THE IMPACT OF CONTRACT DESIGN ON CONTRACTOR PERFORMANCE – A SECOND LOOK

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ABSTRACT. This study investigates the impact of contract design on contractor performance in the context of two local level services – residential refuse collection and public bus transit. Data is collected from local government officials on contract design and contractor performance using an Internet based survey. A dataset with 68 usable observations was obtained and the data analyzed using an analysis of variance technique. The results show that the contract design variables of performance specification and contract length are statistically significant with longer contracts being associated with better performance. Use of multiple awards is also statistically significant but associated with weaker performance. A term which addresses the interaction between multiple contracts and contract lengths is also statistically significant and shows that shorter contracts with multiple awards should be avoided. Mixed results were obtained for the use of contract oversight methods.

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INTRODUCTION

To produce needed services internally or to rely on a private source is an important decision faced by public organizations at all levels of government; federal, state, and local. In the United States a prevalent form of privatization is contracting for needed goods and services. In analyzing the make or buy decision public organizations must initially develop political support for the action and ensure that consequences in terms of impact on citizens are acceptable. A critical administrative decision is the selection of particular services to contract and how to use various features of the contracting process. This paper centers on the latter aspect of the contracting decision, which involves how to employ various contracting techniques in choosing a contractor. The related research question is: What is the impact of contract design on contractor performance?

The study builds on previous work (Shetterly, 2000 and 2002) that investigated contract design for residential refuse collection and public bus transit services. The previous studies relied on a 1992 International City/County Management Association (ICMA) survey of Alternative Service Delivery Approaches as a starting point. The survey shows patterns of contracting to for-profit and non-profit firms covering 62 different services. The current study updates that work through use of a larger sample and an approach that measures contractor performance using multiple dimensions.

The current study builds on similar survey information collected by the ICMA in 2007. The 2007 ICMA survey resulted in a report titled Profile of Local Government Service Delivery Choices, 2007 and shows contracting patterns to for-profit and non-profit firms for 67 local governmental services. The survey was mailed to Chief Administrative Officers in jurisdictions with populations of 10,000 or greater and counties with populations of 25,000 or greater. The survey was also sent to a random sample of smaller jurisdictions. A total of 6,095 jurisdictions were mailed surveys and 1,599 responses were received.

The 1992 and 2007 ICMA surveys show that there is a substantial amount of contracting for services to for-profit and non-profit firms at the local level of government. Table 1 collapses the

data from the ICMA surveys into seven major service categories and shows the amount of contracting to for-profit and non-profit firms within each category. In total, the 1992 survey contains information on over 12,000 contracted services, while the 2007 study collected data on just under 11,000 services. A substantial amount of contracting occurs in the Public Works/Transportation, Public Safety, and Health and Human Services categories.

The Public Works/Transportation category, which includes examples of hard services, accounted for 3,731 contracted services in 1992 and remained at about that level in 2007. The services contracted in the Public Works/Transportation category include services such as solid waste collection and disposal, street repair, operation and maintenance of transit systems, operation of airports, water distribution and treatment, and sewage collection and treatment. Public Safety and Health and Human Services combined, which includes examples of soft services, account for 4,344 of the contracted services in 1992. The total in 2007 for this these categories showed a sharp decline to 3,127 contracted services.

Table 1 - Contracting Patterns by Service Category

Source: 1992 and 2007 ICMA Surveys on Service Delivery

Service Category	2007 FPO	2007 NPO	2007 Total	1992 FPO	1992 NPO	1992 Total
Public Works & Transportation	3,424	333	3,757	3,428	303	3,731
Public Utilities	518	71	589	482	49	531
Public Safety	1,565	1,572	3,127	1,323	299	1,622
*Health & Human Services				1,041	1,681	2,722
Parks & Recreation	317	79	396	225	90	315
Cultural & Arts	73	448	521	63	518	581
Support Functions	2,311	137	2,448	2,728	244	2,972
Total	8,208	2,630	10,848	9,290	3,184	12,474

Source: ICMA, The Municipal Yearbook, 1994 and ICMA Profile of Local Government Delivery Choices, 2007. *Totals for 2007 are included within Public Safety

The services contracted in the categories include services such as operation of day care facilities, child welfare programs, programs for the elderly, operation of hospitals, alcohol and drug abuse programs, operation of mental health facilities, operation of homeless shelters, ambulance service, crime prevention/control, and emergency medical services. The decline in services contracted includes many soft services which may be suggestive of the difficulty in contracting for such services.

