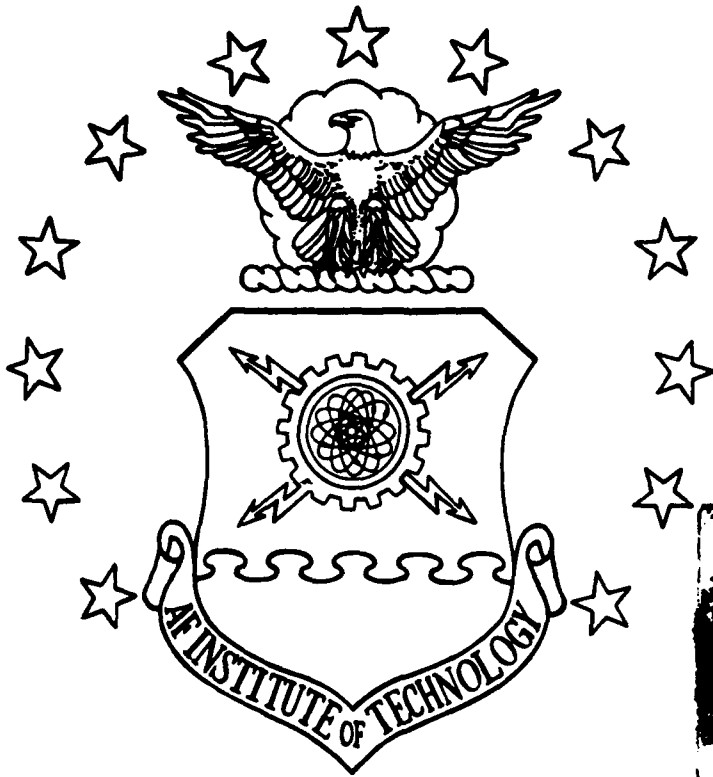
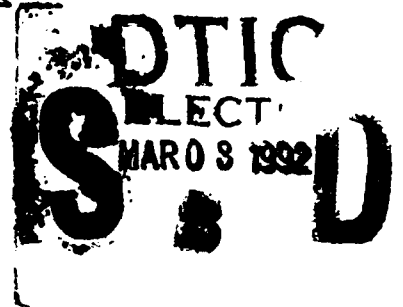


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DEVELOPMENT OF AN
 OPERATIONALLY-ORIENTED
 MEASURE OF SUSTAINABILITY

THESIS

Moira D. Williams, Captain, USAF

AFIT/GLM/LSM/91S-67

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DEVELOPMENT OF AN OPERATIONALLY-ORIENTED
MEASURE OF SUSTAINABILITY

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Moira D. Williams, B.A.

Captain, USAF

September 1991

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Preface

The Air Force is lacking a definitive measure of sustainability that is both militarily-meaningful and relates additions of fiscal resources to sustainability improvements. A Sustainability Task Force has been formed to examine this problem and provide guidance on the development of a new measure. The proposed framework for evaluating this issue addresses the criteria listed above and offers a starting point for the development of an appropriate measure of effectiveness. I had a great deal of encouragement and assistance in my attempt to both evaluate the underlying assumptions stated by the Task Force and to present alternatives. First, I am indebted to Dr. Anthony D'Angelo of AFIT and Lt Col Ron Hitzelberger of the Pentagon for locating and providing me with a copy of the report of the Sustainability Task Force. My husband, Bo Williams, was also of incalculable value in helping me with this project. He not only challenged my arguments, but also helped shape them by providing me with sources of information that inspired me to view the problem from a different perspective. Finally, I would like to thank my thesis advisor, LCDR Don McNeeley for suggesting the topic initially and for his insightful critiques that helped me to identify the important issues surrounding this project.

Moira D. Williams

Abstract

This thesis proposes a framework for evaluating sustainability in the Air Force and for determining an appropriate measure of effectiveness that is both meaningful in a military sense and useful in planning and programming decisions. Following a literature review on organizational performance measures and strategy formulation, Michael Porter's Competitive Analysis model for strategy selection was presented. This model was then used to evaluate cases in which organizations faced strategic decisions and to suggest measures by which these organizations could determine their effectiveness. The model was then shown to be applicable to the Air Force, and recommendations on implementing such a framework to develop a new sustainability measure were proposed. These recommendations would be easy to implement because they require no investment in resources, only a different focus in collecting pertinent information. Furthermore, the same process can be used at all levels of organization and decision making.

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DEVELOPMENT OF AN OPERATIONALLY-ORIENTED
MEASURE OF SUSTAINABILITY

I. Introduction

General Issue

Decision makers in all types of organizations must have access to information that enables them to both allocate resources for the achievement of goals and to evaluate performance. In the Department of Defense (DoD), part of this information is contained in the performance measurement known as sustainability, which helps determine warfighting capability. This measure is needed not only to assess the duration for which forces can continue fighting, but also to relate the allocation of money to increases in this duration (20:iv).

Background. The mechanism by which the DoD develops programs to achieve national security objectives and funds these initiatives is the Biennial Planning, Programming and Budgeting System (BPPBS). Essentially, the security objectives are developed in response to a threat and are then translated into operational plans. The resources needed to execute these plans are then identified, by priority, in each Service's Program Objective Memorandum (8:1,11).

The planning phase of the BPPBS is the responsibility of the Defense Planning Resources Board, or DPRB (formerly

known as the Defense Resources Board, or DRB). This board is chaired by the Deputy Secretary of Defense, and members also include the Service secretaries, the Chairman of the Joint Chiefs of Staff, and other officials in the Office of the Secretary of Defense who are concerned with resource allocation (29:11).

During this phase, the Joint Chiefs of Staff (JCS) assess the threat and develop the military strategy needed to achieve national security objectives. The JCS states these threats, strategies, and objectives in the Joint Strategic Planning Document (JSPD). This document serves as the source document for the Defense Planning Guidance (DPG), which was formerly known as the Defense Guidance (DG). The Services, Defense agencies, and unified and specified commanders are all involved in reviewing the JSPD and developing the DPG. Information contained in the DPG includes threat assessment, force planning guidance, resource planning guidance, and fiscal guidance (29:11).

Upon issuance of the DPG, the Services and Defense agencies initiate the programming phase of the process. They use the guidance in the DPG to develop their POMs. The POMs contain the Services plans to counter the threat and provide the rationale for their funding requests. A review process occurs throughout this cycle. The JCS consider POM submissions in the Joint Program Assessment Memorandum (JPAM), which states their opinion of the capability of the POM to achieve national security objectives. Once

the JCS have issued the JPAM, the Office of the Secretary Defense (OSD) develops issue papers that address the decisions in the JPAM. Finally, the DPRB conducts a final review before the OSD and the Office of Management and Budget (OMB) mutually review and refine the final DoD budget (29:11,13; 8:38).

In accordance with its corporate review authority, the DRB conducted an Implementation Review of Spares in 1987. The board members identified several problems with the Department of Defense's measures of sustainability. First, Days of Supply (DOS), the primary measure, was found to be essentially a financial term that was ambiguous as a measure of warfighting capability. Additionally, the DRB identified inconsistencies between the Defense Guide's outline for assessing enemy threat and the methods included in the Program Objective Memorandum (POM) preparation guidance. Finally, the DRB noted that there were also inconsistencies among the services in the sustainability measures they used (3:1-4).

The Deputy Secretary of Defense established the Sustainability Assessment Steering Group to address these problems and develop meaningful measurements of sustainability. This task force analyzed the following Joint Chiefs of Staff Publication 1 definition of "Day of Supply":

. . . a unit or quantity of supplies adopted as a standard of measurement, used in estimating the average daily expenditure under stated conditions. It may also be expressed in terms of a factor,

such as rounds of ammunition per weapon per day.
(20:2)

They found not only that the term DOS is ambiguous, but also that it does not fully address a number of "complex issues" affecting sustainability. They noted, for example, that current guidelines for calculating DOS do not distinguish between different consumption rates for a given group of commodities by ignoring the theater of operation, operating tempo, and using unit. Furthermore, the method of computation, a ratio of the dollar value of available inventory to the dollar value of the requirement for that commodity group multiplied by the number of days of interest, lends itself to inaccurate estimates of excesses and shortfalls of critical items (20:2).

These criticisms were levied primarily against the measurement of materiel sustainability. The task force, in turn, limited itself to an examination of the problems concerning the measurement of materiel sustainability while recognizing that other aspects of sustainability, such as personnel, mobility capability (airlift and sealift), and other elements of logistics planning, are equally important. Their intent was to take the first steps in an ongoing initiative to improve sustainability measurements of effectiveness (20:vii).

Although this paper is also primarily concerned with measures of materiel sustainability, given that more information is available for this performance indicator, the

focus will be on the validity of the underlying assumptions of these measures. While the researcher does not dispute the value of sustainability as a measure of performance, some of the recommendations and arguments presented by the Sustainability Assessment Task Force are questioned.

