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**A Model for Determining Optimal Governance Structure in
DoD Acquisition Projects in a Performance-Based
Environment**

9 March 2011

by

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Abstract

Prior to the requirement for performance-based contracting, the government structured its acquisition regulations and business practices in a way that resulted primarily in transactional exchanges between the government and industry. The transition to performance-based contracting has created the need for the government to better understand how to both design and govern long-term relationships with their suppliers. This study develops a conceptual model that provides a framework for assessing how knowledge of variables such as environmental uncertainty, task stability, technology application certainty, risk, and transaction-specific investments impact the selection of the optimal mode of governance. Our model views governance alternatives along a continuum ranging from short-term transactional exchanges to more long-term relations exchanges. Moreover, our model predicts the circumstance under which various governance alternatives would be optimal. Finally, we use data from several ACAT I programs to assess the validity of selected components of the model and to assess the impact of governance type on program outcomes.

Keywords: Performance-based contracting, conceptual model, knowledge of variables, governance alternatives, ACAT I programs



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Introduction

The goal of any system is to fulfill the particular mission for which it was designed (Blanchard, 1967). For the Department of Defense (DoD), the first step in meeting that goal is deciding which weapon systems will best support their missions and then decide which contractors are capable of developing these systems in a cost-effective manner. Peck and Scherer (1962) identified three basic steps in the development of a weapon system: (1) the government's decision to initiate a weapons program, (2) the selection of the contractor, and (3) the acquisition of the program through development and production activities. Although comprehensive in terms of acquisition, these steps do not cover the sustainment strategies for these systems once fielded.

Historically, the acquisition and sustainment strategies have been treated as separate and not necessarily equal concerns in U.S. defense acquisitions (Arrol, 1993; Gruber, 1999). Legacy acquisition strategies focused on the acquisition of technology and systems, whereas the sustainment of those systems received considerably less attention. As a result, an imbalance existed between acquisition and sustainment, which led to more emphasis being placed on technological development rather than on the long-term performance of the system once fielded (i.e., system effectiveness). Almost intuitively, legacy contracting strategies were aligned such that the incentives given to the contractor only focused on meeting the short-term specifications of acquisition. Creating incentives that meet the needs of the government at a faster production rate, at a cheaper price, and at a higher quality are all economically responsible constructs when acquiring a system; conjointly, the government should have been developing incentives that would have encouraged the contractor to develop adequate systems for meeting the recurring long-term demands (i.e., replacement, replenishment, etc.) of the customer on the sustainment side.



Although there were many risks associated with the legacy contracting strategy, we identified two major risks that are pertinent to the discussion at hand. Rogerson (1994) argued that roughly 30% of the total defense budget is devoted to acquisition. This means that the remaining 70% is required to sustain these systems over their forecasted life cycles; therefore, more attention needs to be placed on writing contracts that better serve the long-term sustainment needs of the government. Second, many researchers have argued that legacy contracting strategies (i.e., complex formal contracts), such as those used in defense acquisitions, tend to undermine trust and encourage the opportunistic behavior among buyers and sellers that contracts are designed to discourage (Ghoshal and Moran, 1996; Poppo & Zenger, 2002).

To reconcile this unbalanced perception of acquisition and sustainment (see Figure 1), the 2001 *Quadrennial Defense Review (QDR)* mandated a modernization of the defense acquisition process, and one of the results, among other things, was the implementation of a new sustainment strategy that came to be known as performance-based logistics (PBL). The formal adoption of PBL caused a shift in both the acquisition and sustainment environments; more specifically, the sustainment environment transitioned from production-driven objectives to outcome-driven objectives. This implied that contractor performance became the driving force behind the new sustainment strategy. In order to meet the requirements of the new sustainment strategy, program offices needed to better understand how to design and govern long-term relationships with their suppliers, which could help them potentially fight off opportunistic behavior, if structured correctly.

The focus of this study is centered around the practical impact of this strategic shift on the program manager, who now faces a two-fold challenge. The first challenge is how to select the appropriate governance structure for a particular supplier given several variables, such as the type of relationship that currently exists between the contractor and the supplier, the complexity of the part (or system) being procured, the level of uncertainty, the current political environment, and the level of



risk attributable to transaction-specific assets. The second challenge is deciding what are the appropriate contractual and/or non-contractual incentives that will allow the government to gain the most efficient and effective performance of that part or system. In this paper, we focus on providing a framework that reflects the needs that are created by the first challenge.

In terms of legacy frameworks, many scholars have relied on the theories of transaction cost economics (Williamson, 1985) and relational exchange theory, which is rooted in contract law (Macneil, 1980), to provide the frameworks needed for assessing the most appropriate mechanisms to govern exchanges between buyers and sellers (Boyle, Dwyer, Robicheaux, & Simpson, 1992; Cannon, Achrol, & Gundlach, 2000). This study follows the logic of Macneil's (1980) theory of relational exchange and Cannon et al.'s (2000) plural form governance approach and posits that the merging of these two literatures provides a framework that supports the option for more relational exchanges in defense contracting given this PBL environment. To illustrate the merging of these two frameworks, we present a conceptual model that displays a "contractual continuum" going from formal contracting mechanisms, as defined by the Federal Acquisition Regulation (FAR, 2010), to more relational exchanges, which are situationally defined by the parties involved.



