SAN FERNANDO VALLEY STATE COLLEGE

Trends in Marketing of
Defense Electronics Research and Development

A thesis submitted in partial satisfaction of the requirements
for the degree of Master of Science in
Business Administration

by

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The thesis of Horace Augustin Lindsay is approved

Committee Chairman

San Fernando Valley State College

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ABSTRACT

TRENDS IN MARKETING OF DEFENSE ELECTRONICS RESEARCH AND DEVELOPMENT

by

Horace Augustin Lindsay

Master of Science in Business Administration

The defense industry comprises a large portion of all industrial activities, and huge sums of money and other resources are spent in acquiring and sustaining defense business. The general subject of defense marketing has not as yet been adequately documented, and current operations and practices of defense marketing organizations are based largely on past experience rather than established principles. In this thesis is described the organization and methodology employed by the government in the procurement of defense electronic research and development. The impact of this environment on the defense-oriented company and the functions to be performed by the marketing organization for successful accomplishment of corporate objectives are also presented. In addition to providing a concise description of defense marketing and recent trends in the industry, an hypothesis is asserted and tested to show that the traditional marketing principles associated with product, planning, selling and pricing are important aspects of the defense marketer's job, and that the defense marketer is hampered in the performance of his functions by a general lack of formal training in business administration, and a strong engineering orientation in the defense industry.
CHAPTER I

HOW THE GOVERNMENT BUYS RESEARCH AND DEVELOPMENT

A. Introduction

The procurement of research and development systems and equipment by the Department of Defense is a complex activity involving high level policy decisions, congressional approvals, lengthy procurement cycles, and numerous technical, financial, and contracting agencies. It is the purpose of this chapter to describe briefly the procedures and techniques employed by the government in procuring a desired capability, and is to serve as a framework for a clearer understanding of the environment in which the defense marketer must function.

B. Procurement Organization

The Defense procurement organization\(^1\) is designed to satisfy three basic objectives: policy making, procurement implementation, and review. Figure 1 shows a functional procurement organization\(^2\) within the Department of Defense. The activities above the dashed line establish procurement policy and monitor procurement implementation to ascertain that policy objectives are satisfied. The activities below the dashed line are involved in the actual planning, purchasing and contract administration.

1. Policy Making: - Policy decisions are made at the Secretary of Defense and Chief of Staff level. Areas of policy making include:


FIGURE 1  Defense Procurement Organization (Naval Detailed)
a) Determination of which Service will be responsible for procuring specific items (e.g., tactical aircraft, tactical missiles, command control systems, communications system, etc.).

b) Assigning priority to major procurement activities (e.g., anti-missile systems, space vehicles, strategic aircraft, intelligence systems),

c) Budgeting allocations by Service and areas within each Service,

d) Planning, to acquire capability to satisfy established national objectives,

e) Establishing guide lines on methods of purchasing (i.e., competitive vs. non-competitive procurements),

f) Determining the type of contracts to be let in the procurement of select systems,

g) Establishing guidelines for program cost estimating, cost-effectiveness objectives, and government commitment to full production of a developed system.

2. Contract/Program Implementation: - Consistent with policy directives, general guidance and budget authorizations received from the office of the Secretary of Defense, programs for the acquisition of equipment and systems are implemented. The method, schedule, and phases associated with program implementation is referred to in this paper as "The procurement cycle" and is the topic of a following section.

3. Procurement Review: - Both pre-contract and post contract reviews are conducted. At the various purchasing offices, there are contract review boards that review all large or unusual awards (e.g., large dollar value, sole-source, other than low bidder). These boards are staffed by senior procurement personnel who are not directly involved in the particular "buy." Pre-contract reviews normally involve a facilities, personnel, and labor-rate survey, to determine the capability of a potential contractor. Post contract
reviews are intended to ascertain that the best interests of the government are maintained. They normally include a review of program management and performance, and an audit which concentrates on accounting and pricing aspects.

C. The Procurement Cycle

The government buys through a formal process based on Development of Defense guidelines relative to program planning, programming, budgeting and acquisition. The total acquisition period will depend on the type of system being procured, the anticipated cost and the level of priority associated with the procurement. The period normally ranges from two to five years. Procurements can be initiated and/or implemented in many ways; however, the following procedure is considered normal. Figure 2 shows a flow chart, prepared by the writer, which depicts in simplified form, a procurement cycle and some of the interrelationships which are involved. Based on the dictates of Armed Services Procurement Regulations and comments obtained from Air Force contracting personnel, the contract cycle chart shown in Figure 3, was likewise prepared.

1. The cycle usually starts by the "Using Command" (e.g., Air Force Tactical Air Command) establishing a requirement, for example an advanced radar system. This requirement is documented and forwarded to higher headquarters (i.e., Air Force Headquarters - Pentagon) for approval.

2. If approved, the requirement would then be forwarded to the appropriate procuring agency (i.e., Air Force Systems Command) for study, to determine, if the technology exists, the most efficient method of implementation, and the anticipated cost. Depending on the technological area, this

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As using command, Hq TAC establishes an operational requirement

Hq USAF coordinates requirement with using command

Hq AFSC determines feasibility of implementation and establishes a budgetary cost

Not feasible

Approval

Feasible

Not feasible

Disapproval

Hq USAF reviews program and cost estimates

Forwards (via Hq AFSC) Hq ESD performs preliminary engineering analysis and prepares Preliminary Technical Development Plan with cost refinements

Disapproval

Not funded

End (or start over)

Funded

Hq ESD commences procurement action, selects contractor, and provides contract direction

Hq USAF compares proposed budget to appropriation

DOD and Congress review total USAF budget and make appropriation

Regional Contract Administrative Service administers contract, monitors QA, and ensures security

FIGURE 2 Typical Air Force Oriented Procurement Cycle
Figure 3  TYPICAL AIR FORCE CONTRACT CYCLE  
(COMPETITIVE NEGOTIATED)
task may be relegated to a subordinate laboratory. For the hypothesized radar system, either the Electronic Systems Division or the Rome Air Development Center (both divisions of the Air Force Systems Command) would be assigned this task. If implementation of the requirement appears feasible, and it is within the bounds of current objectives, a preliminary program plan with cost estimates will be submitted to Air Force Headquarters for inclusion in the current or forthcoming fiscal budget.

3. At Air Force Headquarters, after much "horse trading," and compromising, the program as approved or modified is included in the proposed Air Force budget. Dependent upon actions and/or decisions by the Department of Defense and Congress, the program, if approved or retained as a part of the final budget allocation, is scheduled for implementation in a given fiscal year, or throughout a number of years.

4. With program funding approved, the procuring agency (e.g., Electronic Systems Division) prepares a statement of work as part of a request for proposal, and publicly announces its intention to procure a given capability. Potential bidders express interest in a procurement by submitting to the procuring agency, a statement of capabilities as they apply to the particular forthcoming procurement. The procuring agency then rules on their qualifications, and prepares a qualified bidders list. The requests for proposal are forwarded to these qualified bidders, who in turn prepare their technical, management, and price proposals for program implementation.

5. The procurement agency organizes a proposal evaluation team, composed of representatives from the user organization (e.g., Tactical Air Command) and their own electronic specialists. This evaluation team grades the submitted proposals on the basis of pre-established criteria and makes a "technical" (including management)
6. The price analysts carefully review the submitted price proposals, considering such factors as overhead rate, labor rates, general and administration rates, and profit. They likewise make a price proposal rating.

7. Two or more companies who receive high technical ratings, and submitted "lower" prices are called in for negotiations. The company which appears to offer the best product for a given price is selected for the award.

8. Following contract award, a project officer is assigned to monitor performance on the contract, and provide direction to the contractor.

9. During the proposal evaluation and contract period, the Defense Contract Administration Service in the contractor's region represents the procuring agency by performing such functions as: contract administration, quality assurance, production monitoring, data financial management, and insuring industrial security.

The above discussion and flow chart are very general in nature, but portray the complexity and organizational interaction in the procurement of an electronic system. The procurement of larger systems such as aircraft and ships are considerably more involved and depend to a larger degree upon political actions.

D. The Customer

Sal Divita in his article "Selling R&D to the Government" states that the customer is not easily identifiable. The customer may be the Air Force, the Navy, NASA, and so forth; or as such sub-elements of these organizations as the Electronics Systems Division or the Bureau of Weapons; or perhaps as the primes (e.g., Boeing, Lockheed, or General Dynamics). However, the customer for any given procurement is, in fact, many people in many different organizations. For example, buyers, contract administrators, project engineers, planners, financial analysts, users, and civilian

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4Ibid., p. 63.
executives -- all of these and more constitute the customer. Each of these has a say in almost every procurement action. Each represents a different organization, and in many cases each represents different, widely scattered facilities. For example:

Suppose the Air Force wants to buy a new airborne radar system for a new fighter aircraft. In this case, the Tactical Air Command at Langley Air Force Base, Virginia, may be involved as the using agency. The Aeronautical Systems Division in Dayton, Ohio, may be involved as the technical laboratory and as the procuring agency (or operating command). The Air Training Command, Randolph Air Force Base, Texas, may be involved from a training standpoint. The Air Force Logistics Command, Dayton, Ohio, may be involved from a logistics support standpoint. The Research and Technology Division, Bolling Air Force Base, outside Washington, D.C., may be involved from a technology standpoint.