Clarification of Key Terms. Sustainability, along with force structure, modernization, and readiness, is one the four pillars that comprise the concept of military capability (27:1). "Military capability" is defined as ". . . the ability of the force to achieve a wartime objective such as winning a battle or war or destroying a target" (27:1). "Sustainability" measures how long forces can fight in a given scenario. It involves resupply efforts, US force size, threat size, and operations tempo (3:3; 27:1). "Force structure" refers to the number, size, and composition of military units. "Modernization" is the degree of sophistication of forces, weapon systems and equipment. Modernization can be improved through either new procurement or modifications of fielded equipment (27:1). "Readiness" is related to sustainability. It measures the ability of forces to carry out their missions by monitoring manning, equipment, and training levels (27:1).

The task force aptly wrote that readiness and sustainability are not separate events, but part of the same continuum. They pointed out that readiness implies a degree of self-sufficiency; this helps determine the need for resupply, hence, it affects sustainability (20:vi)

Problem Statement

The Air Force must develop a measure of merit that easily relates to the duration of combat that can be sustained and is consistent among its units.

Investigative Questions

The concept of sustainability is not peculiar to the Air Force or Department of Defense. Any organization that strives for the prolonged attainment of a goal deals with sustainability issues. Furthermore, a myriad of factors influences sustainability. By examining the performance of other types of organizations, it is possible that a perspective that has not yet been considered will prove to be relevant to the Air Force's ability to sustain combat.

The following questions were developed to help investigate this possibility:

1. Are current measures consistent with Air Force doctrine and strategy? If these measures do not help assess how effectively the Air Force is meeting the goals and objectives outlined in its doctrine, then either the measure itself or some of the variables included in that measure should be eliminated from sustainability assessments, or, perhaps, new variables should be considered.

2. What specifically are the problems associated with the current measures of sustainability? Before new measures are developed, the old problems and their causes must be fully identified.

3. What are the underlying assumptions made by the Task Force (or the DoD in general) concerning the factors comprising sustainability and the method for measuring it? If the assumptions are inconsistent or unclear, some of the recommendations presented by the Task Force could be invalid or could, at least, result in the generation of unnecessary reports and studies.

4. What measures of sustainability does private industry use? The validity of this question is predicated on the assumption that business measures are both useful and applicable to the military.

5. What research methodology is best suited to address these investigative questions?

Scope of the Research

Although this initiative to develop a new measure of sustainability is a DoD-wide effort, the research focuses on the Air Force's efforts. Additionally, the measures of merit used by private industry do not precisely coincide with those used by the U.S. Air Force. The research will focus, therefore, on a broader spectrum of issues: the relationship between strategic planning and sustainable competitive advantage. These issues will also be examined from a public management perspective so that the social and political environments in which the Air Force operates will also be considered. By emphasizing primarily the second, third, and fourth investigative questions in formulating a

new sustainability measure, the author hopes to establish the linkage between given items, expenditures on them, and sustainability levels.

Finally, the research will be limited to unclassified documents, and the topic will be addressed from a theoretical point of view rather than an analytical one. That is, the researcher will attempt to develop an alternative framework for assessing sustainability rather than verifying the one presented by the Sustainability Assessment Task Force.

Chapter Summary

This chapter summarized the Department of Defense initiative to develop a credible, meaningful measure of sustainability. The background section noted the importance of these measures and identified the Defense Resource Board's 1987 Implementation Review of Spares as the catalyst for this action. A discussion of problems with the current measures followed. The concepts of "military capability" and the four pillars that comprise it were then defined. This set the background for the statement of the problem and the investigative questions to be researched. Finally, the scope of the research was briefly discussed.

II. Methodology and Literature Review

Introduction to the Method of Approach

This chapter is comprised of two sections. The first contains an explanation and justification of the author's approach to analyzing the data collected. Following this is a literature review that supports the contention (Chapter I) that since the Sustainability Assessment Task Force premised their evaluation of performance measures on some invalid assumptions, their recommendations will not be wholly effective for use in developing a new measure of sustainability.

Explanation and Justification of Approach

The general method that will be used to collect and analyze data is a traditional literature review emphasizing case studies. Most of the information that describes the background of the problem and addresses the first two investigative questions is contained in government documents such as regulations, technical reports, manuals, and proceedings. Additionally, the author contacted offices in the Pentagon that are involved in the sustainability project. Periodicals and books have proven to be the most useful sources of information so far in researching the second, third, and fourth questions.

Explanation of the Case Study Method. Public administration consists of the activities involved in the establishment and implementation of public policies. Public

management, on the other hand, is a specific focus of public administration that is concerned with the administrative activities that occur within a public agency. It emphasizes policy implementation and how tasks are carried out (15:14-15). Since the research problem falls in the budgeting realm of public management -- how to allocate resources (money, in this case) effectively in order to achieve a performance level that will help the organization to meet its goals -- the author focused on the philosophy of the case method as it applies to management. In this discipline, the case study is a record of all the important variables that influenced a particular managerial situation. The case outlines the circumstances in which the event took place. For example, it describes the industry and its competitive environment, the organization's position in that industry, the history and hierarchical structure of the organization, the organization's products and/or services, and the work climate and personalities involved. In addition, the case often presents pertinent data that will aid the researcher in evaluating the effectiveness of the organization's policies and strategies. This data could include profit and loss sheets, marketing information, and production information (26:273).

Selecting the Cases. A key argument in this research is that the strategic planning process is the key to linking an organization's everyday operations with the attainment of its goals. Strategic planning also provides a

framework for evaluating the organization's performance in achieving these goals. The assessment of this process through case studies could yield insights that are applicable to the planning process in the Air Force. The author, then, is attempting to illustrate that the Air Force should adopt sustainability (i.e., performance) measures that are tied to strategy rather than a budget. For this reason, the author selected cases that emphasize the formulation and implementation of strategic plans. An examination of the similarities of the planning and control functions of management at both the strategic level and the operating level will help to illustrate the disparity between achieving sustainability objectives at the operating level (battlefield or wing/base) and relating them to aggregate financial measures at the corporate level (Air Staff, Major Command). Additionally, the author is interested in cases that share common organizational characteristics with the Air Force. The focus, therefore, is on cases that highlight multidivisional or diversified (vertically integrated) firms, public agencies, and oligopolistic industries.

Analyzing the Cases. The process of analyzing cases is relatively generic. A researcher identifies key issues of the case, evaluates these issues, and makes recommendations to improve performance (26:276-277; 13:17-18; 24:10-12). The evaluation of issues generally consists of identifying the facts available in the case and assumptions made, drawing conclusions from the facts and assumptions,

and determining what theories are relevant to the case (13:22).

Since the strategic planning process is of interest in this research, the author analyzed cases that emphasized this area. The strategic position (that is, the plan the organization follows to achieve its goals) of the organizations was evaluated using Michael Porter's Competitive Analysis Model. Because of the complexities of this model, it is discussed separately in Chapter III. Essentially, though, this model allows the researcher to determine the appropriateness of the organization's strategy and to suggest courses of action to improve its performance.

Justification of the Case Study Method. The case study method was selected because it has the most direct applicability of the research methods reviewed due to the descriptive nature of the research. The problem, developing a descriptive theory, calls for the analysis and synthesis of both qualitative and quantitative data throughout a variety of industries. Since conducting an independent evaluation of an industry, or even an organization, can be both very cost and time-prohibitive, case studies provide researchers with an abundance of data to which they might not otherwise have had access.

The case study method is frequently criticized for being unscientific (i.e., nonempirical); however, Mason and Mitroff note that this charge is elicited by the fact that it is difficult to achieve replicability. That two differ-

ent analysts can suggest two different recommended courses of action indicates the approach is solely subjective.

Mason and Mitroff dispute these objectives, stating,

"What makes something scientific is not the absence of variability in results but rather on our collective ability to study why the results vary. There is nothing inherent in the case approach per se to prevent us from studying how and why different analysts reach different action plans." (19:295-296)

By using a well-known model developed by a respected authority in the field of strategic planning (Michael Porter) to evaluate the cases, the author hopes to eliminate some of these criticisms of the case approach and introduce consistency into the results.

In their paper, "Applying Private Sector Strategic Planning in the Public Sector," John M. Bryson and William D. Roering argue that the implementation of some private sector strategic planning approaches can make governments more effective. While acknowledging that the public sector has a long history of strategic planning, they note that most of the history and development of concepts, procedures, and tools have occurred in the private sector. For this reason, Bryson and Roering evaluated tools used in the private sector for applicability in the public sector. They grouped nine different models into six categories to perform their evaluation (6:21-22). The category labeled "Content Approaches" included two well-known models: the Growth/Share Matrix, a portfolio model developed by the

Boston Consulting Group, and Competitive Analysis as developed by Michael Porter.