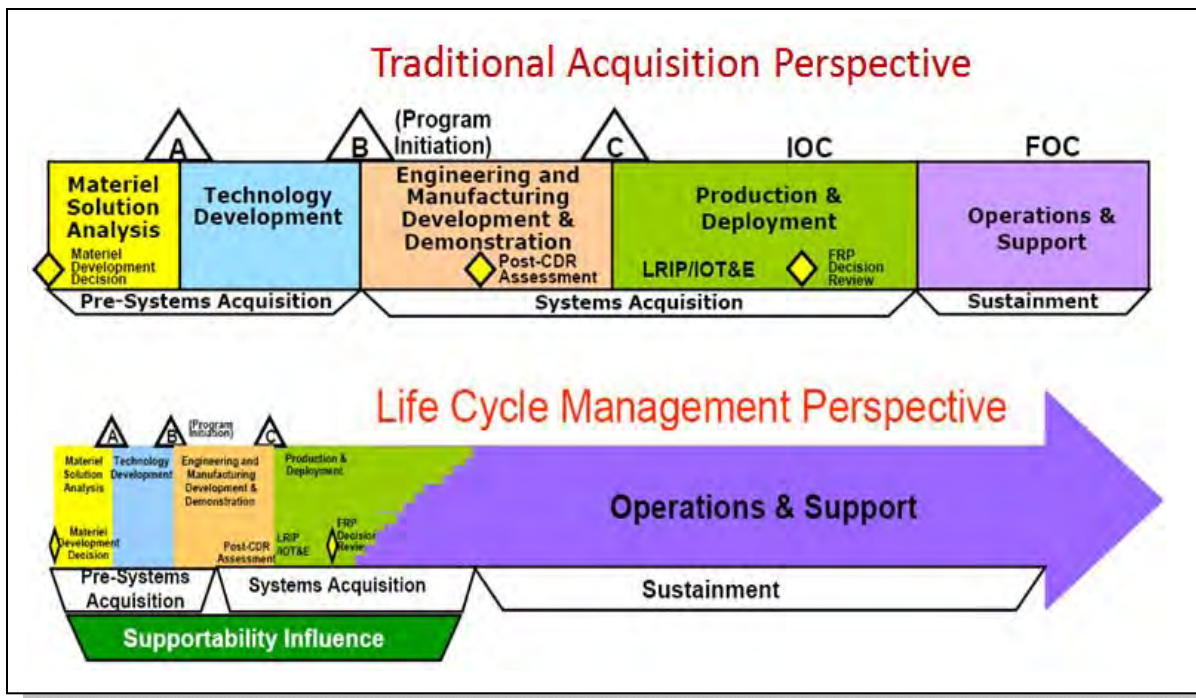


Figure 1. Perspectives on Acquisition and Sustainment
(Defense Acquisition University)



Background

U.S. Defense Industry. The 1990s were a perfect storm of technological change, consolidation, budget downturns, environmental uncertainty, and the embrace of specialization over conglomeration (Chao, 2005). With the collapse of the Soviet Union in the early 1990s, the “Reagan Build-up” was seen as a huge excess of industrial capacity. Senior leaders at the Pentagon began forcing the various defense contractors to think strategically about their long-term positions in the defense industry. This marked the beginning of an industry-wide consolidation of the defense supplier base. The combination of a consolidated defense supplier base coupled with the 21st century shift toward the acquisition of capability (i.e., PBL) rather than platforms has created new challenges for both the supply side and the demand side of the defense industry (Kebede, Maytorena, Lowe, & Winch, 2009). These new challenges require program managers to be more acutely aware of the many variables that can affect a contractor’s decision as to whether they can do business with the government.

One variable for a contractor to consider is that although the U.S. defense industrial base has been a source of long-term competitive advantage for the United States, from an industrial perspective, the defense industry is a very cyclical market. Peaks and troughs, in terms of spending, have long existed in the defense industry. From 1948–2007, volatility was most common in procurement, while personnel, research and development (R&D), and operating costs experienced steady, long-term growth (CSBA, 2009). Specifically, as a result of these peaks and troughs in procurement, the defense industrial supplier base has experienced significant demand volatility. Thus, a contractor must take into account the cyclical nature of the defense industry and weigh the risk of possible termination after significant R&D investments have been made.

Second, defense contractors face lower margins relative to peer industries—for example, computer hardware, utilities, and capital goods. For most defense



contractors, lower margins are a result of heavy internal R&D investments and only having one buyer. Many defense contractors have been able to deal with lower margins by implementing strategies that lower the risk of discontinuation. Traditional methods of lowering risk have been to spread manufacturing plants to different congressional districts, longer term contracts, and R&D being paid for by the government, to name a few. Contractors have also been able to improve their cash margins by cutting costs associated with transaction-specific assets and other forms of investments, such as research, development, test and evaluation (RDT&E). During the Cold War, defense firms invested 4% of their revenue in R&D; today that number is 1.5%. Another way contractors have chosen to deal with lower margins is to increase foreign military sales (FMS) by creating commercial spinoffs that are marketable to the general public as well as to other countries.

Lastly, an important issue is being able to take into account the various differences between the public sector and the private sector. One difference is organizational goals. According to Pierre Chao (2005),

There are fundamental disconnects in the defense industry: the primary one being the tension between public goods and private ends. Corporations want high returns and as much of a monopoly position as possible. The public wants the highest quality but cheapest possible defense.

Another difference is the overall market structure of the defense industry (Dehoog, 1990; Driessnack & King, 2004; Peck & Scherer, 1962). For example, the FAR (2010) defines the procedures and guidelines on everything from what can be bought, to source selection, to contractual terms and conditions, to the disclosure of information, to socioeconomic factors, to how government contracts are to be executed, etc. Having to adhere to the FAR (2010) requires a myriad of government personnel and agencies to be constantly documenting and evaluating their means of complying with these procedures. However, outside of generally accepted accounting principles (GAAP), these issues are not so strictly defined in the private sector. Ultimately, the private sector has the choice of whether to subject themselves to the regulatory constraints of the FAR (2010) in order to do business



with the government, whereas the government is bound by these regulations whether they in-source or outsource.

Acquisition Strategy Evolution. Prior to the 1960s, a formal defense acquisition policy did not exist, due largely to the fact that the powers of the Secretary of Defense were limited. The first major strategic acquisition move was made by Secretary Robert McNamara in 1964 with the issuance of DoD Directive 3200.9. This directive was the implementation of an Air Force procedure that divided the acquisition cycle into three phases: (1) the Concept Formulation Phase, (2) the Contract Definition Phase, and (3) the Acquisition Phase (Smith & Friedmann, 1980). During the Concept Formulation Phase, a decision was rendered about whether a system was needed based on paper cost-effective studies. During the Contract Definition Phase, contractors put together proposals that included design specifications, cost, and scheduling information for accomplishing the Acquisition Phase. Once the preliminary analyses (which were mostly only on paper) were complete, a proposal was selected and a contract was awarded for development and production.

The second major strategic move occurred in 1971 when David Packard issued DoD Directive 5000.1, *Acquisition of Major Defense Systems*, which consolidated most of his major acquisition changes into a single document. Two of the most critical improvements were (1) the institutions of milestones that had to be met as the program progressed through the acquisition process and (2) a formal reporting standard for the program manager. In terms of the strategy itself, there were three milestones employed under this directive: Milestone 1, Program Initiation, which occurred after early conceptual efforts; Milestone II, Full-scale Development, which occurred once there was sufficient evidence and confidence that program worth and readiness warranted a commitment of resources; and Milestone III, Production/Deployment, which was approved by the Secretary once the program could demonstrate that engineering was complete (Smith & Friedmann, 1980).



From 1971–1987, several clauses (most of which were a direct result of the Packard Commission in 1987) were added to DoDD 5000.1 to deal with legacy procedural issues that were deemed problematic and costly. Yet, from an acquisition strategy standpoint, the establishment of two new milestones (Milestone IV and Milestone V) in the 1987 version was one of the most significant additions to DoDD 5000.1. The Milestone IV review takes place one to two years after initial deployment to assure operational readiness. The Milestone V review takes place five to 10 years after initial deployment to determine the state of operational effectiveness and to identify upgrade needs. These milestones were a direct response to the criticisms that too little attention was paid to life-cycle implications of new systems (Ferrara, 1996). As a result, these milestones created the ability not only to see but also to understand the full acquisition life cycle, which allowed the government to assess more accurately the overall health of defense programs.