Perhaps the Electronic Systems Division at Bedford, Massachusetts, may be involved from an electronic support standpoint. The Air Force Systems Command at Andrews Air Force Base, outside Washington, D.C., may be involved from a planning standpoint. The Air Staff at the Pentagon may be involved in connection with the approval and the establishment of the requirements. The Directorate of Defense Research and Engineering may be involved as the Department of Defense technical arm. On top of all this, the financial community throughout all these arms of the Air Force and the Department of Defense may be involved.

Although each of the Service agencies discussed above do have a specific charter relative to the procurement and development of the hypothetical airborne radar system or other equipment and services, the actual interactions between personnel and agencies will vary considerably dependent upon the type of procurement. However, based on several years of personal involvement and observation, the above example is considered to be typical. Furthermore, the skills represented by this spectrum of organizations are diverse, and the points of view of the individuals therein likewise differ. In addition to the complexity of the government customer, there is the fact that
prime contractors often perform the final phases of the R&D systems acquisition process for the ultimate government customer. Of course, when this happens, the structure of the government customer becomes many times more complex for the R&D electronic systems contractors. For example:

Suppose the Air Force decided to buy the airborne radar system from a prime contractor. In such a case, the electronic companies (and other subsystem contractors) would find it necessary to sell their capabilities at two levels: (1) the prime contractor level -- those airframe companies that plan to bid for the total airborne system; and (2) the government level -- those people who would pass judgment on the radar subsystem as a part of the total prime contractor's bid. Hence, the number of people who go to make up the customer is actually multiplied by the number of companies (primes) that show an interest in the procurement at hand.

The customer for R&D, therefore, is a complex organism. It is an organism that is tied together by highly formal relationships, as is typical in large organizations. In addition, its people are tied together by formal-informal relationships. These relationships are found between engineers and engineers, planners and planners, financial analysts and financial analysts, and so forth -- within agencies and within companies, between agencies and between companies, and between agencies and companies. The point stressed here is that many people are involved in deciding on a procurement, and each person may play a very special and distinct role. Some evaluate, some recommend, some review, some approve, and some decide. From the standpoint of marketing, it is important that each be recognized for his contribution to the procurement decision-making process.

E. Procurement Methods

The technique for procurement of goods and services by the government varies considerably dependent upon the type of goods or service, the dollar value, or the amount/quantity that is involved. However, there are essentially only two basic procurement methods, which are referred to as "formal advertising," and "negotiation."
As described below, formal advertising involves public announcement of the requirement and the method of solution. In contrast, the basis for procurement by negotiation is primarily the need for security surrounding the procurement and implementation of national defense programs in accordance with U.S. code, "Survey of Procurement Statistics." Therefore, within the Department of Defense, procurement by negotiation is the predominant means. For example, the Department of the Navy projects that an excess of 90% of all contracts let within fiscal year 1969 will be by negotiation. A description of the categories and applications of procurement by formal advertising and negotiation is presented below.

1. Formal Advertising: This form of procurement can be divided into two classes: conventional and two-step. The conditions under which conventional advertising can be used are as follows:
   (a) The equipment or service to be procured must be described in detail,
   (b) A fairly large number of bidders must be qualified and willing to bid for the award, and
   (c) The period for preparation of bids and the date of award announcement must be predetermined.

   The procedures used in conventional advertising are for the contracting agency to:
   (a) Prepare and publicize the request for proposal,
   (b) Open the submitted bids publicly,
   (c) Evaluate the bids as to their responsiveness and price,
   (d) Determine if the bidder is qualified to satisfy the requirement, and
   (e) Award the contract to the lowest priced qualified bidder whose bid is judged to be responsive.

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In two-step advertisement, the following procedures are followed:

a. A request for technical proposal is issued which includes:
   (i) A description of the requirement,
   (ii) The criteria for the technical proposal evaluation, and
   (iii) The final date of submittal.

b. After the technical proposals have been evaluated, the bidders who submitted acceptable technical proposals are requested to submit price proposals. Upon submittal of the price proposals, the remaining procedures are identical to those described above for conventional advertising.

2. Negotiation: Contracts are awarded on the basis of negotiation for various reasons. Some of these include circumstances when competitive bidding is not possible: the government must depend in part on the contractor to define the requirement; national defense is involved; or the requirement involves research, development, and/or experimentation. By definition, the vast majority of Department of Defense contracts fall into this category, and therefore defense electronic products accordingly.

The significant features surrounding negotiated contracts are that both the technical and price bids are kept secret, and a price and statement of work are negotiated with the selected contractor. This means that the government contracting officer examines the statement of work submitted by the bidder to determine if he is including any tasks or features which are not required by the government.

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He also examines the price proposal with the aim of detecting and eliminating any "fat" in the bidders submitted price.

3. Non-competitive Procurements: Non-competitive procurements normally involve one of the following situations: an unsolicited proposal, a technical and design competition, or a procurement which requires a high start-up cost.

a. Unsolicited Proposals: These are proposals for research or development which are made to the government by a prospective contractor without prior formal or informal solicitation from a purchasing activity. To receive preferential consideration, the unsolicited proposal must offer significant scientific or technological promise, represent original thinking, the results must be desired in a time frame which would preclude formal solicitation, and it must be submitted in confidence by one firm.

b. Technical and Design Competition: This type of award is competitive in nature, but is not strictly on the basis of price. This situation exists when technical superiority is a primary consideration in the selection of the successful bidder from among those submitting proposals in response to a government solicitation.

c. High Start-up Costs: The procurements of equipments and systems are often similar to or based on prior contractual efforts, which required the purchase or development of special tools and capabilities. These costs are sometimes borne by a particular bidder in anticipation of a future award. In such cases, the selection of a contractor other than the one already equipped to perform the desired function would be extremely costly and time consuming to the government.

8 Ibid.
F. Types of Negotiated Contracts

There are three basic types of negotiated contracts: fixed price, cost type, and letter contract.

1. Fixed Price Contract: - The term fixed price normally means that the bidder proposes to furnish specified goods and/or services within a particular period for a stipulated price. The bidder must establish his price such that it includes any risk or penalties which he may have to assume.

Fixed price contracts normally take three basic forms:

(a) Firm Fixed Price: No possibility to expand in scope or to increase cost to government. If the contractor can perform the job at a much lower cost than contracted for, the unexpended funds can be retained as profit. However, if the scope of the effort is misjudged and funds are expended in excess of contract authorization, even on essential tasks, the contractor must absorb these costs as an operations loss.

(b) Firm Fixed Price with escalation: When serious doubt exists as to the stability of market and labor conditions during an extended period, such contingencies, if identifiable, can be covered by escalation. This provides for upward and downward revision of the negotiated price thereby reducing the risk to the contractor.

(c) Fixed Price Incentive: This form of contract provides for an adjustment of profit and the computation of the final contract price by means of a formula based on the ratio of the final negotiated cost to the total target cost. It provides a profit incentive to a contractor to reduce performance costs, but also provides a profit sharing formula under which both the government

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and the contractor share in such reduction and conversely, share in the burden of increased performance costs.

2. Cost Type Contracts: There are three types of cost type contracts: reimbursement, cost plus fixed fee, and cost plus incentive fee.

(a) Reimbursement: This type of contract establishes estimates of total cost for the purpose of obligating 11 funds and for the purpose of establishing ceilings which the contractor may not exceed at his own risk without prior approval of the contracting officer. This form of contracting is used when the uncertainties of performance are such that costs cannot be estimated with enough accuracy to permit the use of a fixed-price contract.

(b) Cost Plus Fixed Fee: In this form of contracting, the bidder estimates the cost of the program and based on a predetermined profit (fee) rate structure computes the fixed fee which he expects to receive upon completion of the contract. Should the program cost actually exceed the estimate, the government will normally pay the additional cost (direct and indirect), but the contractor will not receive a higher fee (proportionate to the higher cost).

(c) Cost Plus Incentive Fee: This type of contract is similar to the cost plus fixed fee with the following differences:

a. If the contractor can reduce costs, improve product quality or delivery schedule in comparison to the negotiated contract, the government agrees to increase the contractor’s profit rate in accordance with pre-established criteria, and

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b. The contractor is normally penalized (reduced profit) should actual cost, quality or schedule be less favorable to the government than the basis on which the contract was negotiated.

3. Letter Contract: - A letter contract is a preliminary contract which is to be replaced and/or superceded at a later date by a definitive and comprehensive contract. It authorizes the immediate commencement of program tasks. Since a letter contract authorizes performance before many areas of the contract are negotiated, its use is authorized only when no other type of contract is suitable, and then only when it is necessary to the national defense to give the contractor a binding commitment to start performance, or there is not enough time to negotiate a definitive contract.

