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# IDENTIFYING FEDERAL CONTRACTING POLICY CHANGES TO IMPROVE GOVERNMENT ACQUISITION OF COMMERCIAL SPACE-LAUNCH CAPACITY

THESIS

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AFIT/GCM/LSP/91S-9

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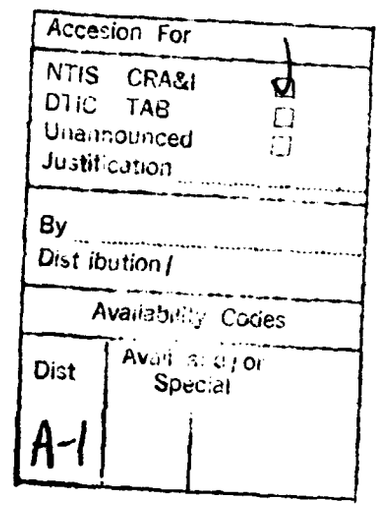

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# IDENTIFYING FEDERAL CONTRACTING POLICY CHANGES TO IMPROVE GOVERNMENT ACQUISITION OF COMMERCIAL SPACE-LAUNCH CAPACITY

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
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Master of Science in Contracting Management

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## Preface

This study deals with the convergence of the Commercial Space Launch Act and the Packard Commission recommendations regarding commercial buying practices. If the United States Congress truly wishes to foster a commercial space-launch industry, changes to statute affecting contracting policy should be contemplated. As a basis for decision-making, industry perceptions represent the best insight available into the impact of policy changes (in my opinion).

I owe a debt of thanks to many people involved in making this study possible. Dr. Rita Wells has inspired and energised much of the creative effort and the pursuit of excellence throughout the process. She gave of her time and toil beyond any obligation as advisor. Space does not permit a sufficient word of thanks to her, nor does it allow mention of all those who contributed.

I want to thank Lt Col Alan Gilbreath for sharing his keen insight and research savy. Many thanks to Lynn Holland and Mike Hale for laying the groundwork for my research and taking time to explain their work to me. Lt Col Holljes made an outstanding contribution in providing insight into current Air Force commercialization of ELVs. Many of the AFIT research faculty have helped immensely, particularly Dr. Guy Shane. Dr. Steel's help with SPSS-X on one gloomy afternoon really turned the tide in my data analysis. My thanks to Mr. Ed Gries of SOLE, and Mr. John Emond, Ms. Karen Poniatowski, Mr. Blair LaBarge, Mr. Lee

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On a more intimate level, my wife, Cindy, has provided the practical and emotional resources to keep me fed, healthy, and mentally stable enough to complete this thesis.

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## Abstract

The study dealt with expressed congressional intent to promote the commercial space-launch industry and defense management emphasis on government use of commercial contracting methods for the purchase of commercial products. The research problem was to determine what contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition. Commercial-like contracting practices include removal of statutory and regulatory barriers to contracting with the government. To accomplish this, the most significant contractual barriers experienced by the industry in doing business with the government were identified. The study hypothesized possible relationships among "barriers", "acquisition cost" variables, "industry well-being" variables, and "commercial-like" variables. A telephone interview instrument was developed to elicit quantitative and qualitative data addressing the hypothesized relationships from space-launch industry representatives. Ten of eleven firms responded to the interview questionnaire, including the three industry leaders. Quantitative analysis revealed very strong associations for the hypothesized relationships. Qualitative analysis supported the quantitative results.

Barriers were associated with higher costs and hurting the industry, while commercial-like contracting by the government was associated with lower costs and promoting the industry.

# IDENTIFYING FEDERAL CONTRACTING POLICY CHANGES TO IMPROVE GOVERNMENT ACQUISITION OF COMMERCIAL SPACE-LAUNCH CAPACITY

## I. Introduction

### General Issue

Congressional intent, as expressed in the Commercial Space Launch Act Amendments of 1988, is to "encourage, facilitate, and promote" (U.S. Congress, 1988:SEC. 2) the United States commercial space-launch industry. However, recent studies (Holland, 1990:124; Lamm, 1988) indicate that barriers to doing business with the government exist. To the extent that government procurement practices differ from commercial-like contracting, these differences constitute barriers to doing business (Sweeny, 1989:3). Commercial-like contracting refers to the purchasing methods used by private-sector firms in the normal course of business (Solloway, 1990:54).

In the current atmosphere of declining government budgets, congressional pressure has come to bear on the executive branch to cut federal government acquisition costs (Packard, 1986:1). Application of commercial-like contracting to the acquisition of federal government space-launch capacity holds promise not only of fostering the space-launch industry (Tokmenko, 1989a:6), but also of lowering acquisition costs (Cheney, 1989:20). Space-launch capacity, as used in this paper, includes expendable launch vehicles (ELVs) and complete launch services.

## Background

Contracting Policy Reform Background. Presidential and Congressional Commissions in the four decades since the close of World War II have recommended major overhaul of the defense procurement process. However, until the 1986 Presidential Commission, known as the Packard Commission, few changes were implemented due to "the Defense Department's unflagging resistance to institutional change" (U.S. Congress, 1988:v). In the past decade, public support for reform has become a catalyst for implementing change (Gansler, 1989:199-202). Many of the Packard Commission recommendations either have been or are being implemented (Cheney, 1989:1). Although commercial-like contracting methods are among the Packard Commission's recommendations, they are among those yet to be fully realized (Cheney, 1989:20).

Defense Management Report. On June 12, 1989, Secretary of Defense Richard Cheney issued the Defense Management Report to the President, informally known as the "DMR" as a plan to implement the Packard Commission's recommendations (Cheney, 1989:i). The DMR advocates implementing the following commercial-like contracting practices urged by the Packard Commission:

> - substantially greater reliance on commercially available products, often well-suited to DoD's needs and obtainable at much less cost;
> - and adoption of competitive practices predicated more broadly on a mix of cost, past performance and other considerations that determine overall "best value" to the government. (Cheney,1989:20)

Additionally, the DMR recommends using "the full range of commercial contracting terms and conditions when buying commercial products" (Cheney, 1989:20).

During the same four decades as the major commissions on defense acquisition, the United States was entering the space age. Once the sole province of governments, space exploitation has now entered the private sector. Public policy has adapted to meet this changing role (Straubel, 1987:941,945).

Commercial Space-Launch Policy. The purpose of the Commercial Space Launch Act of 1984 was to encourage the growth of the domestic commercial space-launch industry (U.S. Congress, 1984:1,2; Straubel, 1987:965). The Commercial Space Launch Act Amendments of 1988 expressed congressional intent to promote the industry in these findings:

> (1) a United States commercial space launch industry is an essential component of national efforts to assure access to space for government and commercial users;
> (2) the Federal Government should encourage, facilitate, and promote the use of the United States commercial space launch industry in order to continue United States aerospace preeminence;
> (3) the United States commercial space launch industry must be competitive in the international marketplace; (U.S. Congress, 1988:SEC. 2)

The National Space Policy issued by the President on November 2, 1989 further stated:

> Governmental Space Sectors shall purchase commercially available space goods and services to the fullest extent feasible and shall not conduct activities with potential commercial applications that preclude or deter Commercial Sector space

> activities . . . Commercial Sector activities shall be supervised or regulated only to the extent required by law, national security, international obligations, and public safety. (Office of the White House Press Secretary, 1989:3)

The policy mandates government purchase of commercial space-launch capacity where practical, and removal of regulatory barriers where possible. The policy also prevents the government from competing with the space-launch industry for commercial payloads (Agres, 1988:41). Taken together, both procurement and commercial space-launch policies invite the application of commercial-like contracting methods to government space-launch acquisition (Tokmenko, 1989a:4,44).

## Research Problem

Congress has expressed an intent to promote the U.S. commercial space-launch industry and preserve its international competitiveness. The Packard commission has advocated commercial-like contracting to improve federal acquisition of commercial products. Commercial-like contracting practices include removal of statutory and regulatory barriers to contracting with the government.

The research problem was to determine what contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition. To accomplish this, the most significant contractual barriers experienced by the industry in doing business with the government were identified. The

study attempted to uncover possible relationships between: 1) current barriers to doing business with the government and acquisition costs to the government, 2) current barriers to doing business with the government and the well-being of the commercial space-launch industry, 3) the use of commercial-like contracting by the government and acquisition costs to the government, and 4) the use of commercial-like contracting by the government and the well-being of the commercial space-launch industry.

Variable Categories

In her recent thesis, "A Survey of Contractor's Perceptions of Current Barriers to Contracting With the Department of Defense and the Potential Benefits of the Adoption of Commercial Style Acquisition Methods" (Holland, 1990:1), Holland found it useful to categorize variables (Holland, 1990:5). This study adopted two major constructs from the Holland study: 1) commercial-like contracting, and 2) barriers to contracting with the government (Holland, 1990:5-6).

The major constructs on which the research problem was based were addressed as categories of variables. The categories were composed of related variables on which each construct was built. Individual variables comprising the variable groups are enumerated in Appendix B. The variable categories are defined below:

Commercial-like variables. This group of variables represents use of commercial-like contracting by the government, or emulation of commercial purchasing methods to the extent possible in the purchase of products also sold to commercial firms.

Barriers. This category represents policies, regulations, and statutes which obstruct implementation of commercial-like contracting, or which act to create differences between government and commercial contracting methods. This category of variables was operationalized by item 1, column (1) of the interview questionnaire in Appendix 1 as "policies, regulations, or statutes, [which] may be seen as making business with government less desirable or more difficult than commercial business."

Industry Well-being. This group of variables refers to factors which may be related to the well-being of the commercial space-launch industry.

Acquisition costs. This represents total acquisition costs to the government for space-launch capacity.

## Investigative Questions

Investigative questions were formulated to support the research problem of determining what changes implementing commercial-like contracting would benefit the commercial space-launch industry and federal space-launch acquisition. The following investigative questions were analyzed in this study:

1. What factors do U.S. commercial space-launch firms identify as barriers to contracting with the U.S. government?

2. What contractual clauses required by statute or executive branch policy does the commercial space-launch industry identify as barriers to contracting with the government?

3. What potential benefits do U.S. commercial space-launch firms associate with the U.S. government adopting commercial-like contracting methods?

Hypotheses

Hypotheses are stated in the form of null hypotheses for the purpose of performing a statistical test (Emory, 1985:352).

$H_{01}$: There is no statistically significant relationship between the "commercial-like" variables and "industry well-being" variables.

$H_{02}$: There is no statistically significant relationship between the "commercial-like" variables and "acquisition cost" variables.

$H_{03}$: There is no statistically significant relationship between the "barriers" and "industry well-being" variables.

$H_{04}$: There is no statistically significant relationship between the "barriers" and the "acquisition cost" variables.

## Scope and Limitations

The focus of this research study was barriers to contracting with the federal government and the potential benefits of applying commercial-like contracting methods to U.S. government space-launch capacity. Commercial-like contracting methods for the purposes of this paper were limited to those methods included in the DMR: 1) buying commercially available products, 2) using commercial terms and conditions (including removing statutory and regulatory barriers), and 3) employing commercial-like competition (Cheney, 1989:20). Discussion of the commercial space-launch industry will be limited to those current aspects affecting applicability of commercial-like contracting.

## II. Literature Review

### Method of Treatment and Organization

Potential barriers to contracting with the government were identified from the literature. The elements of commercial-like contracting were treated in terms of the applicable conditions and expected benefits of the commercial methods. The relevant aspects of the commercial space-launch industry were then examined. The topics were discussed in the following order: 1) potential barriers to contracting with the government, 2) commercial-like contracting, 3) space-launch industry, and 4) applicability of commercial-like contracting.

### Barriers to Contracting With the Government

Barriers are statutes, regulations, or policies which make contracting with the government less desirable or more difficult than a comparable commercial relationship (Sweeny, 1983:3,4). Several categories of barriers identified by the Center for Strategic and International Studies are: 1) accounting differences, 2) specifications and standards, 3) technical data rights, and 4) unique contract requirements.

> 1. Accounting Differences. One of the most expensive and disruptive of all government requirements involves mandatory adherence to very detailed and special-purpose cost accounting procedures. Although originally intended for cost-plus contracts for specialized sole source defense procurement, they are frequently and inappropriately applied to commercial and competitive procurements as well. The principle problem is not that the cost accounting requirements are irrational, but simply that they are not consistent with (or satisfied by) the

accepted (price-based) accounting practices of most of U.S. industry.

2. Specifications and Standards. Similarly, DOD specifications and standards lock in requirements not only on what kinds of specialized, defense-unique products are to be procured (causing product separation), but also on how the product is to be manufactured, evaluated, inspected, packaged, and shipped (causing process separation). Unless DOD standards and specifications are drafted with existing and future commercial products and practices in mind, obtaining a match is unlikely. Commercial industries are understandably reluctant to modify successful and internationally competitive products or production paths. Similarly, they are reluctant to welcome any army of inspectors, who check to see not only if the product works, but if on-product, defense unique, and often obsolete standards have been satisfied, for what amounts to a small portion of total business.

3. Technical Data Rights. Commercial vendors protect proprietary information closely. That technological edge is a key to market competitiveness. By contrast, DOD more often than not requires its sellers to provide technical drawings and data that may be distributed to competitors for reprocurement purposes. Without adequate protection for proprietary information or compensation for lost rights, commercial firms are unwilling to risk sharing state-of-the-art information by incorporating their leading edge technologies into military systems.

4. Unique Contract Requirements. Commercial companies generally buy and sell under some form of Uniform Commercial Code. By contrast, defense contracts are governed by a hodgepodge of legislation and regulation that often is not based on achieving economic efficiency, tends to be irregularly and inconsistently applied, and is constantly changing, particularly in the last decade. [These include] socio-economic goals . . ., supporting small business, or requiring source "preferences" (Bingamon, 1991:16,17)

Barriers are different to different contractors, depending on the degree of government business. Contractors who do business primarily with the government experience less difficulty and cost impact, since their organizational

and accounting structure is already burdened (Bingamon, 1991:13).

An earlier effort, by the Air Force Systems Command Request for Proposal (RFP) Critical Process Team (CPT) developed, with industry involvement, a list of 115 "pains" and "pleasures" of the RFP process. "Pains" in the RFP process include barriers which affect the procurement process. The pains fell into several broad categories:

1) problems with government personnel (training, turnover, ect.),

2) problems with internal management practices or bureaucratic behavior,

3) RFP complexity and format,

4) excessive data requirements,

5) source selection process inefficient and complex,

6) lack of commercial-style competition,

7) certified cost and pricing data,

8) poor communication,

9) insufficient proposal preparation time,

10) small business plans,

11) fixed price research and development contracts,

12) inconsistent approach to past performance,

13) government data formats,

14) contracts too complex, and

15) government specifications (Croucher, 1989).

Elimination of "pains" and barriers is part of commercial-like contracting.

Commercial-Like Contracting

Commercial-like contracting, if implemented by the government, would be for the purchase of commercial products, would use commercial terms and conditions, and would employ commercial-like competition to the extent possible consistent with public policy (Cheney, 1989:20).

Commercial Products. Commercial products refer to non-developmental items sold to the public and purchased by the government for use without alteration. Commercial products can offer government buyers lower cost and risk (Mehling, 1990:14).

Lower Cost. Acceptance of the item by a competitive commercial market provides the buyer assurance of price reasonableness (Mehling, 1990:15). In addition, a wider market may generate lower prices due to higher production quantities. Finally, the government absorbs less of the development costs of commercial items (Mehling, 1990:14,16).

Lower Risk. Generally, products sold to the public offer assurance of quality consistent with the degree of acceptance by the market. Moreover, product support for commercial customers is already in place. Furthermore, the government enjoys less schedule risk for commercially available products than for developmental items (Mehling, 1990:5-16).

Commercial Terms and Conditions.

Shorter, Simpler Contracts. Commercial firms use shorter, simpler contracts than the government uses for comparable items (Robertson, 1990:6; Lamm, 1988:48-49). When government buying practices cause commercial firms to alter their usual practice to do business with the government, it constitutes a barrier which makes contracting with the government less attractive (Robertson, 1990:6; Holland, 1990:15). Recent surveys have shown that contractors believe reducing burdensome paperwork would attract more contractors to do business with the government (Holland, 1990:125; Lamm, 1988:48-49). Use of shorter, simpler commercial terms may also reduce bid and proposal costs (Tokmenko, 1989a:6), as well as administrative costs to the government (Nash, 1989:39-40).

Contract Clauses. Federal government contracts for commercial products are not only more complex, but contain required clauses which impose financial and administrative burdens not found in commercial contracts. Nash (1989:39) discussed clauses enumerated by the Scientific Apparatus Makers Association (SAMA). Examples are clauses implementing socio-economic policy, clauses giving the government unilateral rights (Changes, Termination for Convenience, Audit), and requiring the submission of cost and pricing data (mandatory over $100,000.00) as well as numerous others (Nash, 1989:39).

Commercial-Like Competition. The government practice of awarding contracts "based on price alone versus past performance . . . [and the government's] inability to reward good suppliers with repeat business" (Holland, 1990:133) have also been identified as barriers to doing business with the government (Holland, 1990:133). Commercial-like or "best value" competition addresses this barrier by considering other factors such as past performance and value to the user per dollar in the decision to award (Hansen, 1989:104; Williams, 1988:34).

The nature of the product and the conditions present in a particular industry will determine the extent to which commercial-like contracting methods will benefit the government (Tokmenko, 1989a:4).

## U.S. Commercial Space-Launch Industry

Introduction. Since the beginnings of the space age, the United States defense industry has played a leading role in developing the economic, scientific, and national security potential of space. In today's information age, access to space has become vital to national interests. Launch vehicles, first developed by the defense industry as delivery systems for nuclear warheads, became a primary means of space access. However, until the Commercial Space Launch Act of 1984, the United States government monopolized American space-launch activity (Hale, 1991:1,2). The

purpose of the act was to encourage the growth of a domestic commercial space-launch industry (U.S. Congress, 1984:1,2).

Commercializing the industry has several advantages over continued government monopoly:

> Integration [of government and commercial technologies] offers a strategy that simultaneously addresses both the regulatory difficulties faced by industry in providing for DOD's [or NASA's] needs and the opportunities that exist for harnessing the power of R&D collaboration between industry and government in critical technologies. By breaking down the barriers that compartmentalize U.S. resources into defense and non-defense, . . . [the government] could begin the process of restoring the more natural flow of knowledge and know-how throughout the economy. In the process, they would create a more robust, responsive, and cost-effective structure. Pooling U.S. resources and talents, rather than segregating them, offers a potential to achieve economies of scale and scope. (Bingamon, 1991:10)

Another advantage is that the flexibility and diversity of the industry is increased as new companies enter the business (Hale, 1991:18).

The U.S. commercial space-launch market initially was limited by competition from a heavily subsidized space shuttle program:

> Within the United States, the National Aeronautics and Space Administration (NASA) has had a lock on the market because competitors have been unable to match the prices charged by NASA. NASA's stranglehold on the market, however, is about to end. The Reagan Administration, as a result of its critique of the United States space program following the shuttle Challenger accident, decided to limit NASA's commercial launch activity. (Straubel, 1987:943)

The space shuttle Challenger disaster led to the Reagan Administration forbidding the use of the shuttle for

commercial payloads. "National Security Decision Directive 254, issued in the summer of 1986, was the incentive the commercial space-launch industry needed," said Hale (1991). The potential for renewed competition from the shuttle remained, however, until recently.

Vice President Dan Quayle, of the Bush Administration announced a new national space-launch policy which effectively ends the challenge of the space shuttle and may have significant benefits for the commercial space-launch industry.

> The Bush administration said . . . it will build no more new space shuttles and instead will concentrate on creating a new family of rockets . . . the cost of developing a new family of launch vehicles -- capable of carrying medium and heavy payloads into orbit -- has been estimated as high as $11.5 billion. The aim is to reduce current launch costs, ranging from $3,000 to $10,000 a pound, to about $300 . . . The space launch strategy aims to develop unmanned vehicles that can be qualified later to carry astronauts. It will actively consider commercial space launch needs, and the directive said NASA and the Defense Department "should actively explore having industry take part in new-rocket plans." . . . Mr. Quayle told his audience at Vandenburg that the strategy will lead to a new commercial launch vehicle "as good or better than those of our foreign competitors." (Washington Times, July 25, 1991)

Despite these changes which potentially favor the industry, many factors endanger its continued well-being. Dependence on defense business is hurting the industry as defense budgets shrink, reducing the number of launches (Perry, 1990:233,236).

> these would-be commercial pioneers commonly encounter skittish banks and insurers, indecisive

> government policymakers, and scheduling problems at NASA's launch facilities. Plus an even bigger obstacle: foreign competition. U.S. aerospace companies face a brand new kind of Star Wars with rocket makers from Europe, China, Japan, and the Soviet Union. (Perry, 1990:233)

This study investigates what contracting policy changes implementing commercial-like contracting would benefit the commercial space-launch industry. Since this industry is made up largely of government contractors, and since the government is by far the largest customer, government contracting policy changes have a potentially profound impact on the industry (Tokmenko, 1989:4).

Supply Market. The commercial space-launch industry serves a limited range of space transportation needs. This narrow supply market has few established suppliers, offering differentiated products with overlapping uses. Current demand is backlogged, but high entry costs, coupled with high technical risk, serve as barriers to entry (Scarborough, 1990:39).

Communications satellites are the largest share of payloads launched by the private sector. The commercial launch vehicles presently serving the industry were developed in the 1960s under government research and development programs (Scarborough, 1990:39).

Supplier Base. Established suppliers are contractors with defense business, also offering their products to the

private sector. The launch vehicles by class, name, and manufacturer are as follows:

1) the small class Scout by LTV,

2) the medium class Delta by McDonnell-Douglas,

3) the intermediate class Atlas by General Dynamics, and

4) the large class Titan by Martin-Marietta (Tokmenko, 1989a:4).

The Atlas and Titan "offer a family of variants that bracket the entire satellite weight range . . . the Titan can carry two ordinary satellites" (Scarborough, 1990:39). Some view these suppliers as competitors (Scarborough, 1990:39), while others consider each supplier as serving a different market segment (Tokmenko, 1989a:6).

New firms are attempting market entry in the small payload area. These firms seek to exploit the specialized market area for small research and development payloads (Scarborough, 1990:39). Costs associated with developing their product, together with higher risks, present formidable entry barriers (Tokmenko, 1989a:4,7-8; Tokmenko, 1989b:27).

Risks. The current failure rate for commercial launches is around ten percent (Scarborough, 1990:39; 2:14). Insurance premiums run from twenty to twenty-five percent of combined launch vehicle and payload value (Barnes, 1988:14). New companies seeking to enter the market find insurance

difficult to obtain for their unproven products (Scarborough, 1990:43).

