

An Analysis of the Consequences of Contract Administration Problems for Contract Types

Bill Davison, CPPO

Director of Purchasing, Stearns County

705 Courthouse Square, St. Cloud MN 56303

Tel : 1-320-656-3970 E-mail: bill.davison@co.stearns.mn.us

Richard J. Sebastian, Ph.D.

Department of Management, St. Cloud State University

720 Fourth Avenue South, St. Cloud, MN 56301

Tel : 1-320-308-3226 E-mail: rjsebastian@stcloudstate.edu

Abstract

The primary purpose of this research was to examine the perceived consequences of ten types of contract administration problems for each of seven contract types and to determine how likely each of these consequences were perceived to be. Building upon the earlier research of Davison and Sebastian (in press a, b), the research surveyed National Institute of Government Purchasing (NIGP) and Institute of Supply Management (ISM) members. For each of seven types of contract (e.g., supplies and small purchases) the respondents were asked to indicate the typical consequences they experienced for each of ten contract administration problems (e.g., wrong product). The major problematic consequences examined were contract delays, contract costs, and contract termination. The perceived likelihood of occurrence for each consequence, on the contracting process, was determined for each contract problem within each contract type. The major findings were that when contract administration problems occurred, problematic consequences were more likely than no consequences for all contract types except leases and that the types of problematic consequences that were most likely depended on the type of contract. The implications of the results from this research and Davison and Sebastian's previous findings for procurement professionals and the purchasing process were discussed along with future research directions.

Keywords: Contract Administration, Risk/Risk Assessment, Procurement/Purchasing Processes

1. Introduction

“Contract administration” is a term used to describe the functions that are performed after the parties have signed the contract (Sherman, 1996). As a precise term, contract administration refers to those activities that take place after contract award and can encompass a plethora of activities ranging from routine to unusual. Typical contract administration activities are goal oriented, aimed at ensuring enforcement of the contract terms and conditions while giving attention to the achievement of the stated output and outcome of the contract. In other words, contract administration is about much more than simply the enforcement of the contract language. It requires the contract manager to remain focused on the program goals and objectives

The contractual goal, or end, of the procurement of any good or service should be successful project completion (Davison and Wright, 2004). Successful project completion is defined by NIGP as successful procurement of the right item, in the right quantity, for the right price, at the right time, with the right quality, known as the 5 “R’s” (Thai, 2004). To complete a project successfully, contractual goals should be established to accomplish each of the “5 R’s”. (NIGP, 2000). The establishment of contract goals begins with identifying the typical contract risks and potential contract administration problems associated with the purchase that could affect any of the “5 R’s”. The next steps are to assess the level of risk by determining the probability of occurrence for each type of problem and to develop a contract administration plan to avoid or minimize the problems (Davison & Wright, 2004).

Due to changes in technology, socioeconomic objectives, and legislation, the role of the procurement professional is itself changing from a clerical function and reactive order placer to a proactive strategic participant who is involved in major expenditure decisions (McCue & Gianakis, 2001; McCue & Pitzer, 2000). According to Hinson and McCue (2004) procurement professionals must change their focus from expending effort on the procurement of low value repetitive purchases to the planning and procurement of high value, high risk goods and services. Snyder (2006), furthermore, contended that as long as the efforts of procurement professionals are focused on the means (how something is purchased) instead of the ends (successful project completion), they will remain reactive, and all their decisions will be the result of decisions made by others. This, in turn, will make it difficult for the procurement professional to achieve the goal of becoming a strategic partner in the organization. Snyder further argued that procurement professionals must bridge the gap between balancing the need for successful project completion (ends) with the need for a transparent and effective process (means).

In response to increasing demand for services, coupled with a decrease in taxes, public organizations have flattened every aspect of their hierarchal structure and required departments “to do more with less” (Ancona, Kochan, Scully, Van Maanen, & Westney, 2005). The procurement profession has responded to the “do more with less” edict by increasing organizational efficiency by implementing E-procurement technologies, such as, on line requisitioning and P-cards (Drabkin and Thai, 2003). The adoption of E-Procurement technologies has allowed the procurement department to transfer much of the procurement

clerical function to end users (Bartle and Korosec, 2001). This transfer has provided procurement professionals with the opportunity to become strategic partners in all purchases by allowing them to apply their expertise to areas of the procurement process where they can best add value, such as, developing Requests for Proposals, performance based contracting, and contract management (Schwartz, 2006). As public organizations, like many of their private counterparts, get “flattened” and are required “to do more with less,” procurement professionals will also need to be increasingly efficient and will need to allocate their scarce human and financial resources to the highest value projects (Ancona, Kochan, Scully, Van Maanen, & Westney, 2005).

To bridge the gap between the ends and the means, procurement professionals will need to understand what the project’s goals are (ends). By understanding the relationship between the contract type and potential contract problems, procurement professionals can anticipate the types of contract administration problems that are likely to occur for a specific type of purchase. In turn this will allow them to prepare effective specifications, contracts, and contract administration plans (means) to avoid the potential problems or minimize the potential negative consequences (Davison & Wright, 2004). Conducting research to determine which problems are likely to occur and the consequences of these problems will provide procurement professionals with a rational framework on which to base their recommendations to management.

Currently, typical contract administration efforts focus on reacting to unforeseen problems (change order management, dispute resolution) after they occur. Reacting to problems is a waste of valuable human and financial resources. To be recognized as a strategic partner in the organization procurement professionals will need to become more involved in each of the six phases of the contract management process: procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout. The procurement official must demonstrate that by using the procurement tools at their disposal (specifications, contract pricing, contract monitoring, and payment options), they have the tools and skills to select the best procurement options that will reduce or minimize the risks that could lead to negative consequences.

Prior to our research no one had collected empirical data on the perceived likelihood of occurrence of contract administration problems and the severity of their consequences. With the help of research results public procurement professionals can use their professional judgment to select the appropriate procurement method that will minimize the likelihood of problems occurring, by developing a procurement framework that is based on theory, research, and best practices.

Innovative procurement tools and processes have been adopted by several states in response to recognized contract administration problems, such as poor performance, encountered when awarding to the low bid. The State of Minnesota has enacted Best Value Contracting (BVC) for the purchase of construction services. This alternative method of procurement uses an evaluation criteria consisting of 9 factors to evaluate the relationship between performance and price to achieve the best overall value and lowest long-term cost for government

construction projects. The State of Florida allows competitive negotiations for the acquisition of several professional services, such as, architectural, engineering, landscape architectural or surveying and mapping services.