Of the models presented, this author found the content approach to be the most relevant to this research because these models are more prescriptive in nature; that is, their application yields a "right answer" concerning how a firm can improve its performance (6:25). The Growth/Share Matrix, for example, states that a diversified firm's businesses can be described as a portfolio similar to that of an investment portfolio. This model rests on the observation by one of its developers that there is an "experience curve" that describes the relationship between unit costs and volume. Specifically, unit costs drop by one-third as volume doubles. The strategy a firm should follow, therefore, is to increase market share so that volume will continue to increase (6:26).

How a firm should achieve this strategy can be deduced by analyzing the market share of each business. The businesses will fall into one of four profiles, according to this model. The "stars" are high growth/high share businesses that both generate a lot of revenue and require substantial investment to maintain or increase market share. "Cash cows," on the other hand, are low growth/high share businesses that generate a large cash flow that can be used for investment in other projects because cash cows require little additional investment. "Dogs," the third type of business, are characterized by low growth potential and low

market shares and generate only small amounts of cash. Finally, "question marks" are high growth/low share businesses that would need a substantial investment to become a cash cow. The firm uses this analysis to aid in decisions on allocating resources (6:26). Weaknesses in this model for use in the public sector include the fact that it is concerned only with economic considerations and ignores the political and social climate (6:27). Porter finds additional inherent weaknesses in the model's assumptions. One condition is that relative market share is assumed to be a good representation of competitive position and relative costs, which he asserts is not always true. A second assumption is that market growth is the prime determinant of profits and cash flow, and should, therefore, be the driving factor behind investment decisions (23:364).

Although Bryson and Roering also found weaknesses in Porter's competitive analysis model, they conclude that it has applicability to the public sector. The primary weakness, they contend, is that the competitive analysis model does not recognize that collaboration rather than competition is sometimes needed for the successful performance of public organizations. On the other hand, they found that the greatest strength of the model is that it is prescriptive in nature. That is, it guides the user in developing a course of strategic action (6:20,28).

The Porter model, as will be more fully discussed in Chapter III, is based on the analysis of the forces that

affect a given industry to predict the success of a particular strategy. While acknowledging that Porter's assumptions concerning competitive forces is applicable to the public sector, the authors assert that this model is sometimes difficult to implement because it can be difficult to identify the industry an agency belongs to and the forces that affect the industry (6:28). In this research problem, the industry is clearly defense, and the forces affecting it are well-documented in the defense-related literature. The Porter model was chosen, then, because its strength is in providing a systematic way of evaluating the strategic options available to a firm (6:28), and this strength is greater than its weaknesses.

Review of the Literature

The purpose of this literature review is twofold: to establish a foundation for the author's argument that the sustainability issue is being approached from the wrong perspective and to familiarize the reader with the concepts and terminology of the strategic planning process.

The review begins with a reiteration of the problem. It then discusses how traditional cost accounting can give an inaccurate picture of an organization's performance and financial viability. From there, the process of strategy formulation and implementation will be discussed, and the methods used in the private sector, public sector (excluding the military), and the military will be compared. This

review, then, is the basis for establishing the validity of the analysis performed in Chapter IV, which evaluates case studies using Porter's Competitive Analysis Model.

Reiteration of Problem. As noted in Chapter I, Days of Supply (DOS), the main measure of sustainability in the Department of Defense, does not provide decision makers with enough information to be able to assess the impact of their resource allocation decisions. Because of this limitation, the fiscal year 1990-1994 Defense Planning Guide has established that a new, operationally-oriented measure is needed to describe the extent to which level-of-effort munitions, secondary items, replacement items, and fuel can support operations (20:iv).

The development of this undertaking is complicated by the sheer enormity of the material covered by this measure. In the case of secondary items (generally defined as pieces of hardware that lose their identity when they become part of a larger end item), for example, there are over 5.5 million items currently in the supply system, of which 525,000 are used in war reserve stocks. Furthermore, these items are not listed individually in programming and budget documents, but rather funding is aggregated based on the source of procurement funding (e.g., by appropriation or stock fund) and major materiel category (20:30-31,33).

In addition, requirements levied in the Defense Planning Guidance use peacetime operating tempos to drive the funding of spares and repair parts in order to achieve

planned weapon system availability. That is, peacetime operating tempo programs, such as flying hours, are used to derive funding requirements of secondary items rather than allowing the Services to make line item decisions at their inventory control points. The war reserve secondary item fiscal programming decisions, in turn, are determined by establishing the percentage of the deficiency between requirements and on hand inventory that will be funding. This means that individual line items cannot be tracked until just prior to budget execution. The result of this process is that the Services are unable to establish a linkage between secondary items and the weapon systems they support; therefore, they are unable to fully assess the contribution of a given item to materiel sustainability (20:32-33).

The different characteristics of forces or types of activity also contribute to the complexity of assessing the contribution of secondary items because units would have different support requirements with different rates of consumption. Although the Task Force realizes that each area may need to develop separate measures of sustainability, the ultimate intent is to aggregate these measures in an attempt to develop a time-phased, dollar-based method for comparing the sustainability objective with available inventory (20:34). If traditional cost accounting measures are used to develop this aggregate indicator (which, in turn, is used to justify funding to Congress), the result could be a

distortion of both the true capability of the forces and of the financial picture of the Services.

Inaccuracies of Cost Accounting. In their book, Relevance Lost, H. Thomas Johnson and Robert S. Kaplan trace the development of management accounting and the emergence of the dominance of cost accounting as the basis for strategic decision making and evaluation of corporate performance (17). The management accounting system should provide timely and accurate information that helps managers not only control costs, but also measure and improve productivity and production processes (17:4). They argue that because today's management accounting systems are driven not by processes, but by financial reporting requirements, the information is ". . . too late, too aggregated, and too distorted to be relevant for managers' planning and control decisions" (17:1). In addition, the Johnson and Kaplan contend that the management accounting system is the means by which executives communicate goals and objectives to both subordinate and decentralized managers. Similarly, subordinates use it to pass on information about product performance and other activities. The breakdown of this system, therefore, has an adverse impact on the ability of the organization to achieve competitive success, because the two-way communication link is missing (17:4).

Relevance to the Sustainability Initiative. To their credit, the Task Force recognizes not only that an operations-oriented output is required, but also that sus-

tainability is the result of the efficient and effective deployment of a variety of resources such as trained personnel, mobility capability to deliver and resupply forces, and a logistics infrastructure that can provide materiel. In fact, the status (e.g., manning levels, maintenance condition, etc.) of these resources is routinely monitored in order to aid in the evaluation of strategic planning, force structure, operational plans, and deployment decisions (3:6; 20:13). With this in mind, the Task Force proposed the following definition of sustainability:

The ability to maintain the necessary level and duration of operational activity to achieve military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, materiel, and consumables necessary to support military effort." (20:12).

The Task Force further outlined the minimum criteria the measure of effectiveness should meet, the characteristics it should incorporate, and the means by which it should be quantifiable. The criteria are that the measure must:

- Be easily understood in terms of what it is measuring
- Permit consideration of the time and activity dimensions of the conflict in measuring sustainability resources.
- Support the derivation of programming and budget requirements.
- Be meaningful to the Commanders-in-Chief and Defense Resources Board in the context of their Planning, Programming, and Budgeting System roles.
- Allow for common and consistent application across all sustainability resources, that is, both manpower and materiel. (20:13)

The following characteristics should help ensure the above criteria are achieved:

- Readily recognizable articulation of force size.

- Readily recognizable articulation of the type of activity.
 - Unambiguous articulation of the level of intensity.
- (20:13)

Finally, the measure must be quantifiable by the following:

- Discrete time intervals that capture the salient changes in expected intensity.
 - Theater, not worldwide, averages.
 - Different sustainability MoEs to describe separate mission areas within a Service, were appropriate.
- (20:13)

While it is apparent that the deployment and sustainability of forces relies as much on the process of providing support as it is the physical materiel needed, the Task Force deliberately did not consider these variables because of the complexity involved (20:13). This decision is understandable, of course, because the Task Forces efforts represent just the beginning of what could be a very long project.

By taking this tack, however, the Task Force may have missed an opportunity to look at the sustainability problem from a more effective perspective. By examining the processes that comprise sustainability (for example, the process of acquiring and stockpiling material, the process of recruiting and training personnel, the process of generating and flying sorties, or the process of deploying personnel by a given mode of transportation) the Task Force may have been able to find the relationship between sustainability and resource allocation that it is seeking.

The Rise of Management Accounting. Early management accounting systems emphasized and monitored the processes of an operation. Firms that were established as a result of the Industrial Revolution, along with those that provided the country's infrastructure (such as transportation and communications) represented the first large, hierarchical organizations. Advances in technology presented opportunities for them to realize huge gains through the increased scale of operations. To fully exploit these, however, they required an accurate management accounting system (17:8).