In 1994, the Federal Acquisition Streamlining Act (FASA) mandated the use of contractor past performance data when awarding contracts and encouraged contracting officers to purchase commercial off-the-shelf products, as opposed to investing heavily in the creation of government-only products. The Clinger–Cohen Act of 1996 (an extension of the FASA) sought to loosen some of the restrictions placed on the acquisition policy by previous versions (Pegnato, 2003). The formal adoption of Performance-based Logistics (PBL) in 2001 marked another paradigm shift in the overall acquisition strategy. This new strategy essentially purchased outcomes whose path for meeting required objectives was determined by the awarded contractor, which created a hands-off approach as to how the government acquired new systems.

These examples highlight some of the many revisions that have been made to the federal acquisition laws. One of the key points to take away from this section is that each revision has stressed the importance of centralized policy-making and decentralized program execution (Ferrara, 1996).



Complexity. In the defense industry, complexity has been defined as a product of three overarching dimensions—technical, organizational, and environmental (Drezner, 2007). For the handful of systems-integrating, Tier 1 defense contractors, several facets of complexity increase as the government pushes the capabilities needed for tomorrow’s combat systems. For example, technical complexity increases as combat systems move toward net-centric capabilities, while organizational complexity increases as Tier 1 contractors subcontract out for various components that are part of the system being developed. As complexity grows, these dimensions have a more substantial impact on a contractor’s ability to meet contractual requirements. When dealing with complexity, Drezner (2009) argued that the magnitude of system evolution should determine the level of oversight needed to sufficiently and efficiently manage a particular system; therefore, as complexity grows, so must the level of oversight because the impact of the complexity is too great to be passively managed.

Being able to understand the degree of complexity at any one particular point in time for any one particular program and the potential impact of that complexity requires a more intimate understanding of the program being analyzed. As an example, if the program office for the AH-64 Apache helicopter wants to understand all of the variables surrounding the lead-times for new transmissions, it must first understand the complexity associated with that part. The technical aspects (e.g., the estimated number of flight hours, the physical weight, etc.), the organizational aspects (e.g., the procurement lead-times for the various components, the location of manufacturers, the Army’s supply chain, the logistics of the Army’s supply chain, etc.), and the environmental aspects (e.g., war versus peacetime, defense budget constraints, etc.) must all be taken into consideration in order for the program office to determine how to better manage this subsystem.

Project Success. The questions regarding how project success is defined and what the prime variables are that impact a firm’s ability to be successful have been topics of research for many scholars (Cooper & Kleinschmidt, 1987; DeCottis &



Dyer, 1979; Dvir Lipovetsky, Shenhar, & Tishler, 2003; Freeman & Beale, 1992; Pinto & Slevin, 1987, 1988). A subset of these scholars have applied these questions to defense acquisitions in order to identify what variables have an impact on a defense contractor's ability to be successful (Lipovetsky, Tishler, Dvir, & Shenhar, 1997; Sadeh, Dvir, & Shenhar, 2000; Tishler, Dvir, Shenhar, & Lipovetsky, 1996; Tubig & Abetti, 1990). Tubig and Abetti (1990) analyzed the effects of four endogenous variables on contractor performance—type of R&D, type of solicitation, type of contract, and size of the contractor—and found that all but the size of the contractor had an effect on some of the specified performance variables (technical, schedule, quality, cost, and overall assessment). Tishler et al. (1996) analyzed 110 Israeli defense projects and derived 20 success measures that were then assimilated using a multivariate technique. All of the major results of their study pointed toward relationships as being the glue that held these projects together. Therefore, it is intuitive to suggest that there could be a mix of legal (Tubig & Abetti, 1990) and non-legal (Tishler et al., 1996) governing mechanisms that are driving the overall performance of defense contracts.



Theories of Governance

Transaction Cost Economics. Transaction cost economics (TCE) focuses on the differences between transactional, hybrid, and hierarchical governance structures and the conditions that would lead managers to craft appropriate governance structures to accommodate known exchange hazards such as investments in assets that are unique to a particular exchange, difficulty in performance measurement, and uncertainty.

“Transaction cost economics assumes that human agents are subject to *bounded rationality*, whence behavior is ‘intendedly rational, but only limitedly so’ (Simon, 1961, p. xxiv), and are given to *opportunism*” (Williamson, 1985). The term *bounded rationality* stems from Herbert Simon’s behavioral theory, which states that individuals face uncertainty about the future as well as about costs in acquiring information in the present. According to the theory, these two issues limit the extent to which one can make rational decisions, which forces an individual to make *satisficing*, not *maximizing*, decisions.

This, however, is not the view that New Institutional Economists take on the effect of bounded rationality. Whereas Simon argued that uncertainty forces individuals to make *satisficing* decisions, New Institutional Economists argue that uncertainty gives rise to opportunistic (i.e., self-interested or *maximizing*) decisions. Williamson (1985) defined opportunism as “self-interest seeking with guile,” which causes there to be an “incomplete or distorted disclosure of information.” It is the combination of bounded rationality and opportunistic behavior that Williamson identified as being the root cause of transaction costs.

One element that must be understood when using TCE to explain certain market behaviors is the type of market at hand. Several scholars have cautioned against applying traditional assumptions of a price-driven market to the defense industry (Peck & Scherer, 1962; etc.). In a traditional market system, decisions regarding what to produce and assigning value to the product being produced are



decentralized. The seller takes the initiative in deciding what to produce, how to fund the effort, and what price to charge. The buyer decides whether to purchase the seller's product at the stated price or to purchase a product that is being offered by a competitor at a lower price (Peck & Scherer, 1962). The defense market, however, functions differently than a traditional market because the government operates as a *monopsony*, which means that the government is not only the sole buyer but also the regulator of the market. According to Driessnack and King (2004), "government represents an active institution in the defense industry, and institutions contribute to market structure by defining transaction costs."

Hazards to Exchange. Within the context of TCE, scholars have defined three categories of exchange hazards that require contractual safeguards: (1) asset specificity, (2) difficulty of measurement, and (3) uncertainty. We believe that overlap exists among these three hazards, which is to say that two or three hazards could happen conjointly or the existence of one hazard could be the cause of another. For example, high levels of uncertainty about the direction of a major weapon system (MWS) could make it difficult for a contractor to evaluate whether transaction-specific investments for that MWS would be profitable in the foreseeable future.

Asset specificity arises as sourcing relationships require significant relationship-specific investments in physical and/or human assets (Poppo & Zenger, 2002). Empirical analysis demonstrates that as asset specificity increases, the complexity of contracts also increases (Joskow, 1988). Williamson (1985) addressed asset specificity in the following manner: "Failure to support transaction-specific assets with protective governance structures predictably result in costly haggling and maladaptiveness." This maladaptive effect is a constant worry for most defense contractors. For example, a major IT defense firm might be leery of making heavy investments in transaction-specific assets because as technology rapidly evolves, the need for those assets diminishes due to obsolescence. *Difficulty of measurement* arises when a contractor's level of performance cannot be objectively measured. As a result, the rewards given will not be objectively linked to



productivity. Given this scenario, there is a higher probability that both parties could have incentives to limit their efforts toward fulfilling the agreements because they are defined in the contract. *Uncertainty* requires parties to adapt to future issues that occur as a result of unforeseen changes. Uncertainty within the defense industry arises for various reasons. One of the most critical issues surrounding the defense industry is the cyclical funding issue, which leaves the contractor at the mercy of the defense budget. Given these exchange hazards, managers either choose to vertically integrate or to construct complex contracts that define a systematic process for dealing with uncertain outcomes.