Privatization and local government

Privatization is defined as "the act of reducing the role of government, or increasing the role of the private sector, in an activity or in the ownership of assets" (Savas, 1987, p.3). A variety of privatization arrangements falls within this definition. A useful classification of arrangements includes the following private production arrangements: the market, use of volunteers, self service, franchise, vouchers, grants, and contracts (Savas, 1987, p.84). Use of the market, volunteers, and self service are considered the ultimate in privatization since provision and production is the responsibility of the private sector. Franchise is next in the progression because local government arranges and regulates production but makes no direct expenditures. Vouchers, grants, and contracts follow and represent cases where the government has a provision responsibility and makes direct expenditures to citizens or organizations for production of services.

A local government that decides to contract for needed services is faced with a number of policy choices that impact contract design. First, and perhaps foremost, is the selection of services. Not all services are the same. Some are relatively easy to contract, while others are quite difficult. Broadly speaking, services may be classified as either hard or soft (Savas, 1987; DeHoog, 1985; Hayes, 1989, p.79). Hard services are those with a recognizable production process that produce visible results (Savas, 1987, p.267). Hard services are considered easier to contract because they are less

complex, more conducive to objective outcome measures, and can be described with greater specificity. In contrast, soft services generally involve a client/provider relationship and have a less visible result (Stein, 1990; Fixler and Hayes, 1991). Soft services are considered difficult to contract because they are more complex, harder to measure, and more difficult to describe. Contract design decisions will be more critical for soft than for hard services because soft services are inherently difficult to describe precisely and are not directly observable. Therefore, soft services may involve higher contracting costs to overcome problems inherent in the principal-agent relationship (Gormley, 1994; Ferris and Graddy, 1991). The type of service contracted influences how the contracting process is designed and the ease with which monitoring can be conducted.

LITERATURE REVIEW

Impact of Contracting on Contractor Performance

The effect of contracting on the cost and quality of service delivery can be evaluated from two perspectives. The first and most common approach is to compare contractor performance to public performance. This approach answers the question of which organizational mode, public or private, provides the best performance. The second approach, which is less common, takes the decision to contract as a given, and answers the question of how variation in the design of the contracting process influences the cost and quality of contract performance. While much is known about the first question, very little is known about the latter question.

The potential for cost savings through contracting is a consistent theme in the literature on delivery of public services. Economic arguments strongly support the proposition of reduced cost and indeed evidence suggests that the goal of lower cost with contracting has been largely achieved (Seidenstat, 1996, p.469). Strong evidence of cost savings exists, with services up to 96 % more expensive if produced publicly (Seader, 1986; Savas, 1987; Berenyi

and Stevens, 1988; Fixler and Poole, 1991; Kettl, 1993). In addition savings through contracting appears to be broadly based. There is evidence that lower production cost occurs across a variety of services in a number of geographic locations (Globerman and Vining, 1996, p.579). Evidence supports the claim that contracting for services does result in a lower cost when compared to public sector organizations.

The argument for higher quality in services delivered by contractors is not as theoretically developed as the arguments for lower cost. The main rationale for a presumption of higher quality is that private markets serve a regulating function by forcing private providers who do not perform well to go out of business (Kettl, 1993). However, the empirical results are quite mixed. One theme is that quality is not an important consideration when deciding to contract for services (Donahue, 1989; Van Horn, 1990). If quality is not an important decision factor, it seems to imply that quality will be at least as good as that provided by the public sector, or will not fall to an unacceptable level. This implication is consistent with results of a survey of state administrators responsible for human services which indicated that quality of services provided by for-profit firms was equal to that provided by public organizations (Kettner and Martin, 1988). In addition, a study of eight local level services found that contracting significantly reduced the cost of services without sacrificing effectiveness or quality (Berenyi and Stevens, 1988, p.19).

