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ARMAMENTS COOPERATION IN THE PACIFIC RIM: AN EVALUATION FRAMEWORK FOR THE SELECTION OF COOPERATIVE ARRANGEMENTS

THESIS

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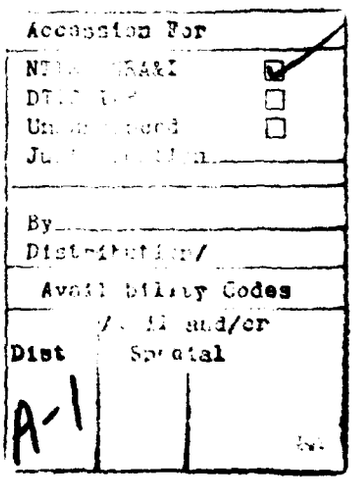

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THESIS

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Abstract

This study presents factors which require evaluation prior to entering into a cooperative arrangement. The purpose of the research was to create an evaluation framework to assist DOD managers of international projects with a tool to enable the selection of an appropriate cooperative arrangement type. The study was focused on the Pacific Rim and includes two case studies on the Japanese FS-X and the Korean Fighter Plane. Factors were identified through literature research, case studies, and personal interviews. The study concluded with the identification of six basic factors: technology, industrial base, political, economic, program stage, and requestor's motives.

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I. Introduction

General Issue

Asian Pacific Rim nations represent some of the fastest growing industrialized economies in the world today. The Pacific Rim comprises a group of extremely diverse countries that are united by their common borders on the Pacific Ocean and their export-oriented economies (23:18). It is estimated that by the year 2000 that the Asia Pacific Rim "will become a world-class technological leader in aerospace (including much defense technology), electronics, telecommunications, basic components, and advanced materials" (40:viii). Robert C. McCormack, Deputy Under Secretary of Defense (Industrial and International Programs), emphasized the Pacific Rim's importance to DOD in his article entitled "Bolstering Defense Industrial Competitiveness Through International Cooperation" as stated,

> Another major effort is aimed at ensuring productive cooperative relationships with the countries in the Pacific Rim. For more than five years, these countries have been our principal trading partners. Only recently has there been a significant effort to bring the shift in trade relations in line with U.S. investment and defense industrial cooperation with the Pacific Rim nations. As this area continues to emerge as a major economic power center, we will be looking for new ways to optimize defense industrial cooperation. Clearly, there are emerging technologies of which the U.S. can and must avail itself. (35:76)

Based on this assumption, the future of armaments cooperation within this region will be extremely valuable to the Department of

Defense in consideration of the economic growth and the emerging of a viable technology base. Armament cooperation is defined as "joint international research, development or production of defense systems" (40:A6i).

Nations within the Pacific Rim are demanding more production involvement in the acquisition of defense weapons, forcing the United States to review its defense industrial cooperation policies currently used in the area. Sales of defense weapons to foreign countries include the usage of many different cooperative arrangements. Common cooperative arrangements include direct sales, offsets (co-production, co-development, co-assembly), licensed agreements, joint ventures, and other such arrangements. Direct sales have been one of the United States' most successful employed arrangement in third world markets. The rapid economic and technological changes occurring in the Pacific Rim require DOD and the defense industry to reassess the current U.S. weapon cooperative policy of direct sales in this area of the world.

In the past decade, the United States' share of the defense market has declined. Lopez and Yager reported in the report entitled "The U.S. Aerospace Industry and the Trend toward Internationalization" that between FY 1976 and FY 1986 the U.S. share declined 30% (26:66). Lopez and Yager cite specific reasons for this decline.

> The decline in the U.S. market share is attributable to factors which include the U.S. self-imposed domestic political and technology constraints, increased foreign competition including increased cooperative arrangements for arms production, including offset; and the development of indigenous arms production capability in a growing number of countries. (26:66)

The Asian Pacific Rim is just one example of an area of the world where indigenous arms production is taking place. Ackerman and Copely

report Singapore as "Southeast Asia's leading manufacturer of military material" (1:11). Singapore has produced the SAR assault rifle, the Ultimax 100 light machinegun. In addition Singapore's aerospace industry has rebuilt A-4 Skyhawks and participated with Grumman to refurbish A-4 engines for Malaysia (1:11-12). Other countries in this region are also developing aerospace industries such as Indonesia, Thailand and Malaysia.

Indonesia has been a licensed producer of trainers, commuter aircraft, and helicopters. Thailand has produced their own fast attack crafts and rockets. Malaysia is also producing licensed weapons such as rifles (1:12). The push for a partially self-reliant defense industry in this part of the world is apparent. The use of direct sales with no other cooperative arrangements can no longer be looked at as the only viable means to sell U.S. defense weapons.

The Defense Science Board's report entitled "Defense Industrial Cooperation with Pacific Rim Nations" summed up the need to review current cooperative cooperation policy.

> If risks of defense industrial cooperation in the Pacific Rim are to be minimized and the benefits maximized, a thorough policy review is necessary. Existing policy does not address the full range of methods for defense cooperation; it is still largely oriented toward foreign military sales cooperation with NATO allies and "assistance" vis-a-vis" cooperation in the PACRIM. Future policies should consider the impact and diversity of forms of defense cooperation between the U.S. and Pacific Rim Countries. Events have overtaken existing policy. (40:41)

Specific Problem

The use of direct sales or off the shelf foreign military sales methods to "purchase military systems from the U.S." are "no longer the

preferred means of providing" for national defense within the Pacific Rim (40:49). At present, no evaluation framework exists in DOD that guides the choice of which cooperative method is applicable in a cooperative program. This type of a framework would help DOD organizations concentrate on the most viable and favorable cooperative method instead of wasting time and effort attempting to negotiate a method that may not be successful. The purpose of this study is to develop an evaluation framework for the selection of cooperative arrangements used by DOD for major systems when one of the parties is a foreign country in the Pacific Rim.

Investigative Questions

The following investigative questions will be used as a guide to obtain information on Pacific Rim nations and current U.S. weapon sales arrangements and policies in order to review, evaluate, and make recommendations for future use of cooperative arrangements:

1. What are the different weapon cooperative arrangements used by the United States?
2. What is the current U.S. policy on weapon sales?
3. What are the current defense cooperation agreements in use in the region?
4. Are there any future defense cooperative agreements being planned for this region?
5. What are the current trends concerning armaments cooperation?
6. What impact does the economic and technological growth in this region have on choosing a cooperative method?

Scope of Research Topic

The Pacific Rim represents a part of the world where increased armaments cooperation will become a major agenda item for the Department of Defense. This paper shall focus on cooperative arrangements used between the United States and the various countries within the Pacific Rim. The advantages and disadvantages of different types of weapon acquisition arrangements will be discussed. This paper will then concentrate on two cooperative agreements including the Korean fighter plane program (KFP) and the FS-X program. Aspects of these specific programs such as acquisition arrangements negotiated and reasons why particular cooperative arrangements were chosen will be evaluated.

It is the intention of this paper to provide prospects on which cooperative arrangements may be successful for future cooperative ventures in this region of the world. A study of cooperative arrangements would not be complete without some discussion of current U.S. arm sales policy for it is this policy that will ultimately affect the choices of cooperative arrangements.

Sequence of Presentation

Chapter II presents the research methodology used in this thesis to answer the investigative questions and to reach a conclusion.

Chapter III presents the literature review of available data on armaments cooperation, defense industrial cooperation trends, DOD Policy, Policy Decision Criteria, and the Pacific Rim.

Chapter IV presents case studies of the Japanese FS-X and Korean Fighter programs and information obtained through personal interviews.

Chapter V presents final conclusions of this research report and a framework for future selections of international armament agreements.

Appendix A - List of DOD personnel interviewed.

Appendix B and C - Interview guides.

Appendix D - List of other DOD guidance for international cooperative programs.

II. Methodology

Research Method

In order to establish an evaluation framework to assist DOD negotiators when choosing an appropriate cooperative arrangements with Pacific Rim nations, a combination of research methods will be used. Using case study coupled with a case comparison approach, historical analysis, and personal interviews have provided relevant and detailed information as to the preference of cooperative arrangements the U.S. should use. The following paragraphs describe each method, their purposes, and possible problems each may have.

Case Study. The case study approach will be the primary research tool used. Its purpose is to explain the different viewpoints considered in the most recent defense cooperative agreements. A case study as defined in Emory is "the detailed analysis of a limited number of events or conditions and their relationships" (17:61). Cooperative agreements to be studied include the Japanese FS-X program and the Korean Fighter program (KFP). Each case study will concentrate on the reasons why certain international cooperative arrangements were chosen. The use of case studies will help explain why countries are requesting certain cooperative agreements and whether future agreements will be similar. In addition, the case studies may provide evidence on whether certain cooperative arrangements employed are successful.

Case Comparison. Both cases will then be studied using a case comparison approach. A case comparison approach involves comparing the

different findings from each study and then searching for common explanations (59:63). In finding these explanations, Robert Yin emphasizes the need to "preserve a chain of evidence." Yin further defines this chain as consisting "of the explicit citation of particular pieces of evidence, as one shifts from data collection to within-case analysis to cross-case analysis and to overall findings and conclusions" (59:63). Failure to establish an explicit chain will lead to questionable conclusions.

Historical Method. Another method to be used in conjunction with case study will be the historical method. This method as defined in the book, *Educational Research: An Introduction* is "the systematic and objective location, evaluation, and synthesis of evidence in order to establish facts and draw conclusions concerning past events" (5:260). The use of this method is essential tc identify why certain procurement policies and methods were employed. In addition, the study of past procurement practices with allies could influence what cooperative arrangements are used in the Pacific Rim.

Personal Interview. The last method to be employed will be personal interviews. The use of this method will add depth and detail to all of the methods above. Emory defines personal interviews as "a two way conversation initiated to obtain information from a respondent" (17:61). The use of interviews with certain government officials directly involved in the region may assist in confirming conclusions reached in the case studies and historical analysis. Interviews also may bring out certain aspects not found in the previous methods. It is also possible that opinions obtained may be confirmed by the previous methods used. Since the interviews will not be based on a survey or

other such instrument, unique preparation of questions for each respondent will have to be accomplished based on the person's expertise. Prior to each interview, an interview guide will be created to ensure coverage of areas of concern in this thesis. Interviews include system program managers, defense department officials and procurement professionals. The obstacles with this method include choosing interviewees and time.

III. Literature Review

Chapter Overview

The purpose of this chapter is to present information discovered during a literature review of subjects relevant to this study. Subjects reviewed include armaments cooperation, trends in armaments cooperation, DOD weapon sales policy, and the Pacific Rim. The presentation of the subjects will follow this order.

Armaments Cooperation

This section provides some basic definitions of terms used in discussing cooperative arrangements and includes the advantages and disadvantages of armaments cooperation.

Definitions. Armaments cooperation is defined as "joint international research, development or production of defense systems (40:A6i). To develop, produce, or sale weapon systems the United States uses many different types of armament cooperation arrangements with our allies. This section first defines the various international arrangements used by government or industry and then defines international agreement and cooperative arrangements as they pertain to the Department of Defense. The following definitions are different types of international agreements used by industry and the U.S. government.

> CO-ASSEMBLY - Assembly in two or more countries of the same system. Usually involves transfer of assembly technology and of subsystems from country of origin to countries assembling the system for their final use. One participant generally has more responsibility for the management and administration of the project. (40:A6i)

COPRODUCTION - Production of a system in two or more countries. Involves the transfer of production technology and of complex or sensitive subsystems or components from the country of origin to countries producing the system. Recipient may expand production to include subsystems and components. (40:A6i)

CODEVELOPMENT - System or subsystem cooperatively designed in two or more countries. Shared responsibilities include design and engineering, and may be expanded to include applied research. (40:A6i)

OFFSETS - Direct or indirect conditions of purchase of defense equipment enacted by a purchaser. Offsets aim to increase economic development benefits and reduce the net balance of payment costs of such a purchase. Purchasers may require as direct offsets the purchase of production in their country of subsystems or components of the purchased system. Indirect offsets to the purchase would include the purchase of unrelated goods, services or supplies. (40:A6ii)

LICENSING - Selling or buying the rights to produce another firm's product. (55:15)

JOINT VENTURE - A separate corporate entity established by the participating companies and operated as an independent body. Represents a greater corporate resource commitment than simple teaming or consortia because the new company must be financed and helped to grow, over an extended period. Usually set up to pursue broad business areas, but objectives and structures are flexible. Concentrate on marketing, joint R&D activities or manufacturing, or a combination. (55:45)

TEAMING - Collaboration on a specific program as prime or subprime. Operates under existing corporate structures. (Also multi-program teaming) (55:15,45)

SOURCING - Direct purchase of a foreign-made part for a U.S. weapon system. (55:15)

SUBCONTRACTING - U.S. prime contractor contracts with a foreign company to develop or produce a portion of a U.S. system. (55:15)

FOREIGN MILITARY SALES - Government sales of U.S. hardware abroad. (55:15)

ALLIANCES - Loose agreements to collaborate in specific areas of technology. (55:15)

CONSORTIUM - Loose agreement of several partners to pursue a technology area from shared resources with shared revenues. Usually assumes an organizational form of its own, often with

a board of directors comprised of the member companies to oversee activities, a lead program manager, and integrated technical and support teams. (55:15,45)

"FAMILY OF WEAPONS" - Agreement to minimize overlapping weapons development by cooperating. Used by NATO. (55:15)

DIRECT COMMERCIAL SALE - U.S. contractor contracts directly with foreign government. U.S. government involvement involves the issuance or denial of arms export licenses. (19:21,31:19)

COUNTERTRADE - Purchase of goods and services from the buyer country as a condition of the offset agreement, excluding purchase under co-production or licensed or subcontractor production. These purchases may be made by the U.S. government, the U.S. contractor, the contractor's suppliers, or by third parties with whom the contractor acts as a middleman. The purchase may involve products for defense or civil use. (11:19)

This paper is concerned with the international arrangements used by the Department of Defense (DOD). Prior to discussing the types of arrangements most commonly used by DOD, it is appropriate to define what international agreement is and is not in the view of DOD.

The book entitled *The Management of Security Assistance* provides the following DOD definition of international agreement.

1. International Agreement

    a. Any agreement that is concluded with one or more foreign governments (including their agencies, instrumentalities, or political subdivisions) or with an international organization:

        (1) Signed or agreed to by civilian or military officers or employees of any organizational element of the Department of Defense, or by representatives of the Department of State or other agencies or the U.S. Government;

        (2) Signifying the intention of the parties to be bound by international law; and

        (3) Whether denominated an international agreement or a memorandum of understanding, exchange of notes, exchange of letters, technical arrangement, protocol, note verbale, aid memoire, agreed minute plan,

contract, arrangement, or some other name having a similar legal consequence.

b. Any oral agreement that meets the criteria [of paragraph 1.a. above] is an international agreement and must be reduced to writing by the Department of Defense representative who enters into the agreement. (13:3-21)

c. The following are not normally international agreements:

(1) Contracts made under the Defense Acquisition Regulation [now Federal Acquisition Regulation]; (13:3-31)

(2) Foreign Military Sales Credit agreements;

(3) Foreign Military Sales letters of Offer and Acceptance and Letters of Intent executed on DD Forms 1513 2012;

(4) Standardization Agreements (STANAGs) that record the adoption of like or similar military equipment, ammunition, supplies, and stores or operational, logistic, and administrative procedures. (A STANAG that provides for mutual support or cross-servicing of military equipment, ammunition, supplies, and stores or for mutual rendering of defense services, including training, is an international agreement);

(5) Leases under 10 U.S.C. S2667; and

(6) Agreements whose only purpose is to establish administrative procedures. (13:3-22)

The Department of Defense uses seven basic types of cooperative arrangements with other nations. The previous definitions of coproduction, codevelopment, and family of weapons are three of the cooperative arrangements used by DOD. The pamphlet entitled *International Cooperative Programs* by Major Rand C. Lewis of the Defense Institute of Security Assistance Management defines four more types of DOD cooperative arrangements.