Use of these innovative tools and processes can be controversial and widespread adoption has not yet occurred. One possible reason may be that the benefits of these new processes have not been compared with the consequences of the typical contract administration problems encountered. Providing formal research on the likelihood of occurrence and the potential consequences will provide procurement professionals with data to determine the possible costs of typical contract administration problems.

1.1 Identifying potential contract administration problems associated with any type of purchase

While there are numerous items and services that can be purchased, each purchase of goods and services faces the same set of contractual risks that affect the successful accomplishment of any of the 5 “R’s”. Abi-Karam (2002) suggested that every purchase should be evaluated for six types of risks: Proposal risk, Surety and liability risks, Schedule risk, Contractual risk, Performance risk and Price risk.

Davison and Wright (2004) expanded on the definition of these risks to include their relationship to the following five “R’s”:

Proposal risk: The legal document that defines the item or service procured (the right item), the mutual areas of agreement, and how risks will be allocated and rewarded.

Surety and liability risks: Protection of the agency’s financial and legal interests (the right price). The contract will define the insurance requirements, bonding requirements, and licensing that are necessary to protect the agency in the event of contract termination or to meet statutory requirements.

Schedule risk: Ensuring timely delivery (the right time). The contract will contain clear and specific language describing the contract deliverables, delivery terms, and any penalties for late delivery.

Contractual risk: Establishing change order procedures, dispute resolution process and termination procedures (the right price and time). The contract is a living document and allowances must be made to accommodate unforeseen conditions that may affect the purchase. The contract will specify who has the authority to make changes, how changes will be made, and what changes will be unilateral. The contract will specify how disputes will be resolved if mutual agreement cannot be reached. The contract will specify the termination process.

Performance risk: Defining acceptance (the right quality). The contract will define the conditions under which acceptance will occur and what type of inspection will be required.

Price risk: Defining payment terms (the right price). The contract will define how and when the Contractor will be paid.

Based on observation and communication with peers, Davison and Wright (2004), proposed that each of these six contractual risks is comprised of a set of contract problems that may occur each time the good or service is procured (Table 1). Each contract problem that occurs can threaten the success of the project by impacting any or all of the 5 “R’s” in an adverse manner, such as, delivery of incorrect product, incorrect quantity, an increase in project costs, a delay in delivery, poor quality or the ultimate unsuccessful result, contract termination.

Table 1. Types of Contract Administration Problems

Contractual Risk and Contract Administration Problem	Example
Proposal risk: Unclear scope of work	Ambiguous specifications lead to disputes over required performance, acceptance.
Surety and Liability risk: Increased cost	Inadequate bonds and insurance to cover vendor failure.
Schedule risk: Wrong product	Purchase order or contract clearly identifies correct product, but vendor ships incorrect. No dispute involved
Schedule risk: Delay	Purchase order has clearly stated completion date. Completion date delayed (any length of time) due to agency or vendor (with or without cause).
Contractual risk: Change order	Change in the scope of work (additional work, money, time), after contract award. Can be requested by either party for any reason.
Contractual risk: Dispute resolution and personality conflict	Personality conflicts between agency project manager or staff and vendor project manager or employees. Disagreement between the parties that cannot be easily resolved. May involve scope of work, materials supplied, payment schedules, or any other aspect of the contract.
Performance risk: Definition of acceptance	Completion of project is delayed due to non acceptance of final product. Example: difference in either party’s definition of what was supposed to be delivered or provided
Performance risk: Poor performance	Contract clearly states a level of expected performance (this is not in dispute) and quality problems with vendor’s performance of work occur.
Performance risk: Sub Contractors	The vendor uses subcontractors not on his payroll to perform any or all of the work. Prior approval, for use of subcontractors, was received
Performance risk: Other sources	There are very few vendors that can perform the work.
Performance risk: Risk of failure	The project has a high risk of failure. i.e. New technology, new equipment, new vendor, Project never been done before. Tight timeline or budget
Price Risk: Cost	Project has a high cost.

1.2 Identifying contract types

Once again, based on observation and communication with peers, Davison and Wright (2004) also proposed that, it is possible that each purchase can be put into one of seven contract types (Table 2).

Table 2. Contract Types

Contract Type	Examples
Commodities, Small Purchases	MRO (Maintenance, Repair and Operating supplies) Term Contracts: i.e. Office Supplies, One time orders for durable goods under \$5000
Capital Outlay	Durable goods over \$5000
Professional Services	Architects, Consultants
Contracted Services	Custodial Services, Food Service
Software	Custom developed and shrink-wrap
Construction	Any type and any dollar amount – New construction or remodeling
Leases	Leased Space or equipment – lease without intent to own

1.3 Determining the likelihood of occurrence for each type of problem

Guided by this framework, Davison and Sebastian (in press a) surveyed NIGP and ISM members to determine empirically what types of problems were perceived to be most common for each of the contract types. They also analyzed their data to determine which types of contracts were perceived to have the most problems across all problem types and which problems were perceived to be most common across all contract types. The mean ratings of the perceived occurrence of contract administration problems over all types of contracts are summarized on Table 3.

Table 3. Perceived occurrence of contract administration problems over all types of contracts

Contract administration problem	Mean	Rank
Delays	5.73a	1
Cost	6.13b	2
Change Order	6.16b	3
Poor Performance	6.36b	4
Definition of Acceptance	6.66c	5
Conflict	6.73cd	6
Other Sources	6.93de	7
Subcontractors	7.08ef	8
Risk of Failure	7.24f	9
Wrong Product	7.29f	10

Note: Means that do not share a common subscript are significantly different at the .05 level.

The mean ratings of the perceived occurrence of contract administration problems by type of contract are summarized on Table 4. The results of this research showed that delays and increased cost were the most commonly encountered contract administration problem for all types of contracts and construction contracts had the most contract administration problems.

Table 4. Perceived occurrence of contract administration problems by type of contract

Contract type	Mean	Rank
Construction	6.02a	1
Contracted Services	6.15a	2
Professional Services	6.23ab	3
Software	6.39b	4
Capital Outlay	6.67c	5
Supplies, Small Purchases	6.67c	6
Leases	6.72c	7

Note: Means that do not share a common subscript are significantly different at the .05 level.