While the Berenyi and Stevens study is a study of public versus private performance, it does provide insight on a research methodology appropriate for the research question. Berenyi and Stevens (1988) conducted a study of eight municipal services in the Los Angeles metropolitan area, comparing public sector performance to contractor performance in terms of efficiency and effectiveness. The study treated contracting as an intervention and sought to determine the influence it has on service delivery. The sample only included services with high private sector involvement and one of the services in the sample was residential refuse collection. They also examined the effect of contract length, size of the contracting firm, and contract design (negotiated or competitive) by using a cross

tabulation procedure and found no statistically significant association between any of these variables and contract price.

Domberger, Hall, and Ah Lik Li (1995) used a two equation econometric model to evaluate how a competitive approach to contracting influenced price and quality of janitorial services. The explanatory variables focused on contractor characteristics (public versus private) and quantifiable contract characteristics such as type of specification used (performance versus functional), whether the service was contracted out for the first time, and use of a pre-qualification list of approved suppliers. They based their analysis on price and quality for 61 cleaning service contracts in the Sydney, Australia metropolitan area: 32 schools, 22 offices, and 7 hospitals. The data collection methodology used a survey instrument for the explanatory variables and contract price. Direct observation was used for the quality variable.

They found that competitive contracting tends to lower cost while at least maintaining quality. In terms of contract characteristics, contractors selected for the first time, from a list of pre-qualified suppliers, or who responded to bids that required a performance specification were not associated with higher prices. They conclude that contract performance is notoriously difficult to measure and evaluate and that a broad range of empirical findings is needed. The challenge is to ensure that contract design is consistent with the different activities that are increasingly being contracted.

Other studies analyzed the impact of competitive contracting on contractor performance. One study focused on the public bus transit service (Shetterly, 2002) and found that sealed bidding had a statistically significant impact on contractor performance. Use of penalty provisions was also found to have a statistically significant impact on performance. Both variables had a positive influence tending to increase the cost of the public bus transit service. In a similar study with residential refuse collection as the focus use of sealed bidding was statistically significant and reduced the cost of contractor performance.

Although not empirically based, other potential determinants of cost and quality include the level of competition in the market,

amount of local level experience with service contracting, form of local level government, and the labor and benefits cost of maintaining a work force. Competition within the contracting environment is considered an essential contracting condition (Prager, 1994; DeHoog, 1985; Sharp, 1990). Without competition, the goal of reduced cost of services is not likely to occur. Three factors determine the number of available suppliers: the geographic area, the service being contracted, and the government itself (Valente, 1984). Local governments in a major metropolitan area are likely to have a higher supplier availability than smaller governments outside a major metropolitan area. In related research, size of the jurisdiction was found to be a key determinant of number of services contracted (Hirsch 1995; Benton and Menzell, 1992; and Ferris, 1986).

Availability of knowledgeable personnel to administer contracting actions may also affect cost and quality outcomes (DeHoog, 1990). As a local government gains experience contracting for services, it is reasonable to expect that the contracting staff will become larger and more technically competent. Experience gained is likely to result in improved contract design and ultimately better contractor performance.

Measuring contractor performance

Performance measurement is defined as "any systematic attempt to learn how responsive a local government's services are to the needs of the community and to the community's ability to pay" (Epstein, 1984, p.2). It is a way of determining whether a local government is providing a quality service at a reasonable price. Three themes emerge from the literature on performance measurement at the local government level. First, the two main components of performance measurement are efficiency and effectiveness with quality being one element of effectiveness (Hatry, 1992; Marlin, 1984; Rehfuss, 1989; Valente, 1984; Savas, 1987, p.96; Kettl, 1993, p.18; and Gormley, 1990, p.7). Secondly, while efficiency is relatively easy to measure, effectiveness is much more difficult to define and measure. Thirdly, even though effectiveness is difficult to measure, it is a vital component of performance measurement and should not be ignored.

Efficiency compares the quantity of services provided to the resources used to provide it and can be expressed as an input/output ratio or output/input ratio (Epstein, 1984). Effectiveness is an important element in the measurement of contractor performance. It is more difficult to deal with than efficiency because of the many ways it can be defined. The conventional definition views effectiveness as a measure of the extent to which local government services achieve established goals and objectives. For local government, effectiveness measures service responsiveness to public needs and has quality as an important dimension (Epstein, 1984). However, effectiveness has also been used synonymously with quality, and quality itself can take several dimensions (Hatry, 1992). One dimension is a narrow view which considers the characteristics of the service itself such as timeliness, accessibility, and courteousness. The other dimension is broader, focusing on results. An example of a results orientation is responsiveness to citizen needs (Marlin, 1984; Valente, 1984).