EXCHANGES - Exchanges are programs that allow the exchange of scientific and technical information, as well as the exchange of scientists and engineers with allies or friendly countries in order to support efforts of standardization or develop sources of new technology. (25:4)

TEST AND EVALUATION - Test and Evaluation allows for the evaluation of foreign weapons and the possibilities for their integration into U.S. programs. This provides an alternate source of equipment or technology that may enhance U.S. programs at lesser cost. (25:4)

OPENING DEFENSE MARKETS - Opening Defense Markets authorizes the procurement of equipment from foreign sources, when those articles meet the needs of the procuring nation and precludes new systems development. (25:5)

PACKAGES - Packages provide for bilateral arrangements to utilize articles or equipment from both national sources to meet a cooperative need. (25:5)

Advantages. Armament cooperation agreements are advantageous for several reasons. Some of the advantages include attainment of friends, reduced costs, standardization, access to technology, strengthening the industrial base, and expansion of markets. The following paragraphs explain such advantages.

Armaments cooperation provides a mean to influence and win friends. Thomas Callaghan as quoted in *Contract Management* emphasizes this advantage through a short story.

> The General was lecturing at the War College on "Cooperation With Our Allies." When he finished a young officer asked, "What do we get out of cooperation with our allies?" The General answered in one word: "Allies!" And if labor or industry on either side of the Atlantic were to ask the same question, three more words would be needed: "Jobs, Markets, Profits." (2:27)

Economies of scale is another reason for armaments cooperation as weapon costs are rising and the defense budget is decreasing. Past U.S. practices have concerned self-sufficiency in meeting national defense needs. This practice has led to increased unit costs fewer new weapon systems (2:27). Armaments cooperation can help reduce duplication of efforts and expand the current defense market of high priced weapons (2:27).

The affordability of technologically superior weapons is questionable in today's defense budget. The article "Thinking Globally" in *Contract Management* quotes one of the famous "Augustine Laws" that states:

> In the year 2054, the entire defense budget will purchase one tactical aircraft. This aircraft will have to be shared by the Air Force and Navy 3 1/2 days each per week except for leap year, when it will be made available to the Marines for the extra day. (2:27)

The article entitled "Tactical Aircraft Producers Face Diminishing Prospects" in *Aviation Week & Space Technology* also emphasized economic concerns supporting more cooperative programs.

1. Expensive fighter programs are eroding national aerospace industrial bases as companies are forced to devote more of their assets to these programs.

2. The high costs of these sophisticated aircraft are consuming larger portions of declining defense budgets while at the same time pricing Western nations out of a shrinking market. (49:34)

R. Richard Heppe, Lockheed Aeronautical Systems Co. executive vice president for ATF programs commented in Aviation Week & Space Technology that basic research and development has been affected by the large investments in the ATF program. Mr Heppe said, "We are robbing the future to pay for today" (49:35).

Besides the cost of production, rising research and development costs also support the use of co-development. The U.S. Congress's Office of Technology Assessment summarizes the advantages of co-development as follows:

> With either separate or integrated design teams, codevelopment is the most difficult forms of cooperation to carry out. The benefits, however, can be substantial. Although total R&D costs may be greater because of the inefficiencies of collaboration, the cost to individual participants is less, often making codevelopment the only affordable means to acquire advanced weapons. (55:98)

The argument for standardized and/or interoperable weapons among allies has been used to justify many joint programs. The use of similar weapons would enhance the effectiveness of allied forces. The Harrier II(AV-8B) is just one example of a co-production program that improves standardization involving British Aerospace and McDonnell Douglas (26:51).

Access to advanced technology is another positive reason to enter armaments cooperation. The article "Thinking Globally" by Lt.Col. Curtis Cook and Capt. Samuel Arroyo provides support for this advantage:

> The United States no longer leads the world in research and development of new technology in key areas. The Japanese claim an advantage in electronics and show every sign of dominating this area. It is in the best interests of this country to form teaming arrangements with foreign countries which have acknowledged that U.S. industry needs to maintain an overall advantage in weapon system technology. (2:27)

Armaments cooperation can also strengthen the U.S. industrial base while ensuring technological leadership remains unchanged. Robert McCormack, Deputy Under Secretary of Defense discussed this advantage:

> From the standpoint of international armaments cooperation, this means aggressively seeking out new areas for cooperation that benefit our security posture and stimulate the technology base. While total national defense self-sufficiency is a laudable goal, it is unrealistic. The global nature of today's international marketplace and the realities of flattening or decreasing defense budgets dictate a more interdependent and streamlined approach to how and what we buy, with other nations participating in a greater share of development and production. At the same time, DOD must do whatever is appropriate to enhance U.S. industry's ability to sell abroad; the revenues generated from such transactions can provide the stimulus for greater investment in the industrial base and help lower acquisition costs. (35:74)

James Compton, acting Deputy Under Secretary of Defense for Industrial and International Programs, also stated a view in *Aviation Week & Space Technology* that basically agreed with Robert McCormack's opinion:

> Just as there is no longer any such thing as an independent deterrent, there is no longer any such thing as an independent, stand-alone national defense industrial base. We are truly interdependent. Our strategy of coalition defense can and must be backed up by coalition research, development, production, and follow-on support. (41:95)

The report *The U.S. Aerospace Industry and the Trend Toward Internationalization* listed some "motivations to collaborate":

1. Possible expansion of markets.
2. Possibility of recouping R&D investment through exports.
3. Creation of jobs.
4. Establishing a positive balance of trade.
5. Strengthening the national technology base.
6. Supporting high technology and defense industries. (26:52)

Disadvantages. Armaments cooperations also have numerous disadvantages that must be considered. Some key issues that can be problems include technology transfer, protectionism, foreign dependence, offset usage, and "the process of collaboration" in the international world. The following paragraphs provide discussions on each of these problem areas.

Technology transfer is a common area of discussion when armaments agreements are considered for a weapon system (2:27). The article "Thinking Globally" summarizes this disadvantage:

> Perhaps the most frequently talked about difficulties in armaments cooperation are concerns over technology transfer, the health and competitiveness of the U.S. defense industrial base, and the use of offsets in the international marketplace. Those opposed to international armaments cooperation point out that cooperation compromises this country's technological competitive advantage and erodes the industrial base. (2:27-28)

Clyde V. Prestowitz, former Commerce Department trade negotiator expressed a noted view on technology transfer in front of the House of Representatives, Committee of Foreign Affairs, during the FS-X debate:

> So the question I think very simply is this. If the United States, by dint of doing this deal, can maintain or enhance its lead in aircraft technology, then it should do the deal. If on the other hand, by reason of doing that deal the U.S. lead is diminished, then it should not do the deal. (50:242)

Another major disadvantage of armaments cooperation is that it sometimes fosters protectionism. The old adage "buy American" surfaces on many international agreements (2:27). The article by Arroyo and Cook" addressed this issue as follows:

> Protectionism is understandable, particularly in the defense industry. Most nations want a strong, healthy, self-sufficient defense industry. Just look at the advantage: increased national prestige, more political influence internationally, the capability to produce sophisticated technology with possible commercial applications, and stronger national sovereignty. (2:27)

Discussion of protectionism leads to another problem area, foreign dependence. A study by the Mobilization Concepts Development Center of the National Defense University "examined the impact of foreign dependency upon our ability to mobilize in case of war" (2:28). The study concluded that foreign dependency on certain products could "adversely affect our ability to mobilize for war" (2:28).

Offsets and their increased uses in armament cooperation ventures are also perceived as a disadvantage, at least by the U.S. government. Offsets are an economic cost to the United States because they take away work that would normally go to a U.S. firm (26:60). President Bush expressed five policy points concerning offsets last year as follows:

1. No agency of the U.S. Government shall encourage, enter directly into, or commit U.S. firms to any offset arrangements in connection with the sale of defense goods or services to foreign governments.

2. U.S. Government funds shall not be used to finance offsets in security assistance transactions except in accordance with currently established policies and procedures.

3. Nothing in this policy shall prevent agencies of the U.S. Government from fulfilling obligations incurred through international agreements entered into prior to the issuance of this policy.

4. The decision whether to engage in offsets, and the responsibility for negotiating and implementing offset arrangements, resides with the companies involved.

5. Any exception to this policy must be approved by the President through the National Security Council. (42:1)

Although offsets are viewed as a disadvantage by the U.S. government, industry has used offsets to gain and foster sales. Robert Trice, Director Business Development, General Dynamics, Fort Worth Division commented positively on indirect offsets in *The DISAM Journal* as follows.

> Indirect offset is often a key element in establishing agreements that are satisfactory to customer governments. This is due to the fact that the finite range of components that can be coproduced and the cumulative effect of offset commitments can result in more direct offset obligations than requirements for the coproduced components. In 1985, General Dynamics established a corporate offset organization to facilitate making, and meeting, indirect offset commitments that are not part of the normal business activities of General Dynamics product divisions. (52:72)

Trends in Armaments Cooperation

Many trends concerning armaments cooperation have been identified in recent reports. Awareness of trends is important to this study because they provide some evidence on which cooperative arrangements would be most viable in the Asian Pacific Rim. The reference to international arrangements within this thesis is equated to the previously discussed types of armaments cooperation agreements. The results of three formal reports concerning defense industrial

cooperation trends and an article by Barry Marvel will be discussed in the following paragraphs.

Aerospace Research Center. The Aerospace Research Center and the aerospace industry lobby group International Council issued a report entitled *The U.S Aerospace Industry and the Trend Toward Internationalization* in March 1988. The report identified two trends in U.S. defense trade:

1. The U.S. share of the world defense market has declined from approximately 43% in FY 1983 to 20% in FY 1986. The decline is attributable to factors which include technology transfer constraints, increase cooperative arrangements for arms production, and development of indigenous arms production capacity in a growing number of countries. (26:66)

2. Downward trend in FMS financing and third world countries increasing demands to expand the country's own defense industrial capability has led to providing military aid through joint ventures and licensing arrangements. An example of this is the Executive Branch's agreement concerning Korean FX fighter project to help develop aerospace capability in the Republic of Korea. (26:67)

Office of Technology Assessment. The Office of Technology Assessment issued a report to the Senate Committee on Armed Services entitled *Arming Our Allies: Cooperation in Competition in Defense Technology* in May 1990. The following are some of the trends that were identified in this report:

1. Industry-to-Industry or direct cooperation between U.S. and foreign defense companies is increasing dramatically. (55:15)

2. Overcapacity of the defense industries is increasing on a global scale. Large U.S. companies are already rationalizing operations, laying off workers, seeking new markets, and forming strategic international alliances. (55:15)

3. The United States has signed memoranda of understandings regarding transfer of military technology with most of the (Association of Southeast Asian Nations) (hereafter referred to as ASEAN). (55:18)

Defense Science Board. The Defense Science Board issued a report entitled *Defense Industrial Cooperation with Pacific Rim Nations* to the Under Secretary of Defense for Acquisition September 1989. Some worldwide trends identified that affect the Pacific Rim region were:

1. National push for self-sufficiency.
2. Growing defense industry capacity with decline in demand.
3. Numerous costly national defense (Development and manufacturing) programs.
4. Severe pressure for export sales.
5. Direct offsets continue to contribute to international technology leveling.
6. International joint ventures in Defense related industries (Aerospace/electronics) are on the increase as a result of under-capacity (commercial aircraft). Joint investment and/or reciprocal technical exchange. Military equipment is currently not a major component of this industrial cooperation in the Pacific Rim. (40:49)

Foreign Military Sales: Industry in Peril. Barry Marvel's article in *Contract Management* magazine stated nine trends in international defense business.

1. Foreign industry will increasingly compete on a par with U.S. firms;
2. U.S. firms will increasingly come under pressure concerning the forms of the business arrangement. For example, U.S. firms will assume more frequently a minority position in international teaming arrangements and joint ventures;
3. Technology transfers will be increasingly required as a condition of major sales;
4. Offsets will become a routine requirement from buyers. Sellers world-wide will begin to offer offsets gratuitously as a marketing tool;
5. Sellers will increasingly be required to provide creative financing;
6. Barter, countertrade, and buyback deals will become commonplace;

7. Offsets will evolve to more complex technology transfer arrangements and investments;

8. The financial function inside defense firms will evolve to assume a "dealmaking" function, rather than the cash management, audit, rate determination, and Cost Accounting Standards role;

9. Offset requirements will increasingly be thrust down to lower tier subcontractors and corporate affiliates. (32:17)

DOD Weapon Sales Policy

A basic understanding of DOD weapon sales policy is presented in this section. Topics covered include the Nunn-Roth-Warner Amendment, memoranda of understanding, DOD armaments cooperation policy, and policy decision criteria.

Nunn-Roth-Warner Amendment. The Nunn-Roth-Warner Amendment to the FY 86 Defense Authorization Bill encourages co-development projects in the realm of international armaments cooperation. The amendment authorized and directed the following:

1. Authorized a specific level of DOD funding exclusively for NATO cooperative R&D projects.

2. Authorized expenditures of additional funds for side-by-side testing of Allied and U.S. systems.

3. Directed that DOD identify and consider cooperative developments or existing Allied systems as alternatives to U.S. deployment programs or systems at every step of the acquisition process. (55:98)

Funds authorized for this amendment include $200 million per year for joint research and development projects with U.S. allies through 1991. In addition another $50 million per year until 1991 was made available for side by side testing (34:82). The side by side testing promotes direct purchases of defense hardware from Europe and U.S. licensed production of such equipment (33:32). The elimination of

uncertain funding should encourage the U.S. armed services to seek out programs which might benefit.

The Nunn-Roth-Warner Amendment can provide many benefits to the United States. Benefits to the U.S. from implementing this amendment include equipment modernization, economies of scale, and equitable burden sharing between the U.S. and allies (3:106-107). In addition to these benefits, the amendment provides alternatives to 100% U.S. sponsored developments (35:75). Some problems with Nunn programs have also been identified.

Funding restrictions and technology transfer issues must be resolved for a successful armament cooperation project. Monies for the initial research and development projects is good for only two years. At that time, the services must fund the project from their budgets (3:106). Another concern is technology transfer issues which have been a concern of many interest groups and congress. The debate between congress and the executive branch over the FSX joint development program emphasized U.S. technology concerns. Congressman Mel Levine concerns with the FS-X co-development deal were quoted before a House Foreign Affairs Congressional hearing on the issue of technology transfer.

> It will give a generation of Japanese aerospace engineers design experience with high performance aircraft and it will provide a massive capital inflow to underwrite continued expansion of the aerospace industrial infrastructure, including the base of dual use technology, production equipment and skilled employment in the plant where military and commercial production take place in tandem. It is very different from the co-production model that it replaces, and it will unquestionably advance Japan's long range plans to compete effectively in world aerospace markets. (54:114).

Memorandum of Understanding. A Memorandum of understanding (MOU) has been the principal instrument used to consummate international cooperative arrangements between the U.S. and its allies. Since MOUs

are the basic formats of most international agreements entered into by the United States, it is important to understand exactly what the purpose of the MOU is, types of MOUs, and the negotiation authority of MOUs.

The purpose of a MOU is threefold as quoted in *The Management of Security Assistance*.

> These are intended to encourage bilateral arms cooperation and trade; establish regular review of armaments programs and trade; and make efficient use of resources through expanded competition. DOD enters into reciprocal defense procurement and offset agreements with NATO, individual NATO governments, and other friendly governments to purchase and sell defense equipment and logistics support. (13:7-4)

MOUs can be classified into two types; general and specific MOUs. General MOUs are negotiated to promote defense trade and eliminate trade barriers such as "buy national" and tariffs with other nations (13:7-5, 39:97). Additionally, the use of an MOU can be a door to opening international defense markets for U.S. concerns.

Program specific MOUs are written and negotiated for the purpose of covering certain phases or particular conditions of a single Department of Defense acquisition program (39:97). While general MOUs set the policy and guidelines to conduct business, specific MOUs are concerned with items such as financing, data rights, cost-sharing, work-share, quality assurance, and any other program unique details (13:7-6). The book entitled *The Management of Security Assistance* states some minimum guidelines that must be met before a program specific MOU is consummated.

1. Clear-cut military requirements of all countries
2. Strong political will to cooperate.
3. A need and desire to cooperate.

4. Good personal arrangements among the project staffs of all participants.

5. A good MOU that is explicit and meets the various national requirements, but which is not so detailed as to deny the project manager room to maneuver. (13:7-6)

Whether a general or program specific MOU is contemplated the negotiating authority and the nature of MOU terms is controlled by the Under Secretary of Defense for Policy per DOD directive 5530.3 (39:97). Actual negotiations are usually conducted by the various military departments after delegation and approval from the under secretary. Further reviews of MOUs include the Department of State, the National Security Council, and the Department of Commerce (39:97-98). Other government agencies may also review the MOU if certain conditions warrant such a review.