Applicability of Commercial-Like Contracting

The applicability of commercial-like contracting methods to government commercial space-launch acquisition is determined by the nature of the product and the conditions present in the commercial space-launch industry (Tokmenko, 1989b:31; Cohen, 1986:269).

Nature of the Product. Unlike commercially developed products, the launch capacity product offered by the commercial space-launch industry is sold to the private sector, but was developed for the government. The government also remains the major buyer with all established suppliers already doing business with the government (Tokmenko, 1989a:7).

Industry Conditions. Many of the benefits of commercial-like contracting methods derive from the assumption of a competitive commercial market (Mehling, 1990:14-16). There is disagreement as to the competitive nature of the commercial space-launch market. If the industry is viewed as a small group of firms whose markets overlap, there is a degree of competition (Scarborough, 1990:39). However, competition is not present if the market is made up of "sole source suppliers of classes of launch vehicles" (Tokmenko, 1989a:6). Competitive pressure can come to bear on the industry, though, through the potential

entry of new competitors (Mehling, 1990:18). An example of the effects of such pressure is the adoption of ""one-stop-shopping" for insurance, financing, and payload integration" (Scarborough, 1990:39) by U.S. companies in response to foreign competitors. High entry barriers mitigate against new entrants through research and development costs and lead time involved in perfecting a launch vehicle design (Scarborough, 1990:39).

Benefits of using some simpler commercial terms and conditions may be gained in the absence of a competitive industry. Reductions in proposal size and cost have been achieved by compromise in the direction of commercialization in the commercial space-launch industry. Further cost savings have been achieved by allowing commercial specifications to replace government specifications (Tokmenko, 1989a:4,45).

Conclusions

The literature reveals that federal government contracting policy has a potentially profound effect on the well-being of the commercial space-launch industry. U.S. national space policy encourages the growth of the U.S. commercial space-launch industry in order to further U.S. national economic interests in space. Historical preeminence of the American defense industry in space faces serious challenges.

The U.S. commercial space-launch industry depends on government business for much of its market base. Many of the benefits of commercial-like contracting rest on the assumption of a competitive commercial market. There is disagreement as to whether the commercial space-launch industry constitutes a competitive market. Some benefits have been realized in the industry through the application of commercial terms and conditions.

The review of the literature emphasizes the importance of the research problem. To effectively implement expressed U.S. commercial space launch policy, policy makers must determine what contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition.

## III. Methodology

Congressional intent to promote the United States commercial space-launch industry was expressed in the Commercial Space Launch Act Amendments of 1988. The Packard commission called for greater use of commercial practices by the federal government when purchasing commercial products. The purpose of the study was to investigate which contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition.

### Data Collection

Telephone interviews were used to collect data from the population of U.S. commercial space-launch firms.

Interview. The information to be obtained was attitudinal in nature, since the effects of government adoption of commercial-like contracting can only be objectively observed to the extent that these practices have been implemented (Emory, 1985:158). In fact, to the extent that commercial-like contracting may be defined as eliminating the differences between government and commercial purchasing practices, the definition excludes those changes which have already been made.

Telephone Interview. The face-to-face interview method of data collection was eliminated due to several factors:

1. risk of selected respondents being unavailable,

2. cost of travel,

3. timing of interviewing schedule during an academic quarter, and

4. geographic dispersion of population (Dillman, 1978:74-75).

Critical factors in choosing telephone interview over mail survey are as follows:

1. greater probability of response, once contacted,

2. greater success with open-ended questions, screen questions, and controlling sequence of questions,

3. greater success with avoiding item non-response,

4. less sensitive to questionnaire construction,

5. greater speed of implementation,

6. greater ability to determine characteristics of non-respondents (Dillman, 1978:74-75).

Interview Instrument

The interview instrument (See Appendix A) consisted of ordinal (Likert) scaled questions for hypothesis testing, ratio-scaled questions for attributes, and open-ended questions for clarity and depth of response (Dillman, 1978:79-90).

Scaled Questions. Pages 1 and 2 of the questionnaire consist of scaled items designed to measure the variables and provide statistical support for hypothesis testing. Associated follow-up questions were designed to enhance construct validity.

Potential Barriers. Page 1 is devoted to barriers to contracting with the government. Item 1 forms a matrix of three statements about twenty-one potential barriers, identified from the literature review and during the validation process. Responses are measured on a five point Likert scale from 1 being "strongly disagree" to 5 being "strongly agree". Item 2 asks the respondent to provide specific reasons or examples explaining each response agreeing with a statement about a potential barrier. Item 3 requests a ranking of the top three potential barriers. Item 4 gives the respondent an opportunity to propose additional barriers not listed.

Other Scaled Items. Page 2 focuses on commercial-like contracting practices. Item 5 poses a series of five point Likert scaled items designed to measure the "commercial-like" variables in the case of sub-items a through c, f, and j through o. The other sub-items address tangentially related questions which lend themselves to scaled responses. Like item 2, item 6 asks for explanation of the responses. Item 7 asks which commercial-like features would most reduce acquisition costs. Item 8 seeks to capture insights into any effects foreseen from government adopting commercial-like practices. Item 9 solicits opinions about potential changes to available contractor remedies.

Attribute Items. Items 10 through 14 (page 3) gather attribute information to be used to determine differences

between respondent groups. The attribute variables consist of type of space products and services offered, degree of commerciality of the space-related portion of each firm's business (from exclusively commercial to exclusively government, and international customers), market share, length of time in the space-launch industry, length of time in the commercial space-launch industry, and number of employees in the firm's space sector.

Open-ended Questions. Items 15 through 25 (page 3) are open-ended items screened for only ELV-producers. Open-ended items were used to gather information about potential confounding or intervening variables which might reduce the effect size of barriers or commercial-like variables. Topics include perceptions of market forces, commerciality of the space-launch product, factors affecting the well-being of the space-launch industry, and differences between NASA and the DoD. The telephone interview portion of the questionnaire concludes with an open-ended question (item 26) about the affects of the cost of insurance, and (item 27) gives the respondent an opportunity for clarifications.

Written Question. Page 4 of the questionnaire asks for a written response to a list of clauses, provided on pages 5 through 7, which currently may be required in space-launch contracts by statue or executive branch policy. The item asks respondents, "Please review the list and identify any of the clauses which you consider:

(1) Are important barriers to commercial space-launch contracting, or

(2) Add additional cost to government contracts which would not be there with commercial contracting practices.

Please indicate the rationale for your answers. Feel free to use examples or anecdotes. Add as many additional pages as you require." The following statement appears directly above the space provided, "This section is key to our process. Your response is crucial if we are to present a well-articulated position on streamlining space-launch acquisition."

Development of Written Question

Investigative Question 2 poses the question, "What contractual clauses required by statute or executive branch policy does the commercial space-launch industry identify as barriers to contracting with the government?" To address this issue, a list of clauses required by statute and executive branch policy was needed which were applicable to commercial space-launch contracts. A list of clauses was obtained through contact with the Space System Division Office of Commercial Launch (SSD/CL). SSD/CL provided a Request for Proposal (RFP) which, "(in our opinion, at least) uses the maximum of commercial features consistent with the FAR [Federal Acquisition Regulation]" (Holljes, 1991). The relationship of each clause to its source in statute, executive order, or regulation was established

using a study prepared by the Logistics Management Institute for the Defense Management Review Regulatory Relief Task Force in November of 1989 (Logistics Management Institute, 1989). Clauses which were not based on statute (Public Law or United States Code) or executive order were eliminated from the list of clauses in the RFP to obtain the final list.

Validity of instrument. As a prerequisite to establishing validity, reliability of the instrument was tested. Reliability of the variable groups composed of selected scaled items was established using Cronbach's Alpha (Emory, 1985:99-100). Additional evidence of reliability was obtained through the telephone interviewing process.

The instrument was reviewed for content validity by a panel of experts (Emory, 1985:95) from the National Aeronautics and Space Administration (NASA), the Office of the Assistant Secretary of the Air Force for Space (SAF/SX), and the Logistics Education Foundation of the Society of Logistics Engineers (LEF-SOLE). Faculty members with expertise in the Commercial Space Launch Act, federal government contracting, and research methods were also consulted. Construct validity for the variable groups was assured by comparing the results of measurement with predicted outcomes from the literature and hypotheses developed by the researcher (Emory, 1985:97).

Questionnaire Development

The initial draft version of the questionnaire was developed directly from the investigative questions and hypotheses. The investigative questions and hypotheses were broken down into the constructs, and the constructs into items of measurement. A series of revisions resulted from the review of the questionnaire by the above-named organizations. The initial draft was reviewed by the Office of the Assistant Secretary of the Air Force for Space (SAF/SX) and the Logistics Education Foundation of the Society of Logistics Engineers (LEF-SOLE). Recommendations were incorporated into a second draft, and then sent to NASA and SAF/SX. A summary of reviewer comments and their resolution follows:

SAF/SX initial review. The initial version of the questionnaire was sent to SAF/SX by telecopier on 19 April. Response was made by telephone on 25 April. Extensive suggestions for wording of the cover page and instructions were made and incorporated. Additional barrier items were suggested to be added, eventually resulting in items 1.g, 1.h, 1.i, and 1.q. Additional items were added that developed into items 5.d, 5.e, and 5.f. Further additions were made to open-ended items, resulting in items 15, 16, 22.

LEF-SOLE. The second draft of the questionnaire, containing 17 pages, was also transmitted to LEF on 22 April 1991. The draft was reviewed by the LEF Vice President for

Operations, people within his firm's contracts department, and people within LEF. The response was transmitted by telecopier on 30 April, 1991.

They considered the coverage of the instrument to be very complete. They expressed concern over the possibility of instrument length and complexity leading to non-response. They preferred the Likert-scaled items, noting that it might be desirable to convert some open-ended items to scaled items. Finally, they recognized that many of the questions were designed for top-level managers, suggesting that care be exercised in selecting respondents, expressing concern that these busy individuals might not be sufficiently motivated to respond.

Content validity was supported by the LEF comments. Instrument length was reduced, in the final form, to seven pages, with the telephone portion of the instrument comprising only three pages. In expressing concern over complexity, the reviewers assumed mail survey format. The interview nature of the instrument provided sufficient opportunity for clarification. Selection of respondents by SAF/SX provided a degree of assurance that individuals occupying appropriate senior level positions within each firm were selected.

NASA. The second draft version of the questionnaire was sent on May 5 to three space-related offices within NASA: the Office of Commercial Programs, the Office of Space Flight, Unmanned Vehicles, and Upper Stages, and the Office

of Procurement for the Goddard Space Center. Written response was received on 24 May by telecopier and followed up by mail.

In response to NASA reviewers' comments, the instrument was revised as follows:

On pages 1 and 2, concern was expressed that the items might be too broad to get meaningful results. In response to this concern, follow-up questions, which asked the respondent to give specific reasons or examples, were added as items 2 and 5.

On page 1, under potential barriers, additional suggestions were made. "cost and pricing data" was changed to "certified cost and pricing data". The reviewers felt that "government drawings and specifications", and "government oversight" might be broken into various kinds of specifications and oversight. This concern was handled by asking the follow-up questions, which allowed clarification of what aspect of a potential barrier the respondent had in mind. In answer to suggested breakdown of "RFP process", items 1.g, 1.m, 1.q, and 1.u provided a breakdown into "government solicitation too detailed", "insufficient proposal preparation time", "source selection process", and "solicitation format", respectively. Item 1.n, "contract type" covered concerns about preference of fixed-price versus cost reimbursement, and reasons for the preference.

On page 3, item 13, the phrase, "over the last 5 years, based on actual contracts/agreements" was incorporated as

suggested. Item 17 was suggested to be rephrased to reflect understanding that commercial customers generally buy launch services rather than vehicles. Since the primary thrust of the question focused on the potential for the product the government buys (launch vehicles) to be considered a commercial product, the question was not altered. On item 26, the reviewers suggested expanding the question to include details about various aspects of insurance. This was deemed unnecessary to fulfill the intent of the question which was simply to elicit a response to a potential threat to the industry which could reduce the effect size of government contracting methods on industry health. Finally, NASA reviewers suggested getting a comparison of each firm's typical commercial contract to a typical government contract for that firm. The suggested bases for comparison were covered in items 1 and 5. In the interest of keeping the questionnaire length manageable, it was determined not to ask this information separately, but to extract the necessary information from the existing items, if practical.

SAF/SX second review. On 5 May, the second draft questionnaire was transmitted to SAF/SX. When the agency responded by telephone on 30 May, few changes resulted to the instrument, with the exception of the addition of item 9. However, the agency wished to enlarge the scope of the study to include satellite and first tier subcontractors to the space-launch industry. The changes to accommodate this

included changing wording to include non-launch companies (i.e. "space-launch" to "space-related" as in item 11), and the screening of items 15 through 25 for space-launch only. These firms were interviewed, but responses fell outside the scope of this study. Analysis of the results will be subsequently reported to the sponsoring agency, along with the space-launch results.

## Population

A telephone interview of all (census) U.S. domestic launch providers was planned. In the case of a census (complete population) the population is assumed to represent itself (Dillman, 1987:41). The list of domestic space-launch providers was furnished by the office of the Assistant Secretary of the Air Force for Space. Completeness of the listing of firms was verified by the Procurement Subcommittee of the Commercial Space Transportation Advisory Committee (COMSTAC), NASA, and the Licensing Division of the Office of Commercial Space Transportation of the Department of Transportation (DoT). Three additional firms were identified by the DoT as potential new entrants to the commercial space-launch market.

## Data Collection Plan

Details of collection. Respondents were selected according to position title most corresponding to "Launch

Vehicle Program Manager", in some cases there were distinctions between government and commercial programs.

Introductory Letter. Respondents were initially contacted by introductory letter (Appendix E), explaining the purpose of the interview and providing motivation relating to the interests of commercial space-launch industry (Dillman, 1978:246). The introductory letter was signed by Dr. William Pursch, the Functional Director for Research and Grants of the National Contract Management Association (NCMA). NCMA agreed to co-sponsorship with the Logistics Education Foundation of the Society of Logistics Engineers (LEF-SOLE). Sponsorship by these organizations provided neutrality and a possible point of reference for respondents.

Respondents were then contacted by telephone to schedule an interview time. A confirmation letter, including a copy of the interview instrument was sent. The instrument was included to encourage consultation or gathering of information unlikely to be available during the interview in order to maximize accuracy (Dillman, 1978:65-66). Since the object of the interview was beyond personal characterization of the selected respondent, this method was considered more advantageous (Dillman, 1978:64-65).

During the telephone interview, scaled responses were marked on the interview form, and notes taken to record open-ended responses. The quantitative data was then transcribed into a file on the Air Force Institute of

Technology VAX/VMS computer system for processing using the Statistical Package for the Social Sciences - X (SPSS-X), a resident statistical software package. Qualitative comments were transcribed to a common word processing file by item, with each respondent's comments identified by a control number.

Implementation of the Instrument

Initial contact with the industry representatives listed by SAF/SX was begun by sending a cover letter signed by the National Contract Management Association Functional Director for Research and Grants on 10 June, explaining the background and purpose of the research. Initial telephone contact was begun on 13 June to schedule appointment times to conduct the interviews. Daily status of contacts was tracked through a database maintained on a personal computer. Notes of each phone contact were written on a hardcopy report, then transcribed into the database. The interview questionnaire was reformatted with additional space for note-taking during the telephone interviews. After initial contact, each individual received a copy of the questionnaire by telecopier for review and consultation prior to the interview, and as a means of further explaining the content and purpose of the research. The questionnaire was sent under second letter which included instructions (Appendix F).

In the course of conducting the interviews, a point of contact for the Department of Transportation Commercial Space Launch Licensing Board was identified, leading to the addition of three companies desiring to enter the commercial space-launch market. A third letter (Appendix G) was formulated combining the content and functions of the first two letters, and sent by telecopier to these firms with a copy of the questionnaire.

Some difficulty was encountered in contacting the intended respondents personally due to business trips, vacations, and meetings. In addition, personnel transfers occurred in several cases, resulting in a different individual responding than originally identified, although occupying the same position within the firm. Also, the representatives identified by SAF/SX sometimes delegated the task of responding to a functional manager more attuned to the issues. In the case of the additional firms identified by the DoT Licensing Board, in each case, the only individual qualified to respond to the questionnaire was the proprietor.

As the questionnaire was implemented, some of the individuals stated a preference to respond in writing. This presented no difficulty due to the structure of the questionnaire and the opportunities for clarification of written comments. This option was subsequently extended to representatives who had not yet scheduled an interview time to increase the probability of response.

## Statistical Tests

Reliability analysis. Internal consistency of responses to variable groups was assessed using Cronbach's alpha:

> Cronbach's procedure, like the other internal consistency measures, uses data collected on a single occasion. The alpha method is a generalization of Kuder-Richardson Formula 20, in that the test items (or other components of the measurement procedure) do not have to be scored either zero or one. This improvement makes it possible to apply Cronbach's method to many measurement procedures other than tests, including attitude instruments in which each item requires a response on a five-point scale that might range from "Strongly Disagree" to "Strongly Agree." (Jaeger, 1988:100)

The scale shown in Table 1 was used to evaluate reliability coefficients:

TABLE 1

Reliability Coefficient Scale

| Reliability Coefficient | Evaluation |
|---|---|
| .90 - 1.00 | Excellent |
| .85 - .89 | Very Good |
| .80 - .84 | Good |
| .70 - .79 | Fair |
| .69 or less | Poor |

(Balian, 1988:128)

The scale is considered highly stringent when applied to attitudinal or opinion studies and for less than thirty respondents (Balian, 1988:128).

Univariate analysis. Scaled response levels to individual items were obtained by univariate analysis. Univariate analysis consisted of descriptive statistics and frequency distributions, displayed as histograms (Balian, 1988:206,207). Two types of analysis were performed. First, continuous attribute data about respondents was broken into categories to preserve anonymity. The categories were then depicted as frequency distributions or histograms. Second, Likert scaled items were depicted as histograms, along with mean and standard deviation.

Bivariate analysis. Relationships between variables were obtained using bivariate analysis consisting of Pearson's product moment correlation coefficient, r, to determine both the strength and direction of linear relationship between variables (McClave, 1988:514; Balian, 1988:220). For hypothesis testing, a p-value or significance level of 0.05 or less was used for judging a correlation to be significant. In addition, strength of relationship was gauged according to the scale of Table 2.

TABLE 2

Strength of Correlation Coefficient

| r | Strength of Relationship |
|---|---|
| > .70 | Very Strong |
| .50 - .69 | Strong |
| .30 - .49 | Moderate |
| .15 - .29 | Weak |
| < .15 | No Relationship |

(Kidder, 1981:329)

In analyzing the data, it must be remembered, however, that correlation does not imply causation (Balian, 1988:221). In the case of this research study, it was not feasible to use an experimental design, since the objective is to identify possible changes, rather than to examine the effects of past changes. Since the design is not experimental but correlational, it is impossible to determine causal relationships between the variables.

## IV. Analysis of Data

### Purpose

The study dealt with expressed congressional intent to promote the commercial space-launch industry and defense management emphasis on government use of commercial contracting methods for the purchase of commercial products. The research problem was to determine what contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition. Commercial-like contracting practices include removal of statutory and regulatory barriers to contracting with the government. To accomplish this, the most significant contractual barriers experienced by the industry in doing business with the government were identified.

The study investigated possible relationships between: 1) current barriers to doing business with the government and acquisition costs to the government, 2) current barriers to doing business with the government and the well-being of the commercial space-launch industry, 3) the use of commercial-like contracting by the government and acquisition costs to the government, and 4) the use of commercial-like contracting by the government and the well-being of the commercial space-launch industry. A telephone interview instrument was developed to elicit quantitative and qualitative data addressing the

hypothesized relationships from space-launch industry representatives.

## Attributes of Population

Response Rate. Eleven U.S. domestic space-launch firms were identified. A census of these firms was attempted. At the time of the writing, ten of the eleven firms, or 91 percent had responded. At last contact, the representative of the other firm was referring the questionnaire to an appropriate senior-level manager.

Job Titles. Job titles of the representatives of the firms included vice president, program director, chief executive officer, director of contracts, and proprietor.

Years in the Space-Launch Business. Responses to the question, "How long has your firm been a contractor in space-launch business?" is depicted in Table 3. Four of the firms responding have been in business for thirty years

TABLE 3

Years in the Space-Launch Business

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| No Previous Launch | 0 | 3 | 30.0 | 30.0 | 30.0 |
| Ten Years or Less | 1 | 3 | 30.0 | 30.0 | 60.0 |
| 30 or More Years | 4 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

```
COUNT   MIDPOINT   ONE SYMBOL EQUALS APPROXIMATELY   .10 OCCURRENCES

    3        .00  **********************************
    3       1.00  **********************************
    0       2.00
    0       3.00
    4       4.00  ****************************************
                  I....+....I....+....I....+....I....+....I....+....I
                  0         1         2         3         4         5
                            HISTOGRAM FREQUENCY
```

VALID CASES 10 MISSING CASES 0

or more, since the beginnings of the industry. Three firms have been in the business less than ten years, while the remaining three firms have yet to obtain a launch contract.

Years in the Commercial Space-Launch Business.

Responses to the question, "How long has your company been a contractor in commercial space-launch business?" are shown in Table 4. Responses reflect the newness of industry

TABLE 4

Years in Commercial Space-Launch

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| No Commercial | 0 | 4 | 40.0 | 44.4 | 44.4 |
| Four or Less | 4 | 2 | 20.0 | 22.2 | 66.7 |
| Five or Less | 5 | 3 | 30.0 | 33.3 | 100.0 |
| OUT OF RANGE | | 1 | 10.0 | MISSING | |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 4 | .00 | ********** |
| 0 | 1.00 | |
| 0 | 2.00 | |
| 0 | 3.00 | |
| 2 | 4.00 | ********** |
| 3 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5

HISTOGRAM FREQUENCY

commercialization. Comparison with Table 3 indicates that one of the responding firms with launch experience does no commercial business. One respondent declined to answer, considering the information sensitive.

Business Size. Responses to the question, "How many employees does your space-launch sector have?" are depicted in Table 5. Three of the companies reported over one

TABLE 5

Employees in Space-Launch Sector

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Less Than 50 | 1 | 5 | 50.0 | 50.0 | 50.0 |
| 50 to 100 | 2 | 1 | 10.0 | 10.0 | 60.0 |
| 100 to 500 | 3 | 1 | 10.0 | 10.0 | 70.0 |
| More than 1000 | 5 | 3 | 30.0 | 30.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 5 | 1.00 | ********** |
| 1 | 2.00 | ********** |
| 1 | 3.00 | ********** |
| 0 | 4.00 | |
| 3 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I

0 1 2 3 4 5

HISTOGRAM FREQUENCY

VALID CASES 10 MISSING CASES 0

thousand employees, one firm reported between one hundred and fifty employees, and the remainder had less than fifty employees. Of the attribute items, business size best separates the industry leaders from the other firms.