In summary the relevant literature identifies important variables associated with service contracting that may affect the cost and quality of services delivered. Some key factors that are reflective of contract design include: specification type, solicitation method, contract type, length of contract, multiple awards, type of firm, use of contract incentives, and oversight. In addition, factors other than contract design which may also influence contractor performance have been identified. These factors include market competition, the condition under which services are delivered, experience with contracting, form of local government, cost of the contractor's labor force, and the scale of the contractor operation.

In terms of performance measurement, use of resources is best measured through the concept of efficiency. The literature is not as consistent on how to measure effectiveness. However, it still provides ample information for each of the services on how effectiveness can be measured.

None of the attempts to investigate the influence of contract design have been conducted over a wide range of jurisdictions or services. Nor have they specified the number of variables that appear to be important in investigating the influence of contract design on contractor performance. Existing empirical studies on the

determinants of contract performance have the strength of being able to deal in depth with a relatively small sample of services but may miss patterns that emerge with a larger sample.

METHODOLOGY

This study employs a web based survey using the on line survey resources offered by SurveyMonkey. The target respondents for data collection are the set of city and county officials that indicated in the ICMA 2007 Profile of Local Government Service Delivery Choices that their jurisdiction contracted for residential refuse services or scheduled public bus transit to either a for-profit or non-profit. In total 1,599 jurisdictions responded to the 2007 ICMA Survey and of those 442 reported contracting for residential refuse collection and 122 for scheduled public bus transit. The refuse collection and bus transit set of respondents total 544 and represent the potential set of targets for this study.

Of the 442 in the refuse collection group, a total of 62 targets did not provide an email address. Another 121 respondents did not have a working email address. The two categories added up to 183 of the potential targets that could not be contacted. The remaining 259 targets represent the target group for refuse collection that was contacted. Of the 122 in the bus transit group, a total of 24 targets did not provide an email address. Another 29 respondents did not have a working email address. The two categories added up to 53 of the potential targets that could not be contacted. The remaining 69 targets represent the target group for bus transit that was contacted. In total 328 targets were contacted.

A survey questionnaire was developed to acquire data on contract design and contractor performance. The survey questionnaire contains two sections. The first section includes nine questions on contract design. All questions can be answered by using a check off procedure. The second section has one question for collection of performance data on five related attributes. The performance data question can also be answered using a check off procedure. The questionnaire includes a definition of the service and completion instructions. The survey questionnaire was made

available to the survey targets during the period November – December 2011. An email message was provided to each target that provided an Internet link to access the survey. The email message advised targets that participation in the study is voluntary. Targets were given the option to decline to participate altogether, or leave blank any questions they did not wish to answer.

Dependent variables

Five performance dimensions were used to measure the level of contractor performance for the residential refuse collection and bus transit services. The five dimensions are efficiency (Cost per customer), reliability (timely in meeting schedules), complaints by citizens, damage to private property, and quality in terms of cleanness, odors, noise, etc.

The performance dimensions are measured on a Likert scale ranging from a low of 1 to a high of 7. A one is reflective of strong dissatisfaction with contractor performance and a seven with exceptional satisfaction.

Contract design variables

The contract design variables (Table 2) include specification type, solicitation method, contract type, financial incentive provisions, contract length, multiple awards, type of firm, and type of oversight used by the jurisdiction. Definitions of each variable are based on previous research on contract design (Shetterly, 2000) and are summarized here.

Table 2 - Overview of Contract Design Variable

Variable	Definition	Source/Level
Specification Type	performance, design/process, or both	Survey Item Categorical
Solicitation Method	sealed bid, negotiation, two step sealed bidding, or non-competitive	Survey Item Categorical
Contract Type	fixed price, cost reimbursement, other	Survey Item Categorical
Incentives	penalty for non performance, termination for convenience, risk sharing, performance rewards	Survey Item Categorical
Contract Length	Length of contract(s) in years	Survey Item Numerical
Multiple Awards	Award to multiple firms	Survey item Dichotomous