DOD Armaments Cooperation Policy. DOD policy concerning cooperative agreements is included in memorandums, directives, regulations, and federal law. The purpose of this section is review some of these basic policy guidelines. A complete list of applicable directives, regulations and laws as they pertain to international cooperative agreements is provided in Appendix D of this report. The list was included in the draft DoD 5134.1-M manual provided to the author by Col Bill Criss of the Office of the Assistant Secretary of the Air Force for Acquisition.

Negotiation Policy. The basic policy for negotiating U.S. government international agreements is addressed in an Under Secretary of Defense memorandum dated 1 November 1988. The memorandum states four objectives of armaments cooperation. As quoted from the report entitled

Defense Industrial Cooperation with Pacific Rim Nations the objectives are as follows:

1. DOD access to, use of, and protection of the best technology developed by our allies, and comparable allied access to, use of, and protection of the best U.S. technology, thereby avoiding unnecessary duplication of development.

2. Deployment and support of common--or at least interoperable--equipment with the allies.

3. Incentives for the allies to make greater investment in modern conventional military equipment.

4. Economies of scale afforded by coordinated research, development, production and logistics support programs. (40:A4iii)

An attachment to the memorandum provides general policy for the negotiation of international agreements for cooperative projects. Some of the topics discussed which may affect the type of cooperative arrangement used include cost sharing arrangements and offsets.

Cost Sharing. Equity in cost sharing in relation to benefits received is the basic guideline when negotiating this topic. The Under Secretary of Defense memorandum includes the following quoted guidelines to use when deciding cost sharing issues.

> Generally, (1) costs for feasibility studies should be shared equally, (2) development expenses should be shared equitably and (3) in cooperative production and logistics programs, each nation should pay the full costs of its portion of production and logistics. (40:A4iii)

Offsets. The memorandum clearly states DOD policy on offsets as "It is the Department of Defense policy not to enter into any agreement which commits or appears to commit the U.S. government or U.S. private contractors to achieve or guarantee the achievement of a specified level of offsets" (40:A4iv). Exception to this policy

includes agreements by DOD to purchase foreign items to offset another country's expenditure on U.S. defense items. Approval for such an exception is required by the Deputy Secretary of Defense (40:A4iv).

DOD Directive 2000.9. DOD Directive 2000.9 entitled "DOD Participation in International Technical Exchange, Cooperative and Coproduction Programs" provides some of the basic guidelines for cooperative agreements. The directive includes ten policy guidelines. The guidelines have been summarized and are as follows:

1. DOD shall cooperate with allies and other friendly countries when cooperation promotes: U.S, foreign policy objectives, U.S. security interests, validated operational requirements, and U.S. defense industrial base and commercial interests.

2. The DOD shall participate in international programs by encouraging interoperable equipment, encouraging investment in conventional defense equipment, making efficient use of scientific, technical, financial, and industry resources, fostering defense industrial capabilities here and abroad.

3. To use resources wisely, DOD shall promote programs with potential for conserving DOD resources by accessing foreign goods and facilitating a common defense.

4. To encourage harmonization of military requirements: through agreements or treaties, at the earliest stage of military requirement, and through all stages of requirements formulation.

5. Release of information or technology complies with Arms Export Control Act, International Traffic in Arms Regulation, and Published DOD policies.

6. Agreements should consider effects on industrial base, commercial implications, and effect on international competitive position of U.S. industry.

7. DOD shall prepare an industrial base factor analysis for each proposed agreement.

8. DOD shall abide by President's policy on offsets.

9. To ensure consistent approaches to international agreements , DOD shall: negotiate and conclude agreements in accordance with DOD Directive 5530.3 and follow DOD 5105.38-M for Letters of Offer and Acceptance.

10. DOD shall continually monitor agreements and maintain an index of agreements in effect. (15:2-5)

Policy Decision Criteria. Currently there is little guidance or rules to assist in the evaluation of a cooperative program. The *Guide for the Management of Multinational Programs* written at the Defense Systems Management College (DSMC) provides some suggested evaluation criteria to consider. DSMC cites five subject areas which should be addressed inclusive of political considerations, economic considerations, industrial base/critical materials, technology transfer, and managerial/business considerations. It should be noted that these considerations have been created for the NATO environment but that many of the criteria can be applied to other non-NATO country programs.

Political Considerations. Both domestic and international political considerations should be addressed when evaluating a potential collaborative program. As quoted from DSMC's guide the political considerations include the following:

1. In the international arena, one of the most significant questions is the effect upon our relations with the foreign government of a refusal to agree to the program or to certain parts of it. Pertinent to this consideration are such factors as the foreign government's political, military, and economic significance to the US.

    a. Is it an alliance country?

    b. Is the US committed to the program in some form through a separate agreement?

    c. Is there a military, political, or economic quid which the US is seeking to obtain?

    d. Are there base rights considerations involved?

    e. Are we seeking to obtain or preserve areas of cooperation with the country which are of significance to US interests. (14:B-2)

f. Will denial result in a shift in relations to a third country supplier or domestic production at a net loss to US interests. (14:B-2)

2. In the international arena, some consideration should be given to effect of our decision on our relations with other governments in terms of precedent and in terms of advantage or disadvantage to them if they have viable alternatives to offer. (14:B-2)

3. Domestically, there are two areas that need to be examined:

a. The first is whether the US prime contractor involved is generally favorable to the project or not. Major programs involving US industrial participation cannot be successfully implemented without US industry's cooperation. It is, therefore, important to have a back-to-back arrangement in place, i.e., an agreement with the US contractor together with the agreement with the foreign government, so as to ensure that the program can be carried out as agreed to. (14:B-3)

b. A second domestic political factor involves possible Congressional interest in the program. This can be either positive or negative. There may be significant interest on the part of key members of Congress who are in favor of the program while there may also be opposition from key members on the grounds that permission to manufacture abroad will impact unacceptably in key US industrial facilities. In addition, there may be concern expressed in the Congress over the program as a whole, in terms of the releasability of the technology involved and the overall impact of such release on long-range US interests. (14:B-3).

Economic Considerations. Economic considerations involve direct/indirect impacts, short and long-term effects, and a review of these impacts and effects on the U.S. and other nations. DSMC provides an assessment outline for a coproduction program but states other types of programs could follow similar guidelines. As quoted from DSMC the economic assessment involves the following:

1. Micro Analysis

a. What is the cost of doing coproduction for the feasible range of participation? (14:B-3)

b. What is the capability of the participating country to absorb the technology and are there spinoff effects? (14:B-3)

c. What are likely economic benefits/costs?

1. To USG--eg., economies of scale, amortized R&D, overseas depot maintenance, future impact of technology transfer.

2. To the participating country--improvement of industrial (military and commercial) base, impact of increased costs of program (compared to purchase from the U.S.) of the particular weapon system.

3. To the regional alliance (if appropriate)--the benefit/costs to an alliance may be greater than the sum of those applicable to each individual country.

d. What are the feasible alternatives to the participating country if the USG does not agree to collaboration or to the totality of the program desired by the country? (14:B-4)

2. Macroeconomic Analysis

a. Would participation in the project have a measurable impact on the participating country's:

1. Balance of payments?

2. Capital investment?

3. Foreign exchange requirements?

4. Ability to finance other critical government planned expenditures--particularly the defense budget?

b. How do the above impacts compare to those under feasible alternatives (e.g., alternative collaborative projects with other nations)? (14:B-4)

c. What are the likely impacts of the project on the US:

1. Government budget?

2. Employment (specific level of skills and locations)?

3. Loss of technological lead?

4. Balance of payments?

5. Industrial base? (14:B-4, B-5)

Industrial Base/Critical Materials. The use of offsets and coproduction agreements has raised many industrial concerns within the United States. DSMC states that " the Department of Defense objective must be to retain critical domestic skills and industrial capabilities with advanced technology while not becoming foreign source dependent for critical defense items" (14:B-6). Based on this objective DSMC states review criteria for future defense programs as quoted in the *Guide for the Management of Multinational Programs.*

1. Is this particular action in the best interest of our national defense objectives (short and long term)?
2. Are the items critical military items?
3. Will there be an adverse impact on US schedules?
4. Will the US be able to maintain a viable R&D/production capability to meet surge/mobilization needs?
5. If a critical need for domestic sources exist, will the US be able to ensure that at least one domestic source is retained or established?
6. Will the program cause critical plant closures with an attendant loss of job skills and capacity?
7. Will this action require transfer of vital industrial technology to foreign sources and is this going to adversely impact US technology leads or advances?
8. Will US item costs be increased or reduced?
9. Has the effort been fully coordinated with Service/OSD industrial base activities and, where appropriate, with domestic industry thrcugh subcontractor level? (14:B-6)

In addition to the above review criteria Lousher and Salomone in their book entitled *Technology Transfer and U.S. Security Assistance* cite U.S. security policy as a major contributor to problems within the U.S. industrial base. Lousher summarizes U.S. security policy as follows:

> Through a security assistance policy which permits and encourages the development of new manufacturers of arm, the United States creates the long term potential of reducing the size of the industrial base. Once a foreign production capability is developed, that nation will likely demand as a consequence of further purchases of U.S. equipment, that U.S. firms agree to offset requirements. A 1984 U.S. Air Force study, for example, suggested that 75 percent of all foreign source components used in the U.S. aerospace section were provided as a consequence of offset demands. (27:169)

Technology Transfer. The subject of technology transfer has recently become an increasing concern of congress and the aerospace industry alike. DSCMC cites three ways to evaluate proposed technology transfer issues: Technologies List, National Disclosure Policy, and International Traffic in Arms Regulations.

First, through the use of the Military Critical Technologies List. It is used to identify critical technologies and releasibility of such. DSMC stated four items to consider with this list. As quoted, they are:

1. Our defense relations with the nation.
2. Degree to which the recipient cooperates in the control of such technologies.
3. Impact upon an US lead in technology concerned.
4. Impact upon the US industrial mobilization base. (14:B-7)

Second, the National Disclosure Policy sets criteria and procedures to evaluate classified information and equipment releases. It is important that a determination of technology needed be conducted at the beginning of any multinational program in order to abide by the disclosure policy (14:B-7).

Third, "the State Department's International Traffic in Arms Regulations govern the export of technical information for production of

arms, ammunition, and implements of war in a manner generally more stringent than the controls applied to other technical data" (14:B-7).

In the Department of Defense the main office which deals with technology transfer issues is the Defense Technology Security Administration (DTSA). DTSA reviews export license requirements and the Technology Security Risk Assessment (TSRA). The TSRA addresses sensitive data, identification of foreign technologies, and possible benefits to the United States due to the proposed technology transfer (40:A4vii).

Managerial/Business Considerations. A review of the structure of a proposed international program is necessary to avoid future difficulties in areas such as waivers, laws, regulations (14:B-8). DSMC cites some criteria to consider for reviewing the management/business aspects of proposed programs.

1. Are changes to law necessary to implement the program?
2. Are waivers of rules required and what is the impact (political, economic, business) of waiving these rules?
3. To what extent will unique procedures have to be established or existing procedures changed?
4. Will unique organizations have to be established, or the existing organizations modified, to implement the program?
5. Are additional resources (people, facilities, equipment) needed?
6. Is the program manageable?
7. Is the program structure desirable from an acquisition and business viewpoint? (14:B-8)

Policy decisions concerning international cooperative agreements are also guided by congressional reaction. The article entitled "International Defense Cooperation Agreements" in *Program Manager* cited

four factors which can cause intense congressional scrutiny of an international defense agreement.

1. State of trade relations between the United States and the project partner nation.
2. Type of technology involved in the transfer.
3. Ratio of benefit to cost for each of the two countries.
4. Home state concerns of members of congress. (6:30)

The above factors coincide with the previous review criteria in the *Guide for the Management of Multinational Programs* with the exception of the last factor.

The Pacific Rim

The Pacific Rim is an important future market for the United States defense aerospace industry. The importance of this area of the world to the U.S. is evident from a review of current literature. Derek Turner in *Contract Management* said the following.

> As if perestroika and Europe '92 were not enough to be thinking about, now we must also consider the rapidly advancing technologies and industrial capabilities of the Pacific Rim countries such as South Korea, Taiwan, and Japan. They are now serious competitors, both in their in own countries and elsewhere. (53:48)

A brief review of the region's economic position is essential to understanding the importance of this area of the world. Further, U.S. views on defense cooperation with the PACRIM reveal a need for the U.S. to review possible countries for joint efforts in defense cooperation.

PACRIM Economics. The economic growth in the Pacific Rim for the past decade has been referred to as "the Asian economic miracle" (23:18). In comparison to the rest of the world, "the PACRIM has shown

rising per capita income with the highest real rates of economic growth" (23:18). Richard O'Lone cites the future economic power of the PACRIM in *Aviation Week & Space Technology*.

> The growing economic strength of the Pacific rim was described by Canada's J.E.G. Gibson, who pointed out that by the year 2000, these nations would have 70% of the world's population, produce more than 50% of the world's goods and consume 40% of the world's production. By 2000, trans-Pacific trade will account for 70% of world trade. (41:102)

Trade statistics reveal the economic importance of the PACRIM to the United State's economy. Since 1978 U.S.-Pacific trade has surpassed U.S. Atlantic trade totals. In 1986, trade with Asia-Pacific was $215 billion; almost twice that of European trade (45:3). The article "An Economic Profile of the Pacific Rim" by James Koch included a study of major trading relationships of Pacific Rim nations. Some of the conclusions of Mr Koch's study were:

1. The U.S. engages in the most foreign trade of any Pacific Rim country - almost three times as much as Japan.

2. U.S. economic prosperity is closely tied to foreign trade, especially with Pacific Rim countries. Approximately 55 percent of U.S. trade occurs with Pacific Rim neighbors.

3. The most rapidly growing countries on the Pacific Rim (the NICs and ASEAN members) trade relatively little with each other but extensively with the U.S. and Japan. (23:22)

Based on these simple statistics, it is apparent that the PACRIM economic well-being is in the best interest of the United States.

Defense Cooperation and the PACRIM. Past relationships with PACRIM nations indicates the United States prefers direct sales of defense items versus international cooperation programs. Mr Charles Clawson of the F-16 Systems Program Office cited current F-16 Foreign Military Sales programs with the countries of Thailand, Indonesia, Singapore, and South Korea (10). All the programs were categorized as direct sales.

Interestingly, some of these nations participate in coproduction of F-16 aircraft parts via a contract with General Dynamics Corporation. Indonesia coproduces fuel pylons, weapon pylons, landing gear doors, flaperons, composite skins, and parts for the engine door (39:42-43). South Korea coproduces F-1 tanks, center fuselages, forward fuselages, and ventrals (39:42-43). Singapore coproduces some parts for the engine access door (39:43). Other countries including the U.S. produce many of these F-16 aircraft parts as well.

Some PACRIM countries have had additional defense production experience such as South Korea, Japan, and Taiwan, in all of which some type of licensed production of defense items has been allowed. South Korea currently plans to coproduce F-16 aircraft while Japan is developing a fighter known as the FS-X using the F-16 as a base. Taiwan is attempting to build an indigenous fighter with the help of some U.S. aerospace companies.

The growing economies of the PACRIM require the United States to reevaluate our national security policies. The Defense Science Board concluded their report entitled *Defense Industrial Cooperation with Pacific Rim Nations* with the following comment on national security.

> National Security can no longer be viewed only in military terms, but must include economic well being as a key component. Therefore, we must explicitly link cooperative defense technology-sharing issues with economic issues, including trade balance and market access. (40:x).

International defense cooperation is the key to future defense needs. During the FS-X congressional debates, Richard O'Lone wrote about this topic as it relates to a recent PACRIM conference in his article entitled "Cooperation Essential But Difficult When Tapping Defense Market."

> The best way for the U.S. to continue tapping into the growing Pacific Rim defense market is through cooperative programs with those nations, but this is a prickly path that will require deft footwork by all concerned.
>
> This was the theme that emerged from a recent conference here of Pacific Rim governments and defense industry officials, who discussed the issue of cooperation against a backdrop of thawing Cold War, shrinking defense budgets and the growing economic power of the Pacific nations. (41:95)

Industry has also realized the importance of defense cooperation in the growing Pacific Rim. Mr. Robert Trice, Director of Business Development, General Dynamics-Fort Worth Division spoke of future international cooperative ventures in *The DISAM Journal*.