The railroads, for example, tracked the resources used in their internal operations in addition to financial transactions; consequently, they were able to develop performance measures based on this information. They developed measures such as cost per ton mile and various operating ratios to evaluate performance. Similarly, large retail companies developed gross margin and inventory stockturn to measure the efficiency of their purchasing and pricing policies. These early systems, then, were intended to measure not profit, but the internal processes of the firm. Separate financial accounts were maintained for the owners and creditors, but they were independent of the process accounts (17:8-9).

Perhaps the military could develop a system that would, likewise, contain two different sets of data: one for the internal processes of operations (e.g., the costs of deploy

ing and sustaining forces) and one containing financial information for the "owners" (e.g., perhaps the current BPPBS as it used to obtain funding from Congress). The point could be made, however, that the firms mentioned above produced either a single product or single service, while the military, it can be argued, relies on a variety of operations to achieve its goals. In this sense, they can be considered to be a vertically integrated firm since they not only make or buy their materiel, but also distribute it themselves.

The DuPont Powder Company, which was formed at the beginning of the twentieth century, is widely recognized as an early example of a vertically integrated firm. To maintain control of their various operations, they developed a variation on the management accounting systems described above. F. Donaldson Brown, DuPont's chief financial officer, recognized that capital allocation was an important managerial function in an organization of this structure. He developed the concept of return on investment (ROI) to evaluate the success of each operating department and of the entire firm. This measure was intended to help management in directing resources to their most efficient use. ROI was used only as a top management tool; it was not used to evaluate the performance of subordinate managers. As in the single product firms, the role of the subordinate managers was to seek efficiencies in the internal process of the unit (17:11).

General Motors expanded the use of ROI when it adopted the measure for use in their multidivisional firm. This structure is a decentralized one in which geographically dispersed units share common organizational functions. Because of this different structure, General Motors used ROI to seek economies of scope rather than scale (17:11).

The Emergence of Cost Accounting. If measures of internal processes and ROI were effective for planning, controlling, and evaluating a firm's operation, why did they become irrelevant? Johnson and Kaplan attribute this decline to the rise of external financial (or, cost) accounting. As more companies became publicly owned, the demand for audited financial statements, which were based on objective, verifiable, and realized financial transactions also grew. Cost accounting also required that the income statement and balance sheet be integrated; that is, all period expenses or end-of-period assets had to be traceable to the original historical costs of recorded transactions. In other words, the financial statements were based on the same transactions. This resulted in cross-subsidized and distorted costs of inventory because they commonly apportioned indirect costs of production (i.e., resources) as a whole according to a common denominator -- they did not seek to determine the actual indirect costs a product incurred. The resulting "accounting cost" was used to value not only inventories left at the end of a period, but also units sold during the period. The goal of cost accounting was simply

to separate the costs of the period from costs in inventory (17:13,130-132).

Where the goal of firms such as General Motors in the 1920s and 1930s was primarily to remain competitive over an entire business cycle, the increased pressure and competition in today's business environment has led many firms to focus on short-term financial performance. That is, they focus on profit and ROI in the short run -- for example, quarterly. Rather than focusing on achieving objectives by developing new and better products, increasing sales, or reducing operating costs, Johnson and Kaplan postulate, managers in the increasingly competitive environment found they could "earn" profits by exploiting accounting procedures and reducing discretionary expenditures. These techniques included one-shot opportunities to lengthen depreciation, capitalize previously expensed items, and assume higher rates of return on pension fund assets (17:195-197).

Financial accounting became the foundation of "generally accepted accounting principles" (GAAP), and were often mandated by external reporting authorities such as the Financial Accounting Standards Board (FASB), the Securities and Exchange Commissions (SEC), and the Internal Revenue Service (IRS). The original intent of management accounting, to evaluate opportunities for gain and to control internal processes and in order to make value-creating investments and decisions, had been usurped by the valuation of inventory for financial purposes (13,197-198,200).

Although Johnson and Kaplan acknowledge that the management information technology during the early to mid parts of the century time was not advanced enough to make the maintenance of separate management accounting and cost accounting systems cost effective, they argue that the technology now exists to correct these discrepancies. However, cost accounting is entrenched to the point that there have been virtually no new innovations in management accounting since the 1920s. Johnson and Kaplan blame this on the fact that early digital cost systems simply automated the existing system. Furthermore, no new advances were made in academia because the dominant model for firm behavior was based on the almost obsolete single product model. This model broke all costs into fixed and variable costs without fully addressing where fixed costs come from and how they should be allocated among a firm's products. Cost accounting was very persuasive, according to the authors, when it was applied to this model. The problem was that industry was not organized according to the assumptions of the model, yet executives were using it to run their firms (17:13-15).

The problem not only exists, but also is exacerbated by ever-advancing technology. Whereas in the early twentieth century executives were very knowledgeable of the processes of their firms (many helped develop them), today's executives increasingly come from the financial and legal arenas and often do not understand the technology underlying these processes. The results, according to Johnson and Kaplan,

are that the executives make decisions based on increasing short term financial indicators, such as earnings per share and ROI. The authors warn where this situation is leading:

But as product life cycles shorten and as more costs must be incurred before production begins--for research and development, product and process design, capital investment, software development, and education and training--so that directly traceable product costs become a much lower fraction of total costs, traditional financial measures such as periodic earnings and accounting ROI become less useful measures of corporate performance. (17:16)

Suggestions for Improved Systems. Johnson and Kaplan suggest both that an organization's operation and strategy should drive the development of its management accounting system and that the system should measure a variety of nonfinancial measures that include manufacturing, marketing, and research and development success (17:256). In other words, the management accounting system would monitor the various processes that comprise the firm's operations.

The nonfinancial measure used would depend upon the strategy the firm was seeking and the factors that gave them a competitive advantage. For example, a company that competes on quality could measure defect rates, rework, machine downtime, incidence of customer complaints, or warranty costs. Low-cost producers, on the other hand, might look at measuring productivity improvements. Those concerned with design improvement can measure parts per product, breaking them out by those common to other products and those that are unique to a specific product, while firms emphasizing

innovation and high-performance products might be interested in tracking process milestones to determine length of time to launch a product. Finally, most firms realize that they derive benefits from their employees, yet most do not attempt to measure their progress in "enhancing the value" of this resource. Measures such as absenteeism, safety concerns, skills and training, and turnover could all help managers evaluate human resource trends (17:256-258).

Johnson and Kaplan suggest that measures such as these would be better than short-term financial measures for predicting the ability of a firm to achieve its goals because nonfinancial measures take into account the firm's strategy and performance factors. They virtually suggest, in fact, a return to the types of operations-based management accounting systems of the mid-nineteenth to early twentieth century (17:259).

The DoD sustainability issue seems well-suited for a system of this type because not only do the circumstances (such as the complexity of the problem and number of criteria) support Johnson's and Kaplan's arguments, but the Task Force itself recognizes the need to develop an operationally-oriented measure. Since strategy is a key factor in achieving organizational success, it seems advantageous to develop a measure that is tied to the strategic planning process. Although the BPPBS does provide this mechanism through its identification of national security objectives and incorporation of programs to achieve these objectives.

it appears that the financial, rather than the strategic, elements of the system drive current sustainability measures. A measure that focuses on internal processes would meet the criteria the Task Force established and still allow for a dollar-based metric. An emphasis on strategic planning and the processes that comprise combat operations, could, therefore, provide the link between sustainability and resource allocation.

Strategy and Performance. The term "strategy" comes from the Greek strategia, which translates as "generalship" It is defined as "The science of planning and directing large-scale military operations, specifically . . . of maneuvering forces into the most advantageous position prior to actual engagement with the enemy (28:1799). The term was appropriated, metaphorically, first by the political arena and then by the private sector. More recently, the term has made an additional transition into the public sector (25:36-87). The term is said to be used metaphorically in all contexts but the military because the environment in which the other sectors operate does not lend itself to a precise comparison. Despite this semantic problem, the term is used in all these contexts to emphasize the importance of strategic management on an organization's performance, and even its survival.

The following section of the literature review examines the concepts of strategy formulation and implementation in these arenas and emphasizes the similarities among these

applications. The implication is that an analysis of attempts by various private and public sector organizations to both select strategies that help them meet their goals and monitor performance measures that are driven by their strategies will yield information on how the military might proceed in developing a new sustainability measure. Such an analysis is performed in Chapter IV.

Levels of Strategy. In its generic context, strategy involves decisions concerning the allocation resources to increase the chance of attaining a stated objective (18:105). Strategy-related resource allocation decisions can either enhance or impede the process of strategy formulation. If a manager allocates too little funding, he diminishes the capability of his organization. On the other hand, too much funding is a waste of resources (26:224). It is clear that the budget process is a critical element of strategy. This statement, however, belies the complexity of this decision making process, for strategy is not a simple entity, but one that must be defined at all levels of an organization's hierarchy (11:13-21; 26:50-60).