Degree of Commerciality. Respondents were asked to estimate the percentage of their space-launch business over the last five years, based on actual contracts that came from 1) U.S. Government, 2) U.S. Private-sector firms, 3) foreign governments, and 4) international private enterprise. Responses are depicted as Table 6. Before a

TABLE 6

Degree of Commerciality

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Government Only | 1 | 3 | 30.0 | 42.9 | 42.9 |
| Commercial Only | 4 | 2 | 20.0 | 28.6 | 71.4 |
| Some Foreign | 5 | 2 | 20.0 | 28.6 | 100.0 |
| OUT OF RANGE | | 3 | 30.0 | MISSING | |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 3 | 1.00 | ********** |
| 0 | 2.00 | |
| 0 | 3.00 | |
| 2 | 4.00 | ******* |
| 2 | 5.00 | ******* |

I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5

HISTOGRAM FREQUENCY

VALID CASES 7 MISSING CASES 3

frequency distribution could be expressed, percentage responses were separated into five categories: 1) government only, 2) mostly government (over 50 percent), 3) mostly commercial (over 50 percent), 4) commercial only, and 5) some foreign (added for consolidation of information). Responses show fairly strong separation into firms doing business only with the government, and firms doing mostly

commercial work. Non-responding firms considered the information sensitive.

Market Share. Estimates of space-launch market share based on dollars is depicted in Table 7. Over three-fourths

TABLE 7

Market Share

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT |
|---|---|---|---|---|
| Less Than 1% | 1 | 4 | 40.0 | 40.0 |
| 1 to 5 Percent | 2 | 3 | 30.0 | 30.0 |
| 5 to 25 Percent | 3 | 1 | 10.0 | 10.0 |
| 50 Percent or More | 5 | 1 | 10.0 | 10.0 |
| OUT OF RANGE | | 1 | 10.0 | MISSING |
| | TOTAL | 10 | 100.0 | 90.0 |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 4 | 1.00 | ********** |
| 3 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 0 | 4.00 | |
| 1 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5

HISTOGRAM FREQUENCY

VALID CASES 9 MISSING CASES 1

of the market is shared by two of the firms responding. Over three-fourths of the remaining market is occupied by two other firms, with the remaining respondents reporting one percent or less. One industry leader declined to respond, considering the information sensitive. Taking that non-response into account, this item best segregates the industry into three distinct groups: Industry leaders, in

categories 3 through 5, smaller firms, in category 2, and potential entrants, in category 1.

Correlations Among Attributes. Table 8 depicts Pearson's correlation coefficient, r, with associated significance level for demographic attributes of the responding firms.

TABLE 8

Correlations Among Attributes

--PEARSON CORRELATION COEFFICIENTS--

| | SPACEYR | COMSPA | SIZE | COMMCLTY | MSHARE |
|---|---|---|---|---|---|
| SPACEYR | 1.0000 | .2738 | .6752 | -.6714 | .6596 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= . | P= .222 | P= .016 | P= .049 | P= .027 |
| COMSPA | .2738 | 1.0000 | .2659 | -.2616 | .2798 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .222 | P= . | P= .229 | P= .285 | P= .233 |
| SIZE | .6752 | .2659 | 1.0000 | -.5892 | .3742 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .016 | P= .229 | P= . | P= .082 | P= .161 |
| COMMCLTY | -.6714 | -.2616 | -.5892 | 1.0000 | -.4377 |
| | ( 7) | ( 7) | ( 7) | ( 7) | ( 7) |
| | P= .049 | P= .285 | P= .082 | P= . | P= .163 |
| MSHARE | .6596 | .2798 | .3742 | -.4377 | 1.0000 |
| | ( 9) | ( 9) | ( 9) | ( 7) | ( 9) |
| | P= .027 | P= .233 | P= .161 | P= .163 | P= . |

(COEFFICIENT / (CASES) / 1-TAILED SIG)

" . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

| VARIABLE NAME | ATTRIBUTE MEASURED |
|---|---|
| SPACEYR | Years in the Space-Launch Business |
| COMSPA | Years in Commercial Space-Launch |
| SIZE | Employees in Space-Launch Sector |
| COMMCLTY | Commerciality of Space Business |
| MSHARE | Market Share of Space-Launch Business |

Using the strength of correlation ranges from Table 2, years in the space-launch business (SPACEYR) was strongly related to number of space-launch employees (SIZE) and market share (MSHARE), but the strongest relationship among attributes was the negative relationship between years in the business and commerciality (COMMCLTY). A strong inverse relationship was observed between size and commerciality. A moderate inverse relationship between market share and commerciality and a moderate positive relationship between market share and number of employees were observed.

Reliability Analysis of Variable Groups

Reliability analysis of the four variable groups (or scales) was conducted using Cronbach's Alpha. An initial run of the SPSS-X procedure yielded the results of Appendix B. Reliability coefficients for initial, optimal, and final variable groups are summarized in Table 9. Higher alpha

TABLE 9

Variable Group Reliability

| VARIABLE GROUP NAME | INITIAL ALPHA | OPTIMAL ALPHA | FINAL ALPHA |
|---|---|---|---|
| Barriers | 0.89 | 0.93 | 0.90 |
| Acquisition Cost | 0.89 | 0.93 | 0.90 |
| Industry Well-being | 0.92 | 0.95 | 0.93 |
| Commercial-Like Contracting | 0.92 | 0.95 | 0.93 |

values were attainable by eliminating some variables from the groups. A tradeoff was made short of optimizing for alpha, depending on the subjective value of including each variable in the group versus marginal gains in alpha. Reliability coefficient values for all variable groups were in the "excellent" range identified in Table 1 after elimination of only one variable. Item 1.f, "Awards made on price alone vs past performance" was deleted from the "barriers", "acquisition cost", and "industry well-being" variable groups. Item 5.f, measuring degree of agreement or disagreement with the statement, "There is less oversight by commercial customers than government customers" was deleted from the "commercial-like" variables.

Hypotheses

Pearson's product moment correlation coefficient, r, was used to determine the degree of hypothesized linear relationship between variables. Table 10 depicts the correlation matrix computed using SPSS-X for the variable groups including significance level of each correlation.

TABLE 10

Correlation Matrix for Variable Groups

PEARSON CORRELATION COEFFICIENTS

| | ACQCOSTS | WELLBGSC |
|---|---|---|
| BARSCALE | .9682 | .9693 |
| | ( 10) | ( 10) |
| | P= .000 | P= .000 |
| COMSCALE | .8468 | .7952 |
| | ( 10) | ( 10) |
| | P= .001 | P= .003 |

(COEFFICIENT / (CASES) / 1-TAILED SIG)

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| VARIABLE NAME | VARIABLE GROUP |
|---|---|
| BARSCALE | BARRIERS |
| COMSCALE | COMMERCIAL-LIKE |
| ACQCOSTS | ACQUISITION COST |
| WELLBGSC | INDUSTRY WELL-BEING |

Null Hypothesis $H_{01}$. The null hypothesis is stated as follows:

$H_{01}$: There is no statistically significant relationship between the "commercial-like" variables and "industry well-being" variables.

From Table 10, Pearson's r was calculated as 0.80 at a significance level of P = 0.001. The null hypothesis was rejected. There is a strong positive relationship between the "commercial-like" and the "industry well-being" variables.

Null Hypothesis $H_{02}$. The null hypothesis is stated as follows:

$H_{02}$: There is no statistically significant relationship between the "commercial-like" variables and "acquisition cost" variables.

From Table 10, Pearson's r was calculated as 0.85 at a significance level of P = 0.001. The null hypothesis was rejected. The "commercial-like" variables are related to the "acquisition cost" variables.

Null Hypothesis $H_{03}$: The null hypothesis is stated as follows:

$H_{03}$: There is no statistically significant relationship between the "barriers" and "industry well-being" variables.

From Table 10, Pearson's r was calculated as 0.97 at a significance level of P < 0.001. The null hypothesis was rejected. The "barriers" are related to the "industry well-being" variables.

Null Hypothesis $H_{04}$: The null hypothesis is stated as follows:

$H_{04}$: There is no statistically significant relationship between the "barriers" and the "acquisition cost" variables.

From Table 10, Pearson's r was calculated as 0.98 at a significance level of P < 0.001. The null hypothesis was rejected. The "barriers" are related to the "acquisition cost" variables.

## Analysis of Variable Groups by Attributes

Table 11 shows the correlation matrix computed by SPSS-X between the four variable groups and the five attributes.

TABLE 11

Correlations of Variables to Attributes

P E A R S O N  C O R R E L A T I O N  C O E F F I C I E N T S

| | SPACEYR | COMSPA | SIZE | COMMCLTY | MSHARE |
|---|---|---|---|---|---|
| BARSCALE | -.6903 | -.2500 | -.1739 | .6556 | -.4978 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .014 | P= .243 | P= .315 | P= .055 | P= .086 |
| ACQCOSTS | -.7264 | -.1405 | -.1709 | .6015 | -.4427 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .009 | P= .349 | P= .318 | P= .077 | P= .116 |
| WELLBGSC | -.7813 | -.2691 | -.2016 | .6846 | -.6184 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .004 | P= .226 | P= .288 | P= .045 | P= .038 |
| COMSCALE | -.7467 | .0243 | -.3441 | .7207 | -.2561 |
| | ( 10) | ( 10) | ( 10) | ( 7) | ( 9) |
| | P= .007 | P= .473 | P= .165 | P= .034 | P= .253 |

(COEFFICIENT / (CASES) / 1-TAILED SIG)

" . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

| VARIABLE NAME | ATTRIBUTE/VARIABLE GROUP |
|---|---|
| BARSCALE | BARRIERS |
| ACQCOSTS | ACQUISITION COST |
| WELLBGSC | INDUSTRY WELL-BEING |
| COMSCALE | COMMERCIAL-LIKE |
| SPACEYR | YEARS IN THE SPACE-LAUNCH BUSINESS |
| COMSPA | YEARS IN COMMERCIAL SPACE-LAUNCH |
| SIZE | EMPLOYEES IN SPACE-LAUNCH SECTOR |
| COMMCLTY | COMMERCIALITY |
| MSHARE | SPACE-LAUNCH MARKET SHARE |

Very strong (Table 2) negative correlations were observed between years in the space-launch business and "acquisition cost", "industry well-being", and "commercial-like" variables. The negative correlation was strong

between years in the space-launch business and "barriers". The longer a firm has been in the business: 1) the less important they perceived the barriers, 2) the less they felt that those barriers contributed to higher acquisition cost to the government, 3) the less they felt those barriers negatively affected the well-being of the U.S. commercial space industry, and 4) the less beneficial they perceived commercial-like contracting practices to be.

Strong positive correlations were observed between the proportion of commercial versus government business of a firm, and the variable groups. The more commercial business a firm had: 1) the more important they perceived the barriers, 2) the more they felt that those barriers contributed to higher acquisition cost to the government, 3) the more they felt those barriers negatively affected the well-being of the U.S. commercial space industry, and 4) the more beneficial they perceived commercial-like contracting practices to be.

A strong negative correlation was also observed between market share and the "industry well-being" variables. The greater a firm's market share, the less they felt that the barriers negatively affected the well-being of the U.S. commercial space industry.

Investigative Question 1

Investigative Question 1: What factors do U.S. commercial space-launch firms identify as barriers to

contracting with the U.S. government? Respondents identified the important barriers, those barriers which contribute to higher acquisition costs, and those barriers which negatively affect the well-being of the U.S. commercial space-launch industry.

Most Important Barriers

Respondents were asked to indicate the degree to which they agreed or disagreed that a potential barrier, "Represents an important barrier to doing business with the government". Table 12 depicts the three most important barriers, with their mean response on the following scale:

| STRONGLY DISAGREE | MILDLY DISAGREE | NEITHER AGREE Nor DISAGREE | MILDLY AGREE | STRONGLY AGREE |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

TABLE 12

Most Important Barriers to Doing Business With the Government

| POTENTIAL BARRIER | MEAN | RANKINGS 1st | 2nd | 3rd |
|---|---|---|---|---|
| Certified Cost and Pricing Data | 4.2 | 4 | 1 | |
| Government Drawings and Specifications | 4.2 | 1 | 1 | 3 |
| Government Internal Management Practices | 3.9 | 1 | 2 | 1 |

Respondents were also asked to rank the top three barriers. Rankings were used as tie-breakers for barriers with equal mean responses. Mean responses for all items are listed in the reliability analysis in Appendix B.

Certified Cost and Pricing Data. Table 13 depicts degree of agreement or disagreement with the statement, "Certified cost and pricing data represents an important barrier to contracting with the government."

TABLE 13

Certified Cost & Pricing Data a Barrier

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Strongly Disagree | 1 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 1 | 1.00 | ********** |
| 0 | 2.00 | |
| 0 | 3.00 | |
| 4 | 4.00 | ********** |
| 5 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

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Government Drawings and Specifications. Table 14 shows degree of agreement or disagreement with the statement, "Government drawings and specifications represent an important barrier to contracting with the government."

TABLE 14

Government Drawings and Specifications a Barrier

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 20.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 0 | 2.00 | |
| 2 | 3.00 | ********** |
| 4 | 4.00 | ********** |
| 4 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 4.200 STD DEV .789

Government Internal Management Practices. Table 15 represents responses to the statement, "Government internal management practices represent an important barrier to contracting with the government."

TABLE 15

Government Internal Management Practices a Barrier

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 30.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 70.0 |
| Strongly Agree | 5 | 3 | 30.0 | 30.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 4 | 4.00 | ********** |
| 3 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 3.900 STD DEV .994

Contributes to Higher Acquisition Cost

Respondents indicated their degree of agreement or disagreement that each potential barrier, "Contributes to higher acquisition costs." Table 16 shows the items with the highest response means on the five-point scale.

TABLE 16

Contributors to Higher Acquisition Costs

| POTENTIAL CONTRIBUTOR | MEAN |
|---|---|
| Certified Cost and Pricing Data | 4.3 |
| Government Drawings and Specifications | 4.3 |
| Solicitation too Detailed | 4.2 |
| Government Internal Management Practices | 4.0 |

Univariate analysis of the contributors to higher cost follows:

Certified Cost and Pricing Data. Table 17 depicts responses to the statement, "Certified cost and pricing data contributes to higher acquisition costs."

TABLE 17

Certified Cost & Pricing Data Adds Cost

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 0 | 3.00 | |
| 4 | 4.00 | ****************************************** |
| 5 | 5.00 | ************************************************** |

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HISTOGRAM FREQUENCY

MEAN 4.300 STD DEV .949

VALID CASES 10 MISSING CASES 0

Government Drawings and Specifications. Table 18 shows responses to the statement, "Government drawings and specifications contribute to higher acquisition costs."

TABLE 18

Government Drawings, Specs Add Cost

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 20.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 0 | 2.00 | |
| 2 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 5 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 4.300 STD DEV .823

VALID CASES 10 MISSING CASES 0

Government Solicitation Too Detailed. Table 19 represents responses to the statement, "Government solicitation too detailed contributes to higher acquisition costs."

TABLE 19

Solicitation too Detailed Adds Cost

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 1 | 10.0 | 10.0 | 20.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 1 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 5 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

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VALID CASES 10 MISSING CASES 0

Government Internal Management Practices. Table 20 presents responses to the statement, "Government internal management practices contribute to higher acquisition costs."

TABLE 20

Government Internal Management Practice Adds Cost

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 30.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 4 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 4.000 STD DEV 1.054

VALID CASES 10 MISSING CASES 0

Industry Well-being Variables

Negative Impacts to Industry. Degree of agreement or disagreement with the statement that a potential barrier, "Negatively affects the well-being of the U.S. Commercial space industry" was rated on a five point scale. Items with the highest response means are shown in Table 21.

TABLE 21

Negative Impacts to U.S. Commercial Space Industry

| POTENTIAL NEGATIVE IMPACTS | MEAN |
|---|---|
| Certified Cost and Pricing Data | 4.0 |
| Government Drawings and Specifications | 4.0 |
| Government Solicitation too Detailed | 4.0 |
| Government Internal Management Practices | 3.9 |

Univariate analysis of the contributors to higher cost follows:

Univariate Analyses. Tables 22 through 25 depict responses to the following statements respectively:

1) Table 22, "Certified cost and and pricing data negatively affects the well-being of the U.S. commercial space industry.",

TABLE 22

Certified Cost & Pricing Data Hurts the Industry

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Strongly Disagree | 1 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 1 | 10.0 | 10.0 | 20.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 1 | 1.00 | ********** |
| 0 | 2.00 | |
| 1 | 3.00 | ********** |
| 4 | 4.00 | **************************************** |
| 4 | 5.00 | **************************************** |

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HISTOGRAM FREQUENCY

MEAN 4.000 STD DEV 1.247

VALID CASES 10 MISSING CASES 0

2) Table 23, "Government drawings and specifications negatively affect the well-being of the U.S. commercial space industry.",

TABLE 23

Government Drawings and Specifications Hurt the Industry

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 3 | 30.0 | 30.0 | 40.0 |
| Mildly Agree | 4 | 1 | 10.0 | 10.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 3 | 3.00 | ********** |
| 1 | 4.00 | ********** |
| 5 | 5.00 | ********** |

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MEAN 4.000 STD DEV 1.155

VALID CASES 10 MISSING CASES 0

3) Table 24, "Government solicitation too detailed negatively affects the well-being of the U.S. commercial space industry.",

**TABLE 24**

**Solicitation too Detailed Hurts the Industry**

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 30.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 4 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 4.000 STD DEV 1.054

VALID CASES 10 MISSING CASES 0

4) Table 25, "Government internal management practices negatively affect the well-being of the commercial space industry.".

TABLE 25

Government Internal Management Practices Hurt the Industry

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 30.0 |
| Mildly Agree | 4 | 4 | 40.0 | 40.0 | 70.0 |
| Strongly Agree | 5 | 3 | 30.0 | 30.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 4 | 4.00 | ********** |
| 3 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 3.900 STD DEV .994

VALID CASES 10 MISSING CASES 0

Qualitative Analysis of Barriers

Analysis of Most Important Barriers In addition to degree of agreement or disagreement that an item represented an important barrier, respondents were asked to give reasons or examples supporting items scored 4 MILDLY AGREE or 5 STRONGLY AGREE. Actual respondent comments to each barrier appear in Appendix H Summary and analysis of barriers with mean response above 3.9 follows:

Certified Cost and Pricing Data. Most representatives noted that certifying cost and pricing data posed more of a barrier to companies new to government business. One respondent went on to explain, "For a new or small business starting out, the overhead created makes you less competitive in the non-government commercial market." Another respondent observed that to comply a firm "must set up separate accounting system, and separate inventory". He continued, "If government and commercial ELVs are produced on the same production line, you can't certify the data."

Government Drawings and Specifications. Respondents saw this as a barrier due to special tracking and procedures. This was seen as more of a problem on systems not derived from government designs. One respondent urged, "Use final product or service specifications. Leave the "how" up to the supplier."

Government Internal Management Practices. Respondents explained this under the umbrella of "bureaucratic behavior". In the same general category were, "inability to get timely decisions" and "resistance to innovation". One respondent reflected, "A lot of specifications are generated that don't reflect the needs of the customer agency."

Analysis of Contributors to Higher Cost. In addition to degree of agreement or disagreement that an item contributed to higher acquisition costs, respondents were

asked to give reasons or examples supporting items scored 4 MILDLY AGREE or 5 STRONGLY AGREE.

Certified Cost and Pricing Data. Respondents specified costs of maintaining a separate accounting system and separate inventory. One respondent asserted, "the overhead created makes you less competitive in the non-government commercial market."

Government Drawing and Specifications. Respondents related that the increased expense to propose to government solicitations arose from the government attempting to specify how to perform versus performance requirements. One respondent said this, "forfeits value that the supplier could add."

Government Solicitation Too Detailed. Respondents said this drives costs "due to tracking and special procedures", and added no value to the product. Said one respondent, "It costs about $100,000 more per launch."

Government Internal Management Practices. Respondents cited time wasted due to turnover and inability to get timely decisions as bureaucratic behaviors contributing to cost.

Analysis of Negative Impacts

In addition to degree of agreement or disagreement that an item contributes to higher acquisition costs, respondents were asked to provide specific reasons or examples explaining each response coded 4 MILDLY AGREE, or 5 STRONGLY AGREE. The reasons given by respondents for the four items

with the highest response means were that barriers and cost drivers make industry less competitive.

Investigative Question 2

Investigative Question 2: What contractual clauses required by statute or executive branch policy does the commercial space-launch industry identify as barriers to contracting with the government?

Respondents were provided a list of clauses which currently may be required in space-launch contracts by statue or executive branch policy. They were asked, "Please review the list and identify any of the clauses which you consider:

(1) Are important barriers to commercial space-launch contracting, or

(2) Add additional cost to government contracts which would not be there with commercial contracting practices.

Please indicate the rationale for your answers. Feel free to use examples or anecdotes. Add as many additional pages as you require." The following statement appeared directly above the space provided, "This section is key to our process. Your response is crucial if we are to present a well-articulated position on streamlining space-launch acquisition."

Direct Responses. Although the importance of this section was emphasized in the cover letter and the interview process, only three responses directly addressed the

question, none of which provided the requested rationale. Responses are summarized in Table 26.