> In the Pacific Rim region, General Dynamics has sold F-16 aircraft to Korea, Singapore, Indonesia, and Thailand under the FMS program. In the future the company will be required to construct new business arrangements and recognize the industrial sophistication and national economic objectives of these vibrant Asian nations. However, future cooperative aerospace ventures with Asian countries will also continue to be shaped by the prevailing U.S. Government attitude toward trade, technology transfer, and protection of the U.S. industrial base. (52:74)

The fiscal year 1989 "Annual Report to the Congress" from Secretary of Defense Frank C.Carlucci also emphasized the importance of cooperation.

> Military cooperation with many countries in the Pacific is crucial to the United States' strategy of deterrence and forward defense. The broad support these countries provide us -- including access to bases, host-nation support, and participation in combined exercises -- significantly enhances our capabilities and promotes regional stability. (8:83)

IV. Case Studies and Interviews

Chapter Overview

This chapter presents two case studies on the Japanese FS-X program and the Korean Fighter Program and presents information obtained through personal interviewing. The purpose of the case studies is to understand why certain international cooperative arrangements were chosen. Each case study consists of historical background information and negotiations of the specific memorandums of understandings. The case studies concludes with a case comparison analysis. The purpose of the interviews was to ascertain what factors are considered when considering a cooperative agreement.

The FS-X Support Fighter

The FS-X represents the most large scale co-development efforts the United States has ever entered into with an allied nation. The resulting Memorandum of Understanding outlining this cooperative arrangement came after many years of discussion and debate. The following paragraphs briefly describe an historical background of the FS-X, the negotiation of the memorandum of understanding, current management issues of the program, some lessons learned and impacts on future agreements.

Historical Background. In the early 1980s the Japan Air Self Defense Forces (JASDF) decided to phase out the Japanese built F-1 fighter due to technical obsolescence. The F-1 fighter was the first postwar Japanese made fighter introduced in 1977 (44:49). The means by

which to acquire a follow-on fighter was debated widely among Japanese officials. Japan's choices to replace the F-1 fighter included domestic development or acquiring a fighter from a foreign source with possible co-production. The need date for the replacement aircraft was 1995 (36:8). The possibility of indigenous development was understood by the Department of Defense as quoted by Captain Andrew Button, United States Navy in his 1989 executive research report entitled *Cooperation in the Development of the FS-X: An Analysis of the Decision Process*.

> The U.S. Department of Defense (DOD) recognized that the Japanese shared strong support for domestically developing and producing the F-1's replacement. It seemed natural to follow the F-1 with another domestically built fighter. More importantly, Japan's aerospace industry had matured over the years of licensed production since the end of World War II. They believed it was time to "spread their wings" and show that Japan could develop and build a sophisticated fighter. Also, it cannot be ignored that Japan's current major aircraft production lines (F-15s and P-3Cs) are scheduled coincidentally to phase out in the mid 1990s. (7:3)

Support for a domestic developed fighter came from many agencies within the Japanese government including the Japan Defense Agency (JDA) Air Staff office, private industry in Japan, and JDA's research and development agency, the Technical Research and Development Institute (56:10). After a feasibility study in 1985 the institute concluded that Japan was capable of developing and producing an indigenous advanced fighter with the exception of an engine for a cost of one billion dollars (56:10, 7:4-5).

Japan's Fighter Options. Based on this domestic study the JDA then proceeded to evaluate three options to acquire a new jet. The three options inclusive of the institute's findings were as follows as quoted by Captain Andrew Button's report:

1. Introduction of an "as-is" foreign fighter.

2. Domestic development of a new fighter, and

3. Upgrade of the F-4EJ fighter. (7:4)

In order to evaluate these various options the Air Staff Office of the Japanese Air Self Defense Forces (JASD) established an internal Japanese FS-X Program Office. The third option had little support inside the agency, thus, leaving the first two as viable alternatives (7:4). The evaluation of the first option included an initial review by the office of various foreign fighters. Using known performance factors the FS-X office named three possible replacement "as-is" fighters inclusive of the U.S. built F-16 or F/A 18 and the European Tornado (7:4). Further analysis of the foreign fighters was done through the use of questionnaires.

The Japanese FS-X office created four questionnaires to further evaluate foreign fighter candidates. The questionnaires covered four areas as quoted in Captain Andrew Button's report:

1. Foreign Military Sales (FMS) purchasing data (standard off-the-shelf, government sale),

2. Licensed production data (commercial buy) for the airframe,

3. Licensed production data on the engine, and

4. Licensed production data on the radar. (7:4-5)

These questionnaires were received by the Director, Defense Security Assistance Agency in November 1985 (7:5). Upon returning the questionnaire completed to the Japanese FS-X program office, DOD prepared a counter questionnaire to be sent to the JASDF staff office. The purpose of these questions by DOD was to gain a better understanding of the FS-X program and the source selection procedures being employed by the Japanese (7:6). After receiving some initial responses from the

JASDF and answering another questionnaire, DOD soon concluded that U.S. fighters were in a "no-win" competition (7:6).

The Japanese FS-X office was comparing "as-is" fighters with a theoretical paper airplane. The paper airplane met all known requirements while existing aircraft could not possibly meet JASDF requirements without modifications (36:8). The Defense Security Assistance Agency suggested the FS-X program office evaluate improved versions of the F-16 and F/A 18 in lieu of off-the-shelf aircraft. The improved versions were the F-16 Agile falcon and the Hornet 2000 variant (7:7).

DOD's Position. The initial DOD position for the FS-X was the use of an "as-is" fighter but DOD recognized early that Japan was not likely to buy off-the-shelf aircraft especially with an expected quantity of 120 or more. Secretary of Defense Dick Cheney mentioned this fact during a testimony in front of the House Foreign Affairs Committee in Washington as quoted in the article "The FSX Agreement,"

> DOD argued that American aircraft were the most cost-effective and most rapidly available solution to their aircraft needs. These points previously were raised at the highest levels of the Japanese government by then Secretaries of Defense Weinberger and Carlucci, and senior State Department and White House officials on several occasions.
>
> But an off-the-shelf purchase of an American aircraft was never a likely choice for Japan. Japan never has bought aircraft off-the-shelf when significant numbers of planes are involved. The Japanese have always attempted indigenous development, as with the F-1, or entered into a licensed production agreement, as in the cases of the F-4, F-15, and P-3. From both the military and economic points of view, it makes sense to manufacture fighter aircraft in your own country in order to be able to provide sustainability of the force as well as to keep aerospace workers employed. This is the way we do business. (9:27-28)

Knowing the "as-is" option would not be favorable, DOD offered another position allowing for licensed production of an advance fighter (7:9). Discussions on this option and others continued for the next two years with the U.S. even recommending the F-15E as a possible candidate meeting all Japanese requirements (7:17). As meetings continued, it became obvious to DOD that Japan did not want the normal co-production arrangement as in the past. Japan stayed with their original position of domestic development. The possibility of co-development began with DOD establishing a policy position that could be construed as a compromise.

In 1986 DOD revised its position on co-production and substituted instead a third viable option. The GAO report entitled *U.S. Japan Codevelopment* dated February 1990 summarizes this new DOD policy.

> In 1986 DOD established a policy position that offered a compromise, since Japan was not interested in purchasing a U.S. fighter aircraft or producing one under license. The policy suggested that a cooperative venture-codevelopment-between the United States and Japan could be a viable alternative. DOD noted that Japan seemed to be interested in codevelopment if it could retain leadership of the project. The policy statement set the tone for future government and industry discussion with Japan. (56:11)

During visits to General Dynamics and McDonnell Douglas in the spring of 1987, the Japanese delegation from the Technical Research and Development Institute appeared to be swaying toward some type of co-development program. Captain Andrew Button pointed out the dilemma that a codevelopment arrangement presented to the United States.

> However, no one seemed to know how codevelopment would work (i.e., whether the U.S. would cooperate in the domestic development or Japan would improve a current U.S. fighter, where and how to start a government-to-government agreement, and how the business arrangements with industry should proceed). (7:19)

The Japanese Decision. In 1987 the Japan Defense Agency (JDA) finally agreed to on the U.S. fighters but with codevelopment done in country. After numerous presentations by U.S. industry and many review sessions, the JDA selected the F-16C fighter aircraft as the baseline aircraft for the FS-X on October 23, 1987.(7:24, 36:8). At this time, the U.S. government proceeded to prepare and negotiate a memorandum of understanding governing the FS-X development program and defining the term co-development.

Negotiation of the MOU. November 1987 marked the beginning of the negotiations of a memorandum of understanding between the U.S. and Japanese governments concerning the FS-X program. The U.S. negotiation team was led by Mr. Glenn Rudd, Deputy Director DSAA (7:26). Three principal issues were considered by DOD in drafting the original MOU as quoted by Lt Col Donald P. McErlean in his report entitled FS-X Support *Fighter Background Information* dated April 1991.

1. Support foreign policy relations between the U.S. and Japan.
2. Maintain and enhance the defense relationship between the U.S. and Japan.
3. Protect the U.S. industrial base. (36:3-4)

In addition, the U.S. negotiation team set four primary objectives to accomplish according to the GAO report entitled *U.S.- Japan Codevelopment*.

1. Obtain an adequate U.S. development work share, both in quantity and quality (an initial 40-to-60 percent goal was established);
2. Obtain free and automatic flowback of any technical improvements that Japan made to the baseline aircraft, for example, rights to F-16 derived technology at no cost and access to all Japanese-developed FS-X technology;

3. Establish a joint DOD-JDA steering group to implement, oversee, and manage the program; and

4. Obtain provisions for a 30-to-70 percent U.S. production work share (excluding the engine). (56:13)

Results of Negotiations. In November 1988 both governments signed a memorandum of understanding for the codevelopment of the FS-X. Due to congressional concerns about the agreement President Bush delayed notification to congress in order to get some clarifications resolved with Japan. Secretary of Defense Dick Cheney reported the final results of the MOU negotiations on May 3, 1989 to Congress as quoted from the journal *DISAM* Summer 1989 issue.

> Under the agreement, Japan will completely fund the FSX program and the U.S. will receive approximately 40 percent of the development workshare and a similar share of production work. The Congress has been notified of the developmental phase of this agreement. In this agreement, the workshare will be based on 40 percent of the total FSX development budget, as determined by exchange rates at the time the contracts are let. Based on the present estimated FSX budget, this amounts to about $480 million. the agreement includes substantial work for the American subcontractor, including airframe and software development in partnership with the Japanese.
>
> The U.S. will have access to all technology brought to the program by Japan. Additionally the agreement provides that technological improvements based on U.S. information will flow back to the U.S. expeditiously and free of charge. Technologies solely developed by Japan can also be acquired by the U.S.
>
> Unique to the FSX agreement is the provision for a technical steering committee to oversee the development and monitor the two-way transfer of technology and allocation of workshares. the committee is co-chaired by general officers of the U.S. Air Force and the Japan Air Self-Defense Force. The Commerce Department will also be represented on this committee. (9:28)

Current Issues of the FS-X. As of April 1991 the FS-X program still has some concern over key issues such as workshare, budgeting, and scheduling. Many of these concerns have been addressed through the use of side letters and additional agreements which complement the basic MOU.

Workshare. The MOU negotiated stated a 40 percent U.S. workshare for the development phase of the FS-X. General Dynamics and the Japan Defense Agency (JDA) each budget in a different way. Guided by the USAF, General Dynamics budgets for total program costs while the JDA budgets yearly on a phase basis. This small difference in budgeting techniques causes havoc in the estimation of workshare percentages as total program budgets are not necessarily updated and total costs may not be estimated with accuracy until after the fact. The MOU does provide some guidance to resolve the projected budgets and workshare by requiring a Development Participation Plan (DPP). The JDA FS-X program manager is responsible for preparation and maintaining the DPP. The DPP has yet to be approved as of this date due to a disagreement on required submission date (36:29).

FS-X Budget. Originally the estimated development cost for the FS-X program was $1.2 billion in 1987 based on data provided by General Dynamics. Due to changes in the program and later negotiations than anticipated costs have increased. It should be noted that the General Dynamics cost data was created prior to the agreement to enter into a co-development arrangement. In addition the program did not actually begin until March 1990. The United States insistence on two sets of cocured wings versus one and the decision not to release digital flight control source code contributed to an increase in development costs. Final estimates put the cost of FS-X development at approximately $2 billion dollars. The JDA has refused to revise its previous cost estimate and thus has caused problems in workshare planning and scheduling (36:31).

Schedule Problems. Due to the late start of the program the original need date will be missed and the current optimistic date is 1999 now. The Japanese are planning to use upgraded F-4EJs and F-15Js to fill the FS-X mission in the interim. A future major concern is that if costs continue to rise over time the FS-X may never reach production. Japan is currently studying development plans for an indigenous fighter just in case (36:31).

Lessons Learned. The conception of the FS-X program provides some learned in the areas of single interface offices, use of steering groups, technology transfer, workshare, and attention to economic issues.

Single Interface Office. The use of a single office in DOD as a focal point for this FS-X program provided a one faced U.S. government and U.S. industry stance against the Japanese government agencies. The possibility of a bidding war between General Dynamics and McDonnell Douglas was avoided as an impartial Office of Secretary of Defense kept the balance fair. The Defense Security Assistance Agency (DSAA) was the central government office since the original request came in as a FMS and licensed production request. Although the FS-X program became a developmental effort upon which the Under Secretary of Defense office would have normal cognizance, the DSAA continued to lead the way since it made no sense to change primary offices in midstream (7:34).

Role of DSAA and FS-X Steering Group. The use of a designated FS-X steering group helped maintain a fair competitive arena for U.S. industry. Currently, a steering group for the FS-X program is maintained and according to Captain Craig Mallory of the F-16 Systems

Program Office, the use of the group has been successful in solving many technical problems (30). In addition, the negotiation of the MOU prior to private industry contracts being entered into helped eliminate any Japanese advantage in using auctioning techniques with U.S. companies (7:35).

Technology Transfer. The agreement that technology flowed two ways was fundamental in persuading the different U.S. government agencies that the FS-X deal was advantageous to U.S. aerospace industries. DOD also attempted to protect those technologies and manufacturing processes upon which the U.S. was clearly ahead of Japan (7:35).

Workshare. Throughout the negotiations of the FS-X MOU workshare percentages were stressed in hopes to satisfy all parties inclusive of private industry, the administration, and congress (7:35). The issue of workshare was shown to be an important consideration for the U.S. government to enter into a co-development program with an ally.

Economic Issues. DOD attempted to separate trade and defense issues throughout the discussions and negotiations of the FS-X agreement. National Security objectives were paramount as in past co-production agreements. GAO found this point of view unacceptable and reported it in The GAO report entitled *U.S.-Japan Codevelopment*.

> Prior to the fiscal year 1989 legislative requirement and the subsequent interagency review of the FS-X arrangement, major defense items were transferred without full consultation with the economic agencies. In 1982 we reported that when negotiating a coproduction agreement with Japan on the U.S. F-15 aircraft-and on other military coproduction programs as well-DOD and State separated the U.S. defense and foreign policy interests from the domestic economic, industrial, and labor considerations. DOD and State did not systematically draw upon the available expertise of other federal agencies when considering coproduction requests or when negotiating and implementing these programs. On the other

> hand, Japan and other countries included such interests in their decisions to coproduce rather than purchase off-the-shelf U.S. aircraft. We stated that it is appropriate for U.S. allies to consider their economic interests when addressing defense issues, but it is just appropriate for the United States to do the same. (56:16)

Future Impacts. The high level government debates on the FS-X will certainly affect future cooperative programs. During the review of the FS-X, the departments of commerce and labor, the intelligence agencies, and members of Congress adamantly opposed the agreement due to the failure of DOD to coordinate the agreement with other departments (18:29). The procedure followed by DOD was not unusual since agreements such as the FS-X have normally been handled by the departments of state and defense within the executive branch (51:33). Changes such as new directions to require reviews of such proposed programs by other departments besides the DOD were implemented.

The Korean Fighter Program

The Korean Fighter Program is a recent coproduction agreement between the United States and the Republic of Korea. The coproduction deal involves the acquisition of 120 F-16C/D aircraft at an estimated cost of $5.2 billion (47:24). A review of the background of this program along with discussions on South Korea's motives and the issues with the negotiation of an MOU provides some understanding on how a coproduction agreement was reached.