In their second paper Davison and Sebastian, (in press b) examined specifically and statistically which types of problems were perceived to be most and least common for each type of contract and what contract types were perceived to be most and least affected by each of the contract problems. The results of the second paper are summarized in Appendix 3, Tables 1-17. For example, in the following table for construction contracts, “change order” had the highest mean rating of perceived occurrence and “other sources” the lowest mean rating.

Table 5. Perceived occurrences of contract administration problems for construction contracts

Problem	Mean	Rank
Change Order	4.74a	1
Delays	4.81a	2
Cost	5.52ab	3
Sub Contractors	5.89b	4
Conflict	6.12bc	5
Definition of Acceptance	6.22bc	6
Poor Performance	6.27bc	7
Risk of Failure	6.93cd	8
Wrong Product	7.53d	9
Other Sources	7.54d	10

Note: Means that do not share a common subscript are significantly different at the .05 level.

1.4 Identifying consequences experienced for each type of problem within each type of contract

Based on the types of contract administration problems that could occur for each contract type, Davison and Sebastian (in press a) proposed and examined the following primary consequences: contract delays, contract costs, and contract termination. More specifically, for each of the seven contract types they examined the following consequences for each of the ten contract problems: contract delay less than 10 days; contract delay greater than 10

days; increased contract cost less than 10%; increased contract cost greater than 10%; contract termination; none of these consequences. This paper reports the results of this research.

2. Research Method

2.1 Subjects and Procedure

The subjects were the members of two organizations--the National Institute of Governmental Purchasing, Inc. (NIGP) and the Institute of Supply Management (ISM). A “blast” email with a hot link to the survey was sent to all 10627 NIGP members on May 2. ISM has over 40000 members. A random sample of 2000 members was sent a postcard with the survey URL printed on it. These cards were also left outside of meeting rooms at an ISM regional meeting and approximately 50 cards were picked up. The email to NIGP members that had the link to the survey had the preface (Appendix 1).

To pilot the survey it was sent to 10 NIGP members, 7 of whom replied. Though some commented on its length and complexity, no major issues were raised.

2.2 Survey Instrument

The survey initially asked a number of background questions, including, country in which the respondent worked, type of agency worked for, current position, total years in purchasing, years in current position, highest level of education, field of education, professional certifications currently held, year when most recent certification was obtained, approximate annual purchasing volume for the respondent’s entire agency, approximate annual purchasing volume made by the respondent, respondent’s level of purchasing authority, number of full time employees in respondent’s agency, number of full time employees in respondent’s purchasing unit, types of purchases respondent has current responsibility for, and the number of purchase orders or contracts issued by the respondent for the major contract categories investigated in the study—Commodities, Capital Outlay, Professional Services, Contracted Services, Software, Leases, Construction, and Other. A copy of the complete survey is in Appendix 2.

The survey then provided definitions of the seven major contract purchase types and ten major contract administration problems—Wrong Product, Delay, Final Acceptance, Change Order, Personality Conflict, Poor Performance, Sub Contractors, Cost, Other sources, and Risk of Failure. Using these definitions, respondents were then asked to rank order the frequency with which these problems occur for each type of contract. The exact instructions for this question follow:

“For purchases made within the past year, rank order the problems that apply in terms of how often they occur for each contract type with 1 being most frequent (as applicable) to 10 being least frequent (as applicable) or choose 99 for those that do not apply. The definitions of contract type are listed in Attachment A, and the definitions of contract problems are listed on Attachment B. **Please use each of the ten ranks only once.**”

Lastly, the respondents were asked to indicate the typical consequences they experienced for each type of problem within each type of contract. The exact wording of the question follows: “Using the following categories, indicate the **typical** consequences you experience for each type of problem within each type of contract using **1**=Contract delay less than 10 days, **2**=Contract delay greater than 10 days, **3**=Increased contract cost less than 10%, **4**=Increased contract cost greater than 10%, **5**=Contract termination, **6**=None of these consequences. **Please check all that apply.**”

3. Results

3.1 Response rate

The total number of respondents from both samples was 557. Since all respondents accessed the survey through the same link, it is impossible to state definitively how many came from each organization. However, 492 of the respondents indicated they worked for a government or public agency. Only 16 said they worked for a private agency while 4 worked for a utility and 43 worked for an educational institution. Two respondents did not indicate where they worked.

The timing of the responses as well as type of organizations for which they worked suggested that the vast majority of the respondents, approximately 500, were NIGP members. Because 442 of the emails were not delivered due to bad addresses, the response rate for NIGP is 5 % (500/10185). All that can be confidently stated is that the response rate for ISM was less than that for NIGP. These results are not surprising in that ISM members had to type in a long URL to access the survey whereas NIGP members simply had to click on a link. In addition, a small number (34) of the postcards which were sent were returned to the sender for a variety of reasons, such as no forwarding address, insufficient address, or insufficient postage for international addresses, further contributing to the relatively low response rate.

Though the response rates were low, the overall size of the sample was good. The relatively low response rates were not surprising in view of the complexity and length of the survey.

3.2 Respondent characteristics

The respondents were experienced in their fields and had substantial purchasing authority. The median number of years they said they had in purchasing was 16 with a median of 5 years in their current positions. The median annual purchasing volume for their entire agency was 50 million while their median purchasing volume for the last year was 7 million. The respondents also tended to work for rather large agencies. The median number of full time employees in their agencies was 600 and the median number of full time employees in their purchasing units was 8. The respondents, on average, were well educated with over 60 % of the sample having a 4 year college degree or beyond. Their educational fields of study were rather varied but the vast majority (56%) had studied business. Liberal arts (11%) and public administration (9%) were the other most common fields of study.

3.3 Consequences of problems for contract types

The major results of this study are found in Tables 6-12 which present the respondents' reported frequency and the computed percentage of the six consequences for each contract problem for each contract type. The percentage for each type of consequence is based on the total frequency of responses for that specific problem which are found in the final column

labeled Row Frequency Total. The total frequency of occurrence of each consequence and its percentage of the total reported consequences are found at the bottom of each table. For example, for supplies and small purchases the most common problematic consequences are wrong product (38.9%) and delays of less than ten days (43.0%). In addition, for supplies and small purchases, inspection of the bottom rows in the table reveals that there were problematic consequences 63 % of the time. The results in the other tables can be interpreted in the same way.