TABLE 26

Clauses Identified By Respondents As Barriers or Adding Cost

CLAUSES REQUIRED BY OR SUPPORTING STATUTE

| FAR Section | NOTES | TITLE |
|---|---|---|
| 52.204-2 | 2 | SECURITY REQUIREMENTS |
| 52.215-1 | 2 3 4 | EXAMINATION OF RECORDS BY COMPTROLLER GENERAL |
| 52.215-2 | 5 2 3 4 | AUDIT--NEGOTIATION |
| 52.215-23 | 5 2 3 4 | PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA |
| 52.215-25 | 5 2 4 | SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS |
| 52.216-7 | 5 | ALLOWABLE COST AND PAYMENT |
| 52.219-8 | 2 | UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS |
| 52.219-9 | 2 | SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN |
| 52.222-20 | 2 | WALSH-HEALEY PUBLIC CONTRACTS ACT |
| 52.222-35 | 2 | AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS |
| 52.222-36 | 2 | AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS |
| 52.222-37 | 2 | EMPLOYMENT RECORDS ON SPECIAL DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA |
| 52.230-3 | 1 3 | COST ACCOUNTING STANDARDS |
| 52.232-16 | 5 3 4 | PROGRESS PAYMENTS |
| 52.233-1 | 3 | DISPUTES |
| 52.233-3 | 3 4 | PROTEST AFTER AWARD - ALT I |
| 52.242-1 | 5 | NOTICE OF INTENT TO DISALLOW COSTS |
| 52.245-2 | 5 2 | GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS) |
| 52.248-1 | 4 | VALUE ENGINEERING |

| DFARS Section | NOTES | TITLE |
|---|---|---|
| 52.227-7013 | 5 2 | RIGHTS IN TECHNICAL DATA AND COMPUTER SOFTWARE |
| 52.227-7018 | 5 2 | RESTRICTIVE MARKINGS ON TECHNICAL DATA |
| 52.227-7029 | 5 2 | IDENTIFICATION OF TECHNICAL DATA |
| 52.227-7030 | 5 2 | TECHNICAL DATA--WITHHOLDING OF PAYMENT |
| 52.227-7031 | 5 2 | DATA REQUIREMENTS |
| 52.227-7036 | 5 2 | CERTIFICATION OF TECHNICAL DATA CONFORMITY |
| 52.227-7037 | 5 2 | VALIDATION OF RESTRICTIVE MARKINGS ON TECHNICAL DATA |
| 52.233-7000 | 5 | CERTIFICATION OF REQUESTS FOR ADJUSTMENT OF RELIEF EXCEEDING $100,000 |
| 52.242-7003 | 5 | CERTIFICATION OF INDIRECT COST |

CLAUSES ARISING UNDER EXECUTIVE BRANCH POLICY

| FAR Section | NOTES | TITLE |
|---|---|---|
| 52.230-4 | 1 3 | ADMINISTRATION OF COST ACCOUNTING STANDARDS |
| 52.232-1 | 2 | PAYMENTS |
| 52.232-9 | 4 | LIMITATIONS ON WITHHOLDING OF PAYMENTS |
| 52.232-22 | 5 | LIMITATION OF FUNDS |
| 52.243-1 | 3 | CHANGES--FIXED-PRICE |
| 52.244-1 | 4 | SUBCONTRACTS (FIXED-PRICE CONTRACTS) |
| 52.245-5 | 5 | GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS) |
| 52.246-25 | 4 | LIMITATION OF LIABILITY--SERVICES |
| 52.249-2 | 5 1 3 4 | TERMINATION FOR CONVENIENCE OF THE GOVERNMENT |

| | | | |
|---|---|---|---|
| | | | (FIXED-PRICE) |
| 52.249-8 | 5 | 3 | DEFAULT (FIXED-PRICE SUPPLY AND SERVICE) |

(Continued)
(Continued)

| DFARS Section | | | TITLE |
|---|---|---|---|
| 52.231-7000 | | 2 | SUPPLEMENTAL COST PRINCIPLES |
| 52.243-7001 | 5 | | PRICING ADJUSTMENTS |
| 52.271-7001 | 5 | 2 | RECOVERY OF NONRECURRING COSTS ON COMMERCIAL SALES OF DEFENSE PRODUCTS AND TECHNOLOGY AND OF ROYALTY FEES FOR USE OF DOD TECHNICAL DATA |

NOTES:
1. Clauses considered important barriers to commercial space-launch contracting by one firm.
2. Clauses considered to add additional cost to government contracts which would not be there with commercial contracting practices by the same firm as note 1.
3. Clauses recommended for waiver by Commercial Space Transportation Advisory Committee (COMSTAC) as of March, 1989.
4. Representative FAR clauses recommended by a second firm to be excluded from commercial ELV procurements by the government.
5. Clauses considered by a third firm to be either important barriers to commercial space-launch contracting, or to add additional cost to government contracts which would not be there with commercial contracting practices.

---

Other Responses. Other respondents commented as follows:

a. Look at all the clauses, only a handful are required. Determine whether they make sense on a case-by-case basis. Don't know why they're in there. In the launch business, commercial means the seller takes the risk. Add clauses back in one at a time. Ought to start with six or seven required clauses and make the PCO (procuring contracting officer) justify adding other clauses.

b. Nothing bothersome, just everyday operations. Already implemented approved systems, have certified costs, socio-economic provisions are a way of life. A lot of them protect the government. Could reduce costs some, but a lot of state governments have duplicative requirements. The government really shouldn't relax all the rules.

c. Not really qualified to respond. Getting other inputs would take a long time.

d. Other companies are in a better position to comment on the appropriateness of various specific

clauses. Certain clauses (e.g. affirmative action) might be certified in general for a contractor to become "GSA-approved." Otherwise, a simpler contract form should rely on commercial-like contracts that assume a body of law and a body of ethical practices that can be invoked for clear violation.

Investigative Question 3

Investigative Question 3: What potential benefits do U.S. commercial space-launch firms associate with the U.S. government adopting commercial-like contracting methods?

Benefits of Commercial-like Contracting. Respondents' degree of agreement or disagreement with statements about potential use of commercial-like contracting by the government were recorded on a five point scale. Items with the highest response means are listed in Table 27.

TABLE 27

Benefits of Commercial-like Contracting

| COMMERCIAL-LIKE FEATURE | MEAN |
|---|---|
| Industry Well-being Promoted | 4.5 |
| Acquisition Costs Reduced | 4.5 |
| Healthy Industry Offers Low Cost | 4.4 |
| Able to Quote Lower Prices | 4.3 |
| Cost of Securing Government Work Reduced | 4.3 |
| Cost of Managing Government Work Reduced | 4.2 |
| Contractors More Willing to Do Business | 4.0 |

Univariate analysis and qualitative support for the items listed in Table 27 follows:

Industry Well-being Promoted. Table 28 presents the respondent's degree of agreement or disagreement with the statement, "The well-being of the U.S. commercial space-launch industry would be promoted if the government used commercial-like contracts."

TABLE 28

Well-being Promoted by Commercial-Like Contracting

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 2 | 20.0 | 20.0 | 30.0 |
| Strongly Agree | 5 | 7 | 70.0 | 70.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .20 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ***** |
| 0 | 3.00 | |
| 2 | 4.00 | ********** |
| 7 | 5.00 | ********** |

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HISTOGRAM FREQUENCY

MEAN 4.500 STD DEV .972

VALID CASES 10 MISSING CASES 0

Acquisition Costs Reduced. Table 29 presents the respondent's degree of agreement or disagreement with the statement, "Acquisition costs to the government would be reduced if the government used commercial-like contracts."

TABLE 29

Acquisition Costs Reduced by Commercial-Like Contracting

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 2 | 20.0 | 20.0 | 30.0 |
| Strongly Agree | 5 | 7 | 70.0 | 70.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .20 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ***** |
| 0 | 3.00 | |
| 2 | 4.00 | ********** |
| 7 | 5.00 | ********** |

```
I....+....I....+....I....+....I....+....I....+....I
0         2         4         6         8         10
          HISTOGRAM FREQUENCY
```

MEAN 4.500 STD DEV .972

Healthy Industry Lowers Cost. Scaled responses to the statement, "A healthy U.S. commercial space-launch industry offers substantially lower costs to the government" is depicted in Table 30.

TABLE 30

Healthy Industry Offers Low Costs

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 20.0 |
| Mildly Agree | 4 | 2 | 20.0 | 20.0 | 40.0 |
| Strongly Agree | 5 | 6 | 60.0 | 60.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .20 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 0 | 2.00 | |
| 2 | 3.00 | ********** |
| 2 | 4.00 | ********** |
| 6 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I....+....I
0 2 4 6 8 10

HISTOGRAM FREQUENCY

MEAN 4.400 STD DEV .843

VALID CASES 10 MISSING CASES 0

Able to Quote Lower Prices. Scaled responses to the statement, "Space contractors would be able to quote lower prices if the government used commercial-like contracts." are depicted in Table 31.

TABLE 31

Able to Quote Lower Prices

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Not Agree/Disagree | 3 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 5 | 50.0 | 50.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 0 | 2.00 | |
| 1 | 3.00 | ********** |
| 5 | 4.00 | ********** |
| 4 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5
HISTOGRAM FREQUENCY

MEAN 4.300 STD DEV .675

VALID CASES 10 MISSING CASES 0

Costs of Securing Government Work Reduced. Scaled responses to the following statement, "Costs associated with securing government contracts would be reduced if the government used commercial-like contracts" are pictured in Table 32.

TABLE 32

Cost of Securing Government Work Reduced

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Not Agree/Disagree | 3 | 1 | 10.0 | 10.0 | 10.0 |
| Mildly Agree | 4 | 5 | 50.0 | 50.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 0 | 2.00 | |
| 1 | 3.00 | ********** |
| 5 | 4.00 | ********** |
| 4 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5

HISTOGRAM FREQUENCY

MEAN 4.300 STD DEV .675

VALID CASES 10 MISSING CASES 0

Costs of Managing Government Work Reduced. Scaled responses to the statement, "Costs associated with managing government contracts would be reduced if the government used commercial-like contracts" are depicted in Table 33.

TABLE 33

Cost of Managing Government Work Reduced

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 1 | 10.0 | 10.0 | 20.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 50.0 |
| Strongly Agree | 5 | 5 | 50.0 | 50.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 1 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 5 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5
HISTOGRAM FREQUENCY

MEAN 4.200 STD DEV 1.033

VALID CASES 10 MISSING CASES 0

Contractors More Willing to Do Business. Scaled responses to the statement, "Space contractors would be more willing to do business with the government if they used commercial-like contracts" are depicted in Table 34.

TABLE 34

Contractors More Willing to Do Business

| VALUE LABEL | VALUE | FREQUENCY | PERCENT | VALID PERCENT | CUM PERCENT |
|---|---|---|---|---|---|
| Mildly Disagree | 2 | 1 | 10.0 | 10.0 | 10.0 |
| Not Agree/Disagree | 3 | 2 | 20.0 | 20.0 | 30.0 |
| Mildly Agree | 4 | 3 | 30.0 | 30.0 | 60.0 |
| Strongly Agree | 5 | 4 | 40.0 | 40.0 | 100.0 |
| | TOTAL | 10 | 100.0 | 100.0 | |

| COUNT | MIDPOINT | ONE SYMBOL EQUALS APPROXIMATELY .10 OCCURRENCES |
|---|---|---|
| 0 | 1.00 | |
| 1 | 2.00 | ********** |
| 2 | 3.00 | ********** |
| 3 | 4.00 | ********** |
| 4 | 5.00 | ********** |

I....+....I....+....I....+....I....+....I....+....I
0 1 2 3 4 5

HISTOGRAM FREQUENCY

MEAN 4.000 STD DEV 1.054

VALID CASES 10 MISSING CASES 0

## Analysis of Commercial-Like Contracting Benefits

In addition to degree of agreement or disagreement with an item, respondents were asked to provide specific reasons or examples explaining each response coded 4 MILDLY AGREE, or 5 STRONGLY AGREE.

Analysis of Respondent Comments to Benefits of Commercial-Like Contracting

Respondent comments were analyzed for the "commercial-like" variables with response means above 3.9 listed in Table 27. Actual comments are listed in Appendix I.

Well-being Promoted by Commercial-Like Contracting. Respondents generally agreed that this would benefit the industry through lower prices and increased competition. Said one firm's representative, "The government's efforts in this area do promote the industry."

Acquisition Costs Reduced by Commercial-Like Contracting. Respondents generally felt that cost reductions would occur through lowered costs of compliance to burdensome reporting requirements and unnecessary paperwork.

Healthy Industry Offers Lower Costs. Most respondents felt this statement to be self-evident, due to increased competition of a "healthy" industry.

Cost of Securing Government Work Reduced. Reasoning was similar to that for lower quotes. One gave this example, "a commercial proposal is one inch thick versus six inches for a government proposal."

Costs of Securing Government Work Reduced. Responses echoed previous rational for cost benefits of commercial-like contracting, tied to expanding the supplier base. One respondent cited the MLV-II procurement as a recent example of cost savings attributable to government movement toward

commercial-like contracting. Another stated, "current practices make you hire more people."

Cost of Managing Government Work Reduced. No new rationale was given by respondents.

Contractors More Willing if Commercial-Like. Most respondents thought the rationale for agreeing with this statement was self-evident, particularly for contractors not currently doing government work, while one respondent stressed that "the government must handle contracts correctly, which requires a cultural change by the government".

Analysis of Open-ended Items

The remainder of the questionnaire dealt with perceptions of market forces (market size, competitive pressures, and barriers to entry), and factors other than government use of commercial-like contracting which might act to confound the relationship between the variable groups, or to reduce the effect size of the variable groups.

Perceptions of Market Forces. Market forces were addressed to gain explanations for factors which might obscure the affects of barriers and commercial-like variables on acquisition cost variables.

Two questions were posed to elicit perceptions of near-term demand:

What is your company's projection of the total (US and international) commercial space launch market? (in the next ten years). Respondents commented as follows:

a. Large satellites, 15 to 20 per year.

b. 5-10 per year.

c. 12-15/yr

d. 2 to 20 per year.

e. $3 billion per year.

Analysis. Only five respondents answered this item, including all three industry leaders. Estimates ranged from two to twenty launches in the larger payload range, with an overall average estimate of 12.4 launches per year.

Is that market sufficiently large to accommodate an expanded US launch industry? (EXPLAIN). Respondent comments are listed below:

a. No, if solely geostationary, more feasible if smaller satellites come in.

b. No. Supply already exceeds demand

c. No. We already found that out. Ariane captured half the market.

d. Not large enough to warrant investment.

e. Market will expand if prices fall.

f. Yes, if industry becomes more economical.

g. Each market segment only supports 2-3 players.

Analysis. Seven respondents answered this item, including the industry leaders. The industry leaders

answered no, one stating, "we already found that out. Ariane captured half the market." Other respondents were more hopeful about market expansion given favorable conditions of falling prices, or within certain market segments.

Respondent's perceptions of the degree of competition within the market were gathered from several items:

Do U.S. commercial space-launch firms compete with each other? (If YES, to what extent?). Nine firms responded as follows:

a. In medium class.

b. Very strong degree.

c. Yes, to the extent of payload overlap.

d. Medium range.

e. Substantial competition within payload class, often between high end of one and low end of the other.

f. U.S. firms compete mostly for U.S. government business.

g. Currently no competition because established firms want to maintain business as usual. 1960s technology satisfies the government, so why change? Not challenging Ariane.

h. Cooperate for general good, but compete fiercely for individual launches.

i. Yes vicious.

Analysis. All but one firm answered "yes", using adjectives such as, "substantial", "fierce", and "vicious" to describe competition within areas of payload overlap. The firm answering negatively cited failure on the part of industry leaders to challenge Ariane.

To what degree do U.S. commercial space-launch firms compete with foreign firms or governments? Seven firms responded:

a. Substantial. Ariane 1/2 world commercial market.

b. Very strong degree.

c. Fully.

d. Able to compete, but foreign subsidized.

e. Substantial.

f. No contest, we let them take over the market.

g. Not at all on US govt procurements.

Analysis. Industry leaders characterized the degree of competition with foreign firms or governments as strong or substantial. One firm observed that foreign firms were not allowed to compete for government launches, while another felt that U.S. firms offered no competition in the commercial market.

To what degree does foreign competition affect prices within the U.S. commercial space-launch industry? Five firms responded:

a. More than 50 percent of the market is open to foreign firms.

b. Strong impact on cost reduction initiatives

c. Strong effect. try to get the price down where you can win competition.

d. Half of European and U.S. commercial markets are available to each other.

e. They raise them - foreign not allowed to bid on US govt procurements, foreign prices are too

low to meet, so they lose commercial business to them, volume goes down, and prices go up.

Analysis. Two industry leaders felt that foreign competition had a strong effect on prices. Two firms remarked that half the U.S. and European commercial markets are open to each other. One firm offered the theory that the effect of foreign competition on U.S. commercial space-launch prices was to raise them by reducing the sales volume of the U.S. firms.

Respondent perceptions of barriers to market entry were gleaned from the following item:

What is the potential for new U.S. commercial ELV companies to enter the market? (What are some of the factors which limit the entry of new ELV firms into the Space-launch industry?). Eight firms responded as follows:

a. Little potential for GEO (Geostationary) orbits, more potential for lower.

b. The market is very thin - limited

c. Small potential, industry saturated, not growing.

d. Seriously limited. Takes too great an investment of resources.

e. Depends on entry prices, foreign competition, and government procurement practices.

f. ELVs are only one type of launch vehicle. Bureaucratic aversion to new entries.

g. Very low. Government requirements force companies to maintain large overhead. Government afraid to give new entries a chance.

h. 1500-2500 lb class, Heavy-Heavy class.

Analysis. Industry leaders felt the potential was low. Two other firms concurred in that assessment, citing too high investment costs, and high overheads for government business. One firm hypothesized dependence on, "entry prices, foreign competition, and government procurement practices." Two more firms identified government resistance to new ideas and new companies as a factor limiting entry.

Other Factors. Potential factors which might act to reduce the effect size or to confound the relationship of barriers and commercial-like variables to industry well-being were addressed by open-ended items.

What do you believe are the impacts of non-market economies (eg. USSR, PRC) on your future business? Seven firms responded:

a. State department can determine the destiny of the industry.

b. Depends on constraints by the government on their use.

c. Potentially very severe impact on loss of sales

d. Makes it more difficult to compete. Their vehicles are already built and paid for, so any price is good for them.

e. Substantial potential effects on price and market.

f. They can set prices arbitrarily, would ruin market if they were allowed to pay to launch our satellites.

g. Unknown.

Analysis. Respondents felt that if the state department allowed these countries market access, it could

easily eliminate the market for U.S. launch services, since these countries could set prices arbitrarily.

What factors pose the most significant threat to the economic well-being of the U.S. commercial space-launch industry? Eight firms responded:

a. Handling of non-market launches, declining commercial market.

b. Unfair international competition

c. If PRC, USSR allowed unconstrained access to the U.S. market, it will kill the industry with their subsidized prices.

d. Foreign subsidies.

e. 1) Subsidized foreign firms, 2) Government failure to buy on commercial basis, and 3) Inconsistent trade negotiations with non-market economies (e.g. waffling in Soviet and Chinese trade negotiations).

f. Bureaucratic inertia and resistance to new ideas and companies.

g. Government taking hands-off approach when a real market doesn't exist, R&D not being done, too many suppliers, too little market

h. Barriers to market entry reduce competition. Government unwilling to accept new entrants. Won't try to develop new sources.

Analysis. The industry leaders identified unconstrained market access to non-market economies, unfair (subsidized) international competition, and a declining commercial market as threats. Other firms identified the following additional threats:

1) barriers to market entry,

2) failure of government to buy on a commercial basis,

3) bureaucratic inertia and resistance to new ideas,

4) government taking a hands-off approach, and

5) too many suppliers for a small market.

How can the U.S. government best promote the well-being of the U.S. commercial space-launch industry?

Respondents gave the following comments:

a. Provide support to technology, provide infrastructure, and regulate the foreign entry.

b. Ranges need to be a means, not an end.

c. 1) Support component technology to improve reliability and performance while reducing costs, 2) Support of infrastructure--still 1950s upgraded to 1960s, 3) Consider commercial aspects of government vehicles in development, and 4) Allow for proper scheduling of the ranges by commercialization agreements.

d. Commercial purchasing of space goods, consistent multi-year funding, consistent trade policies, better access to ranges, streamline range procedures, and avoiding excess regulation.

e. Let the market-place decide who can compete, rather than the government.

f. Do the needed R&D, provide near-term launch opportunities to US companies,

g. Contract for commercial launches. Update ranges to handle increased traffic.

Analysis. Of seven firms responding to this item, six identified the need for an improved range infrastructure and access. Industry leaders suggested support for component technologies to improve reliability and performance while lowering costs. Other strategies identified were:

1) Consideration of commercial aspects of new government vehicles,

2) Commercial purchasing,

3) Providing research and development,

4) Consistent multi-year funding, and

5) Consistent trade policies.

How does the cost of insurance affect your firm's space-related business? Respondents commented as follows:

a. 1) Obligated by 1972 Space Convention agreement to insure against landing in other countries, but U.S. government lays this off on launch providers, 2) Insure launch site against damage, 3) Satellite launch insurance bought on the world market now runs 15 to 16 percent of the value insured. Competed against by Great Wall and the French who get a break on government-backed insurance.

b. Small effect. a small price to pay not to have to bet the corporation on a single launch.

c. High cost has to be passed on to customer.

d. Very significant. Premiums up to 20 to 25 percent range. Government must recognize the premiums or self-insure. No one in industry can afford to self-insure.

e. A minor factor, third party insurance is available and the price isn't too bad. Premiums depend on value and flight history.

f. Insurance can vary from 1% to 15% of the cost of each launch.

g. Not much of a problem for lower cost services, since rates driven by a percentage of hardware costs. Lower cost services will reduce rates by reducing losses to insurers.

h. Minor impact.

i. Minor to small payload class.

j. Negligible, but if the government self-insured, it would drive down the costs.

Analysis. All respondents addressed this item, but no consensus by industry leaders was evident. Two firms felt that insurance rates were high, while seven felt it had minor impact on their business. Several respondents remarked that lower cost vehicles and payloads were less affected by insurance rates. One firm noted that Ariane gets, "a break on government-backed insurance at reduced rates." Another firm suggested that if the government self-insured, rates would be driven down.

The commerciality of the space-launch product was addressed by responses to this item:

Are commercial ELVs essentially the same as those purchased by the government? (If NO, What are the differences?). Respondents commented as follows:

a. Fundamentally the same (engines, guidance), although some versions differ.

b. Yes. commercial may use different faring for payload.

c. No - many differences.

d. Yes.

e. Currently not, but should become more so.

f. Yes.

g. Yes, minor differences in some cases.

h. No, government ELVs more specialized, commercial are more standardized for communication satellite market.

Analysis. Eight responses were split nearly evenly between yes or no, independent of industry grouping. The "yes" answers admitted minor differences, while the "no" responses emphasized that commercial vehicles were more standardized.

The questionnaire treated government business practices as a whole, this item was intended to gauge the validity of that treatment:

What differences does your company experience in dealing with NASA and the DoD? Respondents commented as follows:

a. No difference, except deal with DoD on quasi-commercial basis, whereas NASA is much more commercial-like.

b. NASA has simplified the procurement process.

c. Payment, inspection, reporting.

d. None, almost identical.

e. More difference in NASA "code C" launches.

f. Neither has been helpful.

g. DoD better managed - more efficient, sharper people, better trained, know what they want - more professional.

h. Night and day. NASA writes RFPs [Request for Proposals] for NASA specifications, DoD considers whole market.

Analysis. Three respondents expressed perceptions that NASA was more commercial-like, while two preferred dealing with the DoD. One firm found "no difference" while another stated, "neither has been helpful." No relationship to industry group was apparent.

Summary

Ten of eleven U.S. commercial space-launch firms identified responded to the telephone interview questionnaire. Responses to attribute items separated the firms into three groups: 1) industry leaders, with either five percent or more of the market or one thousand or more employees in the firm's space-launch sector, 2) smaller companies, with 1 to 5 percent of the market, and 3) potential entrants, with less than one percent of the market. Larger, established firms tended to have a greater share of the market and mostly government business, while smaller, newer firms tended to have a lesser share of the market and mostly commercial business.