Number of Awards	Number of contract awarded	Survey item Categorical
Firm Type	for-profit, non-profit, both	Survey item Categorical
Oversight Type	citizen surveys, citizen complaints, field observation, review of reports, independent, or not conducted	Survey item Categorical

Specification Type: A specification is a description of the work to be performed. It represents what the purchaser seeks to buy and what private sector firms must be responsive to in order to be considered for award of a contract (Marlin, 1984, p.41). Specification type refers to the manner in which a specification is written. A process specification deals primarily with how the service will be delivered and provides the contractor less flexibility in work performance. A performance specification is ends oriented, provides clear performance standards, and gives the contractor some discretion in how work is performed (Marlin, 1984, p.42; Kettner and Martin, 1993). Better performance should result when contractors are free from procedural constraints and able to devise their own methods on how work is best done.

Solicitation Method: Solicitation method includes three formal techniques and one informal approach for soliciting contracts. The three formal techniques are sealed bidding, competitive negotiation, and two-step sealed bidding. The informal approach involves use of a non-competitive procedure. Sealed bidding is the most competitive approach because it uses cost as the award criteria. Based on a competitive contract model, use of a sealed bid method is expected to result better contactor performance.

Contract Type: Contract type refers to the type of contractual instrument that is agreed upon by the two parties. Fixed price contracts are defined as ones "...in which the contractor agrees to deliver a specific level and quality of service for a set price" (Valente, 1984, p.3). They shift the financial risk to the contractor and promote efficiency by encouraging flexibility and innovation in work practices. Because of increased flexibility and potential for innovation, use of a fixed price contract is expected improve the efficiency and overall performance of service contractors.

Incentives: Contracts may include provisions to share financial risk between the local jurisdiction and the contractor. Such provisions are intended to encourage the contractor to manage performance to the mutual benefit of both parties (MacManus, 1992, p.54). Some contracts may include positive incentives which promote efficiency by providing contractors a share of the savings realized by implementing innovative practices. Other contracts may include negative incentives, such as penalties which deduct amounts from the contractor payment for missed stops or damaged refuse collection containers. Another common practice is to include a termination for convenience clause in the contract. Such a clause is very broad and gives the government the right to terminate a contract when in the government's interest (Cibinic and Nash, 1994, p.1075). From a principal-agent perspective, penalties and a termination for convenience clause shift risk to the contractor. Therefore, assuming contractors are risk-averse, use of these provisions is expected to increase the cost of contracted services. For example, the contractor may include the cost of increased flexibility in his bid price to avoid financial penalties.

Contract Length: Contract length measures the number of years for which the contract was awarded. Single year contracts are more reflective of a cost-conscious approach to contracting as contractors can be changed more frequently (Kettner and Martin, 1990, p.20). Multi-year contracts include those awarded for a single year with one or more pre-priced option years. Contract length is expected to decrease satisfaction with contractor performance since the service is submitted for competitive bidding less frequently. However, from a principal-agent perspective a risk-averse contractor may favor a longer contract, rather than the uncertainty of a shorter contract at a higher price. Therefore from this perspective, contract length is expected to increase satisfaction with contractor performance.

Multiple awards: Local governments may contract for a single service using one firm, or many firms. A refuse collection contract could be awarded to one firm, or to two or more firms, with each contractor responsibility for a designated geographic area. This variable measures the number of providers awarded a contract for each solicitation. A solicitation that announces the local jurisdiction's

intent to make multiple awards increases competition and is reflective of a cost conscious approach to service contracting. However, efficiency gained through competition could be reduced through less economies of scale, as each contractor has only a part of the total service requirement. Consequently, the effect of multiple awards may be positive or negative depending on whether a competition or economies of scale effect dominates.

Firm Type: Firm type measures the type of private organization awarded a contract. With a for-profit firm the existence of a profit motive should provide a greater incentive for cost savings. The profit motive encourages behavior that maximizes the difference between total cost and total revenue. Conversely, non-profit organizations are assumed to produce at levels where total revenue equals total cost and thus be less efficient. Non-profit firms have more of a public interest focus and are used when service coverage is important. Use of for-profit firms is expected to have a positive impact on contractor performance.