Relational Exchange Theory. Relational exchange theory focuses on the contracting norms and shared expectations that exist in both discrete and relational exchanges (Macneil, 1980). Our argument concerning the types of transactions that exist between a contractor and the government follows closely with Macneil's view that the types of exchange form a continuum that moves from discrete (i.e., transactional) to relational (i.e., long term, continuous) exchanges (Macneil, 1978). Macneil identified three general contracting norms: solidarity, role integrity, and mutuality. Solidarity is what holds exchanges together (discrete = contract law, relational = internalized social norms). Role integrity reflects the expectations of each party (discrete = only focused on the transaction, relational = focused on transactions and other issues not directly associated with the transactions). Mutuality speaks to the need for an even distribution that assures adequate returns for each party (transactional = focused on returns received from individual transactions, relational = undifferentiated returns; Kaufmann & Stern, 1988).

The characteristics of these general contracting norms, however, are only partially captured in the types of contractual mechanisms used by the government. For example, in the case of solidarity, the FAR (2010) does not require the government to stay with a contractor when it is not in its best interest (FAR, 2010, 49.101); therefore, theoretically, government–contractor solidarity only exists to the extent that the government needs a particular system, part, or service from a contractor and does not assume that there will be a need to use that particular



contractor in the future. However, because the majority of Major Defense Acquisition Program (MDAP) contracts are awarded to the same Tier 1 group of suppliers, we believe that these general contracting norms will manifest themselves because there is an ongoing relationship.

Plural Form Governance. The development of this plural form approach has come about as a result of the difficulty of infusing economic and relational theories. According to Bradach and Eccles (1989), exchanges are best understood as being embedded in a complex matrix of economic, social, and political structures and that governance relies on combinations of market, social, and/or authority-based mechanisms, more than any one of these exclusively. Plural form governance uses a combination of legal and non-legal conventions to govern exchanges while taking into account the market structure in which these exchanges are taking place. A basic assumption here is that exchanges will be ongoing, not transactional, and that by having continual exchanges, relational norms will begin to develop, which discourages self-interested behavior in favor of satisfying mutual interests (Achrol & Gundlach, 1999). Cannon et al. (2000) concluded that when transactional uncertainty is high, plural form governance enhances a defense contractor's ability to meet expected performance targets. If effectively managed, the use of plural form governance in the defense industry would provide the flexibility and adaptability needed to deal with future uncertainties, which would otherwise inhibit a contractor's ability to meet contractually defined performance targets.



Governing Mechanisms & Strategies

Contract Types (see Appendix A). According to FAR (2010) 3.101-1, the federal government is responsible for conducting business in a manner that is visible and unambiguous; therefore, formal contracts enable the government to satisfy the visibility criteria required in order to outsource for various products and/or services. When creating these formal contracts, it is important for the contracting officer to remember that contract type selection determines how *cost risk* is going to be allocated between the government and the contractor. FAR (2010) 16.101(b) states that “contract types are grouped into two broad categories: fixed-price contracts and cost-reimbursement contracts.”

It has long been understood that fixed-price contracts are the contractual mechanisms preferred by the government. The reason is two-fold. First, a fixed-price contract “closely approximates the normal marketplace relationship between buyer and seller” (Lenk, 1977). This is in line with the government’s vision of implementing an acquisition environment that functions more like the private sector. Second, there is no absorption of the cost risk associated with producing an end item by the government; therefore, the contractor assumes all of the cost risk associated with that end item. Three of the most commonly used fixed-price contractual agreements are firm-fixed price (FFP), fixed-price-incentive-firm target (FPIF), and fixed-price-award-fee (FPAF).

Firm-fixed price (FFP) contracts are used when the requirements for a particular project are well defined, which means that contractors are experienced in meeting requirements, market conditions are stable (or at least easily determined), and financial risks are otherwise insignificant. The contractor is obliged to provide an acceptable deliverable at the time, price, and level of performance specified in the contract, and the incentive for the contractor is driven by a reduction in the cost of production. These contracts are typically used when purchasing commercial supplies and services and are generally not appropriate for R&D.



Fixed-price-incentive-firm target (FPIF) contracts are used when a ceiling price can be established that covers the most probable risks inherent in the nature of the work (*ceiling price* includes the following elements: target cost, target profit, delivery and quality, and a profit-sharing formula). This type of contract is typically used when the amount of labor and materials required are unknown. An FPIF construct is often used for the production of a major system based on a prototype. In other words, R&D has already gone into the creation of a prototype and low-rate initial production (LRIP) is the next step.

Lastly, fixed-price-award-fee (FPAF) contracts are used to mitigate the risk that the user will not be satisfied because of judgmental acceptance criteria. This type of contract is used when judgmental standards can be fairly applied by the fee-determining official (the potential fee has to be large enough to provide a meaningful incentive for the contractor and to justify related administrative burdens). Under this construct, the contractor not only has the incentive to realize an additional dollar of profit for every dollar that costs are reduced, but also he or she earns an additional fee for satisfying a set of specified performance standards. A typical application for FPAF contracts is performance-based service contracts.

The other contractual category is cost reimbursement (C+). Cost reimbursement, or cost plus, contracts have characteristics that are similar to FP contracts; however, the conditions associated with C+ contracts are different than those associated with FP contracts. As with FP contracts, the seller (i.e., the contractor) is responsible for delivering an end item on time, on cost, and within a specified range of performance. However, because there is a higher level of uncertainty associated with C+ contracts, the government agrees to assume a certain level of risk. (The degree to which the government assumes risk can be seen as a ratio of government-funded R&D relative to contractor-funded R&D.) The risk associated with C+ contracts can be attributed to several variables. Some of the more prevalent variables are volatile market conditions, unstable labor force, availability of materials, and/or technological uncertainty, to name a few.



Within the C+ construct there are various contracts that are used for different reasons. The more common types utilized are cost-plus-fixed-fee (CPFF), cost-plus-incentive-fee (CPIF), and cost-plus-award-fee (CPAF). A CPFF contract is the simplest of all of the C+ contracts. A CPFF contract is designed to reimburse the contractor for the total allowable costs associated with R&D plus a fixed amount for the product(s) that the organization was contracted to provide. CPFF contracts are typically used for conducting research studies.