4. Contract Distribution and Profitability: - Figure 4 shows the number, cost and profit for various fixed price and cost-type contracts completed in the fiscal years 1959 to 1968. It is based on a sampling of 65 defense producers. They included a mix of very large producers (sales of over $200 million per year), medium size producers (sales of $25 million to $200 million) and smaller producers (sales of less than $25 million). The contracts covered were large negotiated ones susceptible to cost and price analysis. Negotiated firm fixed price and formally advertised contracts are not included in the analysis. However, from the data presented it appears that the cost type contracts are less profitable.

G. New Procurement Techniques

During the "McNamara years", the Department developed and instituted new procurement techniques with the objective of achieving

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($ Amounts in Millions)

<table>
<thead>
<tr>
<th>Department and Type of Contract</th>
<th>AWARDED BEFORE JAN 1964</th>
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<tr>
<td></td>
<td>Initially Negotiated</td>
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**FIGURE 4**

NUMBER, COST, AND PROFIT FOR VARIOUS FIXED PRICE AND COST-TYPE CONTRACTS*

a higher level of cost-effectiveness. The techniques which are considered most important as they apply to electronic systems are:

- Multi-year Procurement
- Life Cycle Costs
- Total Package Procurement

1. Multi-year Procurement: - When requirements are well defined and the goods and/or Services must be produced or will be required over a number of years, a single contract covering the entire period of performance is preferred by the government. Multi-year procurement offers the government the advantages of:
   a. Lower costs (compared to several short contracts),
   b. A stabilized contractor work force,
   c. Reduced procurement lead time, and
   d. Increased standardization.

It does, however, have the disadvantages of precluding the reprogramming of funds to another effort (should this be desired at a later time), and contractors are normally reluctant to accept this type of contract due to unpredictable rising costs.

2. Life Cycle Costing: - This involves making contract decisions on the basis of total cost of ownership and not solely on the basis of the lowest bid. Cost of ownership includes: initial purchase price, operation, maintenance and system life. Although this is a very meaningful evaluation criteria, it is often costly and adequate future logistic factors are not always readily available.

3. Total Package Procurement: - This involves the negotiation of a contract at the outset of the acquisition phase for the development, production, and selected support of a particular system. Support may include training, spare parts, maintenance and support equipment, as well as contractor technical services for the useful system lifespan.
CHAPTER II

I. DEFENSE MARKETING

A. CHARACTERISTICS AND TRENDS

1. Characteristics of the Defense Market

The defense market is not primarily regulated by simple, direct supply demand relationships of the type that normally govern commercial markets. Instead, the federal budget process determines both the magnitude and composition of military purchases. Another characteristic which distinguishes the defense market is that it is essentially monopolistic. By the process of "creating" competition to compete for defense business, and selecting the desired contractors for system acquisition purchases, the government controls the entry into and exit from the market, and thusly determines the growth or decline of individual firms. Through contract negotiation, the government, in effect, imposes its ways of doing business on the supplier which includes the specification of various internal operating policies and procedures which are to be adhered to. The recent fair employment practice requirement placed on all government contractors is one example of this type of control.

The military market for electronics systems (e.g., radios, radars, computers, etc.) is characterized by production which is undertaken after the order\(^\text{14}\) is received. Inventory equipment are normally small in cost, and normally subsystem items such as mechanical parts, cables, electronic devices, etc. The reason\(^\text{15}\) for this approach is that individual military requirements tend to be special purpose rather than general purpose, the high cost of R&D, and a short product life cycle due to rapid technological advancement.

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However, in most cases, especially when a particular development is complex, costly, and/or essential to national defense, the government will financially sponsor the research and development effort.

The defense market has relatively simple channels of distribution. The manufacturer normally sells to or contracts with a procuring agency (e.g., Electronic Systems Division) and delivers to the final customer (e.g., Hq., Tactical Air Command). However, to the extent that on occasion the goods may flow from the firm to a military depot, to base supply stations, then to the actual user, it is analogous to the flow from manufacturer to wholesaler, to retailer and to the final customer in the private economy. The major difference is that the military contractor is not normally concerned with the distribution channel, after the equipment is "sold off" or accepted by the depot. However, subcontractors and/or military equipment suppliers often do have channels of distribution in that for relatively stable (technologically) items for which there is a geographically wide demand, manufacturer's representatives and distributors are used as outlets for their equipment.

2. Defense Market Trends

Of major importance to planning the role and activities of a marketing organization is the identification of current trends in the market and their predictive value for future situations. To obtain a sample opinion of defense marketing trends, and the anticipated impact, the marketing/sales personnel, identified in Appendix A, were interviewed. Although the trends which they identified and the indicators cited as evidence of their opinions were highly inter-related, I was amazed to note how similar were their descriptions, and in some cases they were practically identical in form of expression. These men collectively represented approximately 250 years of total experience in the defense industry, and I must presume that within their professional community, their views are in essence "matters of fact" which they include in their planning activities. Attempting to synthesize their comments into discreetly

\[16\] Weindenbaum, loc. cit.
Figure 5
Recent Trend in Expenditures for Exploratory Development*

Figure 6
Relationship of Research and Development To Total Defense Expenditures*

separate entities, six specific trends are identified, although a high
degree of interrelationship still exists. These six trends are:

(a) A reduction in defense research and development
spending,
(b) An increase in the competition for defense funds,
(c) A more cautious and frugal attitude by government in
the development of new systems,
(d) A greater consideration of regional economics in
defense spending,
(e) The diversification of defense contractors into
commercial areas, and
(f) An increasing defense industry emphasis on the
marketing functions.

I should also point out that these expressed opinions have a very
high correlation to those trends identified by Charles Hamman17
in his article on "The Defense Research and Development Market." Since
that article was written in December 1964, it is evident that
these trends have been continuing for some time.

The first trend which I will identify is the slowing of the growth
rate of defense research and development. The growth reduction is
not related to the defense budget which steadily grows, but a tend-
ency on the part of the government to continue to produce tried and
established products and cut back on expenditures for exploratory
investigation and developments.

Figure 5 shows the slowing trend18 in exploratory development
expenditures for the past few years, and Figure 6, based on a study19
carried out by the Bunker-Ramo Corporation and a published

17 Charles L. Hamman, "The Defense Research and Development
Market," an article in Reflections on Progress in Marketing, ed.
L. George Smith (Chicago: American Marketing Association,
1965), p. 56.
18 United States Department of Defense, Defense Industry Bulletin,
19 Penetration and Future in the Other Than Market, A Report Pre-
pared by the Bunker-Ramo Corporation, Defense Systems Div-
Department of Defense Financial Summary,\textsuperscript{20} shows the relationship between research and development expenditures to the total Defense budget. In the area of electronics, a similar leveling off trend\textsuperscript{21} is shown in Figure 7 for the years 1965-1967. This is not to imply that the state-of-the-art is not being continually pressed in numerous frontiers, but that there is a higher degree of selectivity in choosing those programs with a higher probability of success. Of the government expenditures in research and development, the Department of Defense accounts for about half of the total. This is a substantially smaller percentage\textsuperscript{22} than applied a decade ago. For instance, in 1954, the Department of Defense accounted for 79\% of all Federal Government research and development, while in 1965 the percentage was 47\%. Table I shows budget expenditures for research and development for the period 1954-1966 as extracted from the Bunker-Ramo Corporation study. Coupled to the inflationary trend in the value of money, it becomes apparent that the capacity developed to perform research and development activity must be stabilized or even cut back from the exponential growth which has occurred up till recently. This is evidenced by the total Defense employment levels\textsuperscript{23} shown in Figure 8.

The second trend, which is a natural sequel to the discussion above, is that toward more severe competition due to the increasing number of people that the industry currently supports. When the demand for research and development services began to build up

\begin{itemize}
  \item Hamman, \textit{op. cit.}, p. 845.
\end{itemize}
Figure 7

Relationship of Defense Electronic Research and Development to Total Defense Electronic Expenditures*