In the military, for example, Drew and Snow define five interconnected steps in defining strategy. The first step is determining national security objectives. These are the building blocks of the strategy process. One example of a national security objective they cited was the Allies' demand for complete and total surrender of the Axis powers. As Drew and Snow so incisively noted, "Success without clear

objectives amounts to little more than bumbling good luck" (11:16). Formulating grand strategy is the second step. Grand strategy is defined as the development and use of the instruments of national power (military, political, and economic) to attain national objectives. Drew and Snow note this is also sometimes referred to as "policy." They further write that grand strategy is significant because it is the highest level at which the nonmilitary instruments of power connect with the military. While grand strategy assigns roles and missions to these instruments of power, the development of military strategy, which is the third step in the strategy process, entails the coordination, development, deployment, and employment of military forces to meet national security objectives. Designing operational strategy follows the development of military strategy. Operational strategy has a more narrow focus. It is the actual planning and orchestration of campaigns within a given theater of operations. Despite its narrow scope, it also plays a vital role in the achievement of national security objectives. Finally, the last step of the strategy process is the development of battlefield strategy, which is also known as tactics (11:14-21).

The private sector also seeks to create a hierarchy of objectives and strategies that spans all levels of authority in the organization. Thompson and Strickland present a four-tier hierarchy of strategy for achieving performance objectives. The broadest of these is the corporate-level

strategy. This level is concerned with the overall scope and mix of firm's activities and with prioritizing the allocation of resources among these activities. These questions address the position of the firm in its external environment. The line-of-business strategy is the next level of the hierarchy. It addresses similar concerns as the corporate strategy, but it is the game plan for running a particular business unit. The firm attempts to devise its competitive advantage (that is, the characteristic that distinguishes a firm from its competitors) at this level. Functional area support strategy is even more detailed than the line of business strategy because it involves the directing of a subordinate activity (e.g., marketing, R&D) within a business. The fourth and final tier is the operating level strategy describes the strategy-related actions of departmental heads and first-line supervisors (26:50-60). Table 1 summarizes, in descending hierarchical order, the military levels of strategy and their parallel levels of corporate strategy.

Characteristics and Factors Affecting Strategy.

The successful formulation and implementation of strategy depends upon ensuring that the strategy is consistent and that there is a commitment to it, as well as ensuring that complicating factors are considered.

Strategies that are inconsistent or that have not garnered a national consensus can lead to the failure of a given strategy. In the military, the ambiguous objectives

TABLE 1
LEVELS OF STRATEGY

<u>Military</u>	<u>Civilian</u>
National Security Objectives	
Grand Strategy (Policy)	Corporate-Level Strategy
Military Strategy	Line-of-Business Strategy
Operational Strategy	Functional Area Support Strategy
Battlefield Strategy (Tactics)	Operating-Level Strategy

of the Korean conflict and the opposition to American involvement in Vietnam resulted in "ignominious" ends to these campaigns (11:14-16). By explicitly stating strategies and ensuring support for them, decision makers can avoid contradictory choices. According to Grant and King, the simultaneous funding by the U.S. Government of cancer research and subsidizing of tobacco farmers, which represent two conflicting goals, illustrates a lack of consensus of overall strategy at the national level (16:5).

In business also, commitment to an objective is essential in building an advantage. Ghemawat writes that sustainability is related to a willingness to adhere consistently to a particular way of conducting business (12:58). Furthermore, Dierickx and Cool assert that when a firm

always acts punitively to a competitor's entry into the market, it gains credibility and extends the usefulness of its unique assets (10:1508). In addition, consistency and commitment culminate in a sustainable competitive advantage when competitors cannot easily replicate or substitute the distinctive competencies that are the firm's advantage (14:26). Bryson and Einsweiler summed up the importance of consensus in this way:

The specification of goals and objectives. . . does presume such consensus if the goals, objectives, budgets, and work programs are to be anything other than an organizational New Year's resolution. (5:4)

Similarly, consistency in strategy helps a firm achieve its goals. For example, competitive advantage, the unique position of a firm relative to its competitors, is built over time by formulating strategies and consistently following them (10:1506). Consistent, mutually enhancing strategies also help a firm attain its goals by encouraging cohesiveness and discouraging the advancement of pet projects and other deviations from the set priorities (26:60).

The environment in which an organization operates can also affect strategy formulation. The public sector, which includes the military, is strongly influenced by politics and other factors. Bozeman and Strausmann summarize this distinction in their phrase "political authority" which they consider to be the essence of public management. They write that this political authority transcends official policy actions. It includes intangible factors such as the degree

of confidence the people hold in the state and political culture. While acknowledging that political authority is the primary constraint on the public management environment, they also recognize that it provides the framework for action. Strategy is the key to solving this paradox (4:4).

In addition to politics, economics and technology can also influence strategy in the public sector, especially in the military sphere. The modern military puts enormous strains on the government. The all-volunteer force has increased personnel costs, advanced technology has resulted in more sophisticated and more expensive weapons, and more expenditures are going to stockpiling consumables because of their increased usage in recent conflicts. Since limited resources are available to fund these numerous, sometimes conflicting, needs, the military strategist has to perform a greater amount of risk management because he must balance current readiness against future capabilities (11:154-155).

Technology introduces another area of uncertainty in strategy formulation. Although technology can offer advances that increase combat capability, it also has drawbacks that must be weighed against potential gain. These drawbacks include the fact that technology can be replicated and countered by the enemy (given enough time), and the fact that the performance of technology cannot be predicted because ". . . technology tends to operate at the margins of military effectiveness" (11:158-160).

The most important influence on the strategy process as it applies to the military, however, is doctrine. According to Drew and Snow, this concept is peculiar to national security strategy objectives and is a statement of belief about the best way to conduct military affairs. There are three types of doctrine: fundamental, environmental, and organizational (11:163,168-169).

Fundamental doctrine provides the foundation for other types of doctrine; consequently, it is the broadest and most abstract. It defines the nature of war. The second type, environmental doctrine, addresses the beliefs about the conduct of operations in a specific environment (e.g., land, sea, or air). Finally, organizational doctrine looks at the mission of an organization as related to the current situation (11:168-169).

Using these definitions, Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine would be considered environmental doctrine since it concerns the application of military power in the air, although it also incorporate elements of fundamental doctrine. Similarly, Combat Support Doctrine, AFM 1-10, is primarily organizational doctrine because it is concerned with the immediate and ongoing role of particular forces while also addressing the general nature of aerospace power (7;9).

For example, AFM 1-1 makes some assertions about war, such as, "War is planned and executed at three levels: strategic, operational, and tactical" (7:1-2). The strate-

gic level incorporates the formulation of both grand, or national, strategy and military strategy. At this level, decisions integrate all instruments of national power and reflect national goals. The operational level of war is concerned with campaigns in a specified theater. Finally, battles and engagements comprise the tactical level of war (7:2-2).

The roles and missions of aerospace forces and the way in which to employ them, however, is the main thrust of AFM 1-1. These forces are assigned three combat roles and one support role. The combat roles are aerospace control, force application, and force enhancement, while the support role is force support. The force support role is concerned with the sustainability of operations and includes combat service support; air base establishment, operation, and defense; logistics; and on-orbit support. Because force support provides surface bases, large amounts of food, fuel, munitions, and other consumables, maintenance, spares, and human services, this role provides the foundation for aerospace mission accomplishment (7:2-2,3-5).

AFM 1-10 elaborates on the force support role, asserting that warfighting capability is created and sustained through the organization, training, and equipping of forces for employment and deployment. It broadly defines combat support, as ". . . the art and science of creating and sustaining combat capability" (9:1-1).

The doctrine also outlines principles that explain what makes combat support work best and provides a basis for decision making. Among these principles is that of effectiveness, which states that only actions that improve combat capability should be undertaken. This tenet recognizes that while it is incumbent upon military leaders to communicate defense needs, it is other public officials who make the funding decisions that balance affordability with the level of risk assumed. Air Force leaders, then, have a responsibility to maximize the return on defense investment. AFM 1-10 states that the cost of personnel and equipment are their life-cycle costs. By effectively exploiting the acquisition process (for example, by investing money early in the process for greatest cost-effectiveness), costs can be avoided and resources conserved. Furthermore, by improving the reliability, maintainability, transportability, and survivability of aerospace systems, Air Force leaders may be able to reduce the combat support structure necessary to sustain operations (9:3-2).

It can be demonstrated, then, that doctrine and strategy are interrelated because doctrine provides a baseline of experience from which to make strategic decisions. The two concepts also mutually support and enhance one another. As Drew and Snow write, if doctrine is followed but a campaign fails, it indicates that the doctrine could no longer be valid and the experience of this failure could be used to develop new doctrine. If, on the other hand, doctrine is

followed with positive results, this experience could also be added to the store of knowledge that is used to develop doctrine (11:173). Because "doctrine influences strategy and the results of strategy become the experiences that are the basis of doctrine" (11:173-174), it is imperative that doctrine not be allowed to stagnate.

