United States General Accounting Office

GAO

Report to the Honorable
William V. Roth, Jr., U.S. Senate

April 1992

DEFENSE PROCUREMENT

DOD Should Assess Cost Impact of Contractor Teaming Arrangements

GAO/NSIAD-92-15

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-239843

April 2, 1992

The Honorable William V. Roth, Jr.
United States Senate

Dear Senator Roth:

In response to your request, we reviewed the use of teaming arrangements among defense contractors of major weapon systems. We studied the teaming arrangements for the development phase of four major weapon systems. As requested, we determined whether these teaming arrangements (1) ultimately resulted in two equally qualified sources in competition with one another for future production contracts and (2) resulted in written agreements that might adversely affect future production contract costs.

The weapon system programs we selected for our study were the Army's Light Helicopter (LH) and Advanced Antitank Weapon System-Medium (AAWS-M) and the Navy's Advanced Tactical Aircraft (A-12) and Tilt Rotor Aircraft (V-22). None of these systems were in full-rate production at the time of our review.

Results in Brief

Principally because of reductions in the planned production quantities or program termination, three of the four programs we selected for study did not achieve their original purpose of evolving into two equally qualified sources that could compete for future production contracts for the entire system.

Initially, the teaming arrangements for the LH and V-22 were intended to result in dual-source contractors that would compete against each other for a share of the full-rate production contracts. The LH program was later changed so that the team members would jointly manufacture the production aircraft instead of each member independently manufacturing the complete, identical production aircraft in direct competition with its former team member. A similar change from dual-source competition to joint production was being considered for the A-12 aircraft program before it was terminated in January 1991. Only the AAWS-M program remained structured to establish dual-source competition between the team members for a share of the production contracts at the time of our review. Nevertheless, the teaming agreements we reviewed contained provisions that could adversely affect future production contract costs.

Background

The Department of Defense (DOD) was required, under the provisions of 10 U.S.C. 2438, in effect when these procurements were initiated, to provide that two or more sources would compete for major weapon system contracts. The law, however, permitted the Secretary of Defense to waive that requirement in certain limited circumstances.[1] To satisfy the requirement, DOD prepared acquisition strategies for major weapon systems that provided for competitive alternate sources from the beginning of full-scale development through the end of production.

One way to create such alternate sources is a technique referred to as "contractor teaming." Contractor teaming, as the name implies, involves a joint effort of two or more major contractors in the design and testing of a new major weapon system. Each contractor brings into the team its own expertise in designing and developing the weapon system. A number of such teams compete against each other, with one being selected as the "winner" of the development effort and the initial production contract. Instead of having a sole source producer after this point, full-rate production is split between the members of the winning team, based on a competition between them for specified shares. Because the team members are expected to jointly develop and produce the initial systems, each member is also expected to have the capability to independently manufacture the winning design. The government may require teaming for major weapon systems, or contractors may independently decide to create teams.

Generally, DOD does not become directly involved with the contractors' teaming agreements, but prefers to sign a contract with a single entity to avoid becoming a party to the agreement. Although DOD was aware of and had extensive knowledge on the formation of the teams, it was not a formal party to any of the agreements we examined.

In addition to providing competitive dual sources, teaming may be used to (1) enhance the industrial base for a particular system, (2) apportion the risk of development, and (3) enable more contractors to participate in the development and production of major weapon systems. When teaming is primarily intended to develop dual-source competition, the costs associated with establishing more than one production facility and any inefficiencies attributable to having separate production lines are—at least

[1]The law was amended on November 5, 1990, to make the use of dual sources an option rather than a requirement.

in theory—expected to be more than offset by the cost savings derived from awarding contracts competitively.

The contractors that enter into teaming arrangements usually pool their financial and technological resources. Typically, they enter into written agreements that define their respective project responsibilities and discuss some aspects of future competition for production of the weapon system.

On competitive awards, contracting officers rely on a combination of marketplace competition and price analysis to ensure that the prices paid are fair and reasonable. On noncompetitive awards, contracting officers rely on a number of other safeguards intended to detect inflated contractor cost estimates and to ensure fair and reasonable prices. For example, contracting officers normally rely on a team of experts, including auditors, accountants, cost analysts, engineers, and production specialists, to perform a cost and technical analysis of the contractor's proposal. Contracting officers also obtain cost and pricing data as a safeguard against inflated contractor estimates.