Table 6. Consequences of problems for small purchases contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Increased Contract cost <10%		Increased Contract cost >10%		Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	26.0%	81	38.9%	121	17.7%	55	9.0%	28	2.9%	9	5.5%	17	311
Delays	20.3%	64	43.0%	136	20.3%	64	7.6%	24	3.8%	12	5.1%	16	316
Definition of Acceptance	44.0%	125	27.8%	79	12.3%	35	8.1%	23	3.5%	10	4.2%	12	284
Change Order	34.9%	98	21.7%	61	13.5%	38	17.4%	49	10.0%	28	2.5%	7	281
Conflict	38.6%	110	34.4%	98	13.7%	39	6.7%	19	2.8%	8	3.9%	11	285
Other Sources	47.9%	127	24.2%	64	13.6%	36	9.4%	25	2.6%	7	2.3%	6	265
Poor Performance	27.1%	79	29.2%	85	18.6%	54	9.3%	27	4.8%	14	11.0%	32	291
Risk of Failure/Termination	46.0%	126	24.1%	66	9.1%	25	7.7%	21	4.4%	12	8.8%	24	274
Subcontractors	61.2%	153	17.2%	43	7.2%	18	7.2%	18	3.2%	8	4.0%	10	250
Cost	31.8%	91	22.7%	65	10.8%	31	19.2%	55	9.8%	28	5.6%	16	286
Column Totals		1054		818		395		289		136		151	

Column % = the total occurrence

of each consequence/ the total

reported consequences (2843) 37.1% 28.8% 13.9% 10.2% 4.8% 5.3%

Table 7. Consequences of problems for Capital Outlay contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Increased Contract cost <10%		Increased Contract cost cost >10%		Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
	Wrong Product	40.0%	96	20.0%	48	22.5%	54	8.8%	21	4.2%	10	4.6%	
Delays	27.6%	68	19.9%	49	32.1%	79	11.8%	29	6.1%	15	2.4%	6	246
Definition of Acceptance	43.1%	97	23.1%	52	16.9%	38	8.9%	20	4.0%	9	4.0%	9	225
Change Order	39.3%	86	13.2%	29	17.4%	38	17.4%	38	11.0%	24	1.8%	4	219
Conflict	40.7%	92	19.5%	44	23.0%	52	8.0%	18	4.4%	10	4.4%	10	226
Other Sources	53.6%	111	14.5%	30	13.0%	27	12.1%	25	4.8%	10	1.9%	4	207
Poor Performance	36.6%	83	16.3%	37	21.1%	48	10.6%	24	7.9%	18	7.5%	17	227
Risk of Failure/Termination	46.7%	107	17.5%	40	14.4%	33	8.3%	19	7.9%	18	5.2%	12	229
Subcontractors	50.7%	107	15.2%	32	14.7%	31	10.0%	21	4.7%	10	4.7%	10	211
Cost	33.2%	77	16.4%	38	14.7%	34	15.9%	37	14.7%	34	5.2%	12	232
Column Totals		924		399		434		252		158		95	

Column % = the total occurrence of

each consequence/ the total

reported consequences (2262)	40.8%	17.6%	19.2%	11.1%	7.0%	4.2%
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Table 8. Consequences of problems for Professional Services contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Contract cost <10%		Increased Contract cost >10%		Increased Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	56.9%	123	14.4%	31	13.0%	28	5.1%	11	6.5%	14	4.2%	9	216
Delays	26.3%	67	17.6%	45	27.8%	71	13.7%	35	11.8%	30	2.7%	7	255
Definition of Acceptance	41.9%	96	15.7%	36	18.3%	42	10.9%	25	9.2%	21	3.9%	9	229
Change Order	26.0%	64	12.6%	31	17.9%	44	19.5%	48	20.7%	51	3.3%	8	246
Conflict	31.0%	81	18.4%	48	21.5%	56	10.0%	26	12.6%	33	6.5%	17	261
Other Sources	52.7%	116	14.5%	32	11.4%	25	10.0%	22	7.7%	17	3.6%	8	220
Poor Performance	27.9%	75	16.7%	45	19.7%	53	13.4%	36	8.6%	23	13.8%	37	269
Risk of Failure/Termination	35.7%	91	15.3%	39	17.6%	45	10.6%	27	8.2%	21	12.5%	32	255
Subcontractors	41.5%	100	14.1%	34	14.5%	35	11.2%	27	9.1%	22	9.5%	23	241
Cost	25.4%	69	13.6%	37	14.3%	39	21.3%	58	17.6%	48	7.7%	21	272
Column Totals		882		378		438		315		280		171	

Column % = the total occurrence of each
 consequence/ the total reported

consequences (2264) 35.8% 15.3% 17.8% 12.8% 11.4% 6.9%

Table 9. Consequences of problems for Contracted Services contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Contract cost <10%		Contract cost >10%		Contract Termination		Row Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	48.8%	118	23.1%	56	7.9%	19	8.7%	21	4.1%	10	7.4%	18	242
Delays	30.8%	85	29.7%	82	18.1%	50	10.9%	30	4.7%	13	5.8%	16	276
Definition of Acceptance	38.7%	99	22.7%	58	16.4%	42	9.8%	25	5.5%	14	7.0%	18	256
Change Order	31.8%	84	17.8%	47	12.5%	33	20.8%	55	10.6%	28	6.4%	17	264
Conflict	31.3%	85	25.7%	70	17.3%	47	8.1%	22	7.7%	21	9.9%	27	272
Other Sources	48.5%	117	17.0%	41	12.4%	30	11.2%	27	7.9%	19	2.9%	7	241
Poor Performance	26.7%	77	18.1%	52	18.4%	53	10.8%	31	8.3%	24	17.7%	51	288
Risk of Failure/Termination	33.0%	89	21.9%	59	13.0%	35	8.9%	24	8.1%	22	15.2%	41	270
Subcontractors	41.5%	103	19.0%	47	11.7%	29	12.5%	31	8.1%	20	7.3%	18	248
Cost	29.2%	79	14.4%	39	12.5%	34	22.9%	62	12.2%	33	8.9%	24	271
ColumnTotals		936		551		372		328		204		237	