Once the characteristics of strategy and the factors affecting it are understood and identified, it is possible to evaluate the strategy for appropriateness.

Evaluation of Strategy. Methods of evaluation of strategy can take a number of forms, such as subjective or empirical, but most focus on the same sort of result: the measurement of performance to determine if objectives have been met (15:232). Two questions to be determined are how the measure will be computed and what activities are to be measured. It is imperative, furthermore, that the performance measurement accurately reflect the objective being measured, and that the objective be tied to attainment of the overall goal. For example, if a firm's stated goal is to market technically advanced products, a performance objective measure might be to rely on the rating of an independent agency, and an appropriate performance measure might be tracking the ratings given the firm by Consumer Reports (2:230-231).

While this approach to evaluation is very sensible, it does not consider the additional factors present in the public management environment that affect evaluation. This

is mainly derived from the political influence inherent in this structure. According to Graham and Hays, there are at least three ways in which evaluation and politics are connected: programs represent the interests of their political sponsors; evaluation reports are just a part of the information that vies for the attention of politicians, and evaluations make "implicit political statements" (15:230).

The political factor increases uncertainty in performing evaluations because there is no "bottom line" or other easily identifiable objective of many public agencies. Bozeman and Straussman present an example of how this uncertainty worked to the advantage of Casper Weinberger when he was Secretary of Defense. Weinberger was able to acquire larger budgets by taking advantage of the fact that no one could quantify how much national defense a certain level of money bought, and no one wanted to admit the budget would allow for less than 100 per cent security. There was no method for pricing defense capability. Although Bozeman and Straussman recognize this ambiguity as a limitation, they suggest that by analyzing the steps in the process of producing goods and services, public managers can often determine "in a rigorous way" whether they are achieving their objectives, and, hence, can measure performance (4:14-15).

As an alternate approach for performing evaluation in public management, Graham and Hays suggest performing the evaluation from a systems approach to determine organizational effectiveness (15:231). A system is, in general, "

. . . a whole that cannot be subdivided into parts which have independent effects on it" (1:340). It is, then, a function of the interaction of its parts rather than the aggregate of these parts. Optimum performance occurs, not when each part of the system is made to function as well as possible, but when the system as a whole is made to function as well as possible. In other words, while all of its parts has an effect on a system, none acts on it independently (1:340).

Graham and Hays further note that another property of a system is that it is a means of converting inputs into outputs needed to attain goals. The idea behind the systems approach, then, is to fulfill these aims without using up all its resources or overstraining its main program elements. This is essentially a policy of resource conversion which, the authors argue, affects the social, political, and physical environment in which the system operates and influences the ability of the organization to obtain future resources. The model is predicated on the assumption that change in an organization's environment along with tradeoffs in organizational maintenance and development are important in determining effectiveness (15:231). Regardless of the method used, however, evaluation serves the same purpose: determining the effectiveness of an organization (15:231).

Conclusion. This literature review had two main purposes. The first was to develop an argument on which the thesis is based. The premise of the research is that, while the development of new measure of sustainability is perhaps

needed, the underlying guidance is invalid because it attempts to relate improvements in sustainability to dollar expenditures and inventory levels. An additional premise is that sustainability measures, along with other types of performance measures, should be based on an organization's strategy. This leads to the second purpose of the review, which was to present to the reader the purpose and goals of the strategic planning process and to show that this process is remarkably similar in all types of organizational structures.

Chapter Summary

This chapter contained two major sections: a presentation of the methodology and a literature review to present arguments on which the premises of this thesis are based. The methodology contained an explanation and a justification of the case study approach. The explanation portion gave a background of the general method and stated how cases would be selected and analyzed. The justification of the approach was based on the fact that the research is an attempt to develop a prescriptive theory.

The literature review was the most extensive portion of the chapter. It first provided a discussion of the reasons that the guidelines of the Sustainability Assessment Task Force are contrary to their stated objectives. This section compared the use and effectiveness of management and cost accounting in the private sector with the findings and

recommendations of the Task Force. The conclusion drawn from this was that financial measures are an inaccurate reflection of performance and that strategy-related measures should be developed instead.

The second section provided an outline of the strategic planning process. It attempted to show the reader that strategy formulation and implementation is of paramount concern to organizations in both the private and public sector. Furthermore, it showed that concepts about this process are very similar across organizations. The strategy portion addressed levels of strategy, characteristics of strategy, and evaluation of strategy. The intent of this discussion was to demonstrate that the tenets adhered to in both the private and public sectors are applicable to strategy formulation and performance measurement in the military.

The arguments presented in this chapter form the foundation of the analysis conducted in Chapter IV, and the conclusions and recommendations are presented in Chapter V.

III. Explanation of Model

Introduction

As mentioned in Chapter II, Michael Porter's Competitive Analysis model was used to evaluate the case studies in terms of the relationship between a firm's strategy and its performance. This model is appropriate not only because it is prescriptive in its results, but also because it considers the formulation and implementation of strategy from a systems perspective.

Porter states that all firms, either explicitly with a formal planning process or implicitly due to the activities that each department historically pursues, formulate strategy. If the strategy formulation is not centralized and formalized, Porter contends, each department will operate in a manner that is driven by the incentives of those in charge. He further concludes that the aggregation of these approaches is not the best strategy for the firm as a whole (23:xi11). His argument is reminiscent of Ackoff's contention, outlined in Chapter 2, that ". . . the performance of a system is not equal to the sum of the performance of its parts taken separately, but is a function of their interactions" (1:340).

The strategic planning process is the method by which firms explicitly formulate strategy in an effort to bring disparate departments together to achieve a common set of

goals (23:xiii). The generic strategy a firm pursues specifies how it should develop its competitive advantage. This advantage is the key to a firm's ability to create and sustain superior performance (22:25).

The remainder of this chapter, then, consists of two major sections. The first outlines Porter's framework for identifying and evaluating a firm's competitive strategy. The second section, also relying on Porter, considers the concept of the creation of value and how this helps a firm sustain a competitive advantage. By using this framework to evaluate case studies in the following chapter, the author hopes to be able to make recommendations concerning the Air Force's attempt to develop a new measure of sustainability.

Analyzing Competitive Strategy

Porter's method for analyzing strategy is documented in his book, Competitive Strategy: Techniques for Analyzing Industries and Competitors. He breaks the book down into three parts. The first considers the five competitive forces that are at work on an industry and uses these to analyze the structure of the industry. The second part builds on Part I and uses the analysis to help a firm determine how it should develop its competitive strategy given the environment of its industry. The third part consists of a discussion of the important types of strategic decisions a firm faces. Since this research focuses on the appropriateness and effectiveness of strategic planning as it relates

to a firm's performance, this discussion will focus exclusively on Part I. Furthermore, Porter considers structural analysis of paramount importance because it can be used to determine rapidly the nature of competition in an industry, and he concludes, therefore, that the bulk of strategic attention should be focused on this area (23:33).

Porter emphasizes the importance of a systems perspective in formulating strategy by noting that it is crucial for a firm to understand the environment in which it operates (23:3). The focus in this section is on four of the elements that comprise this environment: the structural analysis of the industry as whole, the generic competitive strategies available to a firm, structural analysis within industries, and the evolution of the industry.

Structural Analysis of the Industry. There are five basic competitive forces which shape the competitive nature in an industry. It is the strength of these forces that ultimately determines how profitable (i.e., successful) a firm can expect to be. The five forces are threat of entry, threat of substitution, bargaining powers of buyers, bargaining powers of suppliers, and rivalry among current competitors. While the collective strength of these forces determines the profitability picture, the relative strength of any of these forces drives strategy formulation (23:3-4).

Threat of Entry. These forces are at work in the public sector as well as the private sector, so public

managers must also be aware of the forces that affect their industry.

Client or customer power often is exercised in the public arena, and suppliers of services (e.g., organizations providing contract services and the government's or agency's own labor supply) also can exercise power. There are fewer new entrants, but recently the private sector has begun to compete more forcefully with public organizations. And governments and agencies also often compete with one another (e.g., public hospitals for patients, or states and localities for General Motors Saturn plant). (6:27)

New entrants to an industry are a threat because they encroach on competitors' market shares, reducing their profitability. The extent to which new entrants are considered a threat is determined by the barriers to entry that exist in an industry and the reaction of existing competitors. The stronger the barriers to entry and the more retaliatory the competition, the lower is the threat of new entrants (23:7).