Oversight: Oversight measures the occurrence of monitoring activity. If oversight is conducted there should be a greater likelihood of receiving quality services. When oversight is performed it provides motivation for compliance with contract specifications and allows for early identification and correction of potential problems. Conversely, the absence of oversight provides motivation and means for contractor non-compliance with specifications. Oversight activity is expected to have a positive impact on contractor performance.

Statistical analysis

Descriptive statistics and multivariate analysis were conducted with SPSS 19 (SPSS Inc., Chicago, Ill.). To determine the effects of contractor design variables on contractor performance, the data was analyzed using the multivariate technique of Analysis of Covariance (ANCOVA). Ideally, we should perform MANCOVA (Multivariate analysis of covariance) due to the presence of multiple dependent variables and independent variables. The rule of thumb in multivariate analysis is to have n / k (sample size / number of variables) $\geq$ 10. Limited by our relatively small sample size of 68, we decide to average the five performance indicators into one composite performance indicator

and use it as the only dependent variable in the ANCOVA analysis (Table 3). ANCOVA combines Analysis of Variance (ANOVA) and regression analysis techniques. ANCOVA adjusts for the effects of the group differences on the dependent variable between the independent covariate groups and reduces the error variance on the dependent variable.

Table 3 – Correlation Analysis for Dependent Variables

	DV1 Cost	DV2 Schedule	DV3 Complaints	DV4 Damages	DV 5 Quality
DV1 Cost Pearson Correlation	1	.808	.731	.685	.784
Sig. (2-tailed)		.000	.000	.000	.000
N	68	68	68	68	68
DV1 Schedule Pearson Correlation	.808	1	.833	.745	.818
Sig. (2-tailed)	.000		.000	.000	.000
N	68	68	68	68	68
DV1 Complaints Pearson Correlation	.731	.833	1	.801	.827
Sig. (2-tailed)	.000	.000		.000	.000
N	68	68	68	68	68
DV1 Damages Pearson Correlation	.685	.745	.801	1	.820
Sig. (2-tailed)	.000	.000	.000		.000
N	68	68	68	68	68
DV1 Quality Pearson Correlation	.784	.818	.827	.820	1
Sig. (2-tailed)	.000	.000	.000	.000	
N	68	68	68	68	68

Correlation is significant at the 0.01 level (2 tailed)

RESULTS

Table 4 provides information on the pattern of usage of contract design variables by respondents. The survey questionnaire was made available via email notification to 328 respondents during the period November/December 2011. A total of 68 completed questionnaires (55 for refuse collection and 13 for bus transit) were received for an overall response rate of 21 % for the mailings that were conducted. The picture that emerges is a preference by local jurisdictions for a sealed bid solicitation method, with award of a fixed price contract to a single for-profit firm. Sealed bidding was used by 53% of the respondents. Only five jurisdictions reported awarding more than one contract. In all but five cases the private provider was a for-profit firm. Lastly, half (50%) of the jurisdictions reported using a performance specification of work. Many of the contracts include

some form of financial incentive in their contract. Half of the jurisdictions (50%) report using a provision that allows a deduction from the contract payment for non-performance. About 38 percent reported using a Termination for Convenience clause. The average contract length is about 6.1 years.

TABLE 4 – DESCRIPTIVE STATISTICS

Variable	Definition	n=68	%/mean
Specification type	Performance	34	50.0%
	Design/Process	34	50.0%
Solicitation method	Sealed bid	36	52.9%
	Competitive negotiation	12	17.7%
	Two step sealed bidding	13	19.1%
	Non competitive	7	10.3%
Contract type	Fixed price	60	88.2%
	Cost reimbursement	7	10.3%
	Franchise	1	1.5%
Firm type	For profit	63	92.7%
	Non profit	5	7.3%
Incentives	Penalty for non performance	34	50.0%
	Termination for convenience	26	38.2%
	Risk sharing	7	10.3%
	Performance rewards	2	2.9%
Contract length	1 year	1	1.5%
	2 years	1	1.5%
	3 years	8	11.8%
	4 years	2	2.9%
	5 years	29	42.6%
	6 years	3	4.4%
	7 years	8	11.8%
	8 years	3	4.4%
	9 years	2	2.9%
	10 years.	11	16.2%
Multiple awards	Yes	5	7.4%
	No	63	92.6%
Number of awards	Two awards	4	5.9%
	Three awards	1	1.5%
Oversight method	Citizen surveys	16	23.5%
	Observation by local staff	64	94.1%
	Citizen complaints	66	97.1%
	Review of records	41	60.3%
	External oversight	8	11.8%