Figure 8

Levels of Defense Employment, 1965 to 1968*

### TABLE I

**BUDGET EXPENDITURES FOR RESEARCH AND DEVELOPMENT**

1954 THROUGH 1966 (DOLLARS IN MILLIONS) *

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Department of Defense</th>
<th>NASA</th>
<th>AEC</th>
<th>D/HEW</th>
<th>NSF</th>
<th>Other</th>
<th>Total</th>
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</thead>
<tbody>
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<td>1954</td>
<td>2,487</td>
<td>90</td>
<td>383</td>
<td>63</td>
<td>4</td>
<td>121</td>
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<tr>
<td>1955</td>
<td>2,630</td>
<td>74</td>
<td>385</td>
<td>70</td>
<td>9</td>
<td>140</td>
<td>3,308</td>
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<tr>
<td>1956</td>
<td>2,639</td>
<td>71</td>
<td>474</td>
<td>86</td>
<td>15</td>
<td>161</td>
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</tr>
<tr>
<td>1957</td>
<td>3,371</td>
<td>76</td>
<td>657</td>
<td>144</td>
<td>31</td>
<td>183</td>
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<tr>
<td>1958</td>
<td>3,664</td>
<td>89</td>
<td>804</td>
<td>180</td>
<td>33</td>
<td>220</td>
<td>4,990</td>
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<tr>
<td>1959</td>
<td>4,183</td>
<td>145</td>
<td>877</td>
<td>253</td>
<td>51</td>
<td>293</td>
<td>5,803</td>
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<tr>
<td>1960</td>
<td>5,654</td>
<td>401</td>
<td>986</td>
<td>324</td>
<td>58</td>
<td>315</td>
<td>7,738</td>
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<tr>
<td>1961</td>
<td>6,618</td>
<td>744</td>
<td>1,111</td>
<td>374</td>
<td>77</td>
<td>356</td>
<td>9,278</td>
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<tr>
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<td>6,812</td>
<td>1,251</td>
<td>1,251</td>
<td>512</td>
<td>105</td>
<td>409</td>
<td>10,373</td>
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<td>1963</td>
<td>6,849</td>
<td>2,540</td>
<td>1,335</td>
<td>632</td>
<td>142</td>
<td>490</td>
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<td>1964</td>
<td>7,516</td>
<td>4,171</td>
<td>1,503</td>
<td>791</td>
<td>197</td>
<td>496</td>
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<tr>
<td>1965</td>
<td>7,222</td>
<td>4,900</td>
<td>1,569</td>
<td>801</td>
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<tr>
<td>1966</td>
<td>6,880</td>
<td>5,100</td>
<td>1,557</td>
<td>936</td>
<td>266</td>
<td>706</td>
<td>15,445</td>
</tr>
</tbody>
</table>

after World War II, the capability\textsuperscript{24} in the nation as a whole was relatively quite small. However, in response to this continually increasing demand, many new firms were started and existing organizations expanded to take advantage of this demand. The development of the capability which was sought by these varied organizations required time. In these early years, the capability lagged the demand, but by early in the 1960's the exponentially increasing demand\textsuperscript{25} began to level off. With the supply equaling, and in some cases surpassing the demand, whereas the government used to make numerous "sole-source" contract awards, it became common practice to publicize forthcoming requests for proposal and encourage a high level of competitive bidding. This competition has become so keen in recent years that for major select programs, which are actually few and far between, the total cost\textsuperscript{26} spent by various firms in preparing competitive bids, may actually exceed the dollar value of the actual contract award. It has been my observation that companies will use the technique of spending funds in excess of the anticipated program profit just to obtain the direct dollar "base" and "generated overhead" to maintain their current work force. Other competitive tactics are to deliberately bid below cost for a program, with the hope that through a later program change in scope, the initial losses may be recovered when they are no longer in a competitive position.

There appears to be no apparent solution to this situation short of increased spending on the part of the government, or a reduction of the number of firms in the industry.

Another trend is toward more carefully conceived programs with objectives and probable results being well defined. In the booming years of the late 1950's and early 1960's when new and improved techniques were being frantically sought, many firms were funded to perform parallel efforts with the hope that one or more would prove to be useful. These programs were negotiated on a

\textsuperscript{24} Hamman, \textit{op. cit.}, p. 847.

\textsuperscript{25} Ibid.

\textsuperscript{26} Ibid.
cost-type contract basis, which in essence guaranteed payment of whatever funds the firm expended on the project. Such parallel activity has been considerably curtailed in recent years and further reductions are anticipated in the future. In addition, pressures placed on the defense industry by Charles Hitch, Assistant Secretary of Defense under McNamara for more careful cost estimating, has resulted in even some large, pseudo-developmental programs to be bid on a fixed price basis. Cost type contracts are now quite rare, and to a large degree are now relatively unwarranted. Before development efforts of any magnitude are now permitted to commence, the particular area is studied "to death." In many cases these studies are performed "in house" at company expense. When studies or contract definition phases are funded by the government, they are usually conducted on a fixed price basis, and, since there is normally a competitive bid for the study, it is normally performed at minimal cost to the government. For major programs where a formalized contract definition phase is conducted prior to system acquisition, the government tends to get even greater value for their money. For example, the formal contract definition phase may last for six months, however, the two or three companies who may be competing for the following award are "expected" to continue working and furnishing the government with additional information for an extended period of up to 15 months, while they are determining which contractor to select, or are attempting to "dig up" the required program funding.

Government research and development has considered social and economic implications, for the impact of these expenditures on a regional economy are significant. Current expenditures have had a high geographic concentration in New England, California, and Texas, to name a few. Representatives from other areas have been actively emphasizing this fact in discussions with members of both


28 Campbell, loc. cit.
the legislative and executive branches of the government. Every
country has both its progressive and depressed areas. However,
the balance tends to be "tilted" in accordance with the areas where
defense spending is concentrated. The tendency to use the economic
power of the government through contracting, to reduce the degree
of difference between the areas with high economic growth rates
and those which are depressed, is becoming more evident. Tables
II and III show the gradual shift in defense expenditures by state. 30
In the future this trend is expected to result in programs of action
which will significantly affect the newly established major market
locations for defense research and development, and more equitably
distribute the industrial development "base" throughout the United
States.

These changes in the highly technical research and develop-
ment capability in the United States, presents a challenge to
corporate planners and defense marketers. They are faced with the
problem of cutting back on their capability or finding new areas in
which to apply their surplus. Many companies have branched out
into the commercial markets (e.g., medical electronics, police
force management, and aircraft navigation and control). Both the
federal and local state governments are encouraging this trend
because it is recognized that the technology developed for the
military can, in many cases, be applied meaningfully to commercial
as well as individual pursuits. Supporting this trend is the fact that
significant commercial developments are continually being derived
from vast military research and development expenditures. Prin-
ary among these are the supersonic transport (based on the B-70
design) and the fast deployment logistic ship, which is to have an
atomic power plant similar to those used in nuclear submarines and
aircraft carriers.

29Hamman, op. cit., pp. 848-849.
30United States Department of Defense, Defense Industry Bulletin,
1968), p. 32.
31Dean, op. cit., p. 465.
### TABLE II
Department of Defense Prime Contract Awards by State*

**Net Value of Military Procurement Actions by Fiscal Year**

**FISCAL YEARS 1965, 1966 AND 1967**

(Amounts in Thousands)

<table>
<thead>
<tr>
<th>STATE</th>
<th>Fiscal Year 1965</th>
<th>Fiscal Year 1966</th>
<th>Fiscal Year 1967</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Amount</td>
<td>Percent</td>
<td>Amount</td>
</tr>
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<td><strong>TOTAL U.S.</strong></td>
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<td><strong>3,363,052</strong></td>
<td><strong>25,713,061</strong></td>
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<td><strong>STATE TOTALS</strong></td>
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<td></td>
<td></td>
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<td>100.0</td>
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<td>281,596</td>
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<td>74,175</td>
<td>0.3</td>
<td>71,666</td>
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<td>175,467</td>
<td>0.8</td>
<td>248,228</td>
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<td>95,701</td>
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<td>48,151</td>
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<td>255,893</td>
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<td>2,051,560</td>
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<td>919,779</td>
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<td>604,925</td>
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<td>312,829</td>
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<td>11,112</td>
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## TABLE III
Department of Defense
Prime Contract Awards by State*

Net Value of Military Procurement Actions by Department

FISCAL YEAR 1968

(Amounts in Thousands)

<table>
<thead>
<tr>
<th>STATE</th>
<th>TOTAL, U.S.</th>
<th>NOT DISTRIBUTED BY STATE</th>
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<td>$4,831,597</td>
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</table>

<table>
<thead>
<tr>
<th>STATE</th>
<th>Amount</th>
<th>Percent</th>
</tr>
</thead>
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<td>Arkansas</td>
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<td>Wisconsin</td>
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<tr>
<td>Wyoming</td>
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Of primary importance to the defense marketer, is the fact that his true role has been little understood or appreciated. In the 1950's when the government placed its demands directly on industry, there was little apparent need for a marketing organization. It was not until the industry entered a period of over-capacity that companies began to establish marketing programs for military research and development. Since then, military marketing has struggled for identity and purpose. The government on the one hand suggests that marketing is an extra expense that ought to be abolished, and industry on the other hand has in part ignored the problem, because of a general lack of understanding.

It is the writer's opinion that the increasing competition for available defense funds should certainly place greater emphasis on the need for marketing, and that in the forthcoming years, the senior marketing executive and his staff will be far more influential in the decision making mechanism of the defense oriented corporation than he currently is today.

B. HYPOTHESIS AND CRITERIA FOR TESTING

Up to this point in this thesis is presented a summary of how the government buys research and development and the associated characteristics and trends of the defense market. At this point, the author will state the following hypothesis:

In the competition for defense electronic systems, the successful defense marketer must effectively apply the traditional marketing principles associated with product planning, establishing strategy, selling and pricing. He is, however, hampered in the performance of his functions because of a general lack of "formal" training in business administration, and a strong engineering

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34 Ibid.
orientation in the defense industry.