There is a presumption that adequate price competition will normally exist on dual-source contracts and that price analysis alone can ensure fair and reasonable pricing. However, our prior work for you showed that price analysis alone was not sufficient to ensure that fair and reasonable prices were obtained on dual-source contracts.[2]

Joint Production Replaced or Was to Replace Dual-source Contracting in Three of the Programs

The original purpose of the teaming arrangements for the LH, V-22, A-12, and AAWS-M programs was to develop dual sources that could compete for a share of the production contracts. However, because of reduced acquisition quantities and the resulting cost implications, plans for dual-source competition were canceled or were expected to be canceled for the LH, V-22, and A-12 programs. At the time of our review, plans for the production of the AAWS-M still called for dual-source contracting between team members.

[2]Contract Pricing: Dual-Source Contract Prices (GAO/NSIAD-89-181, Sept. 26, 1989).

Initial Plans Were Changed

In structuring the development and production programs, the government initially had required teaming arrangements for the A-12, V-22, and AAWS-M. Team members were to jointly develop the weapon system and then compete for a share of the full-rate production contracts. The government did not specifically require teaming arrangements for the LH, but did require the development of two sources for production of the winning design. Contractors decided that teaming was the simplest way to meet this requirement for the LH program.

Despite these initial plans for dual-source competition, the LH and V-22 program plans were changed to a joint production arrangement. Under such an arrangement, each contractor was to provide some portion of the system, with final assembly to take place at a single, common facility, and with production costs approximating those for a single source. In addition, before the full-scale development contract for the A-12 was terminated, procurement officials were considering joint A-12 production, although they had not yet formally abandoned plans for dual-source production.

Decrease in Acquisition Quantities Spurred Joint Production Arrangements

The change to a joint production arrangement for the LH and V-22 was necessary because planned production quantities were insufficient to justify the increased costs associated with dual production lines, according to officials of both programs. In addition, A-12 contractor officials told us that dual production lines would not have been economically justified for the expected number of production aircraft before the program was terminated.

The Army initially had planned to purchase 4,000 LH aircraft; however, the Secretary of Defense reduced the planned acquisition quantity to between 1,292 and 1,681 aircraft. A study by the Institute for Defense Analysis, for the Office of the Deputy Director, Tactical Warfare Systems, estimated that joint production of the LH would cost about $2 billion less than maintaining two production lines.[3]

The study, based on a projected production of 2,096 LH aircraft, cited the inefficiencies of redundant equipment and labor costs. In addition, the study questioned the Army's ability to sustain competition between team members during production. The low bidder for the first production lot to be competed, according to the study, would remain the low bidder

[3]Analyses of a Coproduction Acquisition Strategy for the Light Helicopter Program (LH), Institute for Defense Analysis (IDA Paper P-2385, April 1990).

throughout production because of the labor efficiencies associated with higher quantities awarded to the low bidder. This, in effect, would inhibit price competition after the initial competitive award. The report concluded that "unless there is an adequate production quantity to be procured, dual sourcing is not a viable option."

Similarly, the Navy had planned to purchase 657 V-22 aircraft for the Marine Corps, but, according to the program stretch-out plan, only 218 aircraft would be purchased by the year 2002. A contractor official told us that, under these circumstances, it would be prohibitively expensive for team members to compete against each other to produce the aircraft.

Navy officials also anticipated that the planned procurement quantities of the A-12 would not justify dual-source contracting. An analysis by General Dynamics Corporation, one of the team members, demonstrated that maintaining two production lines would have cost about $3 billion (in March 1985 dollars) more than a joint production line because of duplicated tooling and labor inefficiencies. DOD told us that it was not privy to this contractor analysis. The contractor's analysis was based on the Navy's initial planned purchase of 850 aircraft. In addition, contractor officials believed that the 620 aircraft DOD directed the Navy to purchase was an insufficient number for the team members to compete for and recover the losses they would incur during full-scale development. The losses estimated at completion of the contract for full-scale development were between $500 million and $1.2 billion.

Teaming Provisions Could Adversely Impact Future Production Costs

If the government had pursued a dual-source contracting strategy for the production of the LH, V-22, and A-12, provisions in the written agreements between team members could have had an adverse impact on future production contract costs. The written agreement for the AAWS-M program also contained a provision that could result in a similar adverse effect.

Army's LH Program

The written agreement for teaming arrangements on the LH program contained a section requiring the helicopter company that was awarded the contract for the highest share of production to pay the other helicopter company a percentage of the contract's dollar value, depending on the circumstances. In addition, under the teaming agreement the companies would have to pay to the avionics team member a percentage of the dollar value of any avionics work contracted to another firm.