Historical Background. In the early 1980s the Republic of Korea began searching for a new fighter aircraft to replace the aging Northrop F-5 fighters of the Korean Air Force (38:50). Besides replacement of

the F-5s, South Korea was also interested in developing its indigenous aerospace industry (37:23). Two American aerospace companies competed for the new Korean fighter dubbed the FX.

McDonnell Douglas's Offer. McDonnell Douglas attempted to sell the upgraded version of the F/A-18 commonly known as the Hornet 2000 (37:23). Some advantages of the F/A-18 purchase over the F-16 aircraft were quoted in *Aviation Week & Space Technology*.

> McDonnell Douglas has countered with the F/A-18's twin engine safety factor. One of the requirements for the FX is the capability to conduct long range operations over water. The F/A-18 also is certified to carry two missiles the South Koreans are interested in obtaining-the Harpoon antiship missile and the highspeed antiradiation missile (HARM). McDonnell Douglas is offering a substantial industrial development package as well. According to U.S. observers, the firm correctly perceived-from the outset-that the Korean government wanted to use the FX program as a springboard to develop the nation's aerospace industry. (20:195)

Beyond the licensed production of the F/A-18, Mcdonnell Douglas offered what the article entitled "FX Fighter Program to Set Stage for Air Force Modernization Plan" called a six point plan.

> It includes a joint, long range study to develop a strategic plan for Korean industry, the development of an F/A-18 logistics support base, advanced systems research, a share in the work on the firm's ultrahigh bypass commercial transport program and joint development of an entire advanced military trainer system. (20:195)

General Dynamic's Offer. General Dynamics offer also included an upgraded aircraft along with arguments concerning interoperability and cost factors. The latest upgrade of the F-16C/D aircraft is known as Block 50 was offered. Interoperability with previous F-16 aircraft purchased by South Korea was also stressed as an advantage to choose the F-16 (37:23). Additionally, the cost of 120 F-16s would be approximately one billion dollars less than the F/A-18 purchase (20:195). General Dynamics initially failed to recognize Korea's

interest in its aerospace industry development but responded after McDonnell Douglas made its offer.

Aviation Week & Space Technology stated General Dynamics' response to South Korea's other interest.

> General Dynamics' aerospace industry development program for South Korea includes the transfer of manufacturing, management, and design and development technologies. In manufacturing, the firm has offered to grant Korean industry the rights to produce and market Ag Husky and Ag Truck agricultural aircraft and to coproduce Cessna Caravan 1 utility aircraft for the Asian market. (20:195)

General Dynamics offered other incentives to acquire the sell of F-16 aircraft to Korea. The incentives included advanced training in CAD/CAM technology, codevelopment of the Cessna T-37 trainer, continual investigations into other possible joint efforts, and a proposal to upgrade South Korea's current F-16 inventory (20:195-196).

South Korea's Motives. The acquisition of a new modern fighter by South Korea was to serve two purposes. The first purpose was to bolster the Korean aerospace industry and the second was to begin a new air force modernization plan referred to as ROKAF 2000 (43:215, 20:191).

Korean Aerospace Industry Importance. The article "Samsung Keys Future Growth to FX fighter Program" stated the importance of the new fighter acquisition to the Korean aerospace industry.

> "The FX is the first step in building up the aerospace industry," according to Chae-Su Kim, managing director of Samsung Aerospace Industries' Aerospace Research and development Center. The retired Korean air force general said the firm's role as the prime contractor for the FX coupled with other ambitious projects now under way will provide Samsung with the manufacturing and technological skills and experience to achieve its ultimate goal of designing and manufacturing a complete aircraft. (43:215)

The reason for the use of a coproduction agreement versus indigenous development or codevelopment is emphasized in *Aviation Week &*

Space Technology as quoted by a Korean based representative for a U.S. defense contractor.

> The thing that is hurting them badly is that they can't grow engineers fast enough; they can't grow the technology. So they made a conscious effort to derive the technologies any way they can. And the most convenient and expeditious way is to ride in on the tail of defense technologies and bring them into the aerospace sector. (24:201)

ROKAF 2000. A key motive behind the coproduction of an advance fighter is to modernize the Korean air force. *Aviation Week & Space Technology* describe what ROKAF 2000 is about.

> Known as ROKAF 2000, the program is geared toward increasing the service's capabilities by the turn of the century. U.S. officials here say that, although no formal document exists, the basic concept calls for creating a defensive umbrella over the entire Korean peninsula. The plan calls for a buildup of the country's airpower to act as a deterrent to potential adversaries and protect South Korea's economic growth. to accomplish this, the air force is seeking to acquire many capabilities now provided by the U.S. military. (20:191)

Although it appears ROKAF 2000 is basically a want list of weapons, it is also a step toward the development of "an aerospace infrastructure that can support an autonomous national defense (20:191).

MOU Negotiations. The negotiation of an agreeable MOU was slow and dynamic. Throughout negotiations the United States refused any direct buy-back provisions. Additionally, the coproduction mix for in-country production was a point of contention (37:23).

In December 1989, the Korean Air Force selected the McDonnell Douglas F/A-18 over the General Dynamic F-16 and the European Panavia Tornado as the future Korean FX-1 multi-role fighter. The selection followed an evaluation period of about five years (47:24). The basic reasons for the F/A-18 selection were summarized in *Aviation Week & Space Technology* as follows.

> When South Korea chose the F/A-18 over the F-16 in 1989, it said the aircraft capabilities and the Mcdonnell Douglas financial package outweighed the low unit cost of the F-16. a key factor was the single-engine design of the F-16. The Koreans note that their country is a peninsula, surrounded on three sides by water, and that said the twin-engine F/A-18 decision would be inherently safer. (4:30)

The coproduction agreement is a three step program eventually leading to production of aircraft in South Korea. John D. Morrocco in his article "Korea Fears U.S. Technology Transfer Opponents Could Hamper its FX Program" describes the basic deal.

> The program proposed by the U.S. includes eventual licensed production of the aircraft in Korea. Of a total of 120 FX aircraft, 12 will be produced in the U.S., 36 in the form of kits and 72 in commercial coproduction with South Korea. Samsung Aerospace Industries has been selected as the prime contractor. (37:23)

Fifteen months after South Korea chose the F/A-18, the decision was reversed and the F-16 fighter aircraft was chosen. David Brown wrote in Aviation Week & Space Technology the reasons for this change.

> The decision which will save South Korea more than $1 billion over the next decade was "driven by budgetary constraints and other financial considerations," James R. Mellor, president and chief operating officer of General Dynamics told Aviation Week & Space *Technology.*
>
> Mellor said the decision also was affected strongly by the cancellation of the U.S. Navy's A-12 attack aircraft, which was being developed jointly by General Dynamics and McDonnell Douglas, and by actual and proposed cutbacks in the production rates of both the F-16 and the F/A-18 being acquired by the U.S. military. (4:30)

The MOU for the purchase of F/A-18 was used as the basis for the final MOU. The coproduction arrangements remained unchanged (Jenkins). Offset arrangements were left to General Dynamics to negotiate (4:30). Technology transfer issues are also currently being negotiated with some concern on congressional reaction in comparison to the Japanese FS-X program (37:23).

Case Comparisons

In comparing the FS-X and Korean Fighter Programs, similarities of how each became a certain type of cooperative agreement is evident. The following paragraphs discuss the three aspects which led to the selection of a certain cooperative arrangement in each case: the goals of the countries, technology transfer and DOD's position and objectives.

Goals of the Countries. South Korea and Japan had similar goals when pursuing U.S. fighter programs. The immediate goal for both nations was to modernize their air defense capabilities. Both countries have a final goal of being able to produce indigenous advanced fighters. Both countries also tied economics with defense. Each wanted to advance the aerospace industry within their respective countries.

Technology Transfer Issue. The issue of technology transfer was paramount in both cases, more so in the FS-X case. The ability to acquire advanced technology was different. The Japanese have had previous licensed aircraft agreements and wanted to advance to indigenous production. However, there was doubt within the Japanese government about whether Japan had enough know-how to produce such an aircraft in its entirety. Korea has a limited licensed production history with the KFP being its first whole fighter production in-country. This difference in each country's internal abilities led to the selection of appropriate cooperative arrangements.

DOD's Position. DOD attempted to position itself as it has for the last thirty years by pushing off-the-shelf purchases. In addition, DOD attempted to disengage economics from defense spending unsuccessfully. In order to support foreign policy relations, maintain defense

relationships, and protect U.S. technology, DOD decided to compromise in both cases. The compromises shown in the negotiations of both MOUs shows that DOD can change the way it does international business.

Personal Interviews

This section provides information obtained from personal interviews of Defense Department personnel listed in Appendixes A. The information has been combined under topics included in the interview guides (Appendix B and C). The areas discussed included roles of each organization, PACRIM, most important factors considered when evaluating a cooperative agreement, and problems in the cooperative agreement procedures.

Roles of Interviewees Within the Department of Defense. Interviews were conducted with individuals from the systems program office level to the under secretary of defense level in Washington D.C. Each individual interviewed was involved in international agreement either in a supporting role or a direct role. The F-16 System Program Office manages the highly successful F-16 coproduction program and also provides manning to oversee and implement the FS-X program. The program office is a designated member on the many joint DOD/JDA subcommittees (36:13).

Above the program office, Colonel Witt, Director of Allied Armaments Cooperation at Aeronautical Systems Division (ASD) was interviewed. Colonel Witt is the focal point for cooperative agreements at ASD providing guidance and encouragement on international cooperative agreements (57). Above ASD, interviews were conducted with various Department of Defense officials.

Pentagon officials were interviewed from the Joint Military Affairs Group-Korea (JUSMAG-K), Department of the Air Force, Department of Defense, and the Defense Security Assistance Agency. Colonel William Jenkins, Director of Air Force Programs (JUSMAG-K) provided current information on the MOU process of the Korean Fighter Program (22). Colonel Criss, Director, International Program Office, under the Office of the Assistant Secretary of the Air Force (Acquisition) is the focal point for the coordination of MOUs affecting USAF research and development and some coproduction (12). Mr. Thomas Sullivan from the Directorate of Defense Procurement, Office of the Under Secretary of Defense (Acquisition) provides reviews of MOUs and coordinates the approval process of MOUs (48). Additionally, from the same department, Mr. Bruce Gillette, Assistant for the Far East was interviewed. Mr. Gillette's role was the negotiation of MOUs, tracking of MOUs, and searching opportunities for cooperative ventures in R&D (21). Two personnel were interviewed from Defense Security Assistance Agency since the role of this agency is to support FMS sales and coproduction arrangements.

Interviews were also conducted with Major Alan Lovell of the Defense Institute of Security Assistance Management. Major Lovell provided some current material on international cooperative agreements (28).

PACRIM Interest. All interviewees were asked about the PACRIM and what each office was currently addressing the area. The response concerning PACRIM involvement was unanimous. Besides South Korea, Japan, and Australia, no office was currently considering cooperative agreements with any other PACRIM nation (12,21,48,57).

The reason cited for this situation is that a country must have something to offer before cooperation is considered and the other PACRIM nations have nothing to date which interest the Department of Defense (21,48). Korea and Japan were cited strongly for future cooperative ventures due to advancing technologies and defense commitment policies (12,21,22). Mr. Sullivan commented that even though consideration of cooperative agreements with other PACRIM countries is not being addressed, it doesn't mean that it should not be (48).

Factors Most Considered. Based on the interviews, four factors were identified as assisting in the selection of the type of cooperative agreement arrangement to use: country preference, technology transfer, program development, and political motives.

Country Preference. The initial choice of a cooperative agreement stems many times from the country requesting the arrangement (29). Evaluation of other factors leads the United States to accept or reject the requested arrangement. For off-the-shelf purchases, the arrangement is fixed from the inception but the approval of the sale is not (29). Other arrangements such as the FS-X and Korean Fighter Program were evaluated and negotiated over years.

Technology Transfer. The type of technology involved in the cooperative arrangement and access to foreign technology have a direct bearing on the choice of cooperative agreements (57). The use of the technology in the program and whether the technology flow is one or two ways is a factor considered. Current U.S. production licenses are less scrutinized than development agreements (29). The ability to access needed foreign technology was also brought up as a factor to consider when selecting a cooperative agreement type (21,57). Additional

information provided from a recent paper of Colonel Witt discusses technology concerns.

> A basic premise in sharing U.S. technology through cooperative R&D is not only to share the cost of developing a new capability, but also to ensure military capability among our allies that allows them to more effectively contribute to the common defense. To that end, technology transfer is an integral part of the cooperative R&D and U.S. defense policy, and in a narrow sense "the more the better." However, U.S. policy has never been unrestricted transfer of technology in either its research and development form or in the form of advanced equipment. The constraints fall into three general areas: restrictions on transfer to potential enemies, specifically the Eastern Bloc; restrictions on transfer to third party nations; and limiting use "for defense purposes only." (58:7)

Program Development. The stage at which a particular program is currently in (eg. concept exploration, production) has a direct influence on the type of cooperative arrangement chosen (29). Throughout the different stages of a weapon system, different types of cooperative arrangements are used.

Political Factors. Most interviewees cited political motivations as another factor considered when a cooperative agreement is contemplated (12,21,48). The consideration of national security issues, foreign relations and political sensitivity were three political factors brought up in discussions (12,21,48).

Problems in the Cooperative Agreement Process. Many problems with the cooperative agreement process were discussed during the interviews. Some of the areas mentioned included offsets, lack of basic consolidated guidelines, MOU review process, and requirement identification.

Offsets. Countries pursuing cooperative agreements with the United States are consistently requesting increasing offset commitments (12). As discussed in chapter III, offsets are not allowed to be entertained by U.S. government negotiators unless permission is granted.

Industry has stepped in to negotiate and enter into offset agreements within the guidelines of the prevailing MOU.

Basic Guidelines. Within DOD there is no consolidated reference for how cooperative agreements are created and what regulatory and statutory laws apply (12,46). Col Criss's office is currently working on a Department of Defense manual entitled "International Cooperative Programs Management Manual. The manual is an attempt to bring together most DOD material covering cooperative programs (12).

MOU Review Process. The process now in use for reviewing MOUs is time consuming and inefficient. Mr. Sullivan reported that many MOUs are already negotiated or "the wool has already been dyed" before a review or coordination has taken place (48). This lack of following published guidance sometimes delays approval of an otherwise acceptable MOU. Colonel Criss pointed out that the various review levels required seem to complicate the MOU process more than help it (12).

Requirements Identification. Identifying possible cooperative ventures is a complicated task. Matching U.S. needs with another country's needs is the key to solving this problem (12,21). Lack of corporate memory of U.S. personnel assigned throughout the world to identify opportunities is a major problem (48). Unfortunately, progress on improving our identification process cannot be made until we drop what Col Criss calls "the not invented here syndrome" (12).

V. Conclusion and Framework

Chapter Overview

This chapter reviews the specific problem identified for this research, presents some general conclusions on this research, and introduces an evaluation framework for the selection of cooperative arrangements. The chapter will conclude with some recommended areas for future research. The conclusions drawn are from information obtained by research and personal interviews.

Review of Specific Problem

Direct sales or off-the-shelf methods of acquiring military equipment are no longer considered the only means for providing the defense of many countries. There are many types of international cooperative arrangements which offer alternatives to direct sales. At the present time, there does not exist any firm guidelines within the Department of Defense that would assist in the evaluation and selection of an applicable cooperative arrangement. This chapter includes a framework to help DOD personnel evaluate basic factors in order to select the most viable cooperative arrangement.

The different types of cooperative arrangements were defined in chapter III. DOD uses various types of cooperative arrangements. This paper included case studies on coproduction, licensing, and codevelopment. Direct sales are used to sell many U.S. made weapons and has been the most preferred method of DOD to sell to other foreign countries.

DOD has used various cooperative arrangements with nations in the PACRIM. Direct sales on major weapon systems such as the F-16 aircraft was one example cited. This thesis also provided two case studies of recent DOD cooperative arrangements negotiated with Japan and Korea. The FS-X agreement concluded in a modified codevelopment type of agreement after many years of discussion and negotiations. The recently negotiated Korean Fighter Program represents Korea's first major defense fighter coproduction program although Korea has participated in numerous other DOD cooperative programs.