Barriers to contracting with the government were strongly associated by respondents with contributing to higher acquisition costs and negatively affecting the well-being of the U.S. commercial space industry. Respondents strongly associated government adoption of commercial-like contracting practices with reduced acquisition costs and positive well-being of the U.S. commercial space industry. The longer a firm had been in the business: 1) the less important they perceived the barriers, 2) the less they felt that those barriers contributed to higher acquisition cost to the government, 3) the less they felt those barriers negatively affected the well-being of the U.S. commercial space industry, and 4) the less beneficial they perceived commercial-like contracting practices to be. The more

commercial business a firm had: 1) the more important they perceived the barriers, 2) the more they felt that those barriers contributed to higher acquisition cost to the government, 3) the more they felt those barriers negatively affected the well-being of the U.S. commercial space industry, and 4) the more beneficial they perceived commercial-like contracting practices to be. The greater a firm's market share, the less they felt that the barriers negatively affected the well-being of the U.S. commercial space industry.

Respondents identified "certified cost and pricing data", "government drawings and specifications", and "government internal management practices" as important barriers to contracting with the government. Respondents identified those same barriers, plus "government solicitation too detailed" as contributing to higher acquisition costs and negatively affecting the commercial space industry. Qualitative comments about the barriers were listed and analyzed.

Only three respondents responded directly to the request to identify specific contractual clauses which act as barriers from a list of clauses required by statute or executive order.

Respondents identified potential benefits they associated with the U.S. government adopting commercial-like contracting methods. A summary of potential benefits

appears in Table 27. Qualitative comments about the potential benefits were listed and analyzed.

Respondents gave perceptions of market forces (market size, competitive pressures, and barriers to entry). They projected an average market of 12.4 launches per year in the larger satellite range. They felt that potential for market expansion was low in the larger satellite range, but better in the small satellite range. Respondent felt that vigorous competition existed in the areas of payload overlap within the U.S. market and with foreign firms. Most firms felt that foreign competition strongly affected prices. Potential for market entry was perceived to be low, depending on "entry prices, foreign competition, and government procurement practices".

Respondents identified factors other than government use of commercial-like contracting which might act to confound the relationship between the variable groups, or to reduce the effect size of the variable groups. Among those factors were the following:

1) unconstrained market access to non-market economies,

2) unfair (subsidized) international competition,

3) a declining commercial market,

4) barriers to market entry,

5) bureaucratic inertia and resistance to new ideas,

6) government taking a hands-off approach,

7) need for an improved range infrastructure and access,

8) support for component technologies to improve reliability and performance while lowering costs,

9) consideration of commercial aspects of new government vehicles,

10) providing research and development,

11) consistent multi-year funding, and

12) consistent trade policies.

Respondents lacked consensus about the affect of insurance rates, the commerciality of the space-launch product, and differences in dealing with NASA and the DoD.

# V. Conclusions and Recommendations

## Overview of Research

The Commercial Space Launch Act of 1984 encouraged the growth of a U.S. commercial space-launch industry. Executive policy initiatives beginning with Packard commission encourage the use of commercial purchasing practices by the government in the acquisition of commercial products. Commercial-like contracting includes emulation of commercial practices and removal of important barriers to contracting with the government. Some progress has been made by NASA and the DoD in the use of commercial-like contracting methods for the acquisition of government space-launch capacity, but industry representatives have indicated that further measures are needed.

The research problem was to determine what contracting policy changes implementing commercial-like contracting practices would benefit the commercial space-launch industry and government space-launch acquisition. To accomplish this, the most significant contractual barriers experienced by the industry in doing business with the government were identified.

The study investigated possible relationships between: 1) current barriers to doing business with the government and acquisition costs to the government, 2) current barriers to doing business with the government and the well-being of the commercial space-launch industry, 3) the use of

commercial-like contracting by the government and acquisition costs to the government, and 4) the use of commercial-like contracting by the government and the well-being of the commercial space-launch industry. A telephone interview instrument was developed to elicit quantitative and qualitative data addressing the hypothesized relationships from space-launch industry representatives.

The review of the literature emphasizes the importance of the research problem. To effectively implement expressed U.S. commercial space launch policy, policy makers must determine what contracting policy changes implementing commercial-like practices would benefit the commercial space-launch industry and federal space-launch acquisition.

A census of U.S. domestic suppliers of space-launch vehicles and services and potential new entrants was conducted by telephone interview. Ten of eleven firms responded to the interview questionnaire, including the three industry leaders. Quantitative analysis revealed very strong associations for the hypothesized relationships. Qualitative analysis supported the quantitative results.

This chapter discusses the importance of the telephone interview results. Hypothesized conclusions are discussed, followed by unhypothesized conclusions, and comparisons with qualitative results are drawn. Next, practical applications of the results are recommended. Finally, recommendations for follow-on study are made.

Importance of Interview Results

The nature of quantitative correlational research prevents inferences about causation. Inferences from the quantitative data are confined to strength of association, to the extent that respondent perceptions truly measure the variables under study.

Hypothesized Conclusions. Hypothesis testing led to the following conclusions:

1) government use of commercial-like contracting was very strongly associated by respondents with the positive well-being of the U.S. commercial space industry,

2) government use of commercial-like contracting was very strongly associated by respondents with lower acquisition costs to the government,

3) current barriers to contracting with the government was very strongly negatively associated with the well-being of the U.S. commercial space industry, and

4) current barriers to contracting with the government was very strongly associated with higher acquisition costs to the government.

To summarize these relationships, barriers were associated with higher costs and hurting the industry, while commercial-like contracting by the government was associated with lower costs and promoting the industry. While these associations are not surprising, it was nonetheless important to measure the phenomena statistically to provide policy makers a theoretical framework for decision-making.

Unhypothesized Conclusions. Industry leaders held different views than smaller firms and potential entrants. Industry leaders were characterized by being in the space-launch business over 30 years, having 1000 or more employees in the firm's space-launch sector, having most of their business with the government, and market shares above five percent (for those responding to that item). Variable groups had a smaller effect size for industry leaders. Respondents explained this as the result of being organizationally structured to do business with the government. That established members of an industry have a greater affinity for the status quo than newcomers is hardly surprising. These results may be important to bear in mind, however, when attempting to predict results of proposed changes.

Respondents identified a few barriers to contracting with the government as important. Respondents felt those same barriers add to acquisition costs without adding comparable value and hurt the industry by making it less competitive. Respondents felt strongly that commercial-like contracting practices promote the industry and lower acquisition costs to the government.

Only three respondents responded directly to the request to identify specific contractual clauses which act as barriers from a list of clauses required by statute or executive order. Although respondents were generally given adequate time to answer this item, they did not give the

specific kinds of inputs likely to influence policy makers. This reluctance could be related to larger firms (with greater staffing potential) having less interest in changing the status quo. At the same time, smaller firms (with less resources to devote to staffing such a detailed study) tended to have less government business, and may therefore be affected less by government contracting policy.

Respondents felt that competition within the industry was strong. Less confidence in the competitive pressure brought by foreign competitors was warranted from the responses given. Respondent self-interest seemed to play in the partially evasive responses given. The theory offered by one firm that foreign competition raises prices to the government appealed from an economic perspective. If the firms were guaranteed protection from foreign competition for U.S. government business, they have less incentive to drive down prices to compete with foreign firms such as Ariane. The age of the technology in use, together with high research and development costs would tend to keep the firms from developing more efficient, reliable systems to meet the foreign competition. Add to that the availability of surplus government hardware and the industry leaders' history of dealing with government procurement constraints, and the firms would have little incentive to respond to foreign competition with lower prices, since they don't have the flexibility to sustain the competition.

Practical Applications of Results

The practical application of the hypothesized results would be to pursue certain reductions of barriers and implementation of commercial-like contracting practices. Respondents identified important barriers to contracting with the government. Consideration should be given to removing the requirement for certified cost and pricing data and government drawings and specifications from government contracts for commercial space-launch vehicles and services. If the government could follow the advice of one respondent to, use "final product or service specifications" and "leave the "how" up to the supplier" this would facilitate shorter, simpler, less costly proposals, while allowing the supplier to add value otherwise forfeited. The conclusions support the following recommendations:

1) Buy on a commercial basis in terms of specification of performance only, and let the contractor decide how to perform.

2) Consider the product as commercial catalog pricing, and eliminate certified cost and pricing data when buying the commercial product.

3) Consider quantity buys of services to allow economies of scale in production.

4) Don't factor the effects of foreign competition into an estimation of market forces until the U.S. industry has a technological base from which to effectively compete, and shows sign of meeting foreign market prices.

5) Bear in mind that respondents perceived changes implementing commercial-like contracting practices to be beneficial to the industry as a whole, but more so to newcomers, so changes may be more or less effective, depending on what portion of the industry policy makers might attempt to foster.

6) Changing the way the government does business may be difficult to implement, since "the government must handle contracts correctly, which requires a cultural change by the government."

Recommendations for Further Study

A broader spectrum of the commercial space industry which includes satellite makers, rocket engine producers, and other space products was sampled and will be analyzed by the author using the same methodology. This will provide a broader perspective which may shed additional light on the potential effects on suppliers and customers of the commercial space-launch industry. The study could be replicated in other industries to determine the generalizeability of results.

A case study of government contracts for commercial launch could provide deeper understanding of specific benefits of contractual changes. The question of what really happens when a certain clause is modified or eliminated could be addressed. The extent of the differences between the commercial-like contracting

practices of the agencies could contribute to establishing more standardized business practices throughout the federal government.

Industry well-being is affected by many government policies other than contracting policy. The following areas merit further investigation by those interested in promoting the commercial space-launch industry: 1) commercial space-launch trade policy, 2) affects of insurance and governmental self-insurance 3) foreign space-launch industrial policy, and 4) need for an improved range infrastructure and access.

# Appendix A: Telephone Interview Questionnaire

*** All data is requested on a non-attribution basis. Complete anonymity of each respondent will be maintained. Results will be reported on an aggregate basis. ***

1. Some policies, regulations, or statutes may be seen as making business with government less desirable or more difficult than commercial business. For the questions below, please indicate, for each potential barrier, on a scale from 1 being STRONGLY DISAGREE to 5 being STRONGLY AGREE, the degree to which each potential barrier satisfies the statements listed across the top. After marking the scale, you will be asked to substantiate or give examples detailing reasons you 4 MILDLY AGREE or 5 STRONGLY AGREE.

| | STRONGLY DISAGREE 1 | MILDLY DISAGREE 2 | NEITHER AGREE NOR DISAGREE 3 | MILDLY AGREE 4 | STRONGLY AGREE 5 |
|---|---|---|---|---|---|
| POTENTIAL BARRIERS | (1) Represents an important BARRIER to contracting with the government | | (2) Contributes to higher acquisition costs | | (3) Negatively affects the well-being of the U.S. commercial space industry |
| a. Small business subcontracting plan | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| b. Certified cost & pricing data | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| c. Government drawings and specifications | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| d. Socio-economic clauses | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| e. Termination for convenience | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| f. Awards made on price alone vs past performance. | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| g. Government solicitation too detailed | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| h. Government oversight | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| i. Government oversight using FFRDC (Federally Funded R&D Centers) | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| j. Quality assurance by government inspectors | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| k. Government payment practices | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| l. Government delivery schedules | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| m. Insufficient proposal preparation time | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| n. Contract type | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| o. Contract quality requirements | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| p. Government personnel (Training, turnover, etc.) | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| q. Source selection process | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| r. Poor communication | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| s. Government data formats | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| t. Government internal management practices | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |
| u. Solicitation format | 1 2 3 4 5 | | 1 2 3 4 5 | | 1 2 3 4 5 |

2. Please provide specific reasons or examples explaining each response you coded 4 MILDLY AGREE, or 5 STRONGLY AGREE.

3. Rank, in descending order, the top three barriers listed above.

4. Does your firm experience any other barriers to contracting with the government that were not addressed above?

TELEPHONE INTERVIEW QUESTIONNAIRE

5. I will now read several statements which express beliefs about the relationships between several key ideas. Please indicate the degree of your agreement or disagreement with each statement on a scale ranging from 1 being STRONGLY DISAGREE, to 5 being STRONGLY AGREE. After marking the scale, you will be asked to substantiate or give examples detailing reasons you AGREE or DISAGREE.

| | STRONGLY DISAGREE | MILDLY DISAGREE | NEITHER AGREE NOR DISAGREE | MILDLY AGREE | STRONGLY AGREE |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| a. The well-being of the U.S. commercial space-launch industry would be protected if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |
| b. Acquisition costs to the government would be reduced if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |
| c. A healthy U.S. commercial space-launch industry offers substantially lower costs to the government. | | | | | 1 2 3 4 5 |
| d. Government quality assurance inspection is useful in the manufacturing process. | | | | | 1 2 3 4 5 |
| e. Government quality assurance inspection is useful in the range operation process. | | | | | 1 2 3 4 5 |
| f. There is less oversight by commercial customers than government customers. | | | | | 1 2 3 4 5 |
| g. Commercial practices vary from little or no oversight to control equal to that of the government. | | | | | 1 2 3 4 5 |
| h. Space-related R&D should be the responsibility of government | | | | | 1 2 3 4 5 |
| i. Industry could be incentivized to include space-related R&D as part of its responsibility if the government discontinued funding. | | | | | 1 2 3 4 5 |
| j. Space contractors find it more difficult to understand government contracts than commercial equivalents. | | | | | 1 2 3 4 5 |
| k. Space contractors would be more willing to do business with the government if they commercial-like contracts. | | | | | 1 2 3 4 5 |
| l. Space contractors would be able to quote lower prices if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |
| m. Space contractors would be able to deliver items faster if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |
| n. Costs associated with securing government contracts would be reduced if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |
| o. Costs associated with managing government contracts would be reduced if the government used commercial-like contracts. | | | | | 1 2 3 4 5 |

6. Please provide specific reasons or examples explaining each response you coded 4 MILDLY AGREE, or 5 STRONGLY AGREE.

7. What specific commercial-like features would most likely reduce the cost of government acquisition?

8. What do you see as the potential effects of government adoption of commercial-like contracting methods on the U.S. commercial space-launch industry?

9. If the government implemented commercial-like contracting practices, how would you feel if contractor remedies and rights were affected?

10. Which of the following categories apply to your firm?

a. ELV producer b. Other space products c. Space services d. Space components e. Other space-related_____

11. How many years has your company been a contractor in:

_____ space-related business (For ELV: space-launch? _____)

_____ commercial space-related business? (For ELV: commercial space-launch? _____)

12. How many employees does your space sector have?

_____ (For ELV: space-launch sector _____)

13. Please estimate the percentage of your space-related business over the last 5 years, based on actual contracts/agreements that comes from the following sources:

(For ELV: space-launch)

_____% U.S. Government? (_____%)

_____% U.S. private-sector firms? (_____%)

_____% Foreign governments? (_____%)

_____% International private enterprise? (_____%)

14. What would you estimate your company's share of the U.S. space-related market identified in item 10 to be?

_____% (For ELV: space-launch market share _____%)

(FOR NON-ELV PRODUCERS, SKIP TO ITEM 26.)

15. What is your company's projection of the total (US and international) commercial space launch market? (in the next ten years)

16. Is that market sufficiently large to accommodate an expanded US launch industry? (EXPLAIN)

17. Are commercial ELVs essentially the same as those purchased by the government? (If NO, What are the differences?)

18. What differences does your company experience in dealing with NASA and the DoD?

19. Do U.S. commercial space-launch firms compete with each other? (If YES, to what extent?)

20. To what degree do U.S. commercial space-launch firms compete with foreign firms or governments?

21. To what degree does foreign competition affect prices within the U.S. commercial space-launch industry?

22. What do you believe are the impacts of non-market economies (eg. USSR, PRC) on your future business?

23. What factors pose the most significant threat to the economic well-being of the U.S. commercial space-launch industry? (Please feel free to elaborate by example or anecdote).

24. How can the U.S. government best promote the well-being of the U.S. commercial space-launch industry? (consider also US launch ranges and the relevant effect and realistic importance of national security and civil space sector priorities on the ranges)

25. What is the potential for new U.S. commercial ELV companies to enter the market? (What are some of the factors which limit the entry of new ELV firms into the Space-launch industry?)

26. How does the cost of insurance affect your firm's space-related business?

27. Is there anything about the questionnaire or your answers that you would like to clarify?

**WRITTEN QUESTION**

TO: Lt Bryan Moon
c/o Dr. Rita Wells
AFIT/LSP

FAX #: (513) 255-8458

Attached is a list of clauses which currently may be required in space launch contracts by statute or executive branch policy. Please review the list. In the space below, please identify any of the clauses which you consider:

(1) Are important barriers to commercial space launch contracting, or

(2) Add additional cost to government contracts which would not be there with commercial contracting practices.

Please indicate the rationale for your answers. Feel free to use examples or anecdotes. Add as many additional pages as you require. After the telephone interview, return your answer by FAX to (513) 255-8485.

This section is key to our process. Your response is crucial if we are to present a well-articulated position on streamlining space-launch acquisition.

## LIST OF CLAUSES

CLAUSES REQUIRED BY OR SUPPORTING STATUTE

| FAR Section | TITLE |
|---|---|
| 52.203-1 | OFFICIALS NOT TO BENEFIT |
| 52.203-3 | GRATUITIES |
| 52.203-5 | COVENANT AGAINST CONTINGENT FEES |
| 52.203-6 | RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT |
| 52.203-7 | ANTI-KICKBACK PROCEDURES |
| 52.204-2 | SECURITY REQUIREMENTS |
| 52.208-1 | REQUIRED SOURCES FOR JEWEL BEARINGS AND RELATED ITEMS |
| 52.212-8 | DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS |
| 52.215-1 | EXAMINATION OF RECORDS BY COMPTROLLER GENERAL |
| 52.215-2 | AUDIT--NEGOTIATION |
| 52.215-23 | PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA |
| 52.215-25 | SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS |
| 52.216-7 | ALLOWABLE COST AND PAYMENT |
| 52.219-8 | UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS |
| 52.219-9 | SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN |
| 52.219-16 | LIQUIDATED DAMAGES--SMALL BUSINESS SUBCONTRACTING PLAN |
| 52.220-3 | UTILIZATION OF LABOR SURPLUS AREA CONCERNS |
| 52.220-4 | LABOR SURPLUS AREA SUBCONTRACTING PROGRAM |
| 52.222-20 | WALSH-HEALEY PUBLIC CONTRACTS ACT |
| 52.222-35 | AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS |
| 52.222-36 | AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS |
| 52.222-37 | EMPLOYMENT RECORDS ON SPECIAL DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA |
| 52.223-2 | CLEAN AIR AND WATER |
| 52.223-6 | DRUG-FREE WORKPLACE |
| 52.224-1 | PRIVACY ACT NOTIFICATION |
| 52.224-2 | PRIVACY ACT |
| 52.225-13 | RESTRICTIONS ON CONTRACTING WITH SANCTIONED PERSONS |
| 52.227-10 | FILING OF PATENT APPLICATIONS-CLASSIFIED SUBJECT MATTER |
| 52.230-3 | COST ACCOUNTING STANDARDS |
| 52.232-8 | DISCOUNTS FOR PROMPT PAYMENT |
| 52.232-16 | PROGRESS PAYMENTS |
| 52.232-17 | INTEREST |
| 52.232-23 | ASSIGNMENT OF CLAIMS - ALT I |
| 52.232-25 | PROMPT PAYMENT |
| 52.233-1 | DISPUTES |
| 52.233-3 | PROTEST AFTER AWARD - ALT I |
| 52.242-1 | NOTICE OF INTENT TO DISALLOW COSTS |
| 52.244-2 | SUBCONTRACTS (COST-REIMBURSEMENT AND LETTER CONTRACTS) |
| 52.245-2 | GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS) |
| 52.247-1 | COMMERCIAL BILL OF LADING NOTATIONS |
| 52.248-1 | VALUE ENGINEERING |

| DFARS Section | TITLE |
|---|---|
| 52.203-7001 | SPECIAL PROHIBITION ON EMPLOYMENT |
| 52.203-7002 | STATUTORY COMPENSATION PROHIBITIONS AND REPORTING REQUIREMENTS RELATING TO CERTAIN FORMER DEPARTMENT OF DEFENSE (DOD) EMPLOYEES |
| 52.204-7005 | OVERSEAS DISTRIBUTION OF DEFENSE CONTRACTS |

| | |
|---|---|
| 52.205-7000 | RELEASE OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS |
| 52.208-7000 | REQUIRED SOURCES FOR MINIATURE AND INSTRUMENT BALL BEARINGS |
| 52.208-7001 | REQUIRED SOURCES FOR PRECISION COMPONENTS FOR MECHANICAL TIME DEVICES |
| 52.208-7002 | REQUIRED SOURCES FOR HIGH-PURITY SILICON |
| 52.208-7003 | REQUIRED SOURCES FOR HIGH-CARBON FERROCHROME (HCF) |
| 52.208-7006 | REQUIRED SOURCES FOR ANTI-FRICTION BEARINGS |
| 52.210-7005 | ACQUISITION STREAMLINING |

| DFARS Section | TITLE |
|---|---|
| 52.215-7000 | AGGREGATE PRICING ADJUSTMENT |
| 52.219-7000 | SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN |
| 52.219-7003 | DETERMINING THE SET-ASIDE AWARD PRICE |
| 52.219-7009 | INCENTIVE PROGRAM FOR SUBCONTRACTING WITH SMALL AND SMALL DISADVANTAGED BUSINESS CONCERNS, HISTORICALLY BLACK COLLEGES AND UNIVERSITIES AND MINORITY INSTITUTIONS |
| 52.225-7001 | BUY AMERICAN ACT AND BALANCE OF PAYMENTS PROGRAM |
| 52.225-7008 | DUTY-FREE ENTRY - QUALIFYING COUNTRY AND PRODUCTS AND SUPPLIES |
| 52.225-7023 | RESTRICTION ON ACQUISITION OF FOREIGN MACHINE TOOLS |
| 52.227-7013 | RIGHTS IN TECHNICAL DATA AND COMPUTER SOFTWARE |
| 52.227-7018 | RESTRICTIVE MARKINGS ON TECHNICAL DATA |
| 52.227-7029 | IDENTIFICATION OF TECHNICAL DATA |
| 52.227-7030 | TECHNICAL DATA--WITHHOLDING OF PAYMENT |
| 52.227-7031 | DATA REQUIREMENTS |
| 52.227-7036 | CERTIFICATION OF TECHNICAL DATA CONFORMITY |
| 52.227-7037 | VALIDATION OF RESTRICTIVE MARKINGS ON TECHNICAL DATA |
| 52.231-7001 | PENALTIES FOR UNALLOWABLE COSTS |
| 52.233-7000 | CERTIFICATION OF REQUESTS FOR ADJUSTMENT OF RELIEF EXCEEDING $100,000 |
| 52.235-7004 | FREQUENCY AUTHORIZATION |
| 52.242-7001 | MATERIAL MANAGEMENT AND ACCOUNTING SYSTEM REQUIREMENTS AND STANDARDS |
| 52.242-7003 | CERTIFICATION OF INDIRECT COST |