There are seven barriers to entry. The first of these is economies of scale. Economies of scale occur when the unit costs of a product decrease as absolute output per period rises. They are found in nearly all functions of a business, including research and development, distribution, and purchasing, and they are a deterrent because they force potential entrants to either invest at levels that allow them to come in on a large enough scale to compete effectively or to come in on a smaller scale and assume a cost disadvantage (23:7).

Product differentiation is also a barrier to entry because new entrants must spend to overcome brand loyalty that competitors have established through avenues such as advertising and customer service practices. Similarly, firms might also be required to invest heavily in production facilities, up-front advertising, or starting inventories, so capital requirements become an additional barrier to entry (23:9-10).

Switching costs, which occur when the buyer changes his supplier, also create barriers because they often involve costs of researching new sources of supply, retraining personnel, and reequipping personnel or facilities. An additional reason new entrants may feel a financial strain is to secure distribution channels. While this does not entail direct expenditures, it could require that entrants offer distributors price breaks or other forms of compensation to accept their business. This is especially likely to happen when the logical distribution channels are saturated by competitors' business (23:11).

The final two barriers to entry are cost disadvantages independent of scale and government policy. Cost disadvantages independent of scale are those factors that give established firms an advantage and may be unavailable to new entrants. Such factors include favorable locations, access to raw materials, proprietary technology, and government subsidies. The government can also erect barriers to entry in other ways. For example, they may require compliance

with environmental or performance standards or with licensing regulations (23:13).

Substitute Products. Substitute products comprise the second competitive force. Firms are competing not just with businesses in their own industry, but also with those in industries that make substitute products. The nature of this force is found in the price-performance tradeoff that substitutes offer. Substitutes are products that perform the same function as the products of the industry of interest. As such, they limit the profitability of the industry by imposing a price ceiling on the product of the industry. The substitute products that have the greatest impact on a firm's strategy are those that logically could be expected to improve their price-performance tradeoff and those that are produced by industries that enjoy high profits (23:23-24).

Bargaining Power of Buyers. The bargaining power of buyers can also be a formidable competitive force because it, too, affects profitability as do substitute products. By bargaining for price breaks, increased service, or better quality, buyers can have a dampening impact on an industry's overall profitability. The extent of this impact is determined by the power the group of buyers (including individual consumers, retailers, and wholesalers) exerts. The following conditions indicate that a group of buyers is powerful:

1. If the buyer group is concentrated or comprises a large portion of total sales, it becomes more important to the seller.

2. If the buyer spends a large amount of its resources on the products of a given industry, he becomes powerful because he will be motivated to shop for the best deal.

3. If the industry produces undifferentiated products, the buyer has a number of substitute products from which to choose.

4. If the buyer incurs few switching costs, he is able to switch unsatisfactory suppliers easily.

5. If the buyer (as a firm) earns low profits, he becomes more price sensitive, and again, is motivated to shop for the best deals.

6. If buyers can integrate backwards (e.g., if they manufacture their own goods), they could be able to supplant current suppliers.

7. If the industry's products are unimportant to the quality of the buyer's final goods and services, they tend to be price sensitive and look for the lowest cost.

8. If the buyer has full information concerning demand and prices, he increases his bargaining power (23:24-26).

Bargaining Power of Suppliers. Like buyers, suppliers (which also include sources of labor) can exert bargaining power that affects competition. In contrast to buyers, who exert power by bargaining for price breaks and increased service, the source of the power of suppliers

stems mainly from their ability to raise prices or to reduce quality of their products in an effort to increase their own profitability relative to that of the industry they supply. Despite their different sources of power, the conditions that determine how powerful a supplier group is also help to determine the strength of suppliers as a competitive force:

1. If the supplier group is concentrated and the industry it sells to is fragmented, the supplier can negotiate more favorable terms of transactions.

2. If there are no substitute products to compete with the suppliers, the supplier group becomes more powerful.

3. If the industry is not an important customer of the supplier group, it cannot exert much influence on the suppliers because profitability of the suppliers is not tied to the industry.

4. Similarly, if the supplier provides the industry with an important product, the industry becomes dependent on the supplier for its overall profitability.

5. If the supplier group has differentiated their products, it becomes more difficult for the industry to switch to a different supplier.

6. If suppliers are in a position to integrate forwards (e.g., by performing retail or distribution of their products), they become a threat to the industry (23:27-28).

Rivalry Among Competitors. The final force of competition to consider is the intensity of rivalry among competitors in the industry. Rivalry occurs either when a

firm sees an opportunity to improve his position or when a firm feels pressure to take a particular course of action. For example, if the industry has engaged in a price war, all competitors may feel obligated to participate in order to remain competitive (23:17).

A number of structural factors in the industry determine the extent to which rivalry is present. When the following factors are present in an industry, rivalry can be expected to be more intense:

1. When there are a number of competitors, or when competitors are fairly equal in terms of size and available resources, competition will be intense. This is because a large number of competitors may give some firms the belief that they can act in an opportunistic way without attracting notice. On the other hand, when competitors are more equal rather than dominated by one or two strong firms, there is more incentive for the firms to jockey for position. Since the firms are nearly equal in retaliatory capability, this can lead to protracted "fights" among competitors.

2. Slow industry growth also encourages competition because not all firms that seek to expand market shares will be able to do so.

3. High fixed costs and high storage costs also contribute to increased competition. High fixed costs, as a proportion of value added rather than as a proportion of total fixed costs, are problematic because all firms will want to operate at full capacity. When excess capacity is

present, these firms will engage in rapid price cutting to salvage their competitive positions. Similarly, high storage costs can also lead to price cutting as firms try to maintain their market shares and ensure sales.

4. The lack of differentiation among products can also lead to increased competition because competitors products can be substituted freely. This induces competitors to increase advertising, improve service, or engage in cost cutting strategies.

5. Competition will intensify when, due to economies of scale, capacity must be added in large increments. If large investments in capacity are required, the industry could face recurring periods of excess capacity. This situation will drive them to cut prices and disrupt the demand and supply schedules.

6. The diversity of the competition, including the presence of foreign competitors and the differing strategies, goals, and organizational structures, can lead to increased competition because competitors must spend more time trying to gauge each other's intent. There are no implicitly agreed upon rules for competition in that industry.

7. If firms in an industry are seeking high strategic stakes, the effect can be destabilizing because the importance of achieving diverse goals might supersede the profit-seeking motive.

8. High exit barriers, which are factors that prevent a weak competitor from leaving an industry, can force the uncompetitive firm to remain in the industry and to resort to aggressive tactics to try to maintain a viable position. This can result reduced profitability for all competitors. Sources of exit barriers include assets peculiar to an industry; fixed costs of exit, such as terms negotiated in labor agreements; emotional barriers, for example, management's sense of loyalty to employees; and government or social pressure, for example, discouraging a firm from exiting an industry because of the loss of jobs it will bring to a region (23:17-21).

Generic Competitive Strategies. Once a firm has analyzed the structure of its industry by identifying and evaluating the strength of the forces of competition, the firm can formulate a competitive strategy that will help it optimize its performance. There are three generic strategies that a firm can choose from in order to outperform the competition: 1. overall cost leadership, 2. differentiation, and 3. focus. While a firm's strategy may incorporate elements of all of these strategies, only one should comprise the primary focus. The appropriate focus depends upon both the firm's strengths and weaknesses and the competitive forces acting on the industry as well as the commitment of management in pursuing the strategy (23:34-35,44).

Overall Cost Leadership. Overall cost leadership entails minimizing costs, relative to competitors, in re-

search and development, service, advertising, and other functions while simultaneously ensuring acceptable levels of quality and service are met. Cost reductions are pursued through construction of efficient facilities, drawing on experience, and aggressive cost control (23:35).

Although pursuit of this strategy can require high initial investment, the overall cost leader may enjoy above average returns in the industry while erecting effective defenses against the five forces of competition. For example, a firm seeking to be the low cost leader might be required to make an up-front investment in technologically advanced capital equipment. To take full advantage of this investment, the firm might also have to manufacture a variety of related products. It might also have to set prices below cost in order to build market share. Additionally, it might have to seek a unique advantage in the industry, such as favorable access to raw materials (23:36).

The benefits of this strategy however, can make it quite attractive. The cost position of the firm defends it from rivals because they will have to use their profits to compete with the cost leader while the cost leader is still earning returns. In addition, buyers exert little influence over the cost leader because their bargaining power extends only to the next most efficient competitor. Similarly, a firm that is the cost leader has more flexibility than its competitors in pricing because it can counteract increased costs levied by supplier groups. Furthermore, once it has

established itself in this position, it has effectively erected barriers to entry in the form of economies of scale. Finally, the low cost position means that the firm can successfully compete with substitute products (23:35-36).

Differentiation. The differentiation strategy also requires the firm to compete with the entire industry, but instead of seeking an advantage through low cost, the firm tries to make its products stand out from the competition. This uniqueness can be attained from the firm's image, design excellence or technology, or its service reputation (23:37).