The remainder of this thesis will be devoted to presenting the necessary information and arguments which are required to test the hypothesis. This will be based on published literature and interviews with both engineering and marketing executives in the following defense electronic firms: Litton Industries - Data Systems Division, Electronic Communications, Inc. - St. Petersburg Division, International Telephone and Telegraph - Federal Systems Division, Honeywell, Incorporated - Systems and Research Division, Hydrospace Research Corporation - San Diego Division, International Business Machines, Inc. - Los Angeles, and Bunker-Ramo Corporation - Defense Systems Division.

The contacts within the above companies were made on a personal and informal basis, because the information desired was considered to be of a proprietary nature. The information sought and areas of discussion pertained to market intelligence, market planning, proposal formulation, customer relations and contract negotiations. The essence of these discussions are presented in Section C below, "The Defense Marketing Role."

C. THE DEFENSE MARKETING ROLE

1. Introduction

It is important to be able to think conceptually about the marketing role, and its adaptation as a function of varying circumstances. As such, a summarization of previous statements regarding the dominant factors in the defense industry are listed below as a review:

a. The oligopolistic nature of supply and the monopsonistic nature of demand,
b. The controlled and regulated business environment,
c. The heavy imbalance of the power structure,
d. The current and increasing complexity of the desired product, and
e. The lack of product inventory.
These and other factors (discussed in Chapter I) are the environmental elements of a defense company, to which it must adapt if it is to be an effective participant in the industry. An analysis of this environment suggests that certain basic functions must be performed by the defense marketing organization. These must include market intelligence gathering, market planning, proposal formulation, customer relations, and an effective procedure in contract negotiation. 35

2. Market Intelligence

Market intelligence is information of a technical or general nature which contributes to improvement of a company's competitive position. 36 It is derived from an analysis of customer requirements, planning information, procurement contracts, budget statistics, political contacts, and competitive moves. It becomes the basis for company planning and strategy and is critical to maintaining a leadership position in the industry. Contract awards are highly correlated with early identification and proposed solutions for particular requirements. To be effective, the market intelligence function within the marketing organization, should be well defined, its objectives specified, and a formalized reporting procedure established.

Each of the firm's representatives interviewed recognized the value of marketing intelligence and place considerable reliance on it.

Customer Requirements: A customer may be defined as an agency or individual (military or civilian employee of the department of defense) who has an approved requirement and the authorization to take action to procure a capability to satisfy that requirement. Each of the firms contacted have marketing offices


staffed with personnel who are to maintain close coordination with agencies which establish requirements or are in the approval and/or procurement "cycle" for acquisition of electronic systems. The size of the field office marketing staff will depend on the company size, number of areas of interest and/or emphasis in the particular market area handled by a particular government agency. Regardless of the extensiveness of customer "coverage," the basic functions of these personnel are to establish a sufficiently good rapport with the key people involved, that they (the field office representatives) will be informed of major developments. This information is fed back into the home organization for evaluation and dissemination. Initial reports normally generate requests for additional and more detailed information. As a result of the complex nature of the customer, as discussed in Chapter I, requests for information are often simultaneously placed with several field office locations. This often facilitates the correlation and validation of reported information.

**Congressional Hearings:** Many multi-million dollar and/or controversial military programs are often reviewed by Congress. The statements and position taken by the committee members involved, often provide a good indication of the future disposition of the program. Except for highly classified programs, the proceedings of such hearings are accessible to the public in the form of Congressional Hearing Reports, and the larger firms will obtain their own copies for not only market intelligence, but also political and contractual tendencies.

**Military Contracts:** Being under contract to the government can be the most direct vehicle for obtaining marketing intelligence, and perhaps the shortest "route" for intelligence exploitation. It is considered reasonable that a firm under contract to the government should be granted a privileged need-to-know in specific areas which will permit a more cost-effective contractual performance. This information normally provides insight into what other firms are doing and government plans for future procurements. Under the appropriate circumstances the government will modify an existing
contract to add other tasks. This is desirable because it saves the
time and effort associated with a competitive procurement. Many
firms make it a policy, practically from the date of contract award,
to strive towards having the scope, duration and funding of their
contracts increased.  

Government Statistical Data: The Department of Defense pub­
lishes the defense budget which it presents to Congress for approval.
This budget is normally broken down by service and functional area
(e.g., aircraft, electronics, etc.). Backing up this information
are detailed listings of individual programs which comprise the
budget. This information which can be obtained through the Govern­
ment Printing Office in Washington, D. C. provides an insight into
at least which programs are recommended. This listing is in no
way infallible as it is subject to congressional cuts, and overspent
on-going programs and emergency requirements will usurp funds
from other budgeted programs. In addition, for effective planning
purposes, the government budgets for capability attainment on a
five-year basis. This five-year documentation is a valuable basis
for corporate planning of a long term nature.

Commercial Publications: There are a large number of maga­
zines, newsletters, and services which profess to provide market
intelligence of one type or another. The title and publishers of
these publications include: Aviation Week - McGraw Hill Publica­
tions, Armed Forces Management - American Business Press,
Inc., Datamation - F. D. Thompson Publications, Army -
Association of the United States Army, etc. They often have an
uncanny reputation for publishing factual and up to the minute
information long before it is officially announced. All of the com­
panies interviewed subscribe to such periodicals. This does not
include individual subscriptions, but issues which are held as
reference material in the company library. Most companies leave

37 Federal Contracts Report No. 266 (Summary), a report pre­
pared by The Bureau of National Affairs, Inc. (Washington: The
it to the initiative of individual employees to glean meaningful
information from their pages. However, at least two firms admit
that the review of these trade journals is an active part of their
market intelligence and research effort.

2. Market Planning

Market planning is performed to define and update the corpor-
ate marketing goals and the means of their accomplishment. It is
normally based quite heavily on marketing intelligence, and is the
vehicle to determination of the strategies and other variables to be
considered in achieving stated objectives.

Although the defense market in many areas is too dynamic and
unpredictable to make long range planning a meaningful effort, and
the best opportunity may be to "track" and bid for individual pro-
grams (which normally have a one year lead time) as they come
along, it is recognized that long range planning is essential for
product development and the establishment of goals and objectives.
The defense firms such as International Business Machines which
plan and develop on a long range basis take many risks, and when
"payoffs" occur they are normally substantial. Another benefit is
that employees see a fixed objective and are not perturbed by
diversive reactionary moves. The more reactive firms tend to be
smaller and cannot afford the capital investments and the staff which
is required to support major planning of research and development
activity. However, in times of war when many requirements are
granted immediate priority, this type of activity can be very pro-
fitable. In addition, short-term contracts can turn into long-
term contracts and high volume product lines can result (e.g.,
light weight tactical radio, or battle field television.) All of the
companies contacted have some form of market planning or
research organization, and at some time or another have used con-
sultants as required to lecture or provide guidance on specific
market trends. The use of consultants is of particular value when

38

Martín Meyerson, "Price of Admission into the Defense
pp. 111-116.
a new product is being considered or an acquisition contemplated.\(^{39}\)

Each firm has some mechanism for forecasting bookings and sales for a given calendar/fiscal year. This mechanism varies from an anticipated growth or decline expectancy to an enumeration of programs to be pursued and won by name, with a reasonable number of alternates in case of program cancellation or unpredictable loss to a competitor. This forecast becomes the basis for "overhead" determination, manpower requirements, and financial planning. It is updated periodically consistent with new marketing intelligence, the degree of complexity or the dynamic nature of the particular area of business.

4. Proposal Formulation

Proposal formulation is the advertising arm of the defense industry. It is the media through which the customer is made formally aware of the proposed product or service. Within the industrial firm, the marketing organization is assigned the responsibility for identifying the potential customer, exposing him to the capabilities and products of the company, and establishing the strategy which will influence the potential customer to consider the particular firm as a credible source of desired capability. In the procurement of research and development systems, as opposed to "off the shelf" equipment, the customer requires a yard stick by which to determine the selection of one company over another for contract award. The normal procedure is to prepare and issue a request for proposal with an associated "statement of work" (which specifies the characteristics and capabilities of the desired system). The solicited firms which are desirous of competing for the contract will prepare documentation which specifies their approach and method of implementing the required system, how they plan to manage the program, and the price quotation. This documentation is referred to as the proposal and is prepared in three basic sections.\(^{40}\)


The technical section - which presents the technical, operational and procedural solution to the problem,

The management section - which presents the program organization, schedule, personnel, and related experience; and

The price section - which identifies the man-loading of the tasks by category, labor costs, material costs, and anticipated profit.

In summary, the proposal is first, last and always, a selling document, and in many cases is the basic means by which industrial firms derive their income.

A basic goal of the marketing intelligence function is to obtain information which will enhance a company's competitive position and facilitate the preparation of a more responsive proposal. All of the contacted firms agreed that this function, above all others, is expected of the marketing organization by the corporate management and is a continuous activity. It is the marketing responsibility to ascertain that the customer is fully aware of his company's capability and interests in a particular procurement and establish a rapport and working relationship with the customer prior to release of the request for proposal. Other demands often made on the marketing organization include advance information on details of the statement of work, and the funds which are available to purchase the system. As the marketing responsibility also includes meeting the goals in the "forecast," the marketer must evaluate proposal opportunities against resources, making judgments based on volume, nature of business, return on investment, etc. The marketing role also includes establishment of the costs which are to be expended for any given proposal being ever mindful of limited resources and alternate opportunities.