<u>CLAUSES ARISING FROM EXECUTIVE BRANCH POLICY</u>

| FAR Section | TITLE |
|---|---|
| 52.202-1 | DEFINITIONS |
| 52.204-1 | APPROVAL OF CONTRACT |
| 52.209-6 | PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT |
| 52.215-33 | ORDER OF PRECEDENCE |
| 52.216-11 | COST CONTRACT--NO FEE |
| 52.216-8 | FIXED FEE |
| 52.219-13 | UTILIZATION OF WOMEN-OWNED SMALL BUSINESSES |
| 52.222-1 | NOTICE TO GOVERNMENT OF LABOR DISPUTES |
| 52.222-2 | PAYMENT FOR OVERTIME PREMIUMS |
| 52.222-26 | EQUAL OPPORTUNITY |
| 52.222-28 | EQUAL OPPORTUNITY PREAWARD CLEARANCE OF SUBCONTRACTS |
| 52.227-1 | AUTHORIZATION AND CONSENT |
| 52.227-2 | NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT |
| 52.228-5 | INSURANCE--WORK ON A GOVERNMENT INSTALLATION |
| 52.228-7 | INSURANCE--LIABILITY TO THIRD PERSONS |
| 52.229-3 | FEDERAL, STATE, AND LOCAL TAXES |

| | |
|---|---|
| 52.229-5 | TAXES--CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO |
| 52.230-4 | ADMINISTRATION OF COST ACCOUNTING STANDARDS |
| 52.232-1 | PAYMENTS |
| 52.232-9 | LIMITATIONS ON WITHHOLDING OF PAYMENTS |
| 52.232-11 | EXTRAS |
| 52.232-22 | LIMITATION OF FUNDS |
| 52.232-28 | ELECTRONIC FUNDS TRANSFER PAYMENT METHODS |
| 52.237-2 | PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT AND VEGETATION |
| 52.243-1 | CHANGES--FIXED-PRICE |
| 52.243-2 | CHANGES--COST-REIMBURSEMENT |
| 52.243-7 | NOTIFICATION OF CHANGES |
| 52.244-1 | SUBCONTRACTS (FIXED-PRICE CONTRACTS) |
| 52.245-5 | GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS) |
| 52.246-25 | LIMITATION OF LIABILITY--SERVICES |
| 52.249-2 | TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) |
| 52.249-6 | TERMINATION (COST-REIMBURSEMENT) |

| FAR Section | TITLE |
|---|---|
| 52.249-8 | DEFAULT (FIXED-PRICE SUPPLY AND SERVICE) |
| 52.249-14 | EXCUSABLE DELAYS |
| 52.252-2 | CLAUSES INCORPORATED BY REFERENCE |

| DFARS Section | TITLE |
|---|---|
| 52.203-7003 | DISPLAY OF HOTLINE POSTER |
| 52.204-7008 | TELECOMMUNICATIONS SECURITY EQUIPMENT, DEVICES, TECHNIQUES, AND SERVICES |
| 52.209-7001 | ACQUISITIONS FROM SUBCONTRACTORS SUBJECT TO ON-SITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY |
| 52.223-7001 | SAFETY PRECAUTIONS FOR AMMUNITION AND EXPLOSIVES |
| 52.223-7002 | CHANGE IN PLACE OF PERFORMANCE - AMMUNITION AND EXPLOSIVES |
| 52.223-7004 | HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA |
| 52.223-7005 | NOTICE OF RADIOACTIVE MATERIALS |
| 52.223-7500 | DRUG-FREE WORK FORCE (SEP 1988) |
| 52.225-7002 | QUALIFYING COUNTRY SOURCES AS SUBCONTRACTORS |
| 52.228-7006 | ACCIDENT REPORTING AND INVESTIGATION INVOLVING AIRCRAFT, MISSILES, AND SPACE LAUNCH VEHICLES |
| 52.231-7000 | SUPPLEMENTAL COST PRINCIPLES |
| 52.243-7001 | PRICING ADJUSTMENTS |
| 52.271-7001 | RECOVERY OF NONRECURRING COSTS ON COMMERCIAL SALES OF DEFENSE PRODUCTS AND TECHNOLOGY AND OF ROYALTY FEES FOR USE OF DOD TECHNICAL DATA |

## DEFINITIONS
## (as used in this questionnaire)

Commercial: non-governmental (Legislative History, Commercial Space Launch Act)

Commercial-like contracting: emulation of commercial purchasing methods to the extent possible in the purchase of products which may also be sold to domestic commercial firms, foreign governments, or

foreign firms (Cheney, Dick. Defense Management Report to the President, 12 June 1989).

Commercial space launch industry: United States domestic suppliers of government and/or commercial expendable launch vehicles or complete launch services. This includes suppliers of launch vehicle stages (Commercial Space Launch Act).

## Appendix B: Initial Alpha Reliability Analysis

RELIABILITY ANALYSIS OF VARIABLE GROUP "BARRIERS"

| | | |
|---|---|---|
| 1. | IA1 | Small Business Plan a Barrier |
| 2. | IB1 | Certified Cost & Pricing Data a Barrier |
| 3. | IC1 | Govt Drawings, Specs a Barrier |
| 4. | ID1 | Socio-Economic Clauses a Barrier |
| 5. | IE1 | Termination for Convenience a Barrier |
| 6. | IF1 | Award on Price Alone a Barrier |
| 7. | IG1 | Solicitation too Detailed a Barrier |
| 8. | IH1 | Government Oversight a Barrier |
| 9. | II1 | Govt Oversight Using FFRDCs a Barrier |
| 10. | IJ1 | QA by Govt Inspectors a Barrier |
| 11. | IK1 | Govt Payment Practices a Barrier |
| 12. | IL1 | Govt Delivery Schedules a Barrier |
| 13. | IM1 | Insuff. Proposal Prep Time a Barrier |
| 14. | IN1 | Contract Type a Barrier |
| 15. | IO1 | Contract Quality Req. a Barrier |
| 16. | IP1 | Government Personnel a Barrier |
| 17. | IQ1 | Source Selection Process a Barrier |
| 18. | IR1 | Poor Communication a Barrier |
| 19. | IS1 | Government Data Formats a Barrier |
| 20. | IT1 | Govt Internal Mgt Practice a Barrier |
| 21. | IU1 | Solicitation Format a Barrier |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA1 | 3.3000 | .9487 | 10.0 |
| 2. | IB1 | 4.2000 | 1.2293 | 10.0 |
| 3. | IC1 | 4.2000 | .7888 | 10.0 |
| 4. | ID1 | 3.2000 | 1.0328 | 10.0 |
| 5. | IE1 | 3.7000 | 1.2517 | 10.0 |
| 6. | IF1 | 3.5000 | .8498 | 10.0 |
| 7. | IG1 | 3.8000 | 1.2293 | 10.0 |
| 8. | IH1 | 3.7000 | 1.3375 | 10.0 |
| 9. | II1 | 3.8000 | .9189 | 10.0 |
| 10. | IJ1 | 3.3000 | 1.1595 | 10.0 |
| 11. | IK1 | 3.8000 | .7888 | 10.0 |
| 12. | IL1 | 2.9000 | .3162 | 10.0 |
| 13. | IM1 | 3.3000 | .8233 | 10.0 |
| 14. | IN1 | 3.3000 | 1.0593 | 10.0 |
| 15. | IO1 | 2.9000 | 1.2867 | 10.0 |
| 16. | IP1 | 3.3000 | .9487 | 10.0 |
| 17. | IQ1 | 3.5000 | .9718 | 10.0 |
| 18. | IR1 | 3.3000 | .6749 | 10.0 |
| 19. | IS1 | 3.4000 | .9661 | 10.0 |
| 20. | IT1 | 3.9000 | .9944 | 10.0 |
| 21. | IU1 | 3.1000 | .7379 | 10.0 |

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "BARRIERS"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA1 | 70.1000 | 123.8778 | .5125 | .8833 |
| IB1 | 69.2000 | 120.1778 | .5161 | .8835 |
| IC1 | 69.2000 | 122.4000 | .7206 | .8789 |
| ID1 | 70.2000 | 113.2889 | .9663 | .8691 |
| IE1 | 69.7000 | 122.6778 | .4096 | .8874 |
| IF1 | 69.9000 | 141.2111 | -.3136 | .9028 |
| IG1 | 69.6000 | 119.1556 | .5564 | .8820 |
| IH1 | 69.7000 | 118.2333 | .5356 | .8832 |
| II1 | 69.6000 | 131.6000 | .1497 | .8928 |
| IJ1 | 70.1000 | 111.8778 | .9123 | .8694 |
| IK1 | 69.6000 | 134.9333 | .0024 | .8950 |
| IL1 | 70.5000 | 134.9444 | .0756 | .8910 |
| IM1 | 70.1000 | 138.1000 | -.1642 | .8991 |
| IN1 | 70.1000 | 112.7667 | .9650 | .8687 |
| IO1 | 70.5000 | 111.8333 | .8125 | .8722 |
| IP1 | 70.1000 | 121.4333 | .6345 | .8799 |
| IQ1 | 69.9000 | 121.6556 | .6064 | .8806 |
| IR1 | 70.1000 | 124.7667 | .6883 | .8808 |
| IS1 | 70.0000 | 126.4444 | .3784 | .8871 |
| IT1 | 69.5000 | 121.8333 | .5821 | .8813 |
| IU1 | 70.3000 | 124.0111 | .6721 | .8805 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 21

ALPHA = 0.8888

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "ACQUISITION COST"

| | | |
|---|---|---|
| 1. | IA2 | Small Business Plan Adds to Acq. Cost |
| 2. | IB2 | Certified Cost & Pricing Data Adds Cost |
| 3. | IC2 | Govt Drawings, Specs Adds Cost |
| 4. | ID2 | Socio-Economic Clauses Add Costs |
| 5. | IE2 | Termination for Convenience Adds Cost |
| 6. | IF2 | Award on Price Alone Adds Cost |
| 7. | IG2 | Solicitation too Detailed Adds Cost |
| 8. | IH2 | Government Oversight Adds Cost |
| 9. | II2 | Govt Oversight Using FFRDCs Adds Cost |
| 10. | IJ2 | QA by Govt Inspectors Adds Cost |
| 11. | IK2 | Govt Payment Practices Adds Cost |
| 12. | IL2 | Govt Delivery Schedules Add Cost |
| 13. | IM2 | Insuff. Proposal Prep Time Adds Cost |
| 14. | IN2 | Contract Type Adds Cost |
| 15. | IO2 | Contract Quality Req. Add Costs |
| 16. | IP2 | Government Personnel Add Cost |
| 17. | IQ2 | Source Selection Process Adds Cost |
| 18. | IR2 | Poor Communication Adds Cost |
| 19. | IS2 | Government Data Formats Add Costs |
| 20. | IT2 | Govt Internal Mgt Practice Adds Cost |
| 21. | IU2 | Solicitation Format Adds Cost |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA2 | 3.9000 | .5676 | 10.0 |
| 2. | IB2 | 4.3000 | .9487 | 10.0 |
| 3. | IC2 | 4.3000 | .8233 | 10.0 |
| 4. | ID2 | 3.7000 | .9487 | 10.0 |
| 5. | IE2 | 3.4000 | 1.0750 | 10.0 |
| 6. | IF2 | 2.9000 | .8756 | 10.0 |
| 7. | IG2 | 4.2000 | 1.0328 | 10.0 |
| 8. | IH2 | 3.8000 | 1.3984 | 10.0 |
| 9. | II2 | 3.8000 | .9189 | 10.0 |
| 10. | IJ2 | 3.9000 | 1.1005 | 10.0 |
| 11. | IK2 | 3.7000 | 1.0593 | 10.0 |
| 12. | IL2 | 3.1000 | .3162 | 10.0 |
| 13. | IM2 | 3.1000 | .8756 | 10.0 |
| 14. | IN2 | 3.4000 | 1.0750 | 10.0 |
| 15. | IO2 | 3.7000 | 1.3375 | 10.0 |
| 16. | IP2 | 3.6000 | .8433 | 10.0 |
| 17. | IQ2 | 3.6000 | .8433 | 10.0 |
| 18. | IR2 | 3.3000 | .6749 | 10.0 |
| 19. | IS2 | 3.7000 | .8233 | 10.0 |
| 20. | IT2 | 4.0000 | 1.0541 | 10.0 |
| 21. | IU2 | 3.4000 | .6992 | 10.0 |

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "ACQUISITION COST"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA2 | 72.9000 | 122.3222 | .1929 | .8929 |
| IB2 | 72.5000 | 108.5000 | .7927 | .8781 |
| IC2 | 72.5000 | 111.3889 | .7481 | .8805 |
| ID2 | 73.1000 | 113.6556 | .5196 | .8860 |
| IE2 | 73.4000 | 110.9333 | .5731 | .8844 |
| IF2 | 73.9000 | 125.8778 | -.0803 | .9011 |
| IG2 | 72.6000 | 108.0444 | .7431 | .8790 |
| IH2 | 73.0000 | 107.1111 | .5528 | .8862 |
| II2 | 73.0000 | 121.7778 | .1205 | .8967 |
| IJ2 | 72.9000 | 106.9889 | .7409 | .8787 |
| IK2 | 73.1000 | 114.5444 | .4145 | .8894 |
| IL2 | 73.7000 | 125.7889 | -.1159 | .8954 |
| IM2 | 73.7000 | 118.4556 | .3066 | .8916 |
| IN2 | 73.4000 | 104.7111 | .8727 | .8744 |
| IO2 | 73.1000 | 107.6556 | .5629 | .8854 |
| IP2 | 73.2000 | 111.9556 | .6949 | .8817 |
| IQ2 | 73.2000 | 115.0667 | .5134 | .8863 |
| IR2 | 73.5000 | 114.7222 | .6839 | .8835 |
| IS2 | 73.1000 | 118.3222 | .3387 | .8906 |
| IT2 | 72.8000 | 111.0667 | .5801 | .8841 |
| IU2 | 73.4000 | 116.2667 | .5512 | .8860 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 21

ALPHA = 0.8914

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "INDUSTRY WELL-BEING"

| | | |
|---|---|---|
| 1. | IA3 | Small Business PLan Hurts the Industry |
| 2. | IB3 | Certified Cost & Pricing Data Hurts Ind. |
| 3. | IC3 | Govt Drawings, Specs Hurts Industry |
| 4. | ID3 | Socio-Economic Clauses Hurt Industry |
| 5. | IE3 | Termination for Convenience Hurts Ind. |
| 6. | IF3 | Award on Price Alone Hurts the Industry |
| 7. | IG3 | Solicitation too Detailed Hurts Ind. |
| 8. | IH3 | Government Oversight Hurts Industry |
| 9. | II3 | Govt Oversight Using FFRDCs Hurts Ind. |
| 10. | IJ3 | QA by Govt Inspectors Hurts Industry |
| 11. | IK3 | Govt Payment Practices Hurt Industry |
| 12. | IL3 | Govt Delivery Schedules Hurt Industry |
| 13. | IM3 | Insuff. Proposal Prep Time Hurts Ind. |
| 14. | IN3 | Contract Type Hurts Industry |
| 15. | IO3 | Contract Quality Req. Hurt Industry |
| 16. | IP3 | Government Personnel Hurt Industry |
| 17. | IQ3 | Source Selection Process Hurts Ind. |
| 18. | IR3 | Poor Communication Hurts Industry |
| 19. | IS3 | Government Data Formats Hurt Ind. |
| 20. | IT3 | Govt Internal Mgt Practice Hurts Ind |
| 21. | IU3 | Solicitation Format Hurts Industry |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA3 | 3.2000 | 1.1353 | 10.0 |
| 2. | IB3 | 4.0000 | 1.2472 | 10.0 |
| 3. | IC3 | 4.0000 | 1.1547 | 10.0 |
| 4. | ID3 | 3.1000 | 1.1005 | 10.0 |
| 5. | IE3 | 3.7000 | 1.2517 | 10.0 |
| 6. | IF3 | 3.7000 | .8233 | 10.0 |
| 7. | IG3 | 4.0000 | 1.0541 | 10.0 |
| 8. | IH3 | 3.2000 | 1.3166 | 10.0 |
| 9. | II3 | 3.6000 | 1.0750 | 10.0 |
| 10. | IJ3 | 3.3000 | 1.3375 | 10.0 |
| 11. | IK3 | 3.6000 | .9661 | 10.0 |
| 12. | IL3 | 2.9000 | .3162 | 10.0 |
| 13. | IM3 | 3.1000 | .8756 | 10.0 |
| 14. | IN3 | 3.4000 | 1.0750 | 10.0 |
| 15. | IO3 | 3.0000 | 1.3333 | 10.0 |
| 16. | IP3 | 3.3000 | .9487 | 10.0 |
| 17. | IQ3 | 3.6000 | .8433 | 10.0 |
| 18. | IR3 | 3.3000 | .6749 | 10.0 |
| 19. | IS3 | 3.7000 | .8233 | 10.0 |
| 20. | IT3 | 3.9000 | .9944 | 10.0 |
| 21. | IU3 | 3.3000 | .8233 | 10.0 |

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "INDUSTRY WELL-BEING"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA3 | 69.7000 | 159.1222 | .6331 | .9119 |
| IB3 | 68.9000 | 152.7667 | .7856 | .9079 |
| IC3 | 68.9000 | 154.5444 | .7895 | .9080 |
| ID3 | 69.8000 | 154.4000 | .8385 | .9070 |
| IE3 | 69.2000 | 161.5111 | .4862 | .9158 |
| IF3 | 69.2000 | 180.8444 | -.1345 | .9252 |
| IG3 | 68.9000 | 156.3222 | .8009 | .9082 |
| IH3 | 69.7000 | 160.9000 | .4764 | .9163 |
| II3 | 69.3000 | 173.5667 | .1349 | .9228 |
| IJ3 | 69.6000 | 147.3778 | .9047 | .9042 |
| IK3 | 69.3000 | 171.7889 | .2299 | .9201 |
| IL3 | 70.0000 | 178.4444 | .0000 | .9201 |
| IM3 | 69.8000 | 169.5111 | .3626 | .9173 |
| IN3 | 69.5000 | 152.2778 | .9465 | .9046 |
| IO3 | 69.9000 | 155.8778 | .6274 | .9122 |
| IP3 | 69.6000 | 163.3778 | .5883 | .9130 |
| IQ3 | 69.3000 | 164.9000 | .5972 | .9131 |
| IR3 | 69.6000 | 164.4889 | .7855 | .9111 |
| IS3 | 69.2000 | 168.4000 | .4430 | .9158 |
| IT3 | 69.0000 | 160.6667 | .6699 | .9113 |
| IU3 | 69.6000 | 163.8222 | .6664 | .9120 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 21

ALPHA = 0.9173

INITIAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "COMMERCIAL-LIKE"

| | | |
|---|---|---|
| 1. | VA | Well-being Promoted by Comm-Like |
| 2. | VB | Costs Reduced by Commercial-Like |
| 3. | VC | Healthy Industry offers Low Costs |
| 4. | VF | Commercial Customer Oversees Less |
| 5. | VJ | Government Contracts More Difficult |
| 6. | VK | More Willing on Commercial Basis |
| 7. | VL | ble to Quote Lower if Comm-Like |
| 8. | VM | Able to Deliver Faster if Comm-Like |
| 9. | VN | Cost of Securing Govt Work Reduced |
| 10. | VO | Cost of Managing Govt Work Reduced |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | VA | 4.5000 | .9718 | 10.0 |
| 2. | VB | 4.5000 | .9718 | 10.0 |
| 3. | VC | 4.4000 | .8433 | 10.0 |
| 4. | VF | 4.0000 | 1.2472 | 10.0 |
| 5. | VJ | 3.1000 | 1.3703 | 10.0 |
| 6. | VK | 4.0000 | 1.0541 | 10.0 |
| 7. | VL | 4.3000 | .6749 | 10.0 |
| 8. | VM | 3.5000 | 1.2693 | 10.0 |
| 9. | VN | 4.3000 | .6749 | 10.0 |
| 10. | VO | 4.2000 | 1.0328 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| VA | 36.3000 | 51.5667 | .8200 | .9114 |
| VB | 36.3000 | 51.5667 | .8200 | .9114 |
| VC | 36.4000 | 55.8222 | .5890 | .9230 |
| VF | 36.8000 | 52.8444 | .5270 | .9296 |
| VJ | 37.7000 | 49.7889 | .6355 | .9249 |
| VK | 36.8000 | 51.9556 | .7166 | .9166 |
| VL | 36.5000 | 53.8333 | .9760 | .9102 |
| VM | 37.3000 | 50.4556 | .6593 | .9216 |
| VN | 36.5000 | 53.8333 | .9760 | .9102 |
| VO | 36.6000 | 50.7111 | .8279 | .9105 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 10

ALPHA = 0.9246

## Appendix C: Optimal Alpha Reliability Analysis

RELIABILITY ANALYSIS OF VARIABLE GROUP "BARRIERS"

| | | |
|---|---|---|
| 1. | IC1 | Govt Drawings, Specs a Barrier |
| 2. | ID1 | Socio-Economic Clauses a Barrier |
| 3. | IN1 | Contract Type a Barrier |
| 4. | IO1 | Contract Quality Req. a Barrier |
| 5. | IP1 | Government Personnel a Barrier |
| 6. | IQ1 | Source Selection Process a Barrier |
| 7. | IR1 | Poor Communication a Barrier |
| 8. | IT1 | Govt Internal Mgt Practice a Barrier |
| 9. | IU1 | Solicitation Format a Barrier |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IC1 | 4.2000 | .7888 | 10.0 |
| 2. | ID1 | 3.2000 | 1.0328 | 10.0 |
| 3. | IN1 | 3.3000 | 1.0593 | 10.0 |
| 4. | IO1 | 2.9000 | 1.2867 | 10.0 |
| 5. | IP1 | 3.3000 | .9487 | 10.0 |
| 6. | IQ1 | 3.5000 | .9718 | 10.0 |
| 7. | IR1 | 3.3000 | .6749 | 10.0 |
| 8. | IT1 | 3.9000 | .9944 | 10.0 |
| 9. | IU1 | 3.1000 | .7379 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IC1 | 26.5000 | 40.5000 | .5976 | .9262 |
| ID1 | 27.5000 | 34.7222 | .9311 | .9048 |
| IN1 | 27.4000 | 34.2667 | .9461 | .9035 |
| IO1 | 27.8000 | 34.1778 | .7504 | .9207 |
| IP1 | 27.4000 | 38.7111 | .6363 | .9244 |
| IQ1 | 27.2000 | 38.1778 | .6661 | .9227 |
| IR1 | 27.4000 | 40.0444 | .7752 | .9190 |
| IT1 | 26.8000 | 38.1778 | .6474 | .9240 |
| IU1 | 27.6000 | 39.3778 | .7775 | .9178 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 9

