
PERSPECTIVES

Interactive Decision-Making for the International Arms Trade: the Offset Life Cycle Model

By
Dr. Chyan Yang and Colonel Tsung-Cheng Wang, Taiwan Air Force
National Chiao Tung University, Taiwan

Introduction

The concept of offsets is a relatively new marketing tool for most defense companies and governments. Offsets are being used by newly industrial countries to forge bold new trade strategies in order to become major players in global arms market. Exporters rely on offsets to find future business opportunities. The offset agreement is mainly for defense-related contracts, whether they are foreign military sales (FMS) or direct commercial sales (DCS). The principal players in an offset agreement include a supplier of defense related equipment in a developed country and a foreign government buyer. [Palia, 1993, 1992, 1991]

The details of the offset arrangement must be included in the contractual arrangements that involve defense articles and services for export. The two types of offsets are direct and indirect. Direct offsets are directly related to the items or services exported by the defense firm and usually include co-production, financing activities, training, directed subcontracting, investments in defense firms, concessions, transfers of technology and licensed production. Indirect offsets are unrelated to the exports referenced in the sales agreement. These might include purchases, investment, marketing and exporting assistance, training, technology transfer, and other foreign defense related projects. [U.S. Department of Commerce 2003]

The Environment of the World Arms Trade

During the worldwide depression of the 1930s, businesses and governments were unable to finance imports and exports due to “extensive exchange restrictions, large debts, soft currencies, and low foreign exchange reserves.” [Neuman 1985] Offsets arose in the late 1950s and early 1960s in response to the legitimate need to rebuild the defense industrial base in Western Europe and Japan. At that time, offset agreements may have been justifiable for reducing the impact of military equipment purchases on the budgets and trade accounts of these countries. Offsets have contributed to modernizing the arms inventories of the alliance, to contributing to rationalization, standardization, and interoperability, and to strengthening transatlantic ties in the defense of North Atlantic Treaty Organization (NATO) countries. [Neuman 1985] Today, offsets are used as a marketing tool by high technology exporters. In the meanwhile, buying governments can use offsets to decrease the burden of large defense purchases on their economy, to increase or preserve their countries’ jobs, and to improve and maintain their industrial technology base. [U.S. Department of Commerce 1996]

Since 1975, many countries purchasing major defense equipment have required offset agreements to boost their industrial economies. The world’s defense environment has been significantly changed in the world after the Cold War and the breakup of the Warsaw Pact [Waller 2003]. Within this new environment, mega-defense suppliers are chasing fewer customers, and offset packages play a more critical role in global defense procurement competitions. Originally, offsets were provided only by the U.S. and the former Soviet Union, but today they are provided by European countries

(U.K., France, Germany, and Italy), Japan, Israel, China and South Korea. Thus, offsets have already become a competitive tool in the defense market.

Offset Policy

The increasing use of offsets has motivated many countries to set national policies concerning the use of offsets in defense procurements. There are two different views about offset policies. The recipient's view is that offsets are an integral part of the sale itself rather than unrelated compensation practices. The supplier's view is that offsets improve the overall value of the sale. These conflicting views are useful in understanding how governments establish their offset policies.

Countries requiring offsets may be generally divided into four regions, Europe, Asia, Middle East, and North and South America, each with a slightly different view of offsets. [U.S. Department of Commerce 2003] In the Middle East, countries are looking for diversity in economics rather than building or maintaining the defense industry. Pacific Rim countries such as China, Korea, Taiwan, and Singapore are seeking technology transfer in aircraft design to compete in the world aerospace market. Europeans seem to be maintaining the status of their defense industries to be able to export their defense products. In North and South America, the focus is on economy, technology and jobs. [U.S. Department of Commerce 2003] In the U.S., the largest offset supplier, some firms report that, although they have to give up something in the offset process, they have gained market share in return. [U.S. Department of Commerce 1996]

Offset Roles and the Flow of Funds

The critical factors for executing an offset program are very complex and dynamic. When we discuss this issue, we need a thorough understanding of the major players and process in this competitive game. Earlier research concentrates on the relationships between sellers and buyers from a seller's perspective. [DISAM 2003, 1995]. We expand on this point and integrate it with the views of the buyer, creating a new illustration for the main players and the flow of funds for offsets under a government-to-government or a direct commercial sale. The new illustration includes the seller's players (executive branch, legislature, military, prime contractors and their subcontractors), and the buyer's players (recipient government's administration and legislature, local industries, military, and research and development (R&D) organizations). Most buyers focus on technology transfer for reducing R&D costs and shortening schedule of the life cycle, so they need national level R&D organization to take the new technology and transfer it to local industries. The relationships of the seller and recipient are depicted in below Figure 1.