A CPIF contract is a more complex and often controversial construct that is often used when an objective relationship can be established between the fee and different measures such as actual costs, delivery dates, performance benchmarks, etc. For example, a contractor bids on and is awarded a prototype missile contract; under a CPIF contract, the government will negotiate an initial fee for meeting a predetermined set of objectives. That fee will be adjusted by a formula (which is based upon the relationship of target costs to actual costs and/or target performance to actual performance) once that contract has been satisfied. Therefore, the fees associated with a CPIF contract are contingent upon an organization's ability to fulfill the specified needs of the government. The controversy tends to appear when fees are determined based upon a set of measures that cannot be fully realized. CPIF contracts are typically used for the R&D of a prototype for a major system.

Lastly, a CPAF contract is inherently the most complex because it tends to be used when objective incentive targets are not feasible for critical aspects of performance. In other words, CPAF contracts are issued because the objectives of the government are more broad, giving the contractor flexibility to interpret how to achieve those objectives. For example, if the government believes that solar energy will become the preferred source of energy in the 21st century, then different agencies could award CPAF contracts with the objective of furthering the capabilities of solar technology. The amount awarded would then be based on the contractor's performance. The award amount (which has a ceiling) is a pool of dollars that the contractor can earn by means of meeting the objectives specified in the contract, and, in theory, the amount awarded should be large enough to motivate the



contractor to perform well. CPAF contracts are typically used for large-scale and/or exploratory research studies.

Legacy Contracting. Historically, contracting officers have developed short-term focused contracts accompanied by complex statements of work that articulated how contractors were to achieve very specific outcomes. This contracting strategy typically fosters transactional behavior in which each organization attempts to maximize its unique position on each individual transaction with little regard for long-term consequences. Another issue is the use of inappropriate, inadequate, and/or incomplete cost data for awarding contracts. Under the leadership of Secretary McNamara, proposal cost estimates were used as the basis for awarding fixed-price contracts, which were believed to provide a better incentive for cost reduction and to require less government supervision. In 1969, this strategy lost most of its validity when an OSD review found that costs were 79% higher and procurement lead-times were 32% longer than original estimates for the seven major weapon systems that were under review (Smith & Friedmann, 1980).

There are two different methods for the government to procure goods: sealed bidding and negotiated procurement (Holtz, 1979). Under the sealed bidding method, there is no assurance that the price given by the lowest bidder will be fair and reasonable. Additionally, In-Gyu Kim (1998) found that sealed bidding runs a high risk of opportunistic behavior if an incumbent is concerned about losing the contract to an entrant. As for negotiated pricing, this typically occurs when the two parties have a close relationship and there is uncertainty. The parties come together to work out the price relative to risk, duration, etc. It gives each party an opportunity to set a clear understanding of the desired results and rewards.

Performance-Based Contracting. Performance-based contracts have been part of the contracting environment since 1991. A basic tenet of performance-based contracting suggests that the people associated with the contracting process must recognize the potential long-term nature of the relationship between the government and its suppliers and, in doing so, should integrate more collaboration and adaptive



capabilities into the formal contracts. Given this new environment, the preferred performance-based contracting approach is long-term contracts; therefore, the DoD is not only investing in the acquisition of a product but also in a relationship.

Rogerson (1994) argued that the DoD's current long-term relational partnerships with major suppliers are similar to the relationships that large commercial firms have with their major suppliers. There are specific examples of governments creating acquisition mechanisms that permit more integrated long-term relationship with suppliers. For instance, the UK Ministry of Defence (MoD) instituted an IPT framework to support their capability acquisition programs that is rooted in relational contracting (MoD, 2005).

Practically speaking, when a performance-based contract is drafted, all aspects of the acquisition, including the statement of work, are centered on the purpose of the work being performed, as opposed to how that work is executed. Additionally, quality-related evaluation factors are used not only as part of the source selection process, but also as part of the performance specifications. Most of these contracts have few metrics that define performance. The global metrics provide for a common understanding of what is desired. In turn, the contractor is free to choose the method of performance as long as the overall metrics are met. This provides an incentive to the contractor to perform so that profits are maximized.



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Conceptual Development

After thinking about these facets of defense acquisitions and contracting, one could conclude that using TCE as the remedy for various problems in the defense industry is difficult, due largely to the fact that TCE overstates the desirability of integration or instituting more contractual safeguards in exchange situations that are deemed hazardous (Poppo & Zenger, 2002). Following the traditional TCE framework, defense agencies craft complex contracts that define remedies for many contingencies, or specify processes for resolving unforeseeable outcomes, as a means of maintaining good relationships with their suppliers. In doing so, these complex contracts become more costly to craft, harder to monitor, and more difficult to enforce. As an alternative, adopting a plural form governance structure would allow program managers to incorporate relational norms that would allow both parties to more easily adapt to future contingencies.

Conceptual Model. Formal contracts have not only served as the primary governing mechanism for acquiring products and/or services, but also as the primary means of relational governance. Yet studies consistently report that the ability to perform is typically greater among organizations that use non-legal principles to govern the relationships among buyers and suppliers. Our conceptual model (see Figure 2) aligns the alternative governance structures derived from transaction cost economics, normative structures derived from relational exchange theory, and plural form theory derived from the joining of these two frameworks in order to explain the possible mechanisms for governing DoD contractual relationships.