ANCOVA ANALYSIS

As shown in Table 5 below, the response variable is the performance indicator which is computed as the average of the 5 individual performance items (quality, schedule, damage, cost, complaints). In our initial model, we included all independent variables and tested their main effects on the dependent variable. Restricted by our small sample size, we decide to drop all independent variables showing no significant ($p > 0.1$) effect on the dependent variable to maintain the required n/k ratio ≥10. The independent categorical predictor variables included in our final model are specification with performance focus, multiple contract awards, oversight by citizen survey, and oversight by observation by governmental staff. The numerical independent variable (covariate) is contract length measured as the years of the contract term.

Overall, our ANCOVA model is very significant (F-Value = 222.131 *df* = 7 p-value = 0.000) and explains 96% of the observed variability in the performance variable. The sizable model effect (measured in terms of the proportion of variance explained) eased our earlier concern over the inclusion of only a subset of significant independent variables and the consolidation of the five performance items into one indicator. In addition to the individual independent variables showing significant impacts on the dependent variable, the two way interaction between multiple awards and contract length demonstrates a significant effect on the dependent variable. For the dichotomous independent variables, all main effects could be assessed unambiguously by comparing the pairs of groups means associated with each independent variable. The "sign of effect" indicates the directionality of the relationships between dependent variable and independent variables (as an independent variable moves from 0 to1, performance moves higher + or lower -).

Table 5 - Analysis of Covariance (ANCOVA)
with Performance Index as DV

Model n=68 F-Value = 222.131 *df* = 7 p-value = 0.000 R^2 = 0.962						
IV	DV	Sign of Effect	F-Value	P-Value	Group (1) Mean	Group (0) Mean
Specification with Performance Focus	**Performance Index** is computed by averaging the five individual performance items	+	3.665	0.060 *	5.74	5.3
Multiple Awards		-	12.071	0.001 ***	4.2	5.63
Citizen Surveys		-	3.197	0.079 *	5.15	5.64
Observation by Government Staff		+	7.798	0.007 ***	5.61	4.01
Contract Length as Covariate		+	9.998	0.002 ***		
Multiple Awards X Contract Length		-	7.025	0.010 ***		

*Significant at 0.10 level, **Significant at 0.05 level, ***Significant at 0.01 level

To further investigate the effects of the covariate and the interaction, we ran three regression analyses. First, we ran a regression between the dependent variable and independent variables using all 68 observations as data points. The regression coefficient for contract length is 0.112 with a p value of 0.10. Next, we split our data file using multiple awards as a grouping variable (a "0" group versus "1" group). We then repeated the above regression analysis without the independent variable of multiple rewards. For the single award group, the regression coefficient for contract length is 0.062 and insignificant. For the multiple award group, the regression coefficient for contract length is 0.60 and statistically significant with p-value of 0.011. Clearly, short term contracts with multiple awards yield the lowest performance scores on the performance index. As can be seen in Table 4, three contract design variables show significance at the .01 alpha level and another two contract design variables show significance at the .10 alpha level. In the discussion that follows we attempt to add additional insight on the meaning of these results.

DISCUSSION

The goal of this study was to investigate the relationship of contract design to contractor performance. A limited number of studies have addressed the influence of the various contractual methods on the performance level of service contractors. Two earlier studies (Shetterly 2000 and 2002) of contracting for residential refuse collection and public bus transit showed limited impact of contract design on contractor performance. The key results showed that in the case of bus transit sealed bidding was associated with a lower cost per mile and that use of a penalty provision tended to increase cost per mile. The result of a penalty provision was the same for residential refuse collection with use of a penalty associated with higher cost per residence. These results are not reinforced in the current study. However the current study provides interesting results for several other contract design variables. The results show that six contract design variables have a statistically significant impact on contractor performance and each is discussed further in the paragraphs that follow.