It is the marketing organization which should establish the

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41 William S. Tilghman, "So Your Title is Proposal Manager," Data Magazine, X (March 1965), p. 15.
42 Kennedy, loc. cit.
strategy to be used in a proposal. This includes whether it should be fully compliant, austere, over-responsive (more than asked for), what areas are to be stressed, and whether or not alternate proposals are to be submitted. Pricing strategy is likewise a marketing responsibility, only deferring to the general manager on financial risks which may be necessary on extremely low bids. This pricing responsibility includes reviewing engineering estimates for job completion, and establishing overhead, general and administrative and profit rates (within the bounds of legal limits).

Several companies did point out, however, and I consider it worthy of note; that early customer contact is not always essential in a competitive award. "After all," as the Honeywell company representative was quick to state, "the only legal basis for a competitive award is supposed to be the proposal document, and that must be the basis for recommendation."

Advertising is likewise a marketing responsibility in the defense firm and is a method of exposing a company's capabilities to a potential customer and establishing image. Advertising is normally directed to a limited audience and as such the bulk of the advertising effort is through prepared technical brochures and advertisements in select trade journals. The larger companies that are very hardware oriented, such as International Telephone and Telegraph, International Business Machines, and Litton Industries, also advertise by establishing hardware exhibits in association with trade conferences. The percent of total sales allotted to advertising ranged from 0.2% to 1.3%. The expenditure ratio was highly related to company size with Bunker-Ramo at 0.2%, and International Business Machines at about 1.3%. The distribution by channel of promotion does vary as a function of the individual product lines and status of sales, however, the breakout shown in Table IV for the Bunker-Ramo Corporation is considered to be exemplary. It should be noted that sales in 1968 were $50 million and the advertising budget $126,446, as opposed to an estimated budget of $144,170 for 1969 whereas sales are estimated to be about $32 million.
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<td>Media Advertising</td>
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<td>Space (Trade Journals)</td>
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<td>Production</td>
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<td>(a) In-House art &amp; photo</td>
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<td></td>
<td>(b) Vendor: Design, Plates</td>
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<td>Trade Shows &amp; Exhibits</td>
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<td>B.</td>
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<td>C.</td>
<td>Display design &amp; set-up (art &amp; photo)</td>
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<td>Sub-Total</td>
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<td>*Held in reserve for 1968 BR-700 demonstrations.</td>
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<td>III.</td>
<td>Brochures &amp; Literature</td>
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<td>B.</td>
<td>Brochures (reprints)</td>
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<td>C.</td>
<td>PI Sheets, Letterheads, etc.</td>
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<td>Labor Burden (art &amp; photo)</td>
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<td>IV.</td>
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<td>General Capabilities</td>
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<td>Motion Picture (15 min.)</td>
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<td>V.</td>
<td>Promotional Items</td>
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<td>Sub-Total</td>
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<td>Travel (PR support)</td>
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<td>GRAND TOTAL</td>
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**TABLE IV**

BUNKER-RAMO CORPORATION SUMMARIZED BUDGET FOR ADVERTISING, TRADE SHOWS AND COLLATERAL
5. Customer Relations

Customer relations is the personal sales activity of a business, and is a vital link to market intelligence and proposal formulation. It must perform all necessary activities to positively affect sales potential, close sales opportunities, and follow-up on current business. It is not an exclusive marketing function, but is controlled by the marketing organization consistent with their goals and objectives. Each customer contact with a company counterpart, whether it be at the general manager, or detailed engineering level, is a form of customer relations, and can enhance or detract from the company image. Although frequent customer relations is desirable, and each company indulges in this practice extensively, it is generally accepted that in these days of strong competition and many laws governing contractor-government relations, there is no real substitute for overall effective marketing management to ensure that customer relations personnel are cognizant of, and participate in the overall market strategy plan. 43

6. Contract Negotiation

Each type of contract is designed to help the government and the contractor apportion the risks that may arise during the performance. In deciding which is the best type of contract for the particular situation, the following points should be considered:

a. The apportionment of business risks between the parties,
b. The nature of the work to be performed,
c. The relative difficulty of estimating cost of performance, and
d. The administrative difficulties that might arise under each type of contract.

The limits to which the company negotiation team can go in taking risks and establishing strategy to conclude a contract

negotiation is normally determined by the marketing manager, backed-up by the general manager. Within the Bunker-Ramo Corporation, as with several other firms, the Contracts Department is within the marketing organization. As such, the marketer must be familiar with contract types and liabilities. In addition, as these negotiations often involve a test of nerves and skill (i.e., on the part of the government negotiator to get the best product at the lowest price, and on the part of the company negotiator to protect his company's best interests), a knowledge of human behavior and timing are invaluable. As the final step in concluding a contract award, the contract negotiation, especially on a competitive basis, is of prime concern to the marketer and its successful accomplishment is a primary role which he must execute.

D. THE DEFENSE MARKETER

1. Organization

Characteristically, the defense electronic company has organic to its organizational structure, a Marketing Department at either or both the corporate and division level. Within this department exist at least three basic functions: market research, advertising and sales promotion, and a form of home-office sales. In addition, either as an extension of the home office sales activity or as a separate entity, there is normally a field sales organization. The organizational structure will vary with the size, type of company, degree of decentralization, and the corporate emphasis on the marketing function being performed by the formal marketing organization. The latter qualification is made with malice of forethought because the marketing function can be performed in many ways, as will be discussed later.

In general, it is the role of the field force to gather intelligence on customer goals and objectives. This information is often requested by, or in any case, funneled into technical channels, where the information is interpreted and decisions made. The preparation of proposals is also in many companies a purely engineering activity, and to the extent that this activity is performed outside the marketing organization or outside the purview of marketing
control, a basic marketing role and contribution have been thwarted. The same is true in the areas of present planning, contracts and product pricing. In recent years, several companies have formally expanded the marketing organization to include an advanced planning (product planning), contracts and advanced systems (proposals) groups. Of the companies investigated, the Bunker-Ramo Corporation comes closest to having a comprehensive marketing organization structure, with the basic exception being a formalized market research activity. The lack of formalized capability in this area is explained as being due to the inability to meaningfully predict long-range business activity, and the short-term objective of being an industry follower, responding primarily to request for proposals rather than attempting to create demands. It has been observed, however, that a formal organizational relationship is not the sine qua non of its marketing influence. Several functions often found outside of the marketing organization, such as advanced systems, product design and the like, may actually operate under the direct control and/or influence of the marketing director, but it is not "fashionable" to label these activities as marketing. Litton-Data Systems is a classic example of this principle. The formal marketing organization (see Figure 9), consists basically of the field sales force and limited home office sales activities. It is on an apparently equal level with the much larger advanced programs organization which is responsible for "filtering" incoming marketing intelligence, performing pre-proposal activities, and actually directing all major proposal efforts. The Litton Vice President of Marketing has a major "say-so" regarding the activities of this organization. So strong, at one time (just one year ago) was the desire to downgrade the marketing term (but definitely not the function) that the Litton marketing staff (field sales force) was but a part of the advanced programs organization. The trend toward recognizing and accepting marketing as a vital and necessary function within companies appears to be progressively growing, but is still hindered by the previously discussed reluctance to accept the marketer both within the company and by the customer.
FIGURE 9  Organization Chart - Litton Data Systems Division (October 1968)
2. **Marketing Influence**

To some extent, the role and influence of the marketer or the marketing team as a whole will depend in part on the relative position and title within a company. The senior marketing executive is far more effective with the title of vice president, then director, or manager if all other basic functions (e.g., administration, finance, engineering, etc.) reporting to the president or general manager are at the vice president level. Likewise, at lower levels of the organization where marketing people are supporting an engineering or line organization, they can be far more effective if they have an independent and direct line to the top, rather than being subservient or performing a staff function to the line organization's manager. As such, the first and perhaps most important step is to organize the company to permit a strong and effective marketing role. The second is the assignment of "strong" and knowledgeable marketing managers who are capable, will assert their authority, and fully perform their role. This latter requirement to have "strong" marketing managers can not be overstressed, and the impact of its existence or lack thereof can, in my opinion, become a company "trademark" within the industry. For example, there is no doubt that Litton-Data Systems is a marketing oriented division. The marketing organization is competent, and reliable, and the marketing vice president, a dynamic individual, participates actively in basic operational decisions. The engineering organization executes their function in accordance with the strategy and guidelines established for them. In the Bunker-Ramo Corporation's Defense Systems Division, within the span of only one year this situation was made most obvious. A selection for Director of Marketing was made which brought a long-time senior employee into the position. He was a lawyer by profession and was previously a secretary of the company. He came to his new job with little training or experience in the engineering products or marketing objectives of the

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firm. Placed in direct competition with a strong director of engineering, the result was obvious, "the tail wagged the dog." About nine months later, as a corrective action, the position was upgraded to Vice President Marketing, and an extremely competent engineering manager was promoted to the post. It was less than a month before the changes were noticeable. The marketing organization took on a new status image, morale went up, and marketing decisions became company decisions. Recognizing the fact that corporate management can be quite subtle and a "soft voice can be backed up with a big stick," my example may be somewhat subjective, however, it is my opinion that a vital element of an effective marketing organization is directly related to the caliber of its top executive. This subject is discussed further in a subsequent section.