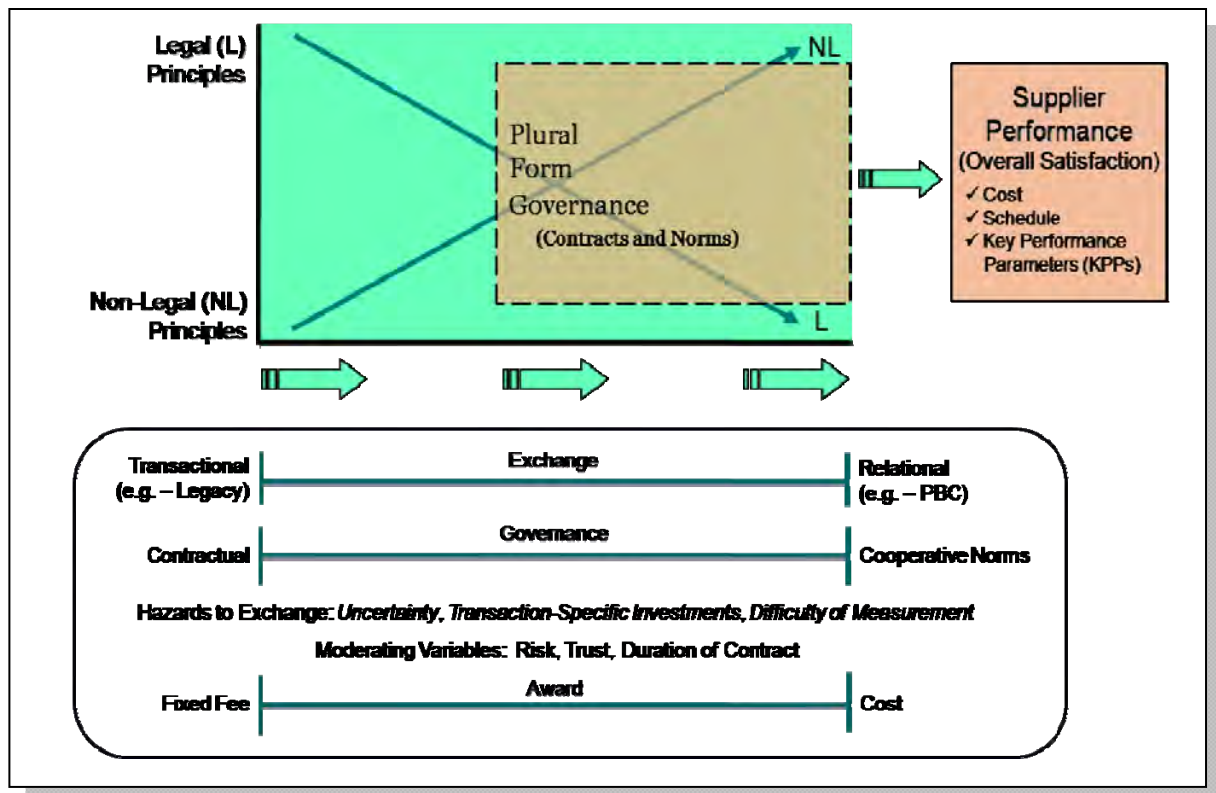


Figure 2. Conceptual Model

Our vision is that the program manager, who is responsible for evaluating proposals submitted for major weapon systems, will be able to use this model to systematically evaluate the type of exchange and governance structures needed for these major weapon systems and determine what would be the optimal mix of legal (i.e., formal contracting) and non-legal (i.e., relational norms) principles in order to achieve the highest level of long-term, sustainable performance. This model will also provide guidance for the types of exchange and governance structures needed given the type of relationship that currently exists between the government and the contractor.

We suspect that by incorporating this model into the contractual decision-making process, the government would develop more productive relationships with their suppliers and the contracts themselves would contain fewer legal bonds and exhibit more relational governance. This model would also provide the program manager with a framework for selecting subjective governing mechanisms in a more

objective manner. In other words, the program manager would be able to systematically select a contractual mechanism and set of relational norms that correspond with that particular contractual mechanism in order to facilitate the ability to satisfy the contractually defined key performance parameters (KPPs).

Propositions. Many scholars have differing views as to the degree of impact formal contracts have on the government–contractor relationship, as well as on the overall level of success a contractor could achieve as a result of having formal contracts (Aldrich, 1979; Cannon et al., 2000; Child, 1972; Fehr, Gächter, & Kirchsteiger, 1997; Ghoshal & Moran, 1996; Poppo & Zenger, 2002). Our preliminary assessment suggests that formal contracts alone cannot be seen as an efficient means for safeguarding against opportunistic behavior, specifically when high levels of complexity and uncertainty exist. Therefore, we have the following propositions:

1. Substituting certain legal norms found in formal acquisition and sustainment contracts with relational structures will enhance a Major Defense Acquisition Program (MDAP) contractor's ability to satisfy KPPs.
2. By allowing for more relational norms, the program manager and contracting officer(s) gain greater flexibility to alter the means of governance when volatility increases because the overall complexity of the contracts is reduced.
3. Because formal contracts are also inherently bounded in their rationality and cannot account for all future contingencies, it is imperative that more plural form governing strategies be incorporated into the contracting methodology of the defense industry.
4. If managed correctly, relational arrangements supported by trust, commitment, collaboration, and information exchange can be viewed as substitutes for complex contracts in buyer–seller arrangements.



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Methodology

Programs. In order to test our theoretical model and evaluate our propositions, we are evaluating 16 Major Defense Acquisition Programs (MDAPs) that span the different Service branches: three programs were selected from the U.S. Army, three from the U.S. Air Force, five from the U.S. Navy, and five programs were classified as Joint Service Products (see Figure 3). These programs also vary in terms of their functional capability area, technological needs, relational demands, and years in the Services.

Weapon System	Service Branch	ACAT	Functional Capability Area	Years of Observation
CH-47F Chinook	Army	1C	Focused Logistics	1998-Present
Patriot PAC-3	Army	1C	Force Protection	1994-Present
FBCB2	Army	1C	Command & Control	1995-Present
F-22A Raptor	Air Force	1D	Force Application	1996-Present
C-5M Super Galaxy	Air Force	1C	Focused Logistics	1999-Present
C-17A Globemaster III	Air Force	1C	Focused Logistics	1995-Present
V-22 Osprey	Navy	1D	Force Application	1992-Present
F/A-18E/F Super Hornet	Navy	1C	Force Application	1997-Present
EA-18G Growler	Navy	1D	Force Application	2002-Present
EFV	Navy	1D	Force Application	1997-Present
AH-1Z & UH-1Y	Navy	1D	Force Application	1997-Present
F-35 Joint Strike Fighter	Joint Service	1D	Force Application	2001-Present
JSOW	Joint Service	1C	Force Application	1997-Present
RQ-4A/B Global Hawk	Joint Service	1D	Battlespace Awareness	2001-Present
AMRAAM	Joint Service	1C	Force Application	1997-Present
Navstar GPS	Joint Service	1D	Net Centric	1997-Present

Figure 3. MDAP ACAT I Programs List

Data. Using contract data housed by the Federal Procurement Data System (FPDS) coupled with performance data found in the Selected Acquisition Reports (SAR) housed by the Defense Acquisition Management Information Retrieval (DAMIR) system, we are analyzing several variables that we believe can show the impact of the selected governing mechanisms on the overall performance of a contract. Specific variables being analyzed include, but are not limited to, the



following: the contractor(s) selected for a program, contractor turnover, previous relationship versus new relationship, old technology versus new technology, no R&D versus R&D, type of contracts used at the various milestones, estimated duration of work for those contracts, actual duration of work on those contracts (if completed), contractual modifications, and dollar values for those contracts (see Appendix B).

Data Issues. After reviewing the types of data elements collected by the various publically available sources such as the Federal Procurement Data System (individual contract actions), Selected Acquisition Reports (overall program performance data), and www.defense.gov (contract announcement information), we began looking for ways to connect all three data sources and found no meaningful or consistent way to do so. For example, one of the primary variables we were looking to analyze was the type of contractual mechanism used for a particular contract over time. What we found was inconsistent inputs across the various data sources. The offices responsible for inputting data into the FPDS appeared to be reporting inconsistent contractual mechanisms over time. For example, between 2004 and 2009, one F-22A contract experienced 13 contractual type changes, and although there were only two types used (CPFF and FFP), they were fundamentally different. Throughout the course of our research, we ran into countless circumstances that were similar to this one, which made it difficult to accurately assess what was really going on with any one particular contract.

We gathered data elements for various known contract types (RDT&E, EMD, LRIP, etc.) that were written for all 16 programs. Unfortunately, there was no foreseeable way to tie these individual data elements to the performance of the contracts because the publicly available performance data contained within a Selected Acquisition Report only looked at the overall performance of a system (i.e., schedule delays, cost overruns, etc.) not at how well a particular contract performed over time. The performance of an individual contract would need to be known in order for us to test our theoretical framework. To remedy this dilemma, we accessed private data sources that would allow us to better understand the true performance of the contracts under review.