Specification Type

It was hypothesized, based on a competitive contracting perspective, that use of a performance specification would be associated with higher contractor performance. The primary rationale was that a performance specification would have fewer procedural constraints and give a contractor the freedom to devise their own methods on how work is best done. The finding of this study is consistent with a competitive contracting perspective. Jurisdictions that use a performance specification reported greater satisfaction with contractor performance. The results show that for the group of jurisdictions using a performance specification that overall performance is higher and statistically significant. The mean performance index score for the group using a performance specification is 5.74 and the mean for the group not using a performance specification is 5.30, with a difference of 0.44 between these groups.

Multiple Awards

Governmental organizations may obtain services by awarding a large contract to a single private firm or smaller contracts to many firms. The results show weaker satisfaction with contractor performance for the group using multiple awards than the group using a single award. The mean for the group using multiple awards is 4.2, while the mean for the group using a single award was 5.63. The difference between the mean index scores for the two groups is 1.43 and statistically significant at the 0.01 significance level. A solicitation that awards multiple contracts increases competition and should be associated with lower service cost. However, cost savings due to competition could be eroded through less economies of scale, as each contractor has only a portion of the total service requirement. Therefore, it was hypothesized that the influence of number of contracts awards may be positive or negative depending on whether a competition or economies of scale effect dominates. The results indicate that economies of scale associated with the total contractual requirement being met by a single firm dominates any cost saving resulting from increased competition through the award of multiple contracts.

Contract Length

Contract length measures the number of years for which the contract was awarded. It was hypothesized that contract length would be associated with decreased satisfaction with contractor performance because contracts would be competitively awarded less frequently. A competing hypothesis was that contract length would be associated with an increase in satisfaction with contractor performance. From a principal-agent perspective, a risk-averse contractor may prefer the security of a longer contract at a lower price, rather than the uncertainty of a shorter contract at a higher price. The findings show that longer contracts are associated with higher satisfaction in performance than shorter contracts. Contract length has a positive and statistically significant impact on satisfaction with contractor performance at the 0.01 significance level.

An interesting result is the interaction between multiple awards and contractor length. For longer contracts, there is no significant difference in satisfaction with contractor performance between those using multiple awards and a single award. However for shorter contract lengths, satisfaction with performance is significantly higher for single awards. The findings suggest that the combination of multiple awards and shorter contracts should be avoided for improved performance.

Oversight

Oversight of contractor performance is an important local government responsibility in managing the contractual relationship. It was hypothesized that use of oversight methods would be associated with higher contractor performance. The hypothesis was confirmed with observation as an oversight method. Jurisdictions that used observation by government staff had higher satisfaction with performance. The hypothesis was not confirmed for use of citizen surveys as an oversight method. Citizens surveys are associated with lower contractor performance. While the result is the weakest of those in the statistical model the direction of the impact needs further investigation. Rather than improving satisfaction use of citizen surveys appears to have a negative impact on satisfaction with contractor performance.

Nonetheless, the results suggest that the more aggressive forms of oversight may influence improvement in contractor performance. Lastly, the investment in oversight must be balanced with the amount of improvement that is likely to occur.

Other Contract Design Factors

Data was collected on other contract design factors such contract provisions for rewards and sanction, solicitation methods, contract type and type of firm (for profit or non profit). None of the variables for these factors showed any statistical significance or in the case of firm type or contract type showed very little variation among respondents.

CONCLUSION

Political and fiscal imperatives faced by local governments (cities and counties) provide an enormous impetus to try alternative methods of service delivery. For example, emphasis on deficit reduction causes cutbacks in numerous federal assistance programs with local governments receiving less funding to serve the same or more citizens. In addition, public resistance to new public spending drives demand for new methods of service delivery. Lastly, the need to replace infrastructure and expand services in developing communities will create a demand for capital and put additional pressure on local budgets (Seader, 1986). Consequently, local governments need innovative means of providing services to their citizens. Privatization offers a set of alternative approaches with the potential to improve service delivery. In particular, contracting for services offers substantial promise for fiscally strained local governments.

However, contracting for services involves an array of choices for local government officials on how to structure the contractual relationship. Local officials will want to use those methods which offer the most promise for reducing cost, improving quality, or both. The findings show that the promise of strong contractor performance is enhanced with use of certain contracting methods. Contracts with a performance focus and with award of a single contract for longer periods appear to offer a good strategy for jurisdictions contracting for refuse collection or bus transit services. These contract design features coupled with aggressive oversight by local government staff provide a framework for the promise of efficiency and effective delivery of contracted services.

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