General Conclusions

Based on the research data from the literature search, the two case studies, and the personal interviews; three general conclusions have been formulated.

1. The nations comprising the PACRIM vary in their ability to produce weapon systems. Japan's technology base shows that codevelopment arrangements with the U.S. are feasible and that both sides may benefit. South Korea has gone from coproduction of small weapon systems to coproduction of an advanced fighter aircraft. Other PACRIM nations have limited ability to produce major weapon systems. Coproduction of parts will continue until the countries develop a more advanced technological base.

2. Separating defense and economic issues is no longer viable in today's world defense market. Both Korea and Japan successfully negotiated cooperative arrangements that have a direct bearing on the aerospace industry in each respective country.

3. Technology transfer issues will continue to influence the type and the ability to negotiate future cooperative arrangements. The FS-X case revealed technology concerns were paramount to its approval or disapproval. Additionally, the interviewees cited technology transfer as a key issue in selecting an appropriate cooperative arrangement.

Evaluation Framework for the Selection of Cooperative Arrangements

The evaluation framework presented at the end of this chapter is in the form of a decision trees. Each tree covers a particular factor with topics that should be considered before entering into a cooperative arrangement. Each factor should be reviewed individually first and then evaluated with the results of the other factors. A decision as to what type of cooperative arrangement can only be made by considering all factors. The evaluation trees have been formulated based on data in chapters III and IV.

Figure 1 shows the basic factors that should be reviewed after a request for a cooperative program has been received. An assumption to this chart is that the defense item being requested have been validated as a military requirement. The factors used were identified by the previous discussions of the literature review, case comparison, and interviews. Figures 2 through 6 are trees of the basic factors showing major topics to consider.

Technology Assessment. Figure 2 represents the decision tree to evaluate technology. An initial assessment of the technology involved and whether it flows one or two ways is completed by the initiating department. Based on this assessment, predictions of the reviews by the Defense Technology Security Administration (DTSA) and the commerce department can be made. Accurate predictions can assist a DOD agency in selecting an appropriate cooperative arrangement. It should be pointed out that other executive departments such as the Department of Labor may also review the proposed cooperative arrangement.

The DTSA review will encompass types of technology involved, access to foreign technology and basic benefits to the United States. This review is done with the involved DOD component. Technology can be classified as design and manufacturing know-how, development equipment, production equipment, or systems, components, or information used for other purposes (16:D-12). This classification step is the first indication as to what cooperative arrangement may be appropriate (coproduction, codevelopment, data exchange, etc..,). Second, accessibility to advanced foreign technology is determined and identification of that technology is completed. The review ends with a listing of perceived benefits and risks. Prior to entering negotiations this review must be complete and approved by the Office of the Secretary of Defense (16:3-21).

The Department of Commerce review includes considering the type of technology involved and the effect of such agreement on future trade relations. Although a negative review by commerce or any other government department cannot alone stop a cooperative program, concerns should be addressed adequately and if possible resolved through joint meetings.

Industrial Base Evaluation. An evaluation of the impact on the U.S. industrial base ensures concerns such as critical DOD items, mobilization, domestic sources availability, job skills, and current costs of DOD items are all considered prior to entering into a cooperative arrangement (see Figure 3). All these concerns should be addressed in relation to current and future impacts to the industrial base.

Critical DOD items need to be identified along with U.S. industry's ability to meet mobilization/surge demands of these items. Foreign production of critical items should be carefully evaluated. A review of domestic producers needs to be accomplished to ensure critical items can be produced in the U.S. if needed. Additionally, any loss of critical job skills due to the cooperative arrangement needs to be addressed.

A review of the cost impacts on DOD items is also necessary. Coproduction of parts may cause shortages and increased prices. A thorough review of the price and availability of DOD items will identify cost impacts early.

The review of the industrial base factor can assist DOD in its selection of cooperative arrangements by identifying potential impacts on the U.S. industrial base. The impacts can lead to the use of a different cooperative arrangement than proposed or possibly to rejection of the proposed cooperative arrangement.

Political Factors. Political relations and interests can affect the type of cooperative arrangement negotiated (see Figure 4). The affect of the arrangement on the requesting nation and on other concerned third party nations should be evaluated. The interests of congress and other government departments should also be considered. Early identification of supporters and opposition can assist DOD in deciding what factors need to be addressed openly and sufficiently. Failure to evaluate relevant political factors could lead to debates such as the FS-X.

Economic Factors. Economic factors also contribute to the type of cooperative arrangement (see Figure 5). Workshare arrangements,

technology spinoffs, cost-sharing opportunities, and economies of scale are just some of the economic factors that should be evaluated. The factors can contribute to the type of cooperative arrangement entered into.

Program Stage. The stage of a weapon system has a direct bearing on the selection of a cooperative arrangement (see Figure 6). A weapon system in the early stages may lead to some type of codevelopment arrangement while a weapon currently being produced leans toward the use of a coproduction arrangement or data exchange.

Requestor's Evaluation. A thorough review of the motives of a requesting nation can assist DOD in selecting an appropriate cooperative arrangement (see Figure 7). Economic motives such as financial, industry development, and trade balance considerations should be reviewed in some cases in order to understand the affect of an arrangement on the requesting nation. Also, the ability to identify foreign alternatives to a cooperative arrangement with the U.S. can assist DOD in choosing an appropriate cooperative arrangement to meet not only U.S. needs but the requestor's needs.

Recommended Future Research

This study attempted to identify the most common evaluation factors used in selecting an appropriate cooperative arrangement in the Pacific Rim. Other related studies could examine the actual technological and industrial capabilities of PACRIM nations. These studies could reveal opportunities for cooperative arrangements not yet identified by DOD.