Future Research

One path to consider would be to analyze how certain relational norms might behave in the defense industry. A specific research question might be, do certain relational norms permit, inhibit, or prohibit a contractor from being able to adapt to environmental changes? If one sees that incorporating certain relational norms permits immediate adaptation, then those relational norms positively impact a contractor's ability to adapt to environmental changes. However, if one finds that incorporating certain relational norms inhibits or prohibits adaptation, then those relational norms negatively impact a contractor's ability to adapt to environmental changes and could threaten a contractor's ability to fulfill the terms specified in the contract.

One thing to keep in mind is that it is important for contractors to recognize the current state of the armed Services when determining what variables matter when making risk-reducing decisions. In peacetime, cost is the main goal and performance and schedule take a backseat. In wartime, schedule and performance are the main goals and cost matters less. These different goals could explain why programs experience cost and scheduling overruns at various times during their life cycles. Therefore, an additional research objective could be to analyze whether a correlation exists between the current military state and the contractor's ability to satisfy KPPs.

One could assume that if relational arrangements really do act as substitutes for complex contracts, then it should be apparent that there has been a reduction in the complexity of the contracts written when reviewing contracts that have implemented relational governance methods. Therefore, another interesting question for future research could seek to identify whether the complexity of contracts has been reduced as relational norms have been implemented.

Another issue, which has been more controversial in recent years, has been the stagnant size of the acquisition workforce (see Figure 4). The Government



Accountability Office (GAO, known as the General Accounting Office until July 2004) has published several papers that highlight the impact of not having enough personnel to support the various procurement demands of the government (GAO, 1998, 1999, 2000, 2002, 2003, 2009, 2010). Many of the older reports argued that reducing the size of the workforce would not save the government much money because those services would then have to be contracted out to private industry at a premium (GAO, 1995, 1996). Additionally, those former acquisition personnel simply moved to other parts of the DoD (GAO, 1998). In 2003, the GAO issued a report that analyzed workforce trends relative to spending from 1997–2001 and found that while the acquisition workforce was reduced by roughly 5%, spending on goods and services rose by roughly 11% (GAO, 2003). The same study concluded that although size is an important variable to keep in mind, the knowledge and skills required to meet the complex challenges of tomorrow's systems is an equally important—if not more important—means of achieving successful acquisitions.

Lastly, as we have illustrated earlier, researchers have found that commitment, trust, communication, satisfaction, and performance are higher in relational exchanges than in transactional exchanges. Hence, an important question for future research is, how can government acquisitions that require formal contacts benefit from the advantages of relational partnerships while protecting the public good?



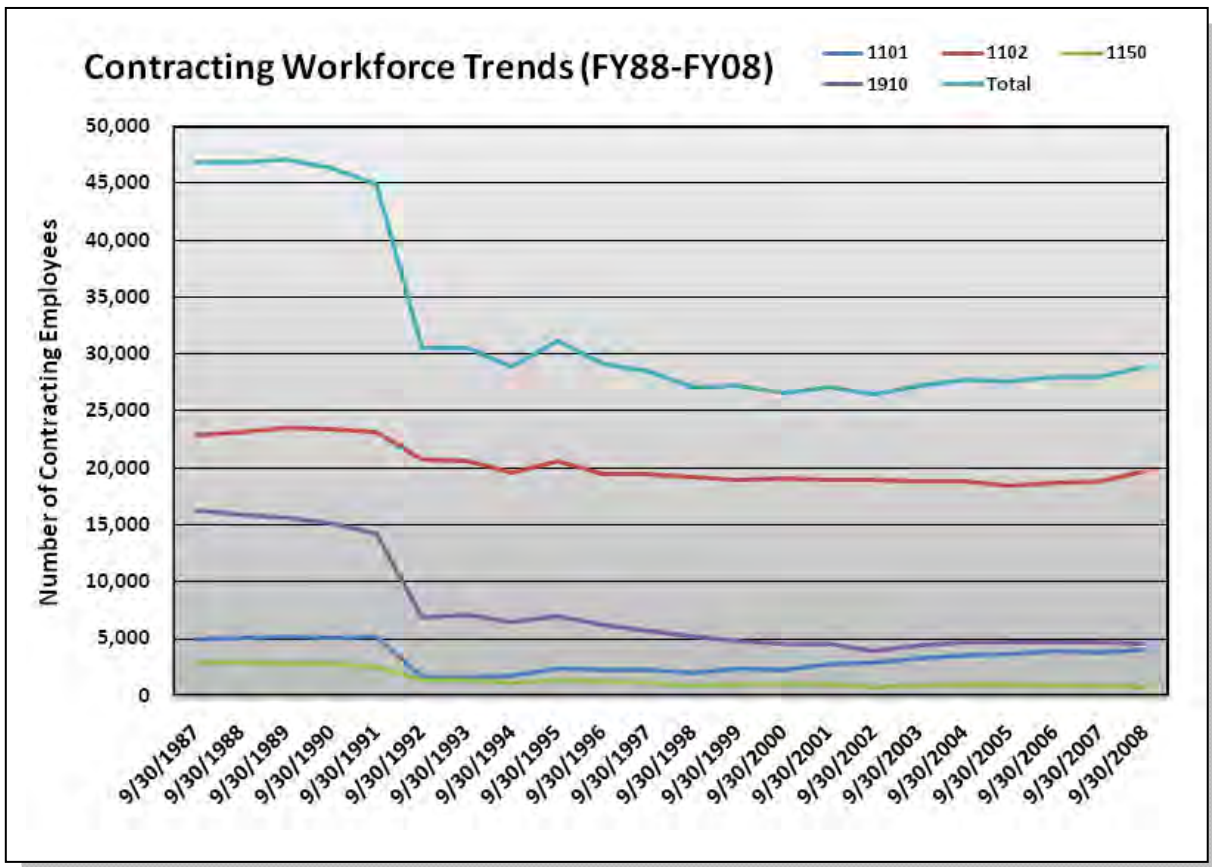


Figure 4. Workforce Figures
(AT&L Workforce DataMart & DMDC)



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Appendix A. Comparison of Major Contract Types