An official of one of the helicopter companies told us that such "surcharge" payments were intended only to provide incentives to contractors to team with each other and that the payment percentages were too small to affect competition. However, in its evaluation of the teaming arrangement, the Army questioned the team about the percentage surcharge for the avionics firm, stating that there would be no incentive for the helicopter companies to obtain additional sources for the LH avionics. Nevertheless, the Army subsequently awarded the team a contract for demonstration and validation in November 1988.

Army's AAWS-M Program

The written teaming agreement for the AAWS-M program included a technology transfer plan that provided for the transfer of proprietary information between the team members to enable both to become qualified independent sources and compete for production contracts. However, the transfer plan did not cover proprietary information pertaining to semiconductors, semiconductor processes, advanced focal plane arrays, and cryogenic components, all of which are needed to successfully develop the AAWS-M system. Without an adequate transfer of this critical information, the Army's objective of having two qualified sources able to compete for production contracts could be impeded.

To help ensure the development of two fully qualified sources, the written teaming agreement required the team member responsible for developing this critical technology to provide nonproprietary form, fit, and function information to the other team member and, if necessary, to assist the other team member in using the information to minimize undue experimentation and excess costs in designing and producing the desired end item, component, or process. In addition, the full-scale development contract provided that the government would not (1) accept hardware from either team member in advance of the other during the low-rate initial production phase unless advance written approval was provided by the contracting officer and (2) conduct testing unless both contractor team members were ready to participate. Although these provisions might mitigate the technology transfer problem, requiring the other team members to produce on only form, fit, and function information could cause delays in the program and increase costs. The delays could occur because the government might not accept one team member's hardware without the other team member demonstrating that it could also produce the item. Such delays could increase costs. Furthermore, if one team member does not develop the capability to produce the item, then dual sourcing would not be achieved.

Navy's A-12 Aircraft Program

The written agreement between the team members for the A-12 program included a provision for the team members to exercise their best efforts to persuade the Navy to guarantee each party at least 40 percent of the A-12 production contracts. As we previously reported, dual-source guarantees of this nature necessitate that contracting officers use the safeguards intended to detect inflated contractor cost estimates and ensure fair and reasonable prices.

In addition, the agreement ensured that each party would receive 50 percent of any business for A-12 "variants and derivatives" (which were not defined in the agreement) by requiring the winning contractor to subcontract with the other team member. The Navy did not include a 40-percent minimum award provision for production contracts in the A-12 full-scale development contract, and no contracts for A-12 variants and derivatives were awarded.

According to officials of one of the contractors, it would have been difficult for the Navy to sustain two competitive sources for the A-12 program without evenly splitting production contracts between the team members because the loser of the first award would not produce enough aircraft to achieve sufficient labor efficiencies to be competitive for the following buy. One contractor official said that an award split other than 50-50 or 60-40 would have put the losing contractor out of the A-12 business.

Navy's V-22 Tilt Rotor Aircraft Program

The written teaming agreement for the V-22 program contained a section that allowed a contractor engaging in independent production to negotiate subcontracts with the other team member for the goods and services that the team member provided during program development. This agreement could result in an adverse impact on future production contract costs because it did not provide for competition among all responsible sources. According to an official of one of the contractors, team members on the V-22 full-scale development contract were not to subcontract with each other.

Recommendation

We recommend that the Secretary of Defense direct that contracting officers review the language in the written agreements involved in teaming arrangements to determine whether these agreements may adversely impact future production costs.

Agency Comments and Our Evaluation

In commenting orally on a draft of this report, DOD concurred with our findings and recommendation.

Scope and Methodology

We selected four programs—the Army's LH and AAWS-M programs and the Navy's A-12 and V-22 programs—whose teaming arrangements appeared to be primarily directed at the development of dual sources for future competitive production awards. As requested, our selection included one special access project, the A-12, for which cost data and other information were strictly controlled for security reasons.

We interviewed and obtained documents from officials at (1) General Dynamics Corporation's Fort Worth Division, Fort Worth, Texas, for the A-12; (2) Bell Helicopter Textron, Fort Worth, Texas, for the V-22 and the LH; and (3) the Texas Instruments/Martin Marietta AAWS-M Joint Venture, Denton, Texas, for the AAWS-M.