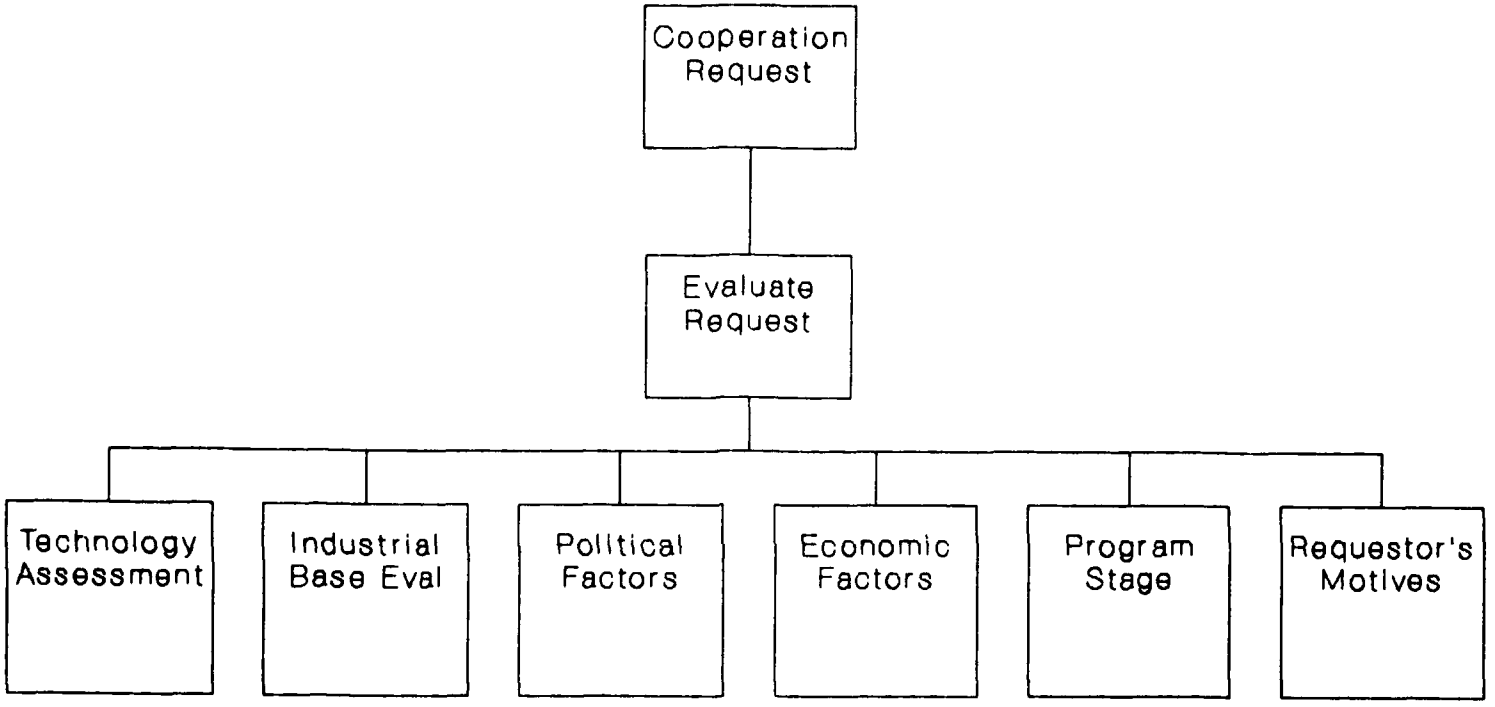

Figure 1. Evaluation Model

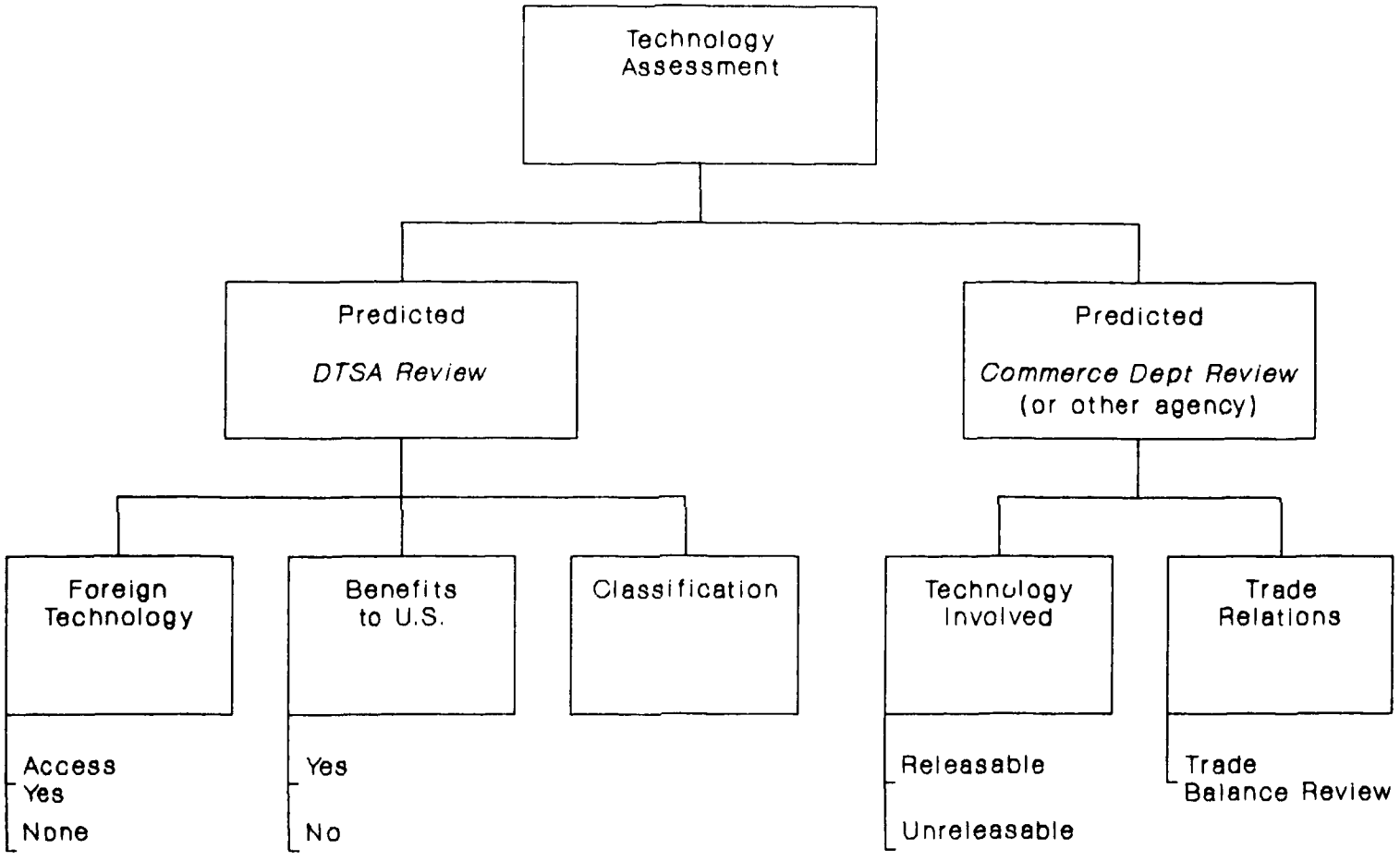

Figure 2. Technology Assessment

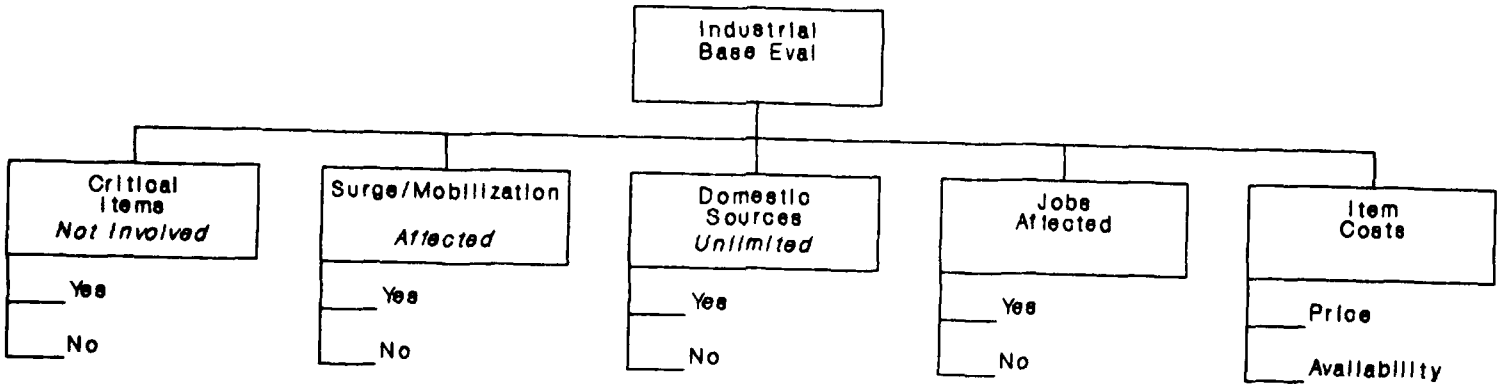

Figure 3. Industrial Base Evaluation

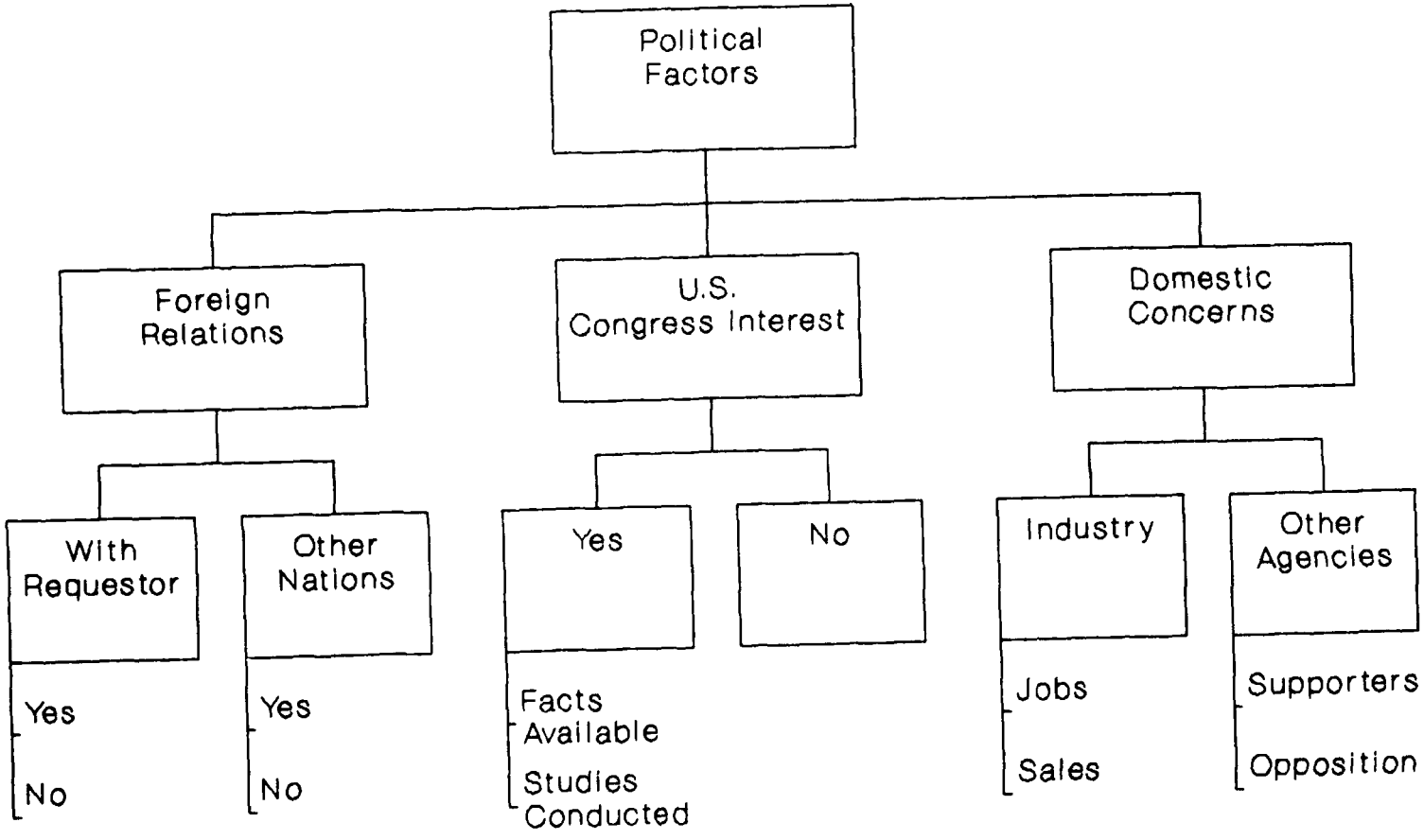

Figure 4. Political Factors

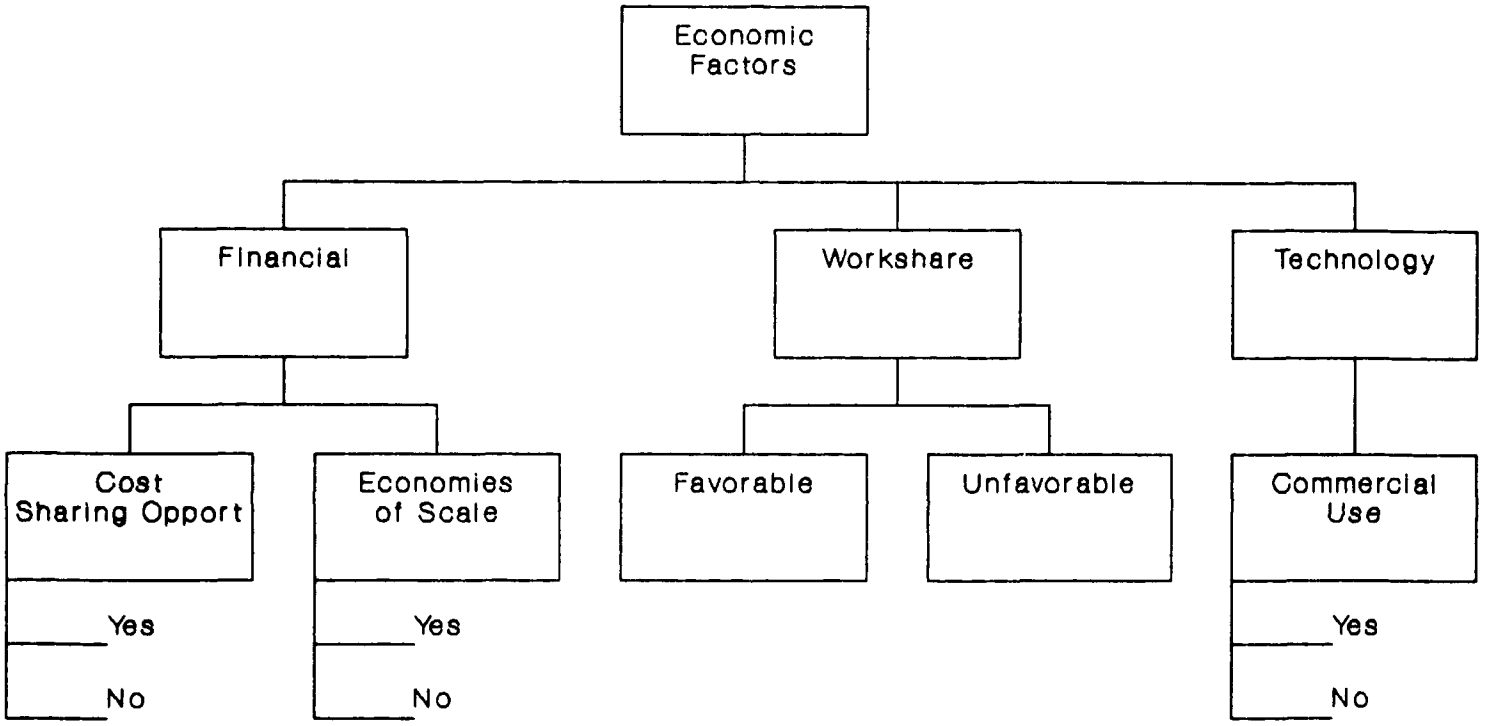

Figure 5. Economic Factors

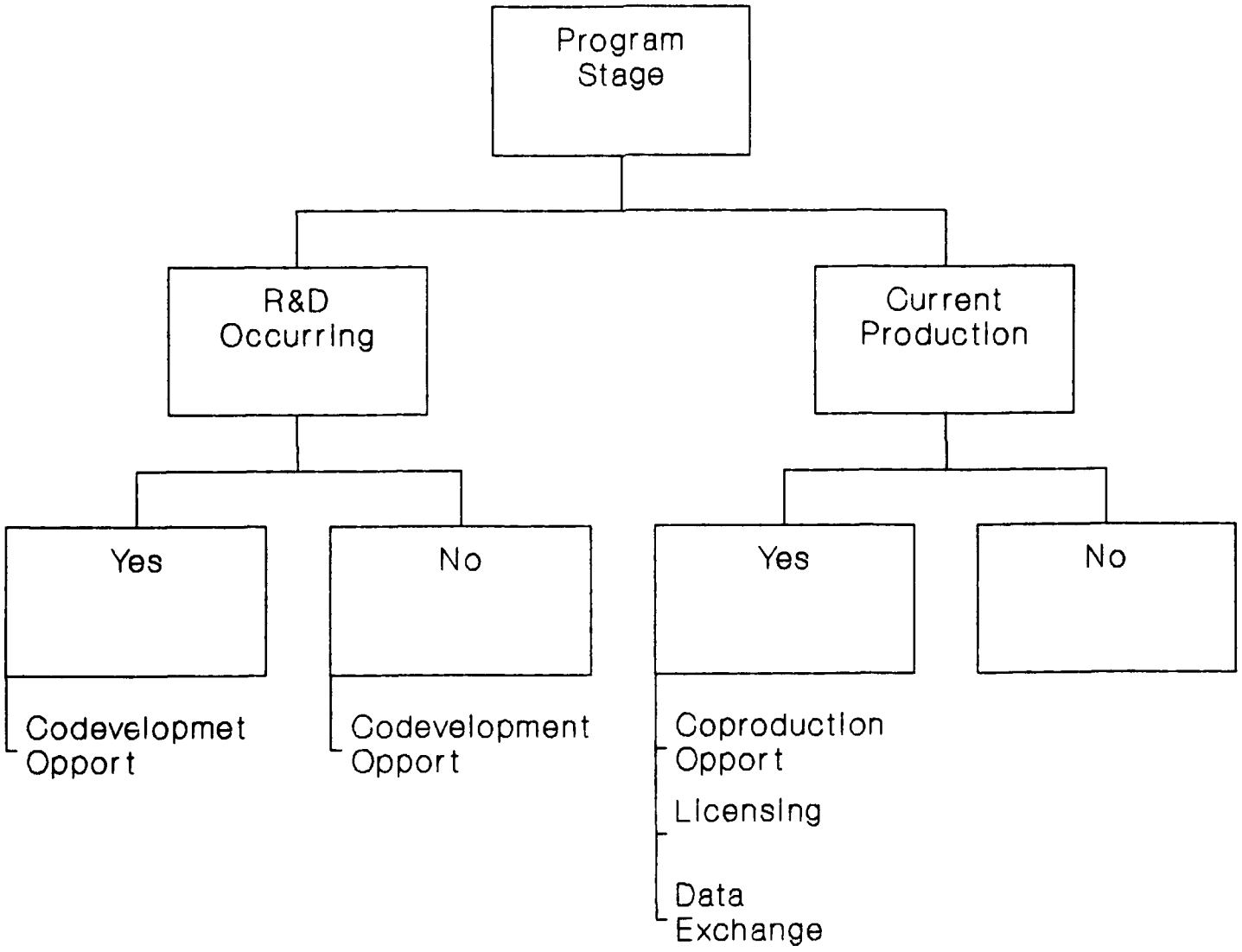

Figure 6. Program Stage

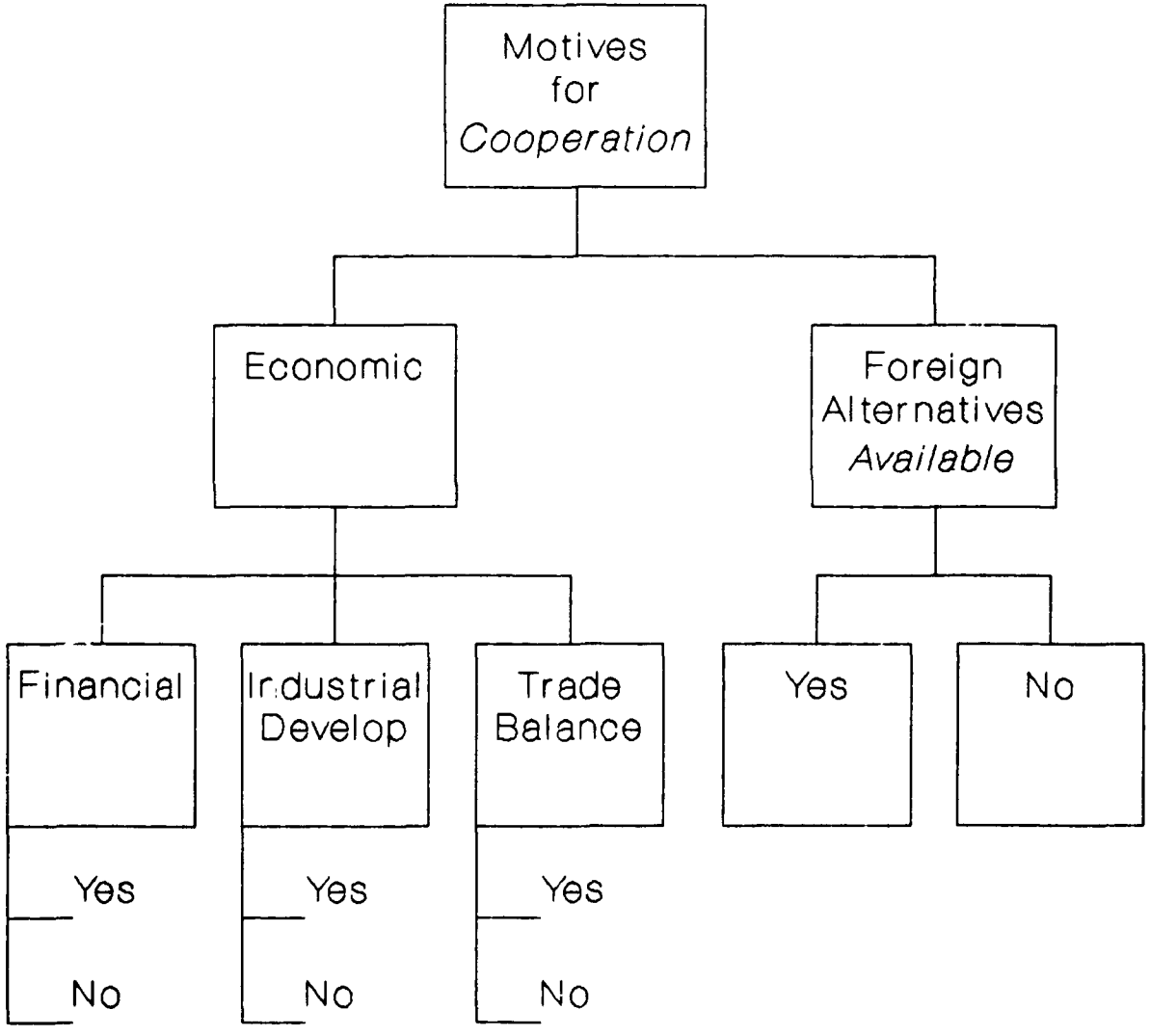

Figure 7. Requestor's Evaluation

Appendix A: List of DOD Personnel Interviewed

Clawson, Charles H.,
Aeronautical Systems Division
F-16 Systems Program Office
Deputy Director Multinational Programs
Directorate of Multinational programs
ASD/YPX
Wright-Patterson AFB OH 45433-6503
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Jenkins, William A., Col, USAF
Director of Air Force Programs
Joint U.S. Military Affairs Group-Korea
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AV 725-4098

Lovell, J. Allen, Maj, USA
Defense Institute of Security Assistance Management
European/Asian Studies Director
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Comm (513)-255-5850

Ludlow-MacMurray, Susan
Defense Security Assistance Agency
Chief, Management Division
Pentagon Room 4B740
Washington DC 20301
Comm (202)-697-8108

Mallory, Craig J., Capt, USAF
Aeronautical Systems Division
F-16 Systems Program Office
Directorate of Multinational Programs
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Soroko, Alexander
Defense Security Assistance Agency
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Washington DC 20301
Comm (202)-697-8108

Sullivan, Thomas M.
Office of Under Secretary of Defense (Acquisition)
Directorate of Defense Procurement
Senior Negotiator
Pentagon Room 3C762
Washington DC 20301

Witt, Merlyn J., Col, USAF
Aeronautical Systems Division
Director, Allied Armaments Cooperation
ASD/XRI
Wright-Patterson AFB OH 45433-6503
Comm (513)-255-6790

Appendix B: F-16 Systems Program Office Interview Guide

DATE:

NAME:

TITLE:

ORGANIZATION

Objective: To ascertain what cooperative arrangements exist in the PACRIM area and how successful are current cooperative programs.

1. What part does the F-16 Systems Program Office play when new MOUs are negotiated with other countries?

2. Does the government provide oversight for offset arrangements negotiated by the contractor?

3. What are the goals of the government in reference to the FS-X agreement?

4. What factors led to the FS-X agreement as a co-development arrangement?

5. What factors are being considered in the KPP program and what factors led to it being designated a co-production program?

6. The success of the F-16 program is well known. The co-production program has been the key to world-wide sale. What part has the government played in the use of co-production in the PACRIM?

Appendix C: DOD Personnel Interview Guide

DATE:

NAME:

TITLE:

ORGANIZATION:

Objective: To understand what factors are considered when deciding to use an international cooperative agreement and how those factors bear on the final agreement type (codevelopment, coproduction, direct sale, etc..,).

1. What role does your organization have when major weapon system's MOUs are negotiated with other countries?

2. What are the most common type of international agreements that your office either participates in or reviews?

3. When selecting an appropriate MOU cooperative arrangement

   a. What political factors contribute to the selection process?

   b. What economic factors contribute?

   c. Does the type of technology transfer affect the selection?

   d. What other factors are considered?

4. Is there any written criteria to assist in deciding what type of cooperative agreement to use?

5. The Pacific Rim is fast growing, both economically and technologically. What types of cooperative agreements would be most appropriate to use by the U.S.?