	Firm-Fixed-Price (FFP)	Fixed-Price Economic Price Adjustment (FPEPA)	Fixed-Price Incentive Firm Target (FPIT)	Fixed-Price Award-Fee (FPAF)	Fixed-Price Prospective Price Redetermination (FPPR)	Cost-Plus-Incentive-Fee (CPIF)	Cost-Plus-Award-Fee (CPAF)	Cost-Plus-Fixed-Fee (CPFF)	Cost or Cost-Sharing (C or CS)	Time & Materials (T&M)
Principal Risk to be Mitigated	None. Thus, the contractor assumes all cost risk.	Unstable market prices for labor or material over the life of the contract.	Moderately uncertain contract labor or material requirements.	Risk that the user will not be fully satisfied because of judgmental acceptance criteria.	Costs of performance after the first year because they cannot be estimated with confidence.	Highly uncertain and speculative labor hours, labor mix, and material requirements (and other things) necessary to perform the contract. The Government assumes the risks inherent in the contract-benefiting if the actual cost is lower than the expected cost-losing if the work cannot be completed within the expected cost of performance.				
Use When...	The requirement is well-defined. • Contractors are experienced in meeting it. • Market conditions are stable. • Financial risks are otherwise insignificant.	The market prices at risk are severable and significant. The risk stems from industry-wide contingencies beyond the contractor's control. The dollars at risk outweigh the administrative burdens of an FPEPA.	A ceiling price can be established that covers the most probable risks inherent in the nature of the work. The proposed profit sharing formula would motivate the contractor to control costs to and meet other objectives.	Standards can be fairly applied by the fee determining official. The potential fee is large enough to both: • Provide a meaningful incentive. • Justify related administrative burdens.	The Government needs a firm commitment from the contractor to deliver the supplies or services during subsequent years. The dollar at risk outweighs the administrative burdens of an FPPR.	An objective relationship can be established between the fee and such measures of performance as actual costs, delivery dates, performance benchmarks, and the like.	Objective incentive targets are not feasible for critical aspects of performance. Judgmental standards can be fairly applied. Potential fee would provide a meaningful incentive.	Relating fee to performance (e.g., to actual costs) would be unwarranted or of marginal utility.	The contractor expects substantial compensating benefits for absorbing part of the costs and/or foregoing fee or • The vendor is a non-profit entity	No other type of contract is suitable (e.g., because costs are too low to justify an audit of the contractor's indirect expenses).
Elements	A firm-fixed-price for each line item or one or more groupings of line items.	A fixed-price, ceiling on upward adjustment, and a formula for adjusting the price up or down based on: • Established prices. • Actual labor or material costs. • Labor or material indices.	A ceiling price • Target cost • Target profit • Delivery, quality, and/or other performance targets (optional) • Profit sharing formula	A firm-fixed-price. • Standards for evaluating performance. • Procedures for calculating a fee based on performance against the standards	Fixed-price for the first period. • Proposed subsequent periods (at least 12 months apart). • Timetable for pricing the next period(s).	Target cost • Performance targets (optional) • A minimum, maximum, and target fee • A formula for adjusting fee based on actual costs and/or performance	Target cost • Standards for evaluating performance • A base and maximum fee • Procedures for adjusting fee, based on performance against the standards	Target cost • Fixed fee	Target cost • If CS, an agreement on the Government's share of the cost. • No fee	A ceiling price • A per-hour labor rate that also covers overhead and profit. • Provisions for reimbursing direct material costs
Contractor is Obligated to:	Provide an acceptable deliverable at the time, place and price specified in the contract.	Provide an acceptable deliverable at the time and place specified in the contract at the adjusted price.	Provide an acceptable deliverable at the time and place specified in the contract at or below the ceiling price.	Perform at the time, place, and the price fixed in the contract.	Provide acceptable deliverables at the time and place specified in the contract at the price established for each period.	Make a good faith effort to meet the Government's needs within the estimated cost in the Contract, Part I the Schedule, Section B Supplies or services and prices/costs.			Make a good faith effort to meet the Government's needs within the ceiling price.	
Contractor Incentive (other than maximizing goodwill)	Generally realizes an additional dollar of profit for every dollar that costs are reduced.	Generally realizes an additional dollar of profit for every dollar that costs are reduced.	Realizes a higher profit by completing the work below the ceiling price and/or by meeting objective performance targets.	Generally realizes an additional dollar of profit for every dollar that costs are reduced; earns an additional fee for satisfying the performance standards.	For the period of performance, realizes an additional dollar of profit for every dollar that costs are reduced.	Realizes a higher fee by completing the work at a lower cost and/or by meeting other objective performance targets.	Realizes a higher fee by meeting judgmental performance standards.	Realizes a higher rate of return (i.e., fee divided by total cost) as total cost decreases.	If CS, shares in the cost of providing a deliverable of mutual benefit.	
Typical Application	Commercial supplies and services.	Long-term contracts for commercial supplies during a period of high inflation.	Production of a major system based on a prototype.	Performance-based service contracts.	Long-term production of spare parts for a major system.	Research and development of the prototype for a major system.	Large scale research study.	Research study.	Joint research with educational institutions.	Emergency repairs to heating plants and aircraft engines.
Principal Limitations in FAR/DFARS Parts 16, 32, 35, and 52	Generally NOT appropriate for R&D.	Must be justified.	Must be justified. Must be negotiated. Contractor must have an adequate accounting system. Cost data must support targets.	Must be negotiated.	MUST be negotiated. Accounting system that supports the pricing periods. Prompt redeterminations.	The contractor must have an adequate accounting system. The Government must exercise surveillance during performance to ensure use of efficient methods and cost controls. Must be negotiated. Must be justified. Statutory and regulatory limits on the fees that may be negotiated. Must include the applicable Limitation of Cost clause at FAR 52.233-20 through 23.			Labor rates must be negotiated. MUST be justified. The Government MUST exercise appropriate surveillance to ensure efficient performance.	
Variants	Firm-Fixed-Price Level-of-Effort.		Successive Targets (FPIS)		Retroactive Redetermination			Completion or Term.		Labor Hour (LH)

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Appendix B. Variables

Weapon System	Original Prime Contractor	# of Prime Contractor Changes	Current Prime Contractor	Type of Relationship	Type of Technology	R&D	Primary Contract Types	Estimated Duration of Work	Actual Duration of Work	Contract Modification	Contract Value	N-M Breach
CH-47F Chinook	X	X	X	X	X	X	X	X	X	X	X	X
Patriot PAC-3	X	X	X	X	X	X	X	X	X	X	X	X
FBCB2	X	X	X	X	X	X	X	X	X	X	X	X
F-22A Raptor	X	X	X	X	X	X	X	X	X	X	X	X
C-5M Super Galaxy	X	X	X	X	X	X	X	X	X	X	X	X
C-17A Globemaster III	X	X	X	X	X	X	X	X	X	X	X	X
V-22 Osprey	X	X	X	X	X	X	X	X	X	X	X	X
F/A-18E/F Super Hornet	X	X	X	X	X	X	X	X	X	X	X	X
EA-18G Growler	X	X	X	X	X	X	X	X	X	X	X	X
EFV	X	X	X	X	X	X	X	X	X	X	X	X
AH-1Z & UH-1Y	X	X	X	X	X	X	X	X	X	X	X	X
F-35 Joint Strike Fighter	X	X	X	X	X	X	X	X	X	X	X	X
JSOW	X	X	X	X	X	X	X	X	X	X	X	X
RQ-4A/B Global Hawk	X	X	X	X	X	X	X	X	X	X	X	X
AMRAAM	X	X	X	X	X	X	X	X	X	X	X	X
Navstar GPS	X	X	X	X	X	X	X	X	X	X	X	X



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