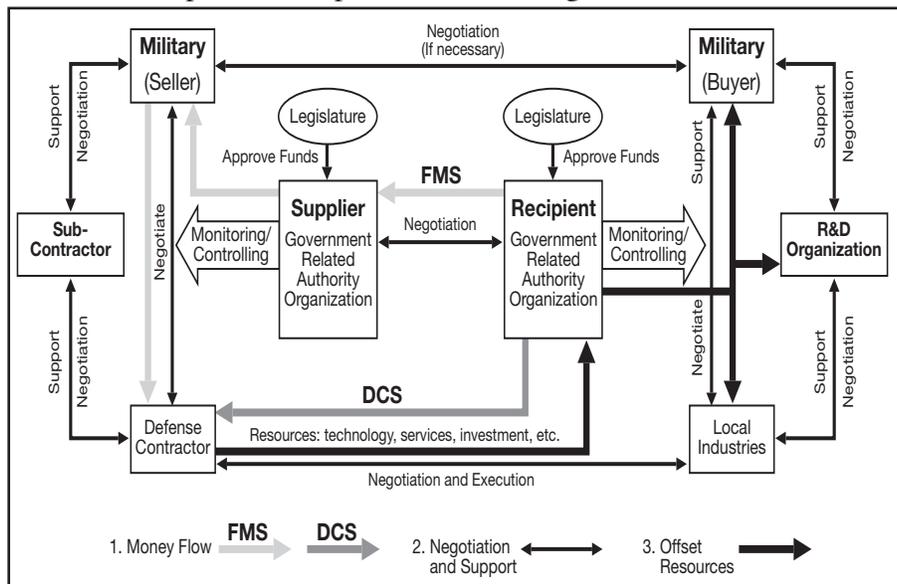


Figure 1. Illustration of the Relationship of the Buyer's and Seller's Offset

Any offset projects need capital to execute what they really want to achieve. However, the power of approving the budget is belongs to the legislature of either the buyer or the seller. The buyer's government transfers FMS or DCS funds to defense contractors as payment for the product. The defense contractor recovers expenditures associated with direct offset transactions through buyer's government payments for the sale. For indirect offsets, the seller's contractors are reimbursed only for administrative costs by the purchasing government; they recover any other costs through resale or marketing assistance for products manufactured in the purchasing country, by returns on their investments, or by other market mechanisms. Indirect offsets also may be related to the production of defense articles sold. Whether direct or indirect, offset transactions return funds to the purchasing country. The offset funds spent in the buyer's country to fulfill offsets are therefore a means by which the purchasing government redirects public expenditures back into its own country. The purchasing country distributes offset credits to execute its government's offset specific goals, for instance technology transfer, local procurement, local investment, cooperative R&D, marketing assistance or training.

Factors Related to Offsets

Perfect negotiation of an offset agreement that is satisfactory to both parties is a necessary first step in a successful ultimate outcome. [Bailey, 1982] However, the definition of a successful offset agreement can be seen from two different vantage points. The first one focuses on fulfillment of offset commitments, and the percentage of offsets actually achieved are criteria for success in offsets. [Farr 1992] The second view discusses success of the offset in terms of results. It could increase profits by making sales, and enhancing a firm's image or market position. It means balancing risks and benefits. We will discuss below the key factors for success relative to the recipients and suppliers.