Underlying the situations and circumstances described above, are fundamental problems which did, at one time, undermine the marketing sales role, and still continue to be a limiting factor. Sal Divita in his article "Selling R&D to the Government," describes these factors in the following categorizations: pecking order, psychological walls, inadequate preparation, and inferiority complex. Some of these have been treated briefly in previous sections of this thesis, however, they will be summarized here for clarity.

a. Pecking Order: The role of the technical man in the electronic defense business has always been a commanding one. In the middle and late 1950's, the market was a seller's market. There were few marketing departments, and little need for marketing. The customer came to the company.

Now the competitive climate has changed considerably, and it is necessary to submit highly technical and detailed competitive proposals. The character of the "product" has not changed over the years. This means that the proposal, because of its technical content, is still prepared almost exclusively by the technical department, as it has always been. As such, engineers have come to believe that they earn the business, that they deserve the

credit for winning competitions, and that the marketer is, at best, only a marginal contributor. To exemplify the initial lack of marketing emphasis, Figures 10, 11, and 12 show organization charts for the Thompson Ramo Wooldridge Corporation Computer Division in 1958, 1961, and 1964 respectively. They show the increased emphasis on marketing with time.

b. Psychological Walls: Over the years, the engineer has always been present; the salesman is a "Johnny-come-lately." With few exceptions, the salesman came actively on the scene about 1960 and was supposed to take over the sales responsibility from the engineers. It is not difficult to understand the conflict that this move generated. Eventually this conflict built a wall between the two departments -- a psychological wall, but one which has to be dealt with if the firm ever hopes to take an aggressive position in the marketplace.

This wall now prevents the marketer from fully achieving a meaningful degree of effectiveness. He cannot even be effective at gathering intelligence unless he has a meaningful rapport with the engineers in the plant. With equipment this is not too difficult, but capability is often brainpower or the thinking of the key technical and scientific people in the engineering department, and the only way the marketer can achieve this understanding is by talking to, and being accepted by the technical people. It has been my observation in recent years, that management has been forcing this interface to the point that it has become common practice to have frequent orientation sessions for field marketing people by various members of the engineering organization.

c. Inadequate Preparation: Another important factor contributing to the poor relationship between the marketer and the engineer is the marketer's lack of adequate preparation for his job. Generally, the training programs consist of educating the marketer with respect to the company's organization (i.e., what activities exist and who is in charge of which activity), and to its experience (i.e., what contracts were previously won). In a few cases
FIGURE 10  Thompson Ramo Wooldridge Corporation, Computer Division in 1958
Without the Existence of a Marketing Organization
FIGURE 11  Thompson Ramo Wooldridge Corporation, Computer Division in 1961 With The Existence of a Customer Requirements (Limited Marketing) Organization
FIGURE 12  Thompson Ramo Wooldridge Corporation, Computer Division in 1964  
With Established Marketing Organization
marketing personnel are exposed to selling techniques. Such training might be adequate if the salesman had previously acquired a knowledge of the marketing function, but he rarely has. Today he is usually an engineer by training or an ex-government employee. John Kennedy in a 1964 article stipulated that over 50% of customer relations/marketing personnel had engineering backgrounds. In recent years, the writer believes that this percentage has increased significantly. One answer for this may be the fact that the defense industry is so highly technological that technological understanding must be dominant to marketing "know-how." Nevertheless, neither of these two areas of experience or training (i.e., engineering or government work) qualifies a man to be an effective marketing representative.

The issue here is: What special marketing skills or knowledge should the salesman/marketer bring to his job? This will be treated in Section D. 3 of this chapter "Current Training and Qualifications."

d. Inferiority Complex: Many companies behave in such a way as to seem ashamed of the marketing function and their salesmen. In these companies, words like marketing, sales, and salesmen never appear in the organization charts or on calling cards. In some cases marketing people have gone to great lengths to cover up the fact that they are salesmen or marketing representatives.

Within the companies contacted the senior marketing executive has the title of either director or vice president of marketing. However, many of the middle management marketing people who interface with the customer on a regular basis, "bear" titles which include: product area director; manager of systems, operations, hardware, requirements; customer liaison, and so forth. It appears to be most important that these people have and can convey the image of being technical rather than marketing oriented. As such, the marketer has not gained full respect for his professional capacity from his colleagues in the other professional disciplines of the company. It would also appear that far too much emphasis is placed on the "obvious" selling/customer relation
function, and not enough on other equally important functions such as planning and pricing.

3. Job Requirements
   a. Introduction

Before describing the characteristics and training required of a marketing manager, it is first necessary to clarify terminology as I have on occasion used the terms marketer and salesmen somewhat interchangeably. Stated simply, the sales manager's job is to direct and control the activities of the salesmen. The salesmen are the people who gather intelligence and establish customer liaison. Sales is but one of the important functions which comprise marketing management responsibility which, as stated earlier, is concerned with the integration of all functions dealing with the movement of goods and services from where they are made or available to the ultimate consumer. Consequently, as contrasted with the sales manager, the marketing manager is a member of top management whatever form it may take in a particular company. Furthermore, he must be thoroughly familiar with all the activities in the company to include engineering, manufacturing, finance, and credit.

b. Job Responsibilities

As previously stated, there are several functional areas which must be performed within the marketing organization and to a considerable degree, specialized skills are required for their effective implementation. However, in describing the job responsibilities of the defense marketer, I am defining the term from the viewpoint of total responsibility on the part of the senior marketing executive, or that potential responsibility for one aspiring to such a position. In small companies, the scope of these responsibilities if not the magnitude, may be borne by a relatively junior person.

There are several ways in which the job description of a senior marketing executive may be described. However, to present the full scope of his tasks in a comprehensive manner, I will summarize and slightly modify a list of items offered by Fen Doscher in his article on "The Vice President for Marketing: What
Kind of Man Must He Be. It is presented from a president or
genral manager's point of view. Following each task description
is a statement regarding the skills and specialized capabilities
which the author believes that the marketing manager must possess
to effectively satisfy the requirement. These qualifications will be
somewhat subjective and probably never complete, but are based on
an understanding of the application of established curricula to which
the author has been exposed. A collective look at these required
capabilities, however, will be indicative of particular needs for
training and/or experience.

(i) Develop a marketing policy in conformance with
established company philosophy and objectives; by example and word
instill in all marketing personnel a sense of purpose and enthus­
iasm for the company and its products. This task requires cap­
abilities in management and administration.

(ii) Organize the marketing function so as to achieve
stated objectives through the effective utilization of available
resources of manpower, funds, and time. This task requires cap­
abilities in management and finance.

(iii) Build a vigorous, hard-hitting sales force; recruit
and select the most promising candidates as salesmen; provide
ample training and opportunity for development at all levels; strive
continuously to improve the quality of sales management; and make
sure, through periodic investigation and reassessment, that sales
personnel are adequately compensated. This task requires cap­
abilities in sales, sales training and administration.

(iv) Sponsor a continuing program of research aimed at
determining industry and general economic trends, customer
attitudes and preferences, the strength of competitive products, and
the company's market position; facilitating the development of new
products and the improvements of old ones; and re-evaluating
sales methods and policies. This task requires capabilities in

Fen K. Doscher, "The Vice President for Marketing: What Kind
of Man Must He Be?" an article in The Marketing Job, ed.
Elizabeth Morting (New York: American Management Associa­
market research, economics, sales and product knowledge.

(v) Analyze and interpret data on indicated trends with a view to useful long- and short-range sales forecasts, subject to periodic adjustment, which can serve as the basis for management decision making. This task requires capabilities in product knowledge and financial planning.

(vi) On the basis of forecasts, participate in corporate decision making and develop detailed sales plans and budgets which will represent the thinking and programming of all levels and form an integral part of over-all company plans and budgets. This task requires capabilities in finance, sales planning and management.

(vii) Plan and direct the actual selling effort; maintain contacts with the field; control selling expense. This task requires capabilities in sales and administration.

(viii) Cooperate with other functions at the top company level in product planning, providing marketing guidance and direction. Consult with industrial design, product research, engineering, manufacturing, packaging, and related personnel on such merchandising problems as product and package design, style, color, and labeling. This task requires capabilities in product knowledge, customer understanding, and merchandising.

(ix) In conjunction with other members of top management, establish a sound pricing policy. Guided by it, set the prices of all company products and proposals to furnish goods and/or services. This task requires capabilities in management and pricing.

(x) Exercise general policy control over advertising and sales promotion, including the preparation and use of exhibits, and displays. Insure that all advertising and promotional materials are both effective and appropriate to the nature of the company's products and the customer. This task requires capabilities in management, customer understanding, advertising and sales.

(xi) Provide those customer services that company products demand and set up the machinery needed to process customer's orders and inquiries in an efficient manner. This task requires capabilities in customer understanding, product support
and contracts.