We met with Defense Plant Representative Office officials at Bell Helicopter Textron and General Dynamics. In addition, we obtained information from officials of the Naval Air Systems Command, the Army Aviation Systems Command, and the Army Missile Command. We reviewed the written teaming arrangements for each of the programs, government requests for proposals and acquisition plans, and various contractor documents.

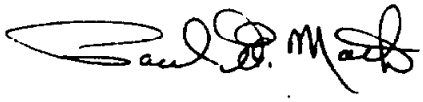
We performed our work between July 1990 and August 1991 in accordance with generally accepted government auditing standards.

The teaming arrangements and status of each program are discussed in more detail in appendix I.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days from the date of this letter. At that time, we will send copies to the Secretaries of Defense, the Army, and the Navy; the Director, Office of Management and Budget; and other congressional committees. We will also make copies available to others upon request.

If you or your staff have any questions concerning this report, I can be reached on (202) 275-4587. The major contributors to this report are listed in appendix II.

Sincerely yours,



Paul F. Math
Director, Research, Development,
Acquisition, and Procurement Issues

Description and Status of Teaming Arrangements for Programs Reviewed

This appendix describes the major weapon systems programs selected for review and provides a summary of the status of these programs.

Light Helicopter

The Army's Light Helicopter (LH) system is expected to be a lightweight, low-cost, twin-engine advanced technology helicopter that will replace the current light fleet of AH-1, OH-6, and OH-58 helicopters for the primary missions of attack and armed reconnaissance. The program, in the demonstration and validation phase, had two contractor teams participating—(1) Bell Helicopter Textron, Inc., McDonnell Douglas Helicopter Company, and McDonnell Aircraft Company and (2) The Boeing Company and Sikorsky Aircraft. The demonstration/validation contracts were cost plus incentive and award fee type. We reviewed the teaming agreements for the Bell/McDonnell team. Subsequently, the Army selected the Boeing/Sikorsky team to build the LH, without any plans for further competition.

Advanced Antitank Weapon System-Medium

The Army's Advanced Antitank Weapon System-Medium (AAWS-M), which will replace the Dragon system, is a portable antitank weapon system designed to provide high lethality against advanced armor and to be a simple-to-operate, easily and economically maintained, rugged and reliable infantry weapon system. The program is in full-scale development under a cost-plus-incentive-fee contract awarded in 1989 to a joint venture composed of Texas Instruments and Martin Marietta. Both companies are subcontractors to the Joint Venture. The team plans to jointly produce the missile during full-scale development and low-rate initial production. After initial production, the team members plan to compete for shares of future production contracts.

A-12 Aircraft

The A-12 was to replace the A-6E "Intruder" as the Navy's new-generation attack aircraft. It was to operate in all types of weather, day or night, and against both fixed and mobile sea and land targets. Low-observable technology, greater speed, and advanced weapon and survivability systems were to enable the A-12 to penetrate the most sophisticated defenses and deliver greater quantities of ordnance with precision at less risk to the flight crew than any previous naval aircraft. The Navy selected a full-scale development team after two teams had competed in the demonstration and validation phase of the program. The selected team, composed of General Dynamics Corporation and McDonnell Douglas Corporation, was in the

full-scale development phase under a fixed-price-incentive contract when the Navy terminated the contract for default on January 7, 1991.

V-22 Aircraft

The Navy's V-22 is under development as a vertical lift aircraft using advanced technology to provide the military services with self-deployable, multimission vertical/short takeoff and landing capability. The V-22 weapon system is expected to satisfy varied operational requirements, including Marine Corps assault vertical lift, Navy combat search and rescue, Air Force special operations, and Army medium cargo assault lift. The contractor team of Bell Helicopter Textron and Boeing Helicopter Company submitted the only proposal for the preliminary design phase of the V-22 program. Following this phase, the team was awarded a fixed-price-incentive contract for six full-scale development aircraft. The program was terminated in 1989. The Navy has no plans for competition for the V-22; Bell and Boeing will jointly produce any future aircraft.

Major Contributors to This Report

National Security and International Affairs Division, Washington, D.C.	John A. Rinko, Assistant Director
Dallas Regional Office	Joe D. Quicksall, Regional Management Representative Kenneth R. Rupar, Evaluator-in-Charge Linda Lohrke, Site Senior
Office of General Counsel, Washington, D.C.	Jerold Cohen, Assistant General Counsel Alan S. Goldberg, Senior Attorney

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