Factors Related To The Buyers

When the buyer's government is interested in engaging a local firm in an offset program, there must be a local firm that is willing to make an investment and cooperate with the government's policy. Therefore, the desire to invest and the ambition to upgrade on the part of local firms are also important factors in the success of offset agreements. Both management experience and international offset experience are critical to success of international cooperative projects. [Farr 1992, Lecraw 1989]. If the buyer is not a potential competitor for the seller, the offset will probably be more successful because sellers would not be likely to share technology with nor buy products from a potential competitor. [Kremer, 1992] In addition, technical experience and capabilities of the buyer is one of the important success factors. [Weida 1996, Farr 1992, Francis 1987] Other factors related to the buyer are a stable political and economic environment and a good relationship with the seller's government. [Tien 2004, Verzariu 1985]

Factors Related to the Sellers

Most seller countries have offset policies that will generate more business opportunities in the world. The successful offset of the seller is related to use of a proactive strategy. [Weida 1996] The international experience of the seller is important to success in the offset agreement. [Verzariu 1985] Most researchers suggest that large producers are more likely to find success in offset agreements than are small companies. Prime contractors stand to gain more from offset deals because they can control more bargaining chips and can coerce subcontractors to assure part of the prime's offset obligations if they want to get the contract. [Weida 1996] Building an in-house team specializing in offsets rather than relying on outside sources is another factor for success in offset agreements. [Kremer 1992, Golden 1987] The next factors related to success are strong commitment and clear user support. [Farr 1992] The most important factor as we mentioned before is the support from top management in the seller's company. [Welt 1984] Without this support, it will be like wringing water

from a flint to achieve a practicable offset strategy. According to the above research, the authors have integrated the related factors in Table 1.

**Table 1. Offset Related Factors
Types of Players**

Buyer	Seller
Critical Factors for Success	Critical Factors for Success
International experience	Compatible goals
Offset experience	Proactive strategy
Not viewed as a competitor	In-house offset group
Technical experience	International experience
Sufficient financial resources	Offset experience
Stable environment	Large company
Willingness of local firms to cooperate	Support of top management
	Commitment to project

Offset Life Cycle Model

Offset requirements are an integral part of the process of request for proposal (RFP) [J. Alex Murray and Frank Horwitz, 1988]. The size of the offset obligation appears to be directly related to the degree of exclusiveness of technology used in the response to the RFP and the competition among the prime contractors. However, this is where shrewd negotiators test their capacity to reach practical arrangements. Because of the highly competitive characteristics of the defense market, it is imperative that management understand the offset process to build an optimum strategy which is part of the overall business plan for both seller and buyer. The offset specialty teams are composed of program managers, government officers, negotiators, financial experts, legal specialists, engineering personnel, users, and industries representatives. All offset team members must support the planning goals. The key person is the program manager who is responsible for the success or collapse of the offset program because he needs to coordinate and to integrate the opinions of different organizations and players in this competition game.

Phases of the Offset Life Cycle Model

Offsets are a complicated and dynamic program, and we have already surveyed offset goals, players, impact factors and teams. Now, we need to discuss the offset process. The authors have integrated the offset sequence of J. Alex Murray and Frank Horwitz (1988) into the weapon system acquisition life cycle concept from U.S. Department of Defense 5000.2 (2003) to develop “the offset life cycle model (TOLCM).” (See Figure 2.)

The offset life cycle is divided into four phases. Phase I is a preparation phase where offset players need to evaluate the seller’s and buyer’s capabilities and situations and then develop a proactive strategy. Phase II is a negotiation and decision process. According to the offset strategies created in phase I, the seller’s and buyer’s offset teams negotiate the offset agreement and then decide how to execute it. Phase III is the execution and audit phase. When both parties reach agreement, the arduous work begins. The buyer and seller will focus on how to smoothly fulfill the agreement and audit all processes to insure that they follow the agreed upon terms and conditions. The audit must

review the offset agreement to see if the desired results have been achieved. The last phase is to wind up the case brightly, or to touch on a lawsuit when one side cannot fulfill the offset agreements.

Phase I – Strategy Developing and Evaluation Stage

In this phase, the selling and buying governments follow their long-term national development plans to match economic missions, technology requirements, industries, and relationships with allies. When a government develops its offset policy, it needs an evaluation mechanism with a strategic-level view to decide which factors can affect the outcomes of the offset. In general, both buyer’s and seller’s governments evaluate the critical success factors in offsets by using policy, economic, capability and global environment viewpoints to map out their offset policy. In Table 2, we have integrated the results of previous research and constructed a framework for strategic evaluation of the offset proposal to be used at check point A in Figure 2.