Column % = the total occurrence of each
 consequence/ the total reported

consequences (2628) 35.6% 21.0% 14.2% 12.5% 7.8% 9.0%

Table 10. Consequences of problems for Software contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Contract cost <10%		Contract cost >10%		Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	40.8%	91	21.5%	48	16.6%	37	9.9%	22	5.4%	12	5.8%	13	223
Delays	27.5%	66	25.0%	60	25.4%	61	10.4%	25	5.8%	14	5.8%	14	240
Definition of Acceptance	37.0%	84	21.1%	48	14.1%	32	13.2%	30	7.9%	18	6.6%	15	227
Change Order	33.2%	72	14.3%	31	16.1%	35	17.5%	38	15.7%	34	3.2%	7	217
Conflict	39.3%	88	23.7%	53	17.4%	39	9.4%	21	5.8%	13	4.5%	10	224
Other Sources	49.5%	105	15.1%	32	14.6%	31	8.5%	18	9.4%	20	2.8%	6	212
Poor Performance	38.5%	87	15.5%	35	15.9%	36	10.6%	24	9.3%	21	10.2%	23	226
Risk of Failure/Termination	45.9%	101	16.8%	37	13.2%	29	8.2%	18	7.3%	16	8.6%	19	220
Subcontractors	53.9%	111	12.6%	26	12.1%	25	7.8%	16	4.4%	9	9.2%	19	206
Cost	34.3%	81	14.4%	34	15.3%	36	17.8%	42	11.0%	26	7.2%	17	236
Column Totals		886		404		361		254		183		143	

Column % = the total occurrence of each consequence/ the total reported consequences (2231)

	39.7%	18.1%	16.2%	11.4%	8.2%	6.4%
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Table 11. Consequences of problems for Lease contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Contract cost <10%		Contract cost >10%		Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	64.4%	121	17.0%	32	6.4%	12	4.8%	9	2.1%	4	5.3%	10	188
Delays	48.5%	94	23.2%	45	15.5%	30	5.7%	11	2.6%	5	4.6%	9	194
Definition of Acceptance	53.1%	102	20.8%	40	8.9%	17	6.3%	12	6.8%	13	4.2%	8	192
Change Order	48.2%	94	15.9%	31	9.7%	19	12.8%	25	9.2%	18	4.1%	8	195
Conflict	52.5%	106	19.8%	40	11.4%	23	5.0%	10	5.0%	10	6.4%	13	202
Other Sources	59.2%	116	15.3%	30	10.2%	20	6.6%	13	6.1%	12	2.6%	5	196
Poor Performance	52.5%	106	14.4%	29	8.9%	18	9.4%	19	3.5%	7	11.4%	23	202
Risk of Failure/Termination	58.3%	116	16.1%	32	5.5%	11	7.5%	15	4.5%	9	8.0%	16	199
Subcontractors	62.4%	118	15.3%	29	3.7%	7	6.9%	13	4.2%	8	7.4%	14	189
Cost	46.6%	97	16.3%	34	10.1%	21	12.5%	26	8.2%	17	6.3%	13	208
Column Totals		1070		342		178		153		103		119	

Column % = the total occurrence of each

consequence/ the total reported

consequences (1965) 54.5% 17.4% 9.1% 7.8% 5.2% 6.1%

Table 12. Consequences of problems for Construction contracts

Contract Administration Problem	No Effect		Contract Delay < 10 days		Contract Delay > 10 days		Increased Contract cost <10%		Increased Contract cost >10%		Contract Termination		Row Freq Totals
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	
Wrong Product	43.6%	95	11.9%	26	17.0%	37	11.5%	25	10.6%	23	5.5%	12	218
Delays	20.2%	53	14.1%	37	27.4%	72	16.7%	44	15.2%	40	6.5%	17	263
Definition of Acceptance	34.7%	78	16.9%	38	19.6%	44	11.1%	25	12.4%	28	5.3%	12	225
Change Order	20.0%	49	13.1%	32	17.6%	43	21.2%	52	23.7%	58	4.5%	11	245
Conflict	28.3%	73	13.6%	35	21.7%	56	12.8%	33	15.9%	41	7.8%	20	258
Other Sources	49.5%	103	12.0%	25	12.0%	25	12.0%	25	11.5%	24	2.9%	6	208
Poor Performance	26.1%	67	11.3%	29	23.0%	59	12.1%	31	14.8%	38	12.8%	33	257
Risk of Failure/Termination	37.1%	86	11.6%	27	18.1%	42	9.1%	21	14.2%	33	9.9%	23	232
Subcontractors	33.0%	76	12.6%	29	17.8%	41	11.7%	27	14.8%	34	10.0%	23	230
Cost	25.0%	65	11.2%	29	16.2%	42	18.1%	47	24.2%	63	5.4%	14	260
Column Totals		745		307		461		330		382		171	
Column % = the total occurrence of each consequence/ the total reported consequences (2396)													
		31.1%		12.8%		19.2%		13.8%		15.9%		7.1%	

The results can be summarized by observing that when contract problems occurred, the respondents reported that problematic consequences were more likely than no consequences for all contract types except lease contracts (Table 13). Problematic consequences were least likely for lease contracts, occurring 46% of the time, and most likely for construction contracts, occurring 69% of the time.

Table 13. Summary of Problematic Consequences for all Contract Problems for a Contract Type

Contract Type	Problematic Consequences	
	Consequences	No Consequence
Supplies and Small Purchases	62.9%	37.1%
Capital Outlay	59.2%	40.8%
Professional Services	64.2%	35.8%
Contracted Services	64.4%	35.6%
Software	60.3%	39.7%
Lease	45.5%	54.5%
Construction	68.9%	31.1%

4. Conclusion and Managerial Implications

When contract problems occur, the research found that problematic consequences were more likely than no consequence for all contract types except lease contracts (Table 13). The results also showed that when problems occur, the severity of the consequences depend on the type of contract. Advance knowledge of the likelihood of occurrence and the severity of consequences will allow procurement professionals to identify the likely contract administration problems for a specific contract type. Once the likely problems are identified the causal risks for each problem (complex specifications, tight timeline, tight budget, complex acceptance, etc) can be identified. Once the causal risks are identified the procurement professional can use the procurement process and the tools available (type of specifications, type of contract pricing, type of inspection, type of monitoring and type of payment) to identify methods to control risk by avoiding, shifting, minimizing or accepting risk. The procurement process can then be used as an effective risk mitigation tool.

