoretical Contribution

Embeddedness theory makes much of the impact of social relations. It offers the proposition that no economic activity is immune to influences from the social structure in which it is embedded. This can be extended to include the evaluation of economic performance. The theory further proposes that social relations can be viewed as either strong ties or weak ties. Strong ties improve outcome by increasing trust and communication between parties. Weak ties improve outcome by increasing the number of sources of information and the amount of accessible resources. The strength of the tie reflects the frequency and intensity of interaction. Strong ties are the result of either very frequent interaction or very intense interaction. Weak ties require the opposite.

The two tie strength have several distinguishing characteristics, but one of the most important is also one of the least seldom mentioned. That is, weak ties occur frequently and strong ties don't. Forming strong ties requires much greater physical, emotional and mental effort than weak ties. Consequently as reflected in the sample data, weak ties will be plentiful and strong ties will be few. In the sample observations, we observed that prime contractors overwhelmingly relied on weak ties to execute contracts. The naturally occurring composition of social ties favors weak ties. They are prevalent because they are easy to accumulate, easy to maintain and they deliver results. Relying on weak ties with subcontractors did not negatively impact the prime contractor's performance scores.

Strong ties were also associated with high performance scores, but in much fewer numbers. There is a boundedness around forming strong ties because they require frequency and intensity of interaction. Organizations and individuals are limited in the time and intensity they can expend in building social relations, therefore they are also limited in the number of strong ties they can form and maintain. The implication of results showing both tie strengths associated with high performance scores is that it is time to shift the conversation. Rather than worry whether prime contractors should build a network of weak or strong ties, the focus can shift to allowing ties to grow organically then maximizing performance scores through that composition of ties.

### Policy Implications

Understanding that strong ties between prime contractors and subcontractors are not required to reach high contract performance scores and that they occur infrequently presents interesting policy opportunities for the State of Georgia. In general, potential exists for public contracting programs to be an integral part of Georgia's larger economic development efforts. For example, the 2012 state budget allocated \$1.9 billion for the Department of Transportation (Kemp and State 2011). The magnitude of resources dedicated to transportation projects makes GDOT a potentially formidable economic engine for the state. GDOT can help marginalized communities access economic opportunity by encouraging prime contractors to include them in their network of subcontractors. Adding these weak ties to the prime's network will not negatively impact performance scores. This opens opportunities for GDOT to play an important role in how the State develops economically. But doing so requires that the State of Georgia take a broader view of GDOT's ability to influence regional economic development. Along with recognizing that GDOT's ability to build and maintain a transportation system is invaluable to economic development, elected officials can also recognize the potential of using transportation dollars to stimulate growth in distressed regions by grafting them into existing contractor networks.

### **Transaction Cost Economics**

### Theoretical Contribution

Unlike embeddedness theory, transaction cost economics is keen on presenting public contracting performance as a function of how the transaction is governed. TCE does allow that, on occasion, it is necessary to engage in incomplete contracting. In such circumstances, social relations between parties become important. Otherwise, the attention needs to stay on the specified dimensions of the transaction.

In analysis of the relations between GDOT prime contractors and their subcontractors, there was no statistically significant evidence that GDOT evaluators recognized improved performance based on the type of social relations between a prime contractor and its subcontractors. This finding differs from Uzzi's findings that the nature of social ties influenced firm survival rates and price paid for legal services (1996, 2004). In the Uzzi cases, however, benefits and performance improvement was tracked between the two parties involved in the social tie. Uzzi analyses determined that at least one party to the tie recognized and acknowledged a benefit from the tie. This analysis in contrast, sought to understand if performance scores from a third party recognized and acknowledged benefits from the tie between two other actors.

In retrospect, I proposed a transitive relationship between prime contractors, subcontractors and GDOT. I proposed that if a prime contractor received benefits from ties with its subcontractors, I would be able to track those benefits to performance scores on GDOT contracts. In this approach, there was an unaddressed assumption of transitivity. This went beyond Uzzi's proposal (1996), where Uzzi only proposed that

one of the parties to the relation would have an improved outcome. With my research design, I mistakenly attempted to use GDOT evaluations to identify if the prime contractor received benefits from its relations with subcontractors.

Even so, I was able to see that embeddedness theory is correct in its proposition that environmental influences will determine whether strong or weak ties will impact performance scores. TCE proposes that environmental uncertainty such as the entry or exit of competition or supply chain disruption should be considered in the make or buy decision. Embeddedness theory, on the other hand, proposes that environmental influences such as industry type or where the industry is in its life cycle will determine which strength of tie will lead to higher performance scores. I found evidence of an intervening variable that influenced the impact of weak ties in some cases and strong ties in other cases. This also supports the argument that TCE is not explaining all the factors that drive performance scores.

The analysis that examined if social relations between the project managers impacted performance measurement showed that higher scores occur when project managers have worked together previously. This relationship provides statistically significant evidence that social relations are influencing performance.



### Policy Implications

There is enough evidence to suggest that public managers need to expand the number of factors they consider when public contracting is used to improve government effectiveness and efficiency. It may be important to get transactions assigned to the correct governance structure, but the process improvement doesn't stop there. When contracting in an environment of highly educated people with a rare set of skills, public managers can get even better performance by building trust based relationships with their contractors.

## **Weaknesses and Future Research**

There are a number of interesting avenues for future research. For example future work can identify whether social relations have the same impact on performance scores in less technical and specialized functions. Is there something different that occurs when public agency engineers and architects work with their private firm peers that does not happen when a public agency contract specialist works with a peer at a social services organization? Future research should work to deliver tools that capture more relations and more impact of all known relations. I used contracts and evaluation reports as evidence of formal social relations. There is much more evidence of social relations that I was unable to capture because federal and state privacy protection require that all contractor resumes be destroyed after a contract has been awarded. There is a possibility that many of the engineers are alumni of the same engineering programs or belong to the same professional and industry groups. Having this evidence of social relations would provide additional evidence of the impact of social relations on performance scores.

Although the goal of this research was not to discuss the impact of evaluator tendencies, it became clear that this is a factor in performance measurement. It has a direct impact on scores and an indirect impact. Scorer tendency changes the affect that other variables have on performance scores. Additional research needs to explain the impact of this factor and offer solutions for offsetting it. In highly technical environments, there are few

people who have the skills to evaluate performance. Therefore the quality of future decisions rests with their ability to deliver objective measurement.

Finally I mentioned that the research was designed such that it attempted to use GDOT evaluations to capture the impact of social relations between prime contractors and their subcontractors. I made the assumption that the impact of tie strength would be visible in a third party's evaluation process. For a number of previously stated reasons the research was unable to observe that impact, with statistically significant results. I would like to see a different research design take another shot at examining whether strength of ties between prime and subcontractors impact performance.

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## **VITA**

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