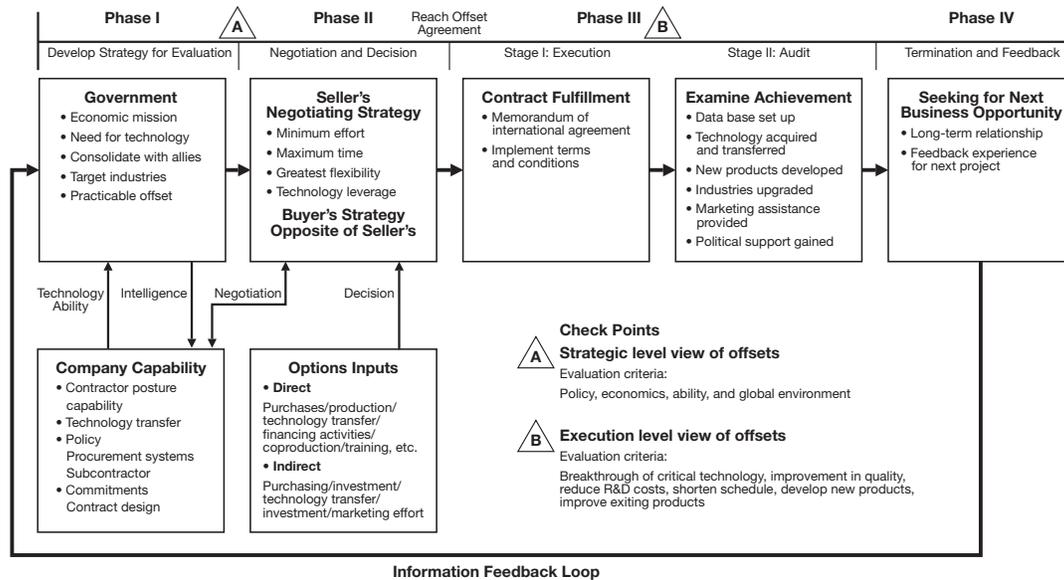


Figure 2. The Offset Life Cycle Model

Governments can use this framework to develop their own strategies. When the government has an explicit offset policy, it needs to be disseminated to companies. Another responsibility for the government is to provide the information about the partner countries or companies to contractors or local industries, which can then use this information to develop a company’s offset strategy. In the meanwhile, the company needs evaluate what kind of capability it has, such as technology capability, technology transfer policy, procurement system, subcontractor commitments, and contract design. However, the government’s offset policies are very much dependent on its own role in the process. For example, the U.S. government has a hands-off policy towards offsets. The U.S. government does not want to be involved too much in offsets, but in Taiwan the government wants to control and audit all offset processes.

Phase II – Negotiation and Decision

When the buyer and seller have developed an offset strategy in phase I, they will follow that logic to develop a negotiation strategy. A seller wants minimum effort, maximum time, the greatest flexibility, minimum technology transfer, and maximum credit multiples, which are the opposite of a buyer’s desires. Negotiation is a process, not an event, and it is used to resolve conflicts between parties. [Pia and Sorenson 2000] We argue that in purchasing projects involving offset negotiations

Table 2. Critical Factors for the Strategic Framework of Offset Execution

Aspect	Policy	Ability	Economy	Environment
Criteria	<ul style="list-style-type: none"> • Combine with national economic development • Degree of government support • Support of top management • Perfect laws and regulations • Proper government reward • Pressure of domestic industries • Legislature pressure • National security • Achievement of offset goals • Proactive strategy • Conflict between suppliers/recipient's policies and regulations 	<ul style="list-style-type: none"> • PM capability of in-house offset team • Formal offset organization/employee • Offset/International experience • Technological manpower capability • Industries' capabilities for absorbing high technology • Industrial competitive capability • Domestic industrialization level • International marketing capability • Difference of seller's and buyer's technological capability • Large company • Mature technology • Complex product • Independent military capability 	<ul style="list-style-type: none"> • Purchasing power • Economies of scale • Global economic situation • Sufficient financial resources • Large dollar value of target • Saving R and D expenditures • Prompting domestic economy • Promoting industry • Opportunity to add jobs 	<ul style="list-style-type: none"> • Stable political environment • Willingness and support by local industries • Buyer and seller formal relationship • Buyer and seller allied with strategy • Buyer and seller opposite international status • Pressure for cooperation on both sides • Not viewed as competitor • High autonomy

are inevitable when there is a difference in benefits to the seller and buyer. Obtaining the optimal benefit for the country is the final goal for government and industry in an offset project. Negotiation is essential to reach an agreement for the greatest benefit to the buyer's or seller's government. A negotiating position is derived from a thorough knowledge of the buyer's needs and motivations. The government of the buyer country can control access to the market under its jurisdiction to satisfy its needs. [Palia 1990] In the meanwhile, the companies of both the seller and buyer states need to negotiate with their related partners (see Figure 1) to decide whether to use direct or indirect offsets, or both, to fulfill the requirements and sign an offset agreement.