An illustration of how to use these research results in combination with results earlier reported by Davison and Sebastian (in press a,b) follows. These researchers initially (Davison & Sebastian, in press a) reported that construction contracts were perceived to have the greatest overall occurrence of contract administration problems (Table 14).

Table 14. Perceived occurrence of contract administration problems by type of contract

Contract type	Mean	Rank
Construction	6.02a	1
Contracted Services	6.15a	2
Professional Services	6.23ab	3
Software	6.39b	4
Capital Outlay	6.67c	5
Supplies, Small Purchases	6.67c	6
Leases	6.72c	7

Note: Means that do not share a common subscript are significantly different at the .05 level.

In a subsequent more detailed analysis, they (Davison & Sebastian, in press b) found that change order and delays were the problems perceived as most likely to occur for construction contracts. For these two contract administration problems for construction contracts, this research (Table 12) shows the following consequences when these contract administration problems occur. If a change order occurs, the most likely consequences respectively are an increase in contract cost, delay, and lastly termination. If a delay occurs, the most likely consequences are a delay of more than 10 days, then an increase in cost, and lastly termination. The results from this line of research can be applied in the same manner for other types of contract, problems, and consequences of the problems. With this information the procurement professional can develop a proactive procurement plan that is based on determining which problems are likely to occur and assigning a risk factor for likely occurrence. The next step is to determine how serious the consequence is if the problem does occur and then assigning a risk factor for each consequence of the problems. The final

step is to combine both of the risk factors (likely occurrence and likely consequence) to determine an overall level of risk factor for each contract problem.

4.1 Managerial Implications

As pressure increases to reduce the overall costs of contracts, managers are evaluating the costs and benefits of performing the contract administration function for each contract. Managers will need accurate information on the severity of consequences of typical problems for each type contract to determine the costs of poor contract performance and how to allocate human and financial resources.

For each of the problems that have been identified as high combined risk, the contracting officer can perform a risk analysis to identify causal risk factors, such as poor specifications, project manager, time frame, etc, and then utilize the proactive contract administration planning tools, that were discussed earlier in this paper, to avoid or minimize the consequences of any contract administration problems instead of wasting valuable resources reacting to problems. The procurement process, especially the pre award activities, can be viewed as a critical component of any project management plan. By effectively using the existing procurement process and using information on potential problems, the procurement official, can select the best option at each stage of the procurement process to achieve the overall goal of successful project completion-- receiving the correct product at the correct time at the correct price without delays or cost overruns. This will allow procurement officials to demonstrate they are providing “more service “ (contract and project management) at a lower cost (fewer delays and cost overruns), thereby also demonstrating the strategic value of procurement.

4.2 Future Research

To assess the generalizability of the results future research can be carried out with additional samples of United States and international procurement professionals using different measurement formats. Future research can also be done to assess the value of this research as a risk assessment tool in the project management process.

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Appendix

Appendix 1. Survey Letter

Dear NIGP Member:

We ask for your help in completing the following survey. It examines the relationship between the type of items or services procured and the problems typically encountered during contract administration. The results may help procurement professionals anticipate the types of administration problems that are likely to occur for specific types of purchases. This information, in turn, will help procurement professionals develop plans to avoid the problems or minimize their potential negative consequences.

The survey will take approximately 10-15 minutes to complete. Your responses will be tabulated by university support personnel and will be completely confidential and anonymous.

Please complete the survey at your earliest convenience or by May 8, 2006. Our survey is at the following location:

<http://surveys.stcloudstate.edu/contractsurvey/contractsurvey.htm>

Thank you in advance for your help.

The postcard sent to ISM members had the following information:

"As part of the Institute for Supply Management(tm)'s mission to lead supply management, ISM encourages the pursuit of academic research. As a member of ISM, you have been selected to participate in this research project.

Responding to the survey is completely voluntary. ISM Policy allows for the release of limited member information to researchers, to be used only for specific approved research projects."

The Relationship between Contract Administration Problems and Contract Type

<http://surveys.stcloudstate.edu/contractsurvey/contractsurvey.htm>

We ask for your help in completing this survey. It examines the relationship between the type of items or services procured and the problems typically encountered during contract administration. The results may help procurement professionals anticipate the types of administration problems that are likely to occur for specific types of purchases. This information, in turn, will help procurement professionals develop plans to avoid the problems or minimize their potential negative consequences. The survey will take approximately 10-15 minutes to complete. Please complete the survey at your earliest convenience or by **May 12, 2006**. Thank you in advance for your help.

Appendix 2. Survey

Analysis of Contract Problems by Contract Type Survey

April 2006

1) Country in which you work?

-
- a) United States
 - b) Canada
 - c) Other, please specify
- 2) What type of agency do you work for?
- A. Federal
 - B. State
 - C. County
 - D. City
 - E. Other, Specify
- 3) What is your current position?
- a) Director of Materials Management
 - b) Director of Purchasing
 - c) Purchasing Manager
 - d) Contract Manager
 - e) Manager of Logistics or Stores
 - f) Senior Buyer
 - g) Buyer
 - h) Contract Specialist
 - i) Assistant Buyer
 - j) Other , Please list
- 4) How many total years in Purchasing do you have (round up to nearest year)?
Number of years _____
- 5) How many years in your current position do you have (round up to nearest year)?
Number of years _____
- 6) What is your highest level education?
- a) High school diploma
 - b) Technical or vocational schools
 - c) Some college
 - d) 2 year college degree
 - e) 4 year college degree
 - f) Masters degree
 - g) Doctorate degree

-
- h) Other, please specify
- 7) Which best describes your field of education?
- a) Liberal Arts
 - b) Business
 - c) Economics
 - d) Public Administration
 - e) Political Science
 - f) Engineer
 - g) Biology or Chemistry
 - h) Other, Please specify
- 8) Which professional certifications do you currently hold?
- a) None
 - b) CPPB (Certified Professional Public Buyer)
 - c) CPPO (Certified Professional Purchasing Officer)
 - d) CPM (Certified Purchasing Manager)
 - e) Other, Please specify
- 9) What year did you receive your most recent certification?
- a) Does not apply
 - b) List year _____
- 10) Approximate annual purchasing volume for your entire agency?
Expressed in dollars (round to nearest dollar)_____
- 11) Approximate annual purchasing volume for purchases made by you.
Expressed in dollars (round to nearest dollar)_____
- 12) Your level of purchasing authority?
Expressed in dollars (round to nearest dollar)_____
- 13) Total number of full time employees in your agency?
Employees _____
- 14) Total number of full time staff in the purchasing unit.
Employees _____

15) From the list of types of purchases identify the items you currently have responsibility for purchasing (check all that apply). Refer to definitions below.