ALPHA = 0.9268

OPTIMAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "ACQUISITION COST"

| | | |
|---|---|---|
| 1. | IB2 | Certified Cost & Pricing Data Adds Cost |
| 2. | IC2 | Govt Drawings, Specs Adds Cost |
| 3. | IE2 | Termination for Convenience Adds Cost |
| 4. | IG2 | Solicitation too Detailed Adds Cost |
| 5. | IH2 | Government Oversight Adds Cost |
| 6. | IJ2 | QA by Govt Inspectors Adds Cost |
| 7. | IK2 | Govt Payment Practices Adds Cost |
| 8. | IN2 | Contract Type Adds Cost |
| 9. | IO2 | Contract Quality Req. Add Costs |
| 10. | IP2 | Government Personnel Add Cost |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IB2 | 4.3000 | .9487 | 10.0 |
| 2. | IC2 | 4.3000 | .8233 | 10.0 |
| 3. | IE2 | 3.4000 | 1.0750 | 10.0 |
| 4. | IG2 | 4.2000 | 1.0328 | 10.0 |
| 5. | IH2 | 3.8000 | 1.3984 | 10.0 |
| 6. | IJ2 | 3.9000 | 1.1005 | 10.0 |
| 7. | IK2 | 3.7000 | 1.0593 | 10.0 |
| 8. | IN2 | 3.4000 | 1.0750 | 10.0 |
| 9. | IO2 | 3.7000 | 1.3375 | 10.0 |
| 10. | IP2 | 3.6000 | .8433 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IB2 | 34.0000 | 61.3333 | .6132 | .9261 |
| IC2 | 34.0000 | 59.5556 | .8744 | .9160 |
| IE2 | 34.9000 | 58.5444 | .7079 | .9215 |
| IG2 | 34.1000 | 59.8778 | .6507 | .9244 |
| IH2 | 34.5000 | 53.1667 | .7955 | .9179 |
| IJ2 | 34.4000 | 56.0444 | .8550 | .9136 |
| IK2 | 34.6000 | 59.3778 | .6642 | .9237 |
| IN2 | 34.9000 | 57.8778 | .7527 | .9192 |
| IO2 | 34.6000 | 54.0444 | .7888 | .9178 |
| IP2 | 34.7000 | 62.6778 | .5958 | .9270 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 10

ALPHA = 0.9282

OPTIMAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "INDUSTRY WELL-BEING"

| | | |
|---|---|---|
| 1. | IB3 | Certified Cost & Pricing Data Hurts Ind. |
| 2. | IC3 | Govt Drawings, Specs Hurts Industry |
| 3. | ID3 | Socio-Economic Clauses Hurt Industry |
| 4. | IG3 | Solicitation too Detailed Hurts Ind. |
| 5. | IJ3 | QA by Govt Inspectors Hurts Industry |
| 6. | IN3 | Contract Type Hurts Industry |
| 7. | IQ3 | Source Selection Process Hurts Ind. |
| 8. | IR3 | Poor Communication Hurts Industry |
| 9. | IT3 | Govt Internal Mgt Practice Hurts Ind |
| 10. | IU3 | Solicitation Format Hurts Industry |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IB3 | 4.0000 | 1.2472 | 10.0 |
| 2. | IC3 | 4.0000 | 1.1547 | 10.0 |
| 3. | ID3 | 3.1000 | 1.1005 | 10.0 |
| 4. | IG3 | 4.0000 | 1.0541 | 10.0 |
| 5. | IJ3 | 3.3000 | 1.3375 | 10.0 |
| 6. | IN3 | 3.4000 | 1.0750 | 10.0 |
| 7. | IQ3 | 3.6000 | .8433 | 10.0 |
| 8. | IR3 | 3.3000 | .6749 | 10.0 |
| 9. | IT3 | 3.9000 | .9944 | 10.0 |
| 10. | IU3 | 3.3000 | .8233 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IB3 | 31.9000 | 58.3222 | .7816 | .9430 |
| IC3 | 31.9000 | 60.1000 | .7447 | .9443 |
| ID3 | 32.8000 | 60.8444 | .7404 | .9442 |
| IG3 | 31.9000 | 60.7667 | .7843 | .9421 |
| IJ3 | 32.6000 | 54.7111 | .9232 | .9358 |
| IN3 | 32.5000 | 58.2778 | .9342 | .9352 |
| IQ3 | 32.3000 | 65.1222 | .6564 | .9474 |
| IR3 | 32.6000 | 65.1556 | .8402 | .9431 |
| IT3 | 32.0000 | 61.3333 | .7990 | .9416 |
| IU3 | 32.6000 | 64.4889 | .7260 | .9451 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 10

ALPHA = 0.9478

OPTIMAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "COMMERCIAL-LIKE"

| | | |
|---|---|---|
| 1. | VA | Well-being Promoted by Comm-Like |
| 2. | VB | Costs Reduced by Commercial-Like |
| 3. | VL | ble to Quote Lower if Comm-Like |
| 4. | VN | Cost of Securing Govt Work Reduced |
| 5. | VO | Cost of Managing Govt Work Reduced |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | VA | 4.5000 | .9718 | 10.0 |
| 2. | VB | 4.5000 | .9718 | 10.0 |
| 3. | VL | 4.3000 | .6749 | 10.0 |
| 4. | VN | 4.3000 | .6749 | 10.0 |
| 5. | VO | 4.2000 | 1.0328 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| VA | 17.3000 | 9.7889 | .8953 | .9353 |
| VB | 17.3000 | 9.7889 | .8953 | .9353 |
| VL | 17.5000 | 11.6111 | .8938 | .9416 |
| VN | 17.5000 | 11.6111 | .8938 | .9416 |
| VO | 17.6000 | 9.6000 | .8611 | .9444 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 5

ALPHA = 0.9512

## Appendix D: Final Alpha Reliability Analysis

RELIABILITY ANALYSIS OF VARIABLE GROUP "BARRIERS"

| | | |
|---|---|---|
| 1. | IA1 | Small Business Plan a Barrier |
| 2. | IB1 | Certified Cost & Pricing Data a Barrier |
| 3. | IC1 | Govt Drawings, Specs a Barrier |
| 4. | ID1 | Socio-Economic Clauses a Barrier |
| 5. | IE1 | Termination for Convenience a Barrier |
| 6. | IG1 | Solicitation too Detailed a Barrier |
| 7. | IH1 | Government Oversight a Barrier |
| 8. | II1 | Govt Oversight Using FFRDCs a Barrier |
| 9. | IJ1 | QA by Govt Inspectors a Barrier |
| 10. | IK1 | Govt Payment Practices a Barrier |
| 11. | IL1 | Govt Delivery Schedules a Barrier |
| 12. | IM1 | Insuff. Proposal Prep Time a Barrier |
| 13. | IN1 | Contract Type a Barrier |
| 14. | IO1 | Contract Quality Req. a Barrier |
| 15. | IP1 | Government Personnel a Barrier |
| 16. | IQ1 | Source Selection Process a Barrier |
| 17. | IR1 | Poor Communication a Barrier |
| 18. | IS1 | Government Data Formats a Barrier |
| 19. | IT1 | Govt Internal Mgt Practice a Barrier |
| 20. | IU1 | Solicitation Format a Barrier |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA1 | 3.3000 | .9487 | 10.0 |
| 2. | IB1 | 4.2000 | 1.2293 | 10.0 |
| 3. | IC1 | 4.2000 | .7888 | 10.0 |
| 4. | ID1 | 3.2000 | 1.0328 | 10.0 |
| 5. | IE1 | 3.7000 | 1.2517 | 10.0 |
| 6. | IG1 | 3.8000 | 1.2293 | 10.0 |
| 7. | IH1 | 3.7000 | 1.3375 | 10.0 |
| 8. | II1 | 3.8000 | .9189 | 10.0 |
| 9. | IJ1 | 3.3000 | 1.1595 | 10.0 |
| 10. | IK1 | 3.8000 | .7888 | 10.0 |
| 11. | IL1 | 2.9000 | .3162 | 10.0 |
| 12. | IM1 | 3.3000 | .8233 | 10.0 |
| 13. | IN1 | 3.3000 | 1.0593 | 10.0 |
| 14. | IO1 | 2.9000 | 1.2867 | 10.0 |
| 15. | IP1 | 3.3000 | .9487 | 10.0 |
| 16. | IQ1 | 3.5000 | .9718 | 10.0 |
| 17. | IR1 | 3.3000 | .6749 | 10.0 |
| 18. | IS1 | 3.4000 | .9661 | 10.0 |
| 19. | IT1 | 3.9000 | .9944 | 10.0 |
| 20. | IU1 | 3.1000 | .7379 | 10.0 |

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "BARRIERS"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA1 | 66.6000 | 128.9333 | .5281 | .8984 |
| IB1 | 65.7000 | 124.9000 | .5386 | .8985 |
| IC1 | 65.7000 | 127.5667 | .7308 | .8944 |
| ID1 | 66.7000 | 118.6778 | .9540 | .8863 |
| IE1 | 66.2000 | 127.9556 | .4128 | .9027 |
| IG1 | 66.1000 | 123.4333 | .5955 | .8966 |
| IH1 | 66.2000 | 123.0667 | .5512 | .8985 |
| II1 | 66.1000 | 136.5444 | .1780 | .9067 |
| IJ1 | 66.6000 | 117.1556 | .9048 | .8866 |
| IK1 | 66.1000 | 140.3222 | .0143 | .9090 |
| IL1 | 67.0000 | 140.6667 | .0593 | .9055 |
| IM1 | 66.6000 | 144.0444 | -.1777 | .9132 |
| IN1 | 66.6000 | 118.2667 | .9471 | .8862 |
| IO1 | 67.0000 | 117.5556 | .7885 | .8899 |
| IP1 | 66.6000 | 126.4889 | .6477 | .8953 |
| IQ1 | 66.4000 | 127.1556 | .5982 | .8965 |
| IR1 | 66.6000 | 130.7111 | .6508 | .8969 |
| IS1 | 66.5000 | 131.8333 | .3806 | .9021 |
| IT1 | 66.0000 | 127.1111 | .5847 | .8969 |
| IU1 | 66.8000 | 129.5111 | .6642 | .8962 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 20

ALPHA = 0.9028

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "ACQUISITION COST"

| | | |
|---|---|---|
| 1. | IA2 | Small Business Plan Adds to Acq. Cost |
| 2. | IB2 | Certified Cost & Pricing Data Adds Cost |
| 3. | IC2 | Govt Drawings, Specs Adds Cost |
| 4. | ID2 | Socio-Economic Clauses Add Costs |
| 5. | IE2 | Termination for Convenience Adds Cost |
| 6. | IG2 | Solicitation too Detailed Adds Cost |
| 7. | IH2 | Government Oversight Adds Cost |
| 8. | II2 | Govt Oversight Using FFRDCs Adds Cost |
| 9. | IJ2 | QA by Govt Inspectors Adds Cost |
| 10. | IK2 | Govt Payment Practices Adds Cost |
| 11. | IL2 | Govt Delivery Schedules Add Cost |
| 12. | IM2 | Insuff. Proposal Prep Time Adds Cost |
| 13. | IN2 | Contract Type Adds Cost |
| 14. | IO2 | Contract Quality Req. Add Costs |
| 15. | IP2 | Government Personnel Add Cost |
| 16. | IQ2 | Source Selection Process Adds Cost |
| 17. | IR2 | Poor Communication Adds Cost |
| 18. | IS2 | Government Data Formats Add Costs |
| 19. | IT2 | Govt Internal Mgt Practice Adds Cost |
| 20. | IU2 | Solicitation Format Adds Cost |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA2 | 3.9000 | .5676 | 10.0 |
| 2. | IB2 | 4.3000 | .9487 | 10.0 |
| 3. | IC2 | 4.3000 | .8233 | 10.0 |
| 4. | ID2 | 3.7000 | .9487 | 10.0 |
| 5. | IE2 | 3.4000 | 1.0750 | 10.0 |
| 6. | IG2 | 4.2000 | 1.0328 | 10.0 |
| 7. | IH2 | 3.8000 | 1.3984 | 10.0 |
| 8. | II2 | 3.8000 | .9189 | 10.0 |
| 9. | IJ2 | 3.9000 | 1.1005 | 10.0 |
| 10. | IK2 | 3.7000 | 1.0593 | 10.0 |
| 11. | IL2 | 3.1000 | .3162 | 10.0 |
| 12. | IM2 | 3.1000 | .8756 | 10.0 |
| 13. | IN2 | 3.4000 | 1.0750 | 10.0 |
| 14. | IO2 | 3.7000 | 1.3375 | 10.0 |
| 15. | IP2 | 3.6000 | .8433 | 10.0 |
| 16. | IQ2 | 3.6000 | .8433 | 10.0 |
| 17. | IR2 | 3.3000 | .6749 | 10.0 |
| 18. | IS2 | 3.7000 | .8233 | 10.0 |
| 19. | IT2 | 4.0000 | 1.0541 | 10.0 |
| 20. | IU2 | 3.4000 | .6992 | 10.0 |

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "ACQUISITION COST"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA2 | 70.0000 | 123.3333 | .1763 | .9032 |
| IB2 | 69.6000 | 109.3778 | .7862 | .8894 |
| IC2 | 69.6000 | 111.8222 | .7683 | .8909 |
| ID2 | 70.2000 | 114.8444 | .4984 | .8973 |
| IE2 | 70.5000 | 112.0556 | .5566 | .8957 |
| IG2 | 69.7000 | 108.9000 | .7381 | .8902 |
| IH2 | 70.1000 | 107.4333 | .5688 | .8967 |
| II2 | 70.1000 | 122.9889 | .1003 | .9073 |
| IJ2 | 70.0000 | 107.1111 | .7707 | .8889 |
| IK2 | 70.2000 | 114.6222 | .4467 | .8990 |
| IL2 | 70.8000 | 126.6222 | -.1187 | .9053 |
| IM2 | 70.8000 | 119.0667 | .3163 | .9017 |
| IN2 | 70.5000 | 105.6111 | .8650 | .8860 |
| IO2 | 70.2000 | 108.1778 | .5719 | .8962 |
| IP2 | 70.3000 | 112.6778 | .6976 | .8924 |
| IQ2 | 70.3000 | 116.0111 | .5040 | .8971 |
| IR2 | 70.6000 | 115.6000 | .6768 | .8942 |
| IS2 | 70.2000 | 119.2889 | .3287 | .9012 |
| IT2 | 69.9000 | 111.4333 | .5991 | .8944 |
| IU2 | 70.5000 | 116.9444 | .5584 | .8964 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 20

ALPHA = 0.9011

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "INDUSTRY WELL-BEING"

| | | |
|---|---|---|
| 1. | IA3 | Small Business PLan Hurts the Industry |
| 2. | IB3 | Certified Cost & Pricing Data Hurts Ind. |
| 3. | IC3 | Govt Drawings, Specs Hurts Industry |
| 4. | ID3 | Socio-Economic Clauses Hurt Industry |
| 5. | IE3 | Termination for Convenience Hurts Ind. |
| 6. | IG3 | Solicitation too Detailed Hurts Ind. |
| 7. | IH3 | Government Oversight Hurts Industry |
| 8. | II3 | Govt Oversight Using FFRDCs Hurts Ind. |
| 9. | IJ3 | QA by Govt Inspectors Hurts Industry |
| 10. | IK3 | Govt Payment Practices Hurt Industry |
| 11. | IL3 | Govt Delivery Schedules Hurt Industry |
| 12. | IM3 | Insuff. Proposal Prep Time Hurts Ind. |
| 13. | IN3 | Contract Type Hurts Industry |
| 14. | IO3 | Contract Quality Req. Hurt Industry |
| 15. | IP3 | Government Personnel Hurt Industry |
| 16. | IQ3 | Source Selection Process Hurts Ind. |
| 17. | IR3 | Poor Communication Hurts Industry |
| 18. | IS3 | Government Data Formats Hurt Ind. |
| 19. | IT3 | Govt Internal Mgt Practice Hurts Ind |
| 20. | IU3 | Solicitation Format Hurts Industry |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | IA3 | 3.2000 | 1.1353 | 10.0 |
| 2. | IB3 | 4.0000 | 1.2472 | 10.0 |
| 3. | IC3 | 4.0000 | 1.1547 | 10.0 |
| 4. | ID3 | 3.1000 | 1.1005 | 10.0 |
| 5. | IE3 | 3.7000 | 1.2517 | 10.0 |
| 6. | IG3 | 4.0000 | 1.0541 | 10.0 |
| 7. | IH3 | 3.2000 | 1.3166 | 10.0 |
| 8. | II3 | 3.6000 | 1.0750 | 10.0 |
| 9. | IJ3 | 3.3000 | 1.3375 | 10.0 |
| 10. | IK3 | 3.6000 | .9661 | 10.0 |
| 11. | IL3 | 2.9000 | .3162 | 10.0 |
| 12. | IM3 | 3.1000 | .8756 | 10.0 |
| 13. | IN3 | 3.4000 | 1.0750 | 10.0 |
| 14. | IO3 | 3.0000 | 1.3333 | 10.0 |
| 15. | IP3 | 3.3000 | .9487 | 10.0 |
| 16. | IQ3 | 3.6000 | .8433 | 10.0 |
| 17. | IR3 | 3.3000 | .6749 | 10.0 |
| 18. | IS3 | 3.7000 | .8233 | 10.0 |
| 19. | IT3 | 3.9000 | .9944 | 10.0 |
| 20. | IU3 | 3.3000 | .8233 | 10.0 |

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "INDUSTRY WELL-BEING"

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| IA3 | 66.0000 | 160.4444 | .6645 | .9200 |
| IB3 | 65.2000 | 154.4000 | .8030 | .9165 |
| IC3 | 65.2000 | 157.2889 | .7673 | .9176 |
| ID3 | 66.1000 | 156.5444 | .8384 | .9161 |
| IE3 | 65.5000 | 163.6111 | .4893 | .9244 |
| IG3 | 65.2000 | 157.9556 | .8219 | .9167 |
| IH3 | 66.0000 | 163.1111 | .4758 | .9251 |
| II3 | 65.6000 | 175.1556 | .1593 | .9306 |
| IJ3 | 65.9000 | 150.1000 | .8835 | .9142 |
| IK3 | 65.6000 | 174.9333 | .1948 | .9291 |
| IL3 | 66.3000 | 180.9000 | -.0183 | .9284 |
| IM3 | 66.1000 | 171.6556 | .3671 | .9257 |
| IN3 | 65.8000 | 154.4000 | .9466 | .9138 |
| IO3 | 66.2000 | 157.9556 | .6299 | .9212 |
| IP3 | 65.9000 | 165.4333 | .5946 | .9216 |
| IQ3 | 65.6000 | 166.9333 | .6058 | .9216 |
| IR3 | 65.9000 | 166.9889 | .7682 | .9201 |
| IS3 | 65.5000 | 170.2778 | .4603 | .9241 |
| IT3 | 65.3000 | 162.9000 | .6680 | .9201 |
| IU3 | 65.9000 | 166.1000 | .6629 | .9208 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 20

ALPHA = 0.9252

FINAL ALPHA

RELIABILITY ANALYSIS OF VARIABLE GROUP "COMMERCIAL-LIKE"

| | | |
|---|---|---|
| 1. | VA | Well-being Promoted by Comm-Like |
| 2. | VB | Costs Reduced by Commercial-Like |
| 3. | VC | Healthy Industry offers Low Costs |
| 4. | VJ | Government Contracts More Difficult |
| 5. | VK | More Willing on Commercial Basis |
| 6. | VL | ble to Quote Lower if Comm-Like |
| 7. | VM | Able to Deliver Faster if Comm-Like |
| 8. | VN | Cost of Securing Govt Work Reduced |
| 9. | VO | Cost of Managing Govt Work Reduced |

| | | MEAN | STD DEV | CASES |
|---|---|---|---|---|
| 1. | VA | 4.5000 | .9718 | 10.0 |
| 2. | VB | 4.5000 | .9718 | 10.0 |
| 3. | VC | 4.4000 | .8433 | 10.0 |
| 4. | VJ | 3.1000 | 1.3703 | 10.0 |
| 5. | VK | 4.0000 | 1.0541 | 10.0 |
| 6. | VL | 4.3000 | .6749 | 10.0 |
| 7. | VM | 3.5000 | 1.2693 | 10.0 |
| 8. | VN | 4.3000 | .6749 | 10.0 |
| 9. | VO | 4.2000 | 1.0328 | 10.0 |

ITEM-TOTAL STATISTICS

| | SCALE MEAN IF ITEM DELETED | SCALE VARIANCE IF ITEM DELETED | CORRECTED ITEM-TOTAL CORRELATION | ALPHA IF ITEM DELETED |
|---|---|---|---|---|
| VA | 32.3000 | 42.0111 | .7850 | .9189 |
| VB | 32.3000 | 42.0111 | .7850 | .9189 |
| VC | 32.4000 | 44.4889 | .6796 | .9254 |
| VJ | 33.7000 | 39.7889 | .6466 | .9332 |
| VK | 32.8000 | 42.6222 | .6620 | .9266 |
| VL | 32.5000 | 43.6111 | .9847 | .9143 |
| VM | 33.3000 | 40.0111 | .6989 | .9267 |
| VN | 32.5000 | 43.6111 | .9847 | .9143 |
| VO | 32.6000 | 40.9333 | .8206 | .9164 |

RELIABILITY COEFFICIENTS

N OF CASES = 10.0 N OF ITEMS = 9

ALPHA = 0.9296

## Appendix E: Introductory Letter

June 10, 1991

name~
company~
address~

Dear salutation~,

As you may be aware, the Commercial Space Launch Act Amendments of 1988 expressed Congressional intent to "encourage, facilitate, and promote" the U.S. commercial space launch industry and make it more competitive in the international marketplace. Since that time, the DoD and NASA have instituted a number of changes in their procurement process. Nevertheless, some industry representatives believe additional measures, in the elimination of certain regulations and laws are still required.

One of our NCMA members, USAF Lieutenant Bryan Moon, is researching the applicability of commercial-like contracting methods to the purchase of space products and services and components by the government, as part of a master's degree in contracting management at the Air Force Institute of Technology. The study is being co-sponsored by the Logistics Education Foundation (LEF) of the Society of Logistics Engineers. The aggregate results of the study also will be furnished on a non-attribution basis to the Office of the Assistant Secretary of the Air Force for Space, Mr. Martin Faga, to assist implementation of the President's U.S. Commercial Space Policy Guidelines of February 11, 1991. Mr. Faga's office has recommended you as an industry representative.