Phase III - Execution and Audit

Appropriate management is essential to the success of an offset project for both governments. In the execution and audit process, buyer and seller need to audit the process to obey the laws and regulations and record the procedure of the project which can satisfy all sides of the golden triangle of quality, price and delivery time [Trice 1990]. Efficiency is the quintessence of any kind of the project; if we need to evaluate the efficiency of project, we should have some standards and a methodology to compare progress against them. In the offset life cycle model, this phase belongs to the execution level. In order to review the efficiency of the offset project case by case, we set a check point (point B in Figure 2) to examine the project. In general, we used the data envelopment analysis method to identify input and output data to evaluate the effects of companies' implementation of offsets. Input factors are how many resources (including manpower, materials, and budget) companies need to put into the offset projects; in the meanwhile, output factors such as breakthroughs of critical technology, improving quality, reducing R&D costs and schedules, developing new products, or improving existing products are evaluation criteria at the execution level. We can use this method to check offset projects and identify whether finished cases were efficient or inefficient.

Phase IV - Termination and Feedback

We choose the efficient offset group in phase IV as the benchmark and feed back this information to the company and government so that the experience can be used to establish efficient criteria for selection of the most appropriate company for the next offset project. For a couple of years, the offset project is executed smoothly since all players join forces in this game. Both seller and buyer complete the offset case and prepare a pile of documents for the ending report. However, previous offset experience can show us some factors and rules for efficient selection, but the prime function is seeking future business opportunities.

Conclusion

This research belongs to systematic conceptual research and combines both seller and buyer conceptions. We reviewed advanced research of other scholars to refine the factors which determined successful offsets for seller and buyer. We know that the relationships between seller and buyer in an offset project are intricate. The program manager must take responsibility for integration of all the interactions of the offset players and their related requirements. We developed Figure 1 to illustrate the entire relationship of the players and flow of funds in the offset process. Offset projects are not a piece-by-piece process but should be a process concerned with the whole life cycle "from cradle to grave." We applied the life cycle concept to the offset process and created the offset life cycle model. [TOLCM] The TOLCM concisely describes the offset process from phase I to phase IV, and provides offset players concrete actions in each phase. In the meanwhile, we set the check points A and B in TOLCM where the strategy and performance can be audited and reviewed.

Offsets have become a well-established part of international arms trade. They will remain so well into the future. If technology is transferred at the right time, the gains will be greater than the losses [Weida 1996]. We conducted this research to provide a distinct process for mapping out usable offset procedures for both buyer and seller countries. Offsets must be examined not just as political

tactics in the global arms trade but as an opportunity to promote future business for the seller and a satisfactory exchange for the buyer. [Palia and Liesch 1997]. We do believe offsets should be a win-win policy.