(xii) Encourage good employee relations within the marketing group and develop a communications network that will promote high morale. This task requires capabilities in administration and interpersonal relations.

(xiii) Periodically review the over-all marketing organization and program, and make adjustments and improvements as needed. This task requires capabilities in management and organization.

The capabilities identified as being necessary to satisfy the categorized job description given above are ranked according to their importance and continued need in the following order:

(a) Management
(b) Sales
(c) Finance and economics
(d) Product knowledge
(e) Customer knowledge and merchandising, and
(f) Administration (which may be considered a subset of management)

These desired capabilities and skill requirements of the marketer will be matched against the current-day training and experience of the men who now hold marketing positions in defense-oriented organizations.

4. Current Training and Qualifications

a. Training

Management, sales, finance, economics, customer knowledge, merchandising and administration, these are fundamentals of a well rounded business administration program and skills and understanding required to meet the needs of the defense marketer. The particular product or product knowledge is actually incidental, being just the objective to which the business administration principles are directed and applied. Extra emphasis on sales or marketing is likewise well within the scope of the normal business administration program. Although business would seem to be the logical background of a marketer, of the companies contacted, over
ninety per cent of their overall marketing/sales staff (as opposed to such related activities as contracts) were either transferees from engineering departments or ex-government employees (i.e., military or civil service) with various backgrounds. The engineering personnel "migrate" into marketing because it represents a promotion in the company hierarchy or their broader view, interest and capability in company affairs are recognized by management to exceed the engineering role. However, the primary emphasis on marketing qualifications has been technical knowledge and capability. Little or no consideration has been given to the lack or presence of formalized training in the areas of business or more specifically, in marketing. Ex-government employees are normally hired for their knowledge of the customer and "contacts" which are useful in the sales effort. These people rarely become senior executives in the marketing or company hierarchy, except for retired general officers or senior civil servants who are often given impressive titles within the organization (e.g., Vice President-Requirements or Director-Customer Relations), but actually perform a higher level sales activity. Even with these senior people, a background in engineering is considered to be advantageous.

To determine the characteristics of the typical academic engineering program and identify what fields of endeavor its graduates are qualified to pursue, a study of several college catalogs was undertaken and the following learned. The engineering program is arranged to provide the student with a sound background in the fundamentals of the engineering disciplines in preparing for a career in engineering. Basic engineering curricula includes such courses as thermodynamics, heat transfer, electric and electronic circuits, and the use of the basic materials. In addition to an area of specialization (e.g., mechanical, electronic, marine, etc.), the engineering studies are to some degree balanced to the economic, social, industrial, and psychological needs of the society it serves. The basic objective of engineering training, is to apply science and a knowledge of the technologies to create useful devices and systems.
As electives, it is possible that engineering students may be exposed to a couple courses in business law, production management and the like, but there is no active attempt to provide overall management skills. Engineering as a field, is, of course, based on the exact sciences and engineers are trained to think and act accordingly. This is in opposition to many management skills such as administration and interpersonal relations which are arts in their implementation requiring "development" on the part of practitioners.

A number of management oriented graduate programs for engineers have become generally available in the last decade. These include such programs as a masters program in engineering management offered by UCLA, and the numerous MBA programs offered by many colleges and universities. Although there is a reported high level of enrollment in these programs, not even one of the senior marketing persons interviewed, and no member of the Bunker-Ramo Defense Systems Division marketing staff, holds such an advanced degree, although several have advanced engineering degrees. This is considered to be most "tragic" as it is such advanced programs as the MBA which are suited to persons with undergraduate degrees other than business, providing them with a broad understanding of the elements and application of business management, with an option to concentrate to a limited degree in the area of marketing. The expressed purpose of such programs is to provide preparation for senior management positions in industry. It is interesting to note, however, that at least one educator\textsuperscript{48} believes that specialized courses in defense marketing and the like are unnecessary in a masters program. He believes that it is the fundamental courses which are required, and that they permit applicability to any business environment.

Time, age or qualification may deter some practicing

marketers from enrolling in formal business programs. However, there are a number of short courses in business and marketing which are offered by both universities and private consulting firms (e.g., The National Defense Education Institute). There is, however, an increasing emphasis on the part of upper management to have middle management personnel attend these lectures and symposia, because they are concentrated in nature and sufficiently short in duration not to significantly hamper normal operations when attended by staff representatives.

b. Experience and Qualification

As can be expected, the experience and qualification of defense marketers will vary considerably depending on the areas of specialization and the business activities of the firms with which they have been affiliated. This latter factor is most significant within the defense industry where I have observed the average length of employment (in the technical areas) with a given company to be about three years.

As an indication of the training and background of the current-day defense marketer, I have carefully chosen the resumes of four typical marketing personnel from a list of sixty, obtained from the personnel files of the Bunker-Ramo Corporation. Their names, university and specific company affiliations have been deleted that they may remain anonymous. They are re-titled resumes A, B, C. and D, and are presented in Appendix B. From these resumes, the strong engineering background of the defense marketer is evident. It is also to be recognized, however, that these men (as is generally the case) were senior engineers with some management experience prior to entering the marketing organization. In terms of qualifications, and I know each of these individuals personally, they are quite competent and astute individuals, and of considerable value to their organizations. However, the unfavorable imbalance in their formal training and experience in the marketing field is considered by them to be a limitation on their effective performance.
CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

The defense market, and the methods used by the government to buy electronic research and development have been shown to be quite complex and involved. In addition, the basic aspects of this environment, including: the government defense procurement organization, the procurement cycle, and the complex nature of the customer, have been presented in sufficient depth to provide the necessary background to appreciate the defense marketing role and facilitate a meaningful test of the stipulated hypothesis. In the hypothesis are essentially two assertions:

1) That the defense marketer must apply the traditional marketing principles associated with product planning, marketing strategy, selling and pricing; and,

2) That the defense marketer is hampered in the performance of his functions due to a lack of formal training in business, and a strong engineering orientation in the defense industry.

Treating these issues in the order presented, the thesis showed that for the defense marketer to perform his job effectively, he must perform functions associated with 1) gathering intelligence on customer requirements; 2) making continual market surveys to facilitate product planning and marketing strategy; 3) providing strategy and pricing guidelines on proposals for new business activities; 4) establishing good customer relations and establishing a favorable company image, and 5) establishing and maintaining the mechanism for processing orders and negotiating contracts.

From the information presented in these areas, obtained from both personal interviews and published data, it is quite apparent that, although the techniques may differ as a function of the environment, the basic marketing principles are and must be applied for successful performance.
Relative to training and job performance on the part of the defense marketer, it has been shown that a large number of practicing defense marketers have extensive engineering backgrounds and hold engineering degrees. Formal training in business is scarce and in some companies, nonexistent. From a study of engineering curricula, it is evident that these scientifically oriented programs do not provide the training necessary for the effective development of strong managerial capabilities required by the defense marketer. This situation is aggravated by the fact that an appreciation of the marketing function has occurred only within the last decade, when competition for the available defense funds became quite intense. Furthermore, the engineering organization, by far the largest element within the defense firm, still visualizes marketing as a necessary or unnecessary evil, whose basic functions could readily be absorbed by engineering, as indeed they tacitly were in the pre-1960 era.

With this knowledge of the situation, it is apparent that the individual defense firms must take positive steps to strengthen their marketing organizations and, thereby, their position in the marketplace. There is no easy and/or quick solution. More specifically, it will involve a rather evolutionary upgrading, consistent with the organizational status of the various firms. In addition, it is recognized that no set of established guidelines are infallible as to their results, and that departures from "school solutions" can at times be quite effective. However, it is believed that judicious application of the steps listed below could result in the type of marketing organizations which will be knowledgeable, respected, and capable of performing their intended roles. The following courses of action are therefore recommended:

1. Assign the marketing organization a full charter of responsibilities, and establish it at the appropriate level to permit the full exercise of intended authority.
2. Select marketing personnel who know the marketing job and are strong enough to get the job done. Do not draw on inadequate "in-house" talent just because it is available.
3. Require, or at least encourage senior, technically oriented, marketing personnel to enroll frequently (at least once per year) in either industry or university sponsored short courses or seminars in general marketing and/or defense marketing.

4. Require junior marketing personnel to commence or continually upgrade their formal business education. Enrollment in a formal degree program is preferred, if said degree (e.g., MBA) has not previously been obtained.

5. Actively recruit graduating college students who have a combination technical/business background, and make college administrations aware of the need and value of such training (e.g., BS in technical field plus MBA). These people will grow up in the profession and take pride in job performance.

6. Stress the other aspects of marketing (e.g., research, pricing, policy formulation, etc.), as well as sales, to eliminate the "peddler image" within and outside the marketing organization.

7. Associate a degree of prestige with the marketing organization and encourage a feeling of membership pride.

Most important of all is to recognize that the defense oriented company of the future cannot tolerate the problems which currently are plaguing marketing operations. In that highly competitive market, the remaining competitors may be singularly identified by the high impact of their marketing activities on corporate affairs.
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