Lt Moon wishes to conduct telephone interviews with a broad cross section of domestic suppliers. Your input as to what barriers face the industry is critical to accurately reflect industry views. Lt Moon will be calling your office in the near future to request the favor of an interview and to schedule a convenient time to conduct a 30 minute telephone interview with you or an appropriate representative of your organization. Thank you for your cooperation in this important research.

If you have any questions regarding the study please contact Lt Moon at (513) 879-0487, or his thesis advisor, Dr. Rita L. Wells, at (513) 255-3944.

WILLIAM C. PURSCH, Ph.D.
Functional Director for Research and Grants
National Contract Management Association

## Appendix F: Cover Letter

BRYAN S. MOON, 1Lt, USAF/Air Force Institute of Technology/AFIT/LSP, Wright Patterson AFB, OH 45433

name~
company~
address~

Dear salutation~,

Thank you for letting me send this questionnaire. Please call me at (513) 879-0487 or leave a message at (513) 255-3944 to schedule a half hour to 45 minute telephone interview between tomorrow and 28 June. I look forward to a candid discussion of your views of government implementation of commercial-like contracting for commercial space acquisition. All data is requested on a non-attribution basis. Complete anonymity of each respondent will be maintained. Results will be reported on an aggregate basis.

A single representative with access to the relevant information, is needed to act as spokesman for the entire firm. Your role is critical if the results are to be useful in recommending policy changes to lawmakers, regulators, and the Defense and National Space Councils. This is an opportunity to make known the views of your firm and your industry through a substantiated and reasoned process.

Pages 1 through 3 are the telephone interview questions. These will be completed at the time of the interview. They are included for your review before the interview, so that you may consult any appropriate specialists. They are also for your reference at the time of the interview.

Page 4 asks you to review a list of clauses (pages 5-7) to identify those which may act as barriers to acquisition of Government and/or commercial space launch vehicles for the government. This is the most significant portion of our process. We need to be able to highlight and justify changes to those regulations or laws that you have reason to believe are an impediment to the acquisition process, or are no longer applicable, and may lead to reduced costs, elimination of excessive bureaucracy, and delivery of a quality product in less time. This part may be completed prior to the interview, but the interview may serve to prompt a memory or to clarify the question. For this reason, and to make the procedure as alike as possible for each respondent, please return that portion immediately after the telephone interview by telecopier to the FAX number listed on page 4.

Please address any questions regarding the study to Lt Moon at (513) 879-0487, or Dr. Rita L. Wells, at (513) 255-3944.

BRYAN S. MOON, 1Lt, USAF
Air Force Institute of Technology

4 Atch

1. Telephone Interview Questionnaire - page 1
2. Written Question - page 4
3. List of Clauses - page 5
4. Definitions - page 7

Phone: (513) 879-0487, Advisor: Dr. Wells (513) 255-3944, FAX: (513) 255-8458

## Appendix G: Third Letter, Combining Introductory and Cover Letters

BRYAN S. MOON, 1Lt, USAF/Air Force Institute of Technology/AFIT/LEP, Wright Patterson AFB, OH 45433

name~
company~

Dear salutation~,

As you may be aware, the Commercial Space Launch Act Amendments of 1988 expressed Congressional intent to "encourage, facilitate, and promote" the U.S. commercial space launch industry and make it more competitive in the international marketplace. Since that time, the DoD and NASA have instituted a number of changes in their procurement process. Nevertheless, some industry representatives believe additional measures, in the elimination of certain regulations and laws are still required.

I am researching the use of commercial-like contracting methods by the government for commercial space-launch acquisition, as part of a master's degree in contracting management at the Air Force Institute of Technology. The study is being co-sponsored by the National Contract Management Association (NCMA) and the Logistics Education Foundation of the Society of Logistics Engineers (LEF-SOLE). The aggregate results of the study also will be furnished on a non-attribution basis to the Office of the Assistant Secretary of the Air Force for Space, Mr. Martin Faga, to assist implementation of the President's U.S. Commercial Space Policy Guidelines of February 11, 1991.

A broad cross section of domestic suppliers are expressing their views. Your input as to what barriers face the industry is critical to accurately reflect industry views. Pages 1 through 3 were designed for a telephone interview, however, a written response is equally acceptable, should you prefer.

Page 4 asks you to review a list of clauses (pages 5-7) to identify those which may act as barriers to acquisition of Government and/or commercial space launch vehicles for the government.

This is the most significant portion of our process. We need to be able to highlight and justify changes to those regulations or laws that you have reason to believe are an impediment to the acquisition process, or are no longer applicable, and may lead to reduced costs, elimination of excessive bureaucracy, and delivery of a quality product in less time.

I may not be able to include any inputs received after July 12, 1991. My apologies for the short suspense. Please call me at (513) 879-0487 to schedule a 30 to 90 minute telephone interview or complete the enclosed questionnaire and fax your written response to FAX #:(513) 255-8458 not later than July 12. Thank you for your cooperation in this important research.

If you have any questions regarding the study please contact me at home (513) 879-0487, or leave a message at (513) 255-3944.

BRYAN S. MOON, 1Lt, USAF
Air Force Institute of Technology

4 Atch
1. Telephone Interview Questionnaire - page 1
2. Written Question - page 4
3. List of Clauses - page 5
4. Definitions - page 7

Phone: (513) 879-0487, Advisor: Dr. Wells (513) 255-3944, FAX: (513) 255-8458

## Appendix H: Respondent Comments on Barriers

In addition to degree of agreement or disagreement that an item represents an important barrier, respondents were asked to provide specific reasons or examples explaining each response coded 4 MILDLY AGREE, or 5 STRONGLY AGREE. For the qualitative support, respondent comments are listed, with industry leaders' comments appearing first, followed by comments from smaller firms. Comments of potential entrants to the market appear last in each list. The order of each firm's comments within each industry sub-group changes between lists to safeguard anonymity of individual firms. Respondents provided the following comments:

Overall Comments About Barriers.

a. Contract commercially for just a launch. Oversight and control add costs.

b. Primarily excessive documentation deliverables.

c. Barriers are not a problem if doing business with the government is a way of life.

d. The government underestimates its power as a buyer, substitutes mandatory purchasing procedures for market forces. For small businesses, government regulatory requirements create uncertainty. The rules are so complex that it becomes possible to get unpredictable and arbitrary enforcement. It becomes difficult to get authoritative answers from oversight personnel. More easily understood criteria for compliance would present much less of a barrier.

e. Government participation and intervention creates a significant amount of additional work in order to comply. This is true whether it relates to supporting inspections, preparing pricing data, or submitting CDRLs [contract data requirements lists].

f. Drive up costs, and are much easier for large companies to handle.

Small Business Subcontracting Plan.

a. A pain, adds cost.

b. Costs are not easily quantified if the firm is already doing.

c. Don't know why it's a problem to anyone--definitely not if already doing business with the government. Using small business may sacrifice a small amount of cost. High technology areas present the most problem.

d. Legal confusion.

e. Anytime you have to create something that isn't there to make a quota, it devalues.

Certified Cost and Pricing Data.

a. Barrier to companies new to DoD business. Must set up separate accounting system, and separate inventory. A critical point [is that you] must be able to attribute to a given end item. If government and commercial ELVs are produced on the same production line, you can't certify the data.

b. Drives cost, price.

c. Not necessary since the government gets better protection from commercial competition. For a new or small business starting out, the overhead created makes you less competitive in the non-government commercial market. Companies that have been in the business 30 to 50 years have the systems in place. For small business, it increases uncertainty. Rules are too complex, making it possible to get unpredictable and arbitrary enforcement. Can't get authoritative answers from oversight personnel. If easily understood criteria for compliance, [it] would not present much of a barrier.

d. Volumes of data.

e. Takes too long, normally wouldn't have to.

Government Drawings and Specifications.

a. Convenient to use government specs on a derivative system, but a big deal if not a government design.

b. Inherently a barrier and cost driver due to tracking and special procedures. Generally don't improve the product for commercial satellite launches. Costs about $100,000 more per launch.

c. Final product or service specifications. Leave the "how" up to the supplier. Has been demonstrated to work in R&D projects and research prototypes.

d. NASA procurements put specifications on their contracts that fall under life support.

e. For a start-up company, unless you were involved in the early work on that program, it becomes a barrier - may not be consistent with your business plan, depends on the details - lose flexibility and latitude. if too specific, get one-of-a-kind vehicle, and too much nonrecurring costs involved.

Socio-economic Clauses.

a. Compliance represents an extra effort. State laws may duplicate, but also add new ones, goals. May force you to make a supplier more capable of delivering in order to comply.

b. May require anti-pollution control devices that would not otherwise be required by state laws.

c. Complex area of legal liability creates a barrier, raises cost, hurts industry.

d. Paperwork, compliance costs.

e. Already complying, so not a problem.

Termination for Convenience.

a. Costs several percent of the whole value of contracts to cover the risk placed on the contractor. Commercial contracts set forth what termination costs the buyer, makes the supplier no worse off than if they hadn't entered the agreement (unlike government termination).

b. The nature of the relationship, but commercial contracts contain reasonable mechanisms for built-in costs to cover cancellation risk.

c. Shift to FP (fixed-price) contracts, shifts risk to contractor, some legitimate costs not recoverable, the government walks out without much penalty - investors are too gun-shy

Awards made on Price Alone Versus Past Performance.

a. A problem for new company.

b. Hurts companies with a good performance record that may not be low cost producers. Can drive high quality producers out of the market at the expense of losing more payloads.

c. Arbitrary selection criteria forces less use of good judgement, allowing underbidding and buy-ins. In commercial contracts, price is one of many criteria.

d. Gets to the heart of the difference between commercial practice and govt - each RFP treated as a new slate, in commercial, poor past performance gets penalized. low-ball pricing results. those without past experience are worse off than those with negative past experience.

Government Solicitation Too Detailed.

a. 50 page commercial proposal does the same job as 4,000 page government proposal. The difference is that commercial customers only specify the performance, not how to perform.

b. Means specified rather than ends. Forfeits value that supplier could add.

c. Yes. could be one page. Need to contract for service, not a product. Can't make RFP for everybody.

d. Leaves no flexibility.

Government Oversight.

a. They don't add much value to the product and cost the government money. Currently helps the industry because their are no alternatives, but a set of standards could be developed to take its place.

b. Should be a means to an end, rather than an end in itself. Range safety organizations have given inconsistent interpretations of their own regulations, providing a moving target, last minute surprises.

c. Tends to slow decisions and production, especially in space hardware. Overseers have incentives to permit deviations leading to

failure. Need to use insight instead of oversight.

Government Oversight Using FFRDCs (Federally Funded R&D Centers).

a. Just drives up cost. Contract for a ride.

b. No value except for experts in reviews or mission peculiar hardware.

c. Less of a problem than without them. Often these are better informed, more long-term corporate knowledge.

d. Multiple opinions cause confusion.

Quality Assurance by Government Inspectors.

a. Add little, waste time.

b. A mixed bag. Have to pay for government inspectors, but can be used to advertising advantage.

c. Whole QA [quality assurance] system inappropriate, runs up cost. At odds with TQM [total quality management]. Commercial practices get better results, higher reliability.

Government Payment Practices.

a. Arcane at best. Standard DFARS [DoD Federal Acquisition Regulation Supplement] payment terms require separate inventories, production lines, creating enormous expense. In commercial business, you get interest or payment up-front.

b. Billing, cash-flow problems need work.

c. Government position is not favorable. Some form of progress payment is desirable. Current practices create poor cash flow situations for government contractors.

d. Part of the non-commercial way of doing business, a costlier way to go.

Government Delivery Schedules.

a. Unrealistic.

b. Nothing inherently wrong in the system. Other reforms may take care of it.

Insufficient Proposal Preparation Time.

a. Leads to change orders and overruns.

b. In general, not enough time is given for proposals to be comprehensive. More time is needed to solicit qualified subcontractors.

Contract Type.

a. FP [fixed-price] not a problem for ELVs, only for R&D. Problem is that government won't make long-term commitment.

b. Cost reimbursement type force firms into cost and pricing data, tracking cost elements adds no value to the product.

c. Our commercial contract is 12 pages - quote a price agree to mission parameters and shared risk

Contract Quality Requirements.

a. government puts extra requirements when contracting for a commercial launch.

b. No current alternatives.

c. Adds cost, anti-TQM.

d. Overlaying requirements.

e. Followed as a standard procedure.

Government Personnel.

a. No long-term responsibility.

b. Transfer of responsibility for programs is just a matter of doing business with the government.

c. Poor training in manufacturing environment, hard to get understanding. Mixed experience with quality of personnel, but do suffer from "migrating manager" syndrome.

Source Selection Process.

a. Used to it.

b. Unsure how to change, must have fairness and openness, unlike commercial world. Regulations often have to be waived to avoid stupid decisions.

c. Arbitrary, criteria are too vendor specific.

Poor Communication.

a. We're used to it.

b. Procurement officials don't understand commercial world well enough.

c. from day one when awarded, clarifications and interpretations process does not differ from commercial, but commercial is more aggressive at resolving communication problems

Government Data Formats.

a. Requires far too much data.

b. We're used to it.

c. Costs extra, Contractor data formats are fine, industry sets the standards.

d. DIDs [Data Item Descriptions] too onerous for ELV-related requirements, safety plans, etc. Too much paper.

Government Internal Management Practices

a. Amount of Oversight. Turnover. Inability to get timely decisions.

b. We're used to it.

c. Bureaucratic behavior. A lot of specifications are generated that don't reflect the needs of the customer agency. Managers protect their rice bowls.

d. Resistance to innovation.

e. Contractor mirrors the government structure, balloons cost.

Solicitation Format.

a. We're used to it.

b. Large size.

Other Barriers Not Addressed by the Questionnaire.

a. None.

b. NASA not using commercial space practices correctly. Need to use residual government assets instead of buying new.

c. None.

d. Can't think of anything else.

e. Pattern of pre-solicitation communication between established suppliers make an inside track which tends to exclude newcomers.

f. Insufficient recognition of private development expenditures and the need for a decent

return on investment through profit or other means. There is a lack of understanding of what "commercial space" really means. The government wants to operate in the commercial market according to government regulations which causes a conflict.

g. Procurement procedures don't consider the reality of the incentive to perform induced by market forces.

h. Government mind-set against new entries at the aerospace system prime contractor level.

i. NASA holds a grudge if you ever get on their bad side.

j. Need to pool requirements as in SLV (Small Launch Vehicle) procurement to get larger buys and more competition.

## Appendix I: Respondent Comments on Commercial-Like Contracting Benefits

Respondent comments regarding the "commercial-like" variables are listed below:

General Comments on Commercial-Like Contracting.

a. Streamlining helps, but also selected oversight.

b. Benefits of commercial-like contracting tied to expanding the supplier base.

c. Streamlined acquisition and manufacturing will help reduce costs, however, the commercial space industry may not be ready to abandon all government oversight (i.e. quality).

d. The government is set up on a "CYA" system where no one is ever accountable for anything. Mountains of needless paper are generated and zillions of forms filled out that no one ever looks at. All this drives up costs.

The well-being of the U.S. commercial space-launch industry would be promoted if the government used commercial-like contracts.

a. The government's efforts in this area do promote the industry.

b. if government can be more commercial-like, can benefit through cost reduction.

c. By allowing commercial and government operations to be run the same.

d. streamlining, past performance considered, less bureaucratic and rigid.

e. Yes, by competition and better prices.

Acquisition costs to the government would be reduced if the government used commercial-like contracts.

a. Cut oversight, unnecessary clauses, routine reports, unnecessary data.

b. Cuts cost of an individual procurement, as well as compliance costs industry-wide.

c. Paperwork, oversight threat of non-performance

d. Can save money. An example of this would be the government being able to take over commercially owned planes, built to standards, in an emergency, but the government can also lease them as commercial carriers, like in Operation Desert Storm.

A healthy U.S. commercial space-launch industry offers substantially lower costs to the government.

a. Well over 60 percent reduction.

b. Increased competition.

c. Self evident.

d. The more you produce, the better quantity buys.

Government quality assurance inspection is useful in the manufacturing process.

a. No value, anti-TQM.

b. government source inspection helps internally and in marketing.

c. Has some value, but more effective methods available.

d. In the old days, it was useful, since the tests took special meters and training, but now that we have smarter equipment, it's not as vital.

e. self-evident.

Government quality assurance inspection is useful in the range operation process.

a. Can be a problem.

b. Commercial QA is equally competent.

c. Range operations work better under commercial practices, as seen in the operation of commercial airports. Currently ranges are haphazard in their approach to safety and cost.

d. Problems happen when they don't check.

There is less oversight by commercial customers than government customers.

a. Commercial customers get insight (not interference) and they pay for it in their contracts.

b. Need to just sit in design reviews, but noncontractual rights to vote.

c. Commercial companies don't practice oversight like the government. Insight doesn't give the customer legal right to stop a procedure, but they have great influence through market pressure.

d. Less interaction.

e. Commercial customer is a team member, but it only requires one representative.

Commercial practices vary from little or no oversight to control equal to that of the government.

a. How you pay.

b. True from customer perspective.

c. Some practice high levels of scrutiny, but never equivalent because of the nature of insight versus government oversight.

d. Almost equal.

e. Dollar amounts can drive this

Space-related R&D should be the responsibility of government.

a. Yes, Space-related R&D is too close to basic research. There is not a commercial market with a large body of buyers from which to recoup R&D costs.

b. Ought to sponsor R&D, but not necessarily to improve a target industry.

c. Agree because U.S. losing competition with subsidized foreign firms.

d. Government should be involved, but a mix of government and private funding is best.

e. Yes, not robust return, too risky. Insure that the R&D done is focused on industry interests, US Govt has ignored R&D.

Industry could be incentivized to include space-related R&D as part of its responsibility if the government discontinued funding.

a. Strongly disagree, can't recoup costs from customer base.

b. Tax incentives could be effective.

c. Need to be able to recoup costs, give a contract that guarantees to buy a technology if developed. you have to have a market before investing. Commercial launch companies go with COTS

Space contractors find it more difficult to understand government contracts than commercial equivalents.

a. Government contractors understand.

b. Tends to exclude technologically competent potential providers.

c. No comparison.

Space contractors would be more willing to do business with the government if they used commercial-like contracts.

a. Perhaps, but the government must handle contracts correctly, which require a cultural change by the government.

b. Slightly more incentivized.

c. Some even opt out of government work.

d. Not so much a problem if you're structured to do it.

Space contractors would be able to quote lower prices if the government used commercial-like contracts.

a. Yes, see recent examples of government moves toward commercial-like contracting, like MLV-II (Medium Launch Vehicle - II).

b. If cut out barriers.

c. Through reduced compliance costs and increased competition.

d. Inherent in commercial practice

e. Yes, current practices make you hire more people.

Space contractors would be able to deliver items faster if the government used commercial-like contracts.

a. Not much to do with the contract, no noticeable difference.

b. No effect. It depends on the government's willingness to buy follow-on launches and pay for them up front.

c. Production is slowed by compliance and QA. Change process is cumbersome, could be more responsive.

d. Some requirements make production workers fill out paperwork.

e. Less over-spec, paperwork, reviews.

Costs associated with securing government contracts would be reduced if the government used commercial-like contracts.

a. See MLV-II procurement.

b. Commercial proposal one inch thick versus six inches for government proposal.

c. The system runs up cost, compared to a commercial sales job.

d. Allows you to treat all your contracts the same.

e. Through less paperwork - proposals cost $250-300K large companies spend $500K.

Costs associated with managing government contracts would be reduced if the government used commercial-like contracts.

a. Yes, but this is anti-government--not as many people used.

b. Reports generation runs up cost.

c. System runs up cost.

d. Allows you to manage all your contracts the same.

What specific commercial-like features would most likely reduce the cost of government acquisition?

a. Literally buying on commercial basis--satellite delivery to an orbit, focus on the data stream, not how you get it.

b. Use FP contracts, little to no oversight.

c. Reduce documentation and deliverables.

d. They won't really help. Unsure if this is in the best interests of the government.

e. 1) Reducing QA procedures, 2) Removing Certification of cost and pricing data, 3) Multi-year procurement on commercial terms, and 4) Go to fixed-price contracts as much as possible.

f. Less inspection, less reporting, better payment terms.

g. Removal of cost accounting paperwork. Commercial customers tell you what they need. Government wants the same price as commercial, but they want you to account for your man-hours.

h. GSA-list purchase-order authority, fixed price contracts for delivery of equipment involving multiple launches, appropriate contracts for on-orbit construction.

i. Use performance requirements, purchase services rather than hardware, eliminate most reporting requirements, Adequate progress payments.

j. Past performance, streamlined bidding for qualified suppliers, need to eliminate poor performers.

What do you see as the potential effects of government adoption of commercial-like contracting methods on the U.S. commercial space-launch industry?

a. reduced costs, more responsive proposals and faster contracts.

b. Lower costs to the government.

c. Improve industry in small payload, but won't help big 3.

d. Expanded supplier base, lower cost, larger market base, greater diversity of products.

e. Quicker deliveries, more launches, lower costs, higher profits.

f. Improved service at a lower cost.

g. Will put America back in first place in space. Current market dominated by firms set up to do business with the government, not pursuing commercial operations competitively in world market.

h. It would help a bit, but until congress establishes a viable, long-term space program, not much will happen.

If the government implemented commercial-like contracting practices, how would you feel if contractor remedies and rights were affected?

a. No effect. Commercial contracts have enough.

b. No problem, commercial contracts use arbitration to handle disputes, the courts take too long. The issue is solving disagreements between buyers and sellers, so why not take the least expensive path to agreement.

c. Current rights need to be maintained.

d. Commercial practices are fine.

e. Should be consistent with equitable commercial practices.

f. Commercial agreements cover this.

g. Fine.

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The study dealt with expressed congressional intent to promote the commercial space-launch industry and defense management emphasis on government use of commercial contracting methods for the purchase of commercial products. The research problem was to determine what contracting policy changes implementing commercial-like contracting practices would benefit the commercial space-launch industry and federal space-launch acquisition. Commercial-like contracting practices include removal of statutory and regulatory barriers to contracting with the government. To accomplish this, the most significant contractual barriers experienced by the industry in doing business with the government were identified. The study hypothesized possible relationships among "barriers", "acquisition cost" variables, "industry well-being" variables, and "commercial-like" variables. A telephone interview instrument was developed to elicit quantitative and qualitative data addressing the hypothesized relationships from space-launch industry representatives. Ten of eleven firms responded to the interview questionnaire, including the three industry leaders. Quantitative analysis revealed very strong associations for the hypothesized relationships. Qualitative analysis supported quantitative results.

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5. Comments

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