- a) Commodities
- b) Capital Outlay
- c) Professional Services
- d) Contracted Services
- e) Software
- f) Leases
- g) Construction
- h) Other, please Specify

16) Within the past year estimate the number of purchase orders or contracts you have issued for each type of purchase.

- a) Commodities number of purchases _____
- b) Capital Outlay number of purchases _____
- c) Professional Services number of purchases _____
- d) Contracted Services number of purchases _____
- e) Software number of purchases _____
- f) Leases number of purchases _____
- g) Construction number of purchases _____
- h) Other, please Specify number of purchases _____

Please use the following definitions in answering Question 17 & 18.

Contract Purchase Types

Commodities: MRO (Maintenance, Repair, Supplies) Office supplies, one time orders for durable goods under \$5,000, blanket contracts.

Capital Outlay: Durable goods over \$5000

Professional Services: Architects, Consultants,

Contracted Services: Custodial Services, Food Service etc.

Software: Custom developed and shrink wrap.

Leases: Leased Space or equipment – lease without intent to own

Construction: Any type and any dollar amount – New construction or remodeling

Contract Management Definitions

Wrong Product received: Purchase order or contract clearly identifies correct product, but vendor ships incorrect. No dispute involved.

Delay Purchase order or contract has a clearly stated delivery completion date. Delivery/completion is late (any length of time) due to either vendor or agency cause (any reason).

Final Acceptance: Completion of project is delayed due to non acceptance of final product. Example: difference in either party's definition of what was supposed to be delivered or provided.

Change Order: Change in the scope of work (additional work, money, time), after contract award. Can be requested by either party for any reason.

Personality Conflict: Personality conflicts between agency project manager or staff and vendor project manager or employees. Disagreement between the parties that can not be easily resolved. May involve scope of work, materials supplied, payment schedules, or any other aspect of the contract.

Poor Performance: Contract clearly states a level of expected performance (this is not in dispute) and quality problems with vendor's performance of work occur.

Sub Contractors: The vendor uses subcontractors not on his payroll to perform any or all of the work. Prior approval, for use of subcontractors, was received.

Cost: Project has a high cost.

Other Sources: There are none or very few vendors that can perform the work.

Risk of Failure: The project has a high risk of failure. I.E. New technology, New equipment, New vendor, Project never been done before. Tight timeline or budget.

17) For purchases made within the past year, rank order the problems that apply in terms of how often they occur for each contract type with 1 being most frequent (as applicable) to 10 being least frequent (as applicable) or choose 99 for those that do not apply. The definitions of contract type are listed on Attachment A, and the definitions of contract problems are listed on Attachment B. **Please use each of the 10 ranks only once.**

Table A. Comparison of General Contract Types and Contract Administration Problems

<i>General Contract Type</i>	<i>Typical Contract Administration Problems</i>									
	Wrong Product	Delays	Definition of Acceptance	Change Order	Conflict	Other Sources	Poor Performance	Risk of Failure/Terminate	Sub contractors	Cost
Supplies and small purchases										
Capital Outlay										
Professional Services (Architects & Engineers)										
Contracted Services (Custodial Services)										
Software										
Leases										
Construction										

18a. Using the following categories, indicate the typical consequences you experienced for each type of problem within each type of contract using 1= Contract delay less than 10 days, 2= Contract delay greater than 10 days, 3= Increased contract cost less than 10%, 4= Increased contract cost greater than 10%, 5= Contract termination.

6= None of these consequences, **Please check all that apply.**

	Wrong Product						Delays						Definition of Acceptance						Change Order					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Supplies and Small Purchases																								
Capital Outlay																								
Professional Services (Architects and Engineers)																								
Contracted Services (Custodial Services)																								
Software																								
Leases																								
Construction																								

18b. Using the following categories, indicate the typical consequences you experienced for each type of problem within each type of contract using 1=Contract delay less than 10 days, 2=Contract delay greater than 10 days, 3=Increased contract cost less than 10%, 4= Increased contract cost greater than 10%, 5=Contract termination, 6=None of these consequences, **Please check all that apply.**

	Conflict						Other Sources						Poor Performance					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Supplies and Small Purchases																		
Capital Outlay																		
Professional Services (Architects and Engineers)																		
Contracted Services (Custodial Services)																		
Software																		
Leases																		
Construction																		

18c. Using the following categories, indicate the typical consequences you experienced for each type of problem within each type of contract using 1=Contract delay less than 10 days, 2=Contract delay greater than 10 days, 3=Increased contract cost less than 10%, 4= Increased contract cost greater than 10%, 5=Contract termination, 6=None of these consequences, **Please check all that apply.**

	Risk of Failure/ Terminate						Sub contractors						Cost					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Supplies and Small Purchases																		
Capital Outlay																		
Professional Services (Architects and Engineers)																		
Contracted Services (Custodial Services)																		
Software																		
Leases																		
Construction																		

Appendix 3. Results of Davison-Sebastian research on the relationship of contract administration problem and contract type.

Means within a column form homogeneous subsets and means within the table that do not share a common subscript are significantly different at the .05 level.