References

- Bailey, Henri Louis. "A Model for the Evaluation of Offsets in International Arms Transfers." Ph.D. diss., St. Louis University, 1982, (AD-A121567)
- Farr, C. Michael. "Managing International Cooperative Projects: Rx for Success." In *Global Arms Production: Policy Dilemmas for the 1990s*, ed. Ethan B. Kapstein, 185-192. New York: University Press of America, 1992.
- Francis, Dick (1987), *The Countertrade Handbook*, Westport CT: Quorum Books. P.28
- Golden, L. Duke. "The International Offset Phenomenon in the Aerospace Industry." In *International Countertrade*, ed. Christopher M. Korth, 65-67. Westport, Connecticut: Quorum Books, 1987.
- Kremer, D. and B. Sain "Offsets in Weapon System Sales: A Case Study of the Korean Fighter Program." Master's thesis, Air Force Institute of Technology, 1992), (AD-A259680),
- Lecraw, Donald J. "The Management of Countertrade: Factors Influencing Success." *Journal of International Business Studies* 20 (1989):41-59.
- Murray, J. Alex and Frank Horwitz "Technology Offsets: Structuring a New Strategy for Industrial Benefits." *International Journal Technology Management* 3 (1988):431-432
- Neuman, Stephanie G.. "Coproduction, Barter, and Countertrade: Offsets in the International Arms Market." *Orbis* 29 (1985):183-209.
- Palia, Aspy P. "Countertrade Practices in Indonesia." *Industrial Marketing Management* 21 (1992): 273-279.
- Palia, Aspy P, "Countertrade Practices in Japan." *Industrial Marketing Management* 22. (1993): 125-132.
- Palia, Aspy P. and Oded Shenkar. "Countertrade Practices in China." *Industrial Marketing Management* 20 (1991): 57-65.
- Palia, Aspy P. and Peter W. Liesch. "Survey of Countertrade Practices in Australia." *Industrial Marketing Management* 26 (1997): 301-313.
- Pia, Christina and David S. Sorenson. *International Military Aerospace Collaboration: Case Studies in Domestic and Intergovernmental Politics*. Brookfield, Vermont: Ashgate Publishing, 2000.
- Tien, Mo-Chung and Ching-Chow Yang. "Taiwan's ICP Mechanism: A Review and a Stage Approach," *Technological Forecasting and Social Change* (2004):29-48.
- Trice, Robert H. (1990), "International Cooperation in Military Aircraft Programs." *The DISAM Journal of International Security Assistance Management* 12 (1989-90):69-76.
- U.S. Department of Commerce. "Offsets in Defense Trade." *The DISAM Journal of International Security Assistance Management* 25 (2003):66-86.
- U.S. Department of Commerce, Bureau of Export Administration, Office of Strategic Industries and Economic Security, Strategic Analysis Division. *Offsets in Defense Trade*. [Washington, D.C.] U.S. Department of Commerce, Bureau of Export Administration, 1996
- U.S. Department of Commerce, Bureau of Industry and Security. (2003), *Offsets in Defense Trade, Sixth Report to Congress*. P1-8.

U.S Department of Defense, Defense Institute of Security Assistance Management, *The Management of Security Assistance*. 15th ed. Wright-Patterson Air Force Base, Ohio, 1995.

U.S Department of Defense, Department of Defense Directive DOD5000.2, *Operation of the Defense Acquisition System Official Documentation*. 2003.

U.S. General Accounting Office. *Military Exports: Implementation of Recent Offset Legislation*. GAO/NSIAD-91-13. Washington: Government Printing Office, 1996.

Verzariu, Pompiliu. *Countertrade, Barter and Offsets: New Strategies for Profit in International Trade*. New York: McGraw-Hill Book Company, 1985.

Waller, Robert L. "The Use of Offsets in Foreign Military Sales." *Acquisition Review Quarterly Summer* (2003): 225-227.

Weida, William J. *Paying for Weapons: Politics and Economics of Countertrade and Offsets*. New York: Frost and Sullivan Press, 1996.

About the Authors

Dr. Chyan Yan received his Ph.D. in computer science from the University of Washington, Seattle. Between 1987 and 1992 he worked as an assistant professor in the Department of Electrical and Computer Engineering, U.S. Naval Postgraduate School at Monterey, California. From 1992 to 1995 he was with the Institute of Management Science, National Chiao-Tung University, Taiwan as an associate professor. He is currently a professor at the Institute of Business and Management in NCTU. He has been an IEEE senior member since 1992. Professor Yang has published more than 50 journal papers and 80 conference papers, mostly on the subject of decision sciences and information management.

Colonel Tsung-Cheng (James) Wang graduated from the U.S. Air Force Institute of Technology in 1996 with an M.S. in logistics management. He was a program manager at the Air Force Headquarters in Taiwan for the Indigenous Defense Fighter, F-16, and Mirage 2000-5 acquisition programs (including offset administration) between 1988 to 1999. From 1999 to 2000, he was system analysis officer for defense investment in office of Ministry of National Defense. In 2000 the Taiwanese government formulated a National Defense Law; he is one of the original designers of the Armament Bureau of Ministry of National Defense. Since 2001 he is has been chief instructor of the division of armament and acquisition management of National Defense Management College, National Defense University. Currently, he is a Ph.D. student at the Institute of Management Science, National Chiao-Tung University, Taiwan.