6. What improvements could be made to the current procedures which lead to U.S. decisions to codevelop or coproduce defense items?

Appendix D: List of Directives, Regulations, and Laws Applicable to Cooperative Agreements

(a) DoD Directive 5134.1, "Under Secretary of Defense (Acquisition)," 8 August 1989.

(b) DoD Directive 2000.9, "DoD Participation in International Technical Exchange, Cooperative, and Coproduction Programs," (Date).

(c) Title 22, United States Code, Chapter 39, Section 2767, "Authority of President to Enter into Cooperative Projects with Friendly Countries" (also known as Section 27, Arms Export Control Act).

(d) Title 10, United States Code, Chapter 138, Section 2350a, "Cooperative Research and Development Projects: Allied Countries."

(e) DoD Directive 5530.3, "International Agreements," 11 June 1987 (currently under revision; expected completion Summer 1991).

(f) "National Policy and Procedures for the Disclosure of Classified Military Information to Foreign Governments and International Organizations" [Short title: National Disclosure Policy (NDP-1)], 9 September 1981.

(g) The Arms Export Control Act (22 U.S.C. 2751 et seq.), as amended.

(h) Title 22, Code of Federal Regulations, Parts 120-130, U.S. Department of State, Office of Defense Trade Controls, "International Traffic in Arms Regulations," November 1989, as amended.

(i) DoD Directive 5230.11, "Disclosure of Classified Military Information to Foreign Governments and International Organizations," 31 December 1984 (currently under revision).

(j) DoD Directive 2040.2, "International Transfers of Technology, Goods, Services, and Munitions," 17 January 1984.

(k) DoD Directive 2000.3, "International Interchange of Patent Rights and Technical Information," 31 May 1961.

(l) DoD Directive 5230.25, "Withholding of Unclassified Technical Data From Public Disclosure," 6 November 1984.

(m) DoD Directive 5230.24, "Distribution Statements on Technical Documents," 18 March 1987.

(n) Executive Order 12356, National Security Information, 2 April 1982.

(o) DoD 5200.1-R, Information Security Program Regulation, 27 June 1988.

(p) Title 10, United States Code, Chapter 138, Section 2350a(e), "Cooperative Opportunities Document."

(q) DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," (Date).

(r) DoD 5000.2-M, "Defense Acquisition Management Documentation and Reports," (Date).

(s) DoD Directive 5000.1, "Policies Governing Defense Acquisition," (Date).

(t) "White House Presidential Policy Statement on Offsets in Military Exports," 16 April 1990.

(u) Title 10, United States Code, Chapter 148, Section 2504, "Defense MOU and Related Agreements," and Section 2505, "Offsets Policy: Notification."

(v) Title 10, United States Code, Chapter 138, Section 2350b, "Cooperative Projects Under Arms Export Control Act: Acquisition of Defense Equipment."

(w) Title 10, United States Code, Chapter 137, Section 2304, "Contracts: Competition Requirements."

(x) DoD 7220.9-M, "DoD Accounting Manual," October 1983, as amended.

(y) Title 22, United States Code, Chapter 39, Section 2796, "Leases of Defense Articles and Loan Authority for Cooperative Research and Development Purposes," (also known as Section 65, Arms Export Control Act).

(z) DoD 5105.38-M, "Security Assistance Management Manual," 1 October 1988, as amended.

(aa) Public Law 99-145, Section 1102 (Quayle-Roth-Nunn Amendment) and Section 1103 (Nunn-Roth-Warner-Glenn Amendment), Department of Defense Authorization Act, 1986, 8 November 1985.

(bb) Title 10, United States Code, Section 2325, "Preference for Nondevelopmental Items."

(cc) DoD FAR Supplement (DFARS), 1988 Edition (as amended), Part 210, "Specifications, Standards, and Other Purchase Descriptions."

(dd) Title 10, United States Code, Section 2457, "Standardization of Equipment with North Atlantic Treaty Organization Members."

(ee) Public Law 101-189, National Defense Authorization Act for Fiscal Years 1990 and 1991, 29 November 1989.

(ff) Federal Acquisition Regulation (FAR) (as amended), Part 6, "Competition Requirements."

(gg) DFARS, 1988 Edition (as amended), Part 206, "Competition Requirements."

(hh) DFARS, 1988 Edition (as amended), Subpart 206.3, "Other Than Full and Open Competition," paragraph 206.302-1(b).

(ii) DFARS, 1988 Edition (as amended), Section 207.105, "Contents of Written Acquisition Plans."

(jj) DoD 7750.5-M, "DoD Procedures for Management of Information Requirements," November 1986.

(kk) DoD Instruction 5230.17, "Procedures for Disclosure of Classified Military Information to Foreign Governments and International Organizations," 17 February 1985.

(ll) DoD Instruction 5230.20, "Control of Foreign Representatives," 25 June 1984.

(mm) DoD Directive 2010.6, "Standardization and Interoperability of Weapons Systems and Equipment Within the North Atlantic Treaty Organization," 5 March 1980.

(nn) U.S. Air Force Regulation (AFR) 80-48, "Advisory Group for Aerospace Research and Development," 14 July 1989.

(oo) DoD Directive 2010.5, "DoD Participation in the NATO Infrastructure Program," 19 March 1985.

(pp) Joint Chiefs of Staff (JCS), Memorandum of Policy (MOP) No. 147, "International Military Rationalization, Standardization, and Interoperability Between the United States and Its Allies and Other Friendly Nations," 11 January 1988.

(qq) Title 10, United States Code, Chapter 138, Subchapter I, "Acquisition and Cross-Servicing Agreements," Sections 2341 through 2349.

(rr) DoD Directive 2010.9, "Mutual Logistics Support Between the United States and Governments of Eligible Countries and NATO Subsidiary Bodies," 30 September 1988.

(ss) DoD Directive 2010.8, "Department of Defense Policy for NATO Logistics," 12 November 1986.

(tt) DoD Directive 5100.27, "Delineation of International Logistics Responsibilities," 29 December 1964.

(uu) Allied Logistics Publication (ALP) 10, "Guidance on Integrated Support for Multinational Equipment Projects (ILS)," June 1990.

(vv) DFARS, 1988 Edition (as amended), Part 225, "Foreign Acquisition."

(ww) Commander in Chief, U.S. Pacific Command Instruction 4900.14, "U.S. Pacific Command (USPACOM) Policy and Responsibilities Relating to Armaments Cooperation," 6 September 1989.

Bibliography

1. Ackerman, Julia. "Asean: The Rich Gatekeeper," *Defense & Foreign Affairs* : 11-12 (August 1985).

2. Arroyo, Samuel A. and Curtis R. Cook. "Thinking Globally," *Contract Management, 30:* 27-28 (September 1990).

3. Bleakley, Gage A. and Craig Brandt. "International Armaments Codevelopment: Nunn Amendment Spurs Interest in Collaboration on Weapons Development," *The DISAM Journal, 13:* 105 (Fall 1990).

4. Bond, David F. and David A. Brown. "South Korea to Buy 120 F-16C/Ds, Reversing Plan to Order F/A-18s," *Aviation Week & Space Technology, 134:* 30 (April 1, 1991).

5. Borg, Walter R. and Meridith D. Gall. *Educational Research: An Introduction* (Second Edition). New York: David McKay Company, Inc., 1971.

6. Bostow, Jennifer., Phillip E. Chartrand, Contance Cox, James H. Hershman, Heike Nuhsbaum, and Howard Stevens. "International Defense Cooperation Agreements," Program Manager, XIX: 30 (Septe nber-October 1990).

7. Button, Capt Andrew J. *Cooperation in the Development of the FS-X: An Analysis of the Decision Process.* Fort McNair: The Industrial College of the Armed Services, April 1989 (AD-B133-929).

8. Carlucci, Frank C. *Fiscal Year 1989 Annual Report to the Congress.* Washington: Government Printing Office, 1988.

9. Cheney, Dick. "The FSX Agreement," The DISAM Journal, 11: 27-29 (Summer 1989).

10. Clawson, Charles H. Deputy Director Multinational Programs, Personal Interview. F-16 Systems Program Office, Wright-Patterson AFB OH, 5 June 1991.

11. Comptroller General of the United States. *Trade Offsets in Foreign Military Sales,* Report Series GAO/NSIAD-84-102. Washington: Government Printing Office, April 13, 1984.

12. Criss, Col Bill, Director of International Programs Office, Personal Interview. Office of Assistant Secretary of the Air Force (Acquisition), Washington DC, 11 June 1991.

13. Defense Institute of Security Assistance Management. *The Management of Security Assistance* (Ninth Edition). Wright-Patterson AFB: February 1989.

14. Defense Systems Management College. *Guide for the Management of Multinational Programs* (Second Edition). Fort Belvoir: DSMC, 1987.

15. Department of Defense. *DOD Participation in International Technical Exchange, Cooperative and Coproduction Programs*. DOD Directive 2000.9. Washington: Government Printing Office.

16. Department of Defense. *International Cooperative Programs* Management Manual (DRAFT). Washington: Office of Under Secretary of Defense, April 1991.

17. Emory, William C. *Business Research Methods* (Third Edition). Homewood IL: Richard D. Irwin, Inc., 1985.

18. _____. "Feeling Slightly Exasperated," *The Economist*, 310: 29 (February 25 - March 3, 1989).

19. _____. "FMS or Commercial," *Defense & Foreign Affairs* : 21 (April 1986).

20. _____. "FX Fighter Program to Set Stage for Air Force Modernization Plan," *Aviation Week & Space Technology*, 130: 191,193,195, 196, 199 (June 12, 1989).

21. Gillette, Bruce W. Assistant for the Far East, Personal Interview. Office of the Under Secretary of Defense (Acquisition), Washington DC, 12 June 1991.

22. Jenkins, Col William A. Director of Air Force Programs, Personal Interview. Joint U.S. Military Affairs Group-Korea, Wright-Patterson AFB OH, 3 June 1991.

23. Koch, James V. "An Economic Profile of the Pacific Rim," *Business Horizon*, 32: 18 (March-April 1989).

24. _____. "Korean Aerospace Firms Seek Greater Role in World Market," *Aviation Week & Space Technology*, 130: 201 (June 12, 1989).

25. Lewis, Major Rand C. *International Cooperative Programs, Primer for United States Office of Defense Cooperation and Other Security Assistance Organizations*. Wright-Patterson AFB: Defense Institute of Security Assistance Management, Undated.

26. Lopez, Virginia C. and Loren Yeager. *The U.S. Aerospace Industry and the Trend Toward Internationalization*. Washington: Aerospace Research Center, March 1988.

27. Louscher, David J. and Michael D. Salomone. *Technology Transfer and U.S. Security Assistance*. Boulder: Westview Press, Inc., 1987.

28. Lovell, Maj J. Allen, European/Asian Studies Director, Personal Interview. Defense Institute of Security Assistance Management, Wright-Patterson AFB OH, 3 June 1991.

29. Ludlow-MacMurray, Susan, Chief, Management Division, Personal Interview. Defense Security Assistance Agency, Washington DC, 13 June 1991.

30. Mallory, Capt Craig J. Manager International Contracts, Personal Interview. F-16 Systems Program Office, Wright-Patterson AFB OH, 5 June 1991.

31. Marshall, Rick. "The OMC and Export Licensing," *Defense & Foreign Affairs* : 19 (April 1986).

32. Marvel, K. Barry. "Foreign Military Sales: Industry in Peril," *Contract Management, 29:* 17 (December 1989).

33. McArthur, Colin. "Benefits of Foreign Weapons Testing," *Defense News* : 32 (September 12, 1988).

34. McCarroll, William G. "The Future of Cooperative Programs," *The DISAM Journal, 13:* 82 (Fall 1990).

35. McCormack, Robert C. "Bolstering Defense Industrial Competitiveness Through International Cooperation," *The DISAM Journal, 11:* 74 (Summer 1989).

36. McErlean, Donald P. *FS-X Support Fighter Background Information.* Wright-Patterson AFB: F-16 System Program Office, April 1991.

37. Morrocco, John D. "Korea Fears U.S. Technology Transfer Opponents Could Hamper its FX Program," *Aviation Week & Space Technology, 130:* 23 (April 3, 1989).

38. Nakarmi, Laxmi. "South Korea's New Destination: The Wild Blue Yonder," *Business Week,* : 50 (September 11, 1989).

39. Office of Technology Assessment, Congress of the United States. *Arming Our Allies: Cooperation and Competition in Defense Technology.* Washington DC: Government Printing Office, May 1990.

40. Office of the Under Secretary of Defense for Acquisition. *Report of Defense Science Board on Industrial Cooperation with Pacific Rim Nations.* Washington: Government Printing Office (October 1989).

41. O'Lone, Richard G. "Cooperation Essential but Difficult When Tapping Defense Market," *Aviation Week & Space Technology, 132:* 95, 102 (February 12, 1990).

42. _____. "Presidential Policy on Offsets in Military Exports," *The DISAM Journal, 12:* 46 (Summer 1990).

43. _____. "Samsung Key Future Growth to FX Fighter Program," *Aviation Week & Space Technology,* 130: 215,217 (June 12, 1989).

44. Samuels, Richard J. and Benjiman C. Whipple. "The FSX and Japan's Strategy for Aerospace," *Technology Review, 92:* 49 (October 1989).

45. Simon, Sheldon. *The Future of Asian-Pacific Security Collaboration.* Lexington: D.C. Heath and Company, 1988.

46. Soroko, Alexander, Management Division, Telephone Interview. Defense Security Assistance Agency, Washington DC, 31 May 1991.

47. Spellman, Anthony. "Korean F-16 Deal on Track Now, But...," *Armed Forces Journal International :* 24 (May 1991).

48. Sullivan, Thomas M. Senior Negotiator, Personal Interview. Office of the Under Secretary of Defense (Acquisition), Washington DC, 11 June 1991.

49. _____. "Tactical Aircraft Producers Face Diminishing Prospects," *Aviation Week & Space Technology, 131:* 34 (February 22, 1988.

50. _____. "Testimony of Clyde V. Prestowitz, May 10, 1989." U.S. Congress, House of Representatives, Committee on Foreign Affairs. *Hearings Before Committee on Foreign Affairs on S.J. 113.* United States-Japanese Security Cooperation and the FSX Agreement, 101st Congress, 1st Session, 1989. Washington: Government Printing Office, 1989.

51. _____. "The FSX, Done Deal at Last," The Economist, *311:* 33 (May 20-26, 1989).

52. Trice, Robert H. "International Cooperation in Military Aircraft Programs," *The DISAM Journal, 12:* 74 (Winter 1989/90).

53. Turner, Derek. "Meeting the Challenge of the 1990's in the International Defense Marketplace," Contract Management, 30: 48 (September 1990).

54. U.S. Congress, House of Representatives, Committee on Foreign Affairs. *Hearings Before Committee on Foreign Affairs on S.J. 113.* United States-Japanese Security Cooperation and the FSX Agreement, 101st Congress, 1st Session, 1989. Washington: Government Printing Office, 1989.

55. U.S. Congress, Office of Technology Assessment. *Arming Our Allies: Cooperation and Competition in Defense Technology,* OTA-ISC-449. Washington: Government Printing Office, May 1990.

56. United States General Accounting Office. *U.S.- Japan Codevelopment, Review of the FS-X Program,* GAO/NSIAD-90-77BR. Washington: National Security and International Affairs Division, February 6, 1990.

57. Witt, Col Merlyn J. Director Allied Armaments Cooperation, Personal Interview. Aeronautical Systems Division, Wright-Patterson AFB OH, 3 June 1991.

58. Witt, Col Merlyn J. "U.S.-Allied Defense Research and Development Cooperation: Technology Transfer Implications," Report provided during Personal Interview. Wright-Patterson AFB OH, 3 June 1991.

59. Yin, Robert K. "The Case Study Crisis: Some Answers," *Administrative Science Quarterly*, 26: 63 (March 1981).

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This study presents factors which require evaluation prior to entering into a cooperative arrangement. The purpose of the research was to create an evaluation framework to assist DOD managers of international projects with a tool to enable the selection of an appropriate cooperative arrangement type. The study was focused on the Pacific Rim and includes two case studies on the FS-X and the Korean Fighter Plane. Factors were identified through literature research, case studies, and personal interviews. The study concluded with the identification of six basic factors: technology, industrial base, political, economic, program stage, and requestor's motives.

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