Table 1. Supplies and Small Purchases

Problem	N	1	2	3
Delays	290	5.75a		
Cost	233	6.59ab	6.59b	
Poor Performance	266		6.71b	
Change Order	249		6.76b	
Wrong Product	291		6.81b	
Other Sources	209		6.84b	
Conflict	227		7.31bc	7.31c
Defn of Acceptance	229		7.38bc	7.38c
Risk of Failure	200			7.74d
Sub Contractors.	156			7.99d

Table 2. Capital Outlay

Problem	N	1	2	3	4	5
Delays	207	5.70a				
Cost	177	6.14ab	6.14b			
Change Order	188	6.40ab	6.40b	6.40bcd		
Poor Performance	185		6.83bc	6.83bcd	6.83bcde	
Other Sources	154		6.89bc	6.89bcd	6.89bcde	
Conflict	180			7.26d	7.26de	7.26
Sub Contractors.	139			7.29d	7.29de	7.29
Defn of Acceptance	177			7.31d	7.31de	7.31
Risk of Failure	164				7.58e	7.58
Wrong Product	166					8.19

Table 3. Professional Services

Problem	N	1	2	3	4
Change Order	213	5.45a			
Delays	204	5.75ab	5.75ab		
Cost	196	5.76ab	5.76ab		
Conflict	197	6.25ab	6.25abc	6.25abc	
Defn of Acceptance	190		6.52bc	6.52bc	
Poor Performance	208		6.55bc	6.55bc	
Sub Contractors.	166			6.80c	
Other Sources	148			6.95c	
Risk of Failure	186			7.03c	
Wrong Product	131				8.25d

Table 4. Contracted Services

Problem	N	1	2	3	4
Poor Performance	236	5.18a			
Delays	218	5.99ab	5.99b		
Defn of Acceptance	208		6.11bc	6.11c	
Conflict	210		6.22bc	6.22c	
Change Order	211		6.50bc	6.50c	
Cost	198		6.53bc	6.53c	
Risk of Failure	205		6.56bc	6.56c	
Sub Contractors	174		6.85bcd	6.85cd	6.85cd
Other Sources	177			6.98cd	6.98cd
Wrong Product	165				7.63d

Table 5. Software

Problem	N	1	2	3
Cost	164	5.59a		
Other Sources	153	5.95ab	5.95ab	
Delays	177	6.08ab	6.08ab	
Defn of Acceptance	163	6.19ab	6.19ab	
Change Order	153		6.80bc	6.80bc
Poor Performance	167		6.83bc	6.83bc
Conflict	160		6.92bc	6.92bc
Risk of Failure	154		6.95bc	6.95bc
Wrong Product	162			7.59c
Sub Contractors	116			7.72c

Table 6. Leases

Problem	N	1	2
Cost	126	6.06a	
Other Sources	111	6.87a	6.87ab
Delays	121	6.93a	6.93ab
Poor Performance	127	6.94a	6.94ab
Defn of Acceptance	119	6.96a	6.96ab
Change Order	118	7.06a	7.06ab
Conflict	128	7.08a	7.08ab
Risk of Failure	119	7.24a	7.24ab
Sub Contractors	78		7.44b
Wrong Product	93		7.68b

Table 7. Construction

Problem	N	1	2	3	4
Change Order	178	4.74a			
Delays	176	4.81a			
Cost	154	5.52a	5.52ab		
Sub Contractors	162		5.89b		
Conflict	168		6.12b	6.12bc	
Defn of Acceptance	162		6.22b	6.22bc	
Poor Performance	173		6.27b	6.27bc	
Risk of Failure	161			6.93bc	6.93cd
Wrong Product	130				7.53d
Other Sources	132				7.54d

Table 8. Wrong Product

Contract	N	1	2
Supplies	291	6.81a	
Construction	130	7.53ab	7.53ab
Software	162	7.59ab	7.59ab
Contracted Services	165	7.63ab	7.63ab
Leases	93	7.68ab	7.68ab
Capital Outlay	166		8.19b
Prof. Services	131		8.25b

Table 9. Delays

Contract	N	1	2	3
Construction	176	4.81a		
Capital Outlay	207	5.70a	5.70ab	
Prof. Services	204	5.75a	5.75ab	
Supplies	290	5.75a	5.75ab	
Contracted Services	218		5.99b	5.99bc
Software	177		6.08b	6.08bc
Lease	121			6.93c

Table 10. Definition of Acceptance

Contract	N	1	2
Contracted Services	208	6.11a	
Software	163	6.19a	
Construction	162	6.22a	
Prof. Services	190	6.52a	6.52ab
Leases	119	6.96a	6.96ab
Capital Outlay	117		7.31b
Supplies	229		7.38b

Table 11. Change Order

Contract	N	1	2
Construction	178	4.74a	
Prof. Services	213	5.45a	
Capital Outlay	188		6.40b
Contracted Services	211		6.50b
Supplies	249		6.76b
Software	153		6.80b
Leases	118		7.06b

Table 12. Conflict

Contract	N	1	2	3
Construction	168	6.12a		
Contracted Services	210	6.22a	6.22ab	
Prof. Services	197	6.25a	6.25ab	
Software	160	6.92a	6.92ab	6.92bc
Leases	128		7.08b	7.08bc
Capital Outlay	180			7.26c
Supplies	227			7.31c

Table13. Other Sources

Contract	N	1	2
Software	153	5.95a	
Supplies	209	6.84a	6.84ab
Leases	111	6.87a	6.87ab
Capital Outlay	154	6.89a	6.89ab
Prof. Services	148		6.95b
Contracted Services	177		6.98b
Construction	132		7.54b

Table 14. Poor Performance

Contract	N	1	2
Contracted Services	236	5.18a	
Construction	173		6.27b
Prof. Services	208		6.55b
Supplies	266		6.71b
Software	167		6.83b
Capital Outlay	185		6.83b
Leases	127		6.94b

Table 15. Risk of Failure

Contract	N	1	2
Contracted Services	205	6.56a	
Construction	161	6.93a	6.93ab
Software	154	6.95a	6.95ab
Prof. Services	186	7.03a	7.03ab
Leases	119	7.24a	7.24ab
Capital Outlay	164		7.58b
Supplies	200		7.74b

Table 16. SubContractors

Contract	N	1	2	3
Construction	162	5.89a		
Prof. Services	166	6.80a	6.80ab	
Contracted Services	174	6.85a	6.85ab	
Capital Outlay	139		7.29b	7.29bc
Leases	78		7.44b	7.44bc
Software	116		7.72b	7.72bc
Supplies	156			7.99c

Table 17. Cost

Contract	N	1	2	3
Construction	154	5.52a		
Software	164	5.59a	5.59ab	
Prof. Services	196	5.76a	5.76ab	5.76bc
Leases	126	6.06a	6.06ab	6.06bc
Capital Outlay	177	6.14a	6.14ab	6.14bc
Contracted Services	198		6.53ab	6.53bc
Supplies	233			6.59c