This strategy can also provide defenses against the competitive forces but in a different way than that of the overall cost leader. A firm pursuing a strategy of differentiation attempts to produce premium products. Its advantage, therefore, is found in customer loyalty, which tends to minimize the threat from competitors. Since customers are willing to pay for the perception of exclusivity, they are less price sensitive than customers looking for the lowest cost, and, therefore, they wield less power since there are fewer substitutes (this also protects against the threat of substitutes). Additionally, differentiated products yield a higher margin which can be used to counter powerful supplier groups (23:37-38).

Focus. The third generic strategy, focus, differs from overall cost leadership and differentiation in its scope, although it does share some characteristics with

each. Rather than seek to implement its objectives industrywide, the firm that pursues a focus strategy attempts to service a particular segment of the industry very well. The firm may focus on a particular buyer group, segment of the product line or geographic market. Because it is competing in only a limited portion of the industry, the firm can pursue either a differentiation strategy, an overall cost leadership strategy, or both. It is important to emphasize that although the firm may be able to achieve both of these objectives, it will do so only in its segment of the industry and not in the industry as a whole. Furthermore, because it can realize some of the same advantages as the differentiation and cost leadership strategies, the focus strategy provides the same defenses against the five competitive forces (23:37-38).

Implementing a Generic Strategy. Although the functional aspects of the three generic strategies were discussed above, their successful implementation also depends upon other factors as well. The appropriate strategy must account for a firm's organizational and control policies, and it demands a commitment to the chosen strategy as the firm's primary target. Table 2 lists the skills and resources and the organizational requirements that are compatible with each strategy.

The firm's commitment in pursuing one of the three generic strategies is important because without it, a firm could find itself "stuck in the middle," which is an untenable

ble competitive position that limits the firm's profitability. If a firm is in the middle of the three strategies, it

TABLE 2
REQUIREMENTS FOR IMPLEMENTING STRATEGY

GENERIC STRATEGY	COMMONLY REQUIRED SKILLS AND RESOURCES	COMMON ORGANIZATIONAL REQUIREMENTS
Overall Cost Leader	Sustained capital investment and access to capital Process engineering skills Intense supervision of labor Products designed for ease in manufacture Low-cost distribution system	Tight cost control Frequent, detailed control reports Structured organization and responsibilities Incentives based on meeting strict quantitative targets
Differentiation	Strong marketing abilities Product engineering Creative flair Strong capability in basic research Corporate reputation for quality or technological leadership Long tradition in the industry or unique combination of skills drawn from other businesses Strong cooperation from channels	Strong coordination among functions in R&D, product development, and marketing Subjective measurement and incentives instead of quantitative measures Amenities to attract highly skilled labor, scientists, or creative people
Focus	Combination of the above policies directed at the particular strategic target	Combination of the above policies directed at the particular strategic target

(23:40-41)

means it has too little market share and capital investment to compete effectively in the low-cost arena. Since it has not established a differentiated product industrywide, nor can it compete on the basis of differentiation. Furthermore, since it does not have this differentiation, it has not eliminated overall cost leadership as a viable strategy. Finally, its lack of focus means that it is unable to pursue either of these strategies on a more limited basis (23:41). Figure 1 illustrates the conditions under which the strategies are appropriate.

Once the firm has performed a structural analysis of its industry, the choice of which generic strategy to pursue should be more clear. Ideally, the appropriate strategy is the one which capitalizes on the firm's strengths and is most difficult for competitors to emulate. Before making a final selection on strategy, however, the firm should be aware of the risks involved in each one so that it can make a more informed choice (23:44).

As mentioned above, a firm seeking to compete on a cost basis might be required to make large capital investments in state-of-the-art equipment. The cost leader must, therefore, be aware of technological improvements because it is attempting to erect barriers to entry based on economies of scale and experience. The risks inherent in this strategy include technological change that outdates past investment or training, the ability of newcomers to either imitate the leader's innovations or invest in more up-to-date equipment,

STRATEGIC ADVANTAGE

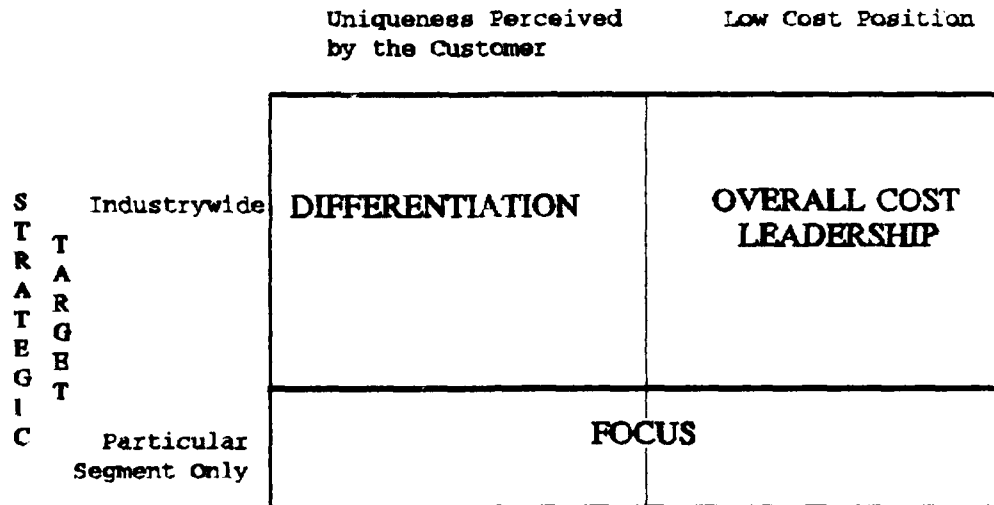


Figure 1. Generic Strategies (23:39)

the inability of the cost leader to recognize the need for technological change because of blind adherence to cost cutting, and the possibility that inflation will increase costs to the point that a firm pursuing another strategy (e.g., differentiation) will effectively become competitive with the cost leader (23:45).

Since differentiation is based on perceived uniqueness of a product and a willingness of the customer to pay for cachet, it carries its own set of risks. For example, a customer's willingness to pay for this uniqueness has limitations. If the cost differential between the firm that is the cost leader and one that is differentiated becomes too large, customers of the differentiated firm may switch brand preference. Similarly, a customer's desire for differentia-

tion may diminish as he becomes more sophisticated. Finally, a firm that is able to imitate the perceived uniqueness of a product may encroach on a differentiated firm's market share (23:46).

Focusing on a narrow segment of the industry does not insulate the focused firm from assuming risk. For example, if the cost differential of competing in a small segment increases relative to that of an industrywide competitor, the focused firm is vulnerable on two fronts. First, it makes the industrywide competitor more of a threat as a possible low-cost producer, and second, it could eliminate the focused firm's differentiated advantage if substitutes from other segments of the industry become available. The focused firm also faces risks if the characteristics of the targeted segment change. For instance, if the difference between products that the segment wants and products the industry as a whole wants narrows, the focused firm could find itself competing industrywide. On the other hand, if competitors are further able to subdivide the targeted segment, they could erode the focused firm's profitability (23:46).

Structural Analysis Within Industries. The concepts discussed in the preceding subsections provide a foundation for considering why some firms in an industry, given that the same competitive forces are at work for all competitors in the industry, consistently outperform others. The answer

lies in the dimensions of competitive strategy and the resulting formation of strategic groups (23:126-129).

Although there are only three generic competitive strategies, each of these strategies contains a variety of dimensions that increase the strategic options available to a firm:

- specialization: the degree to which a firm focuses its efforts on a particular geographic region, product line, or target customer segment;
- brand identification: the degree to which a firm seeks to instill customer loyalty rather than competing on the basis of another variable, such as price;
- push versus pull: the degree to which a firm fosters demand through developing brand identification rather than relying on distribution channels to sell its product;
- channel selection: the type of distribution channel a firm selects;
- product quality: the firm's emphasis on quality in terms of performance, features, and so on;
- technological leadership: the degree to which a firm develops, rather than imitates, innovations;
- vertical integration: the extent to which forward or backward integration adds value to a product;
- cost position: the extent to which a firm attempts to compete on the basis of cost versus some other factor;

- service: the degree to which a firm offers additional features, such as on-site service and credit, with its product;

- price policy: the firm's price position in the market. Although this position is affected by cost, other factors also help in its determination;

- leverage: the amount of financial and operating leverage a firm wields;

- relationship with parent company: the requirements a parent company levies on a unit. These requirements are influenced by the organizational structure of the parent company (e.g., it could be diversified conglomerate or a vertical chain of businesses);

- relationship to home and host government: the nature of these relationships affects the extent to which firms are offered assistance and are regulated (23:127-129).

To analyze structure within industries, the competitors can be grouped along these dimensions. Those that follow similar strategies along these dimensions form "strategic groups." While there are a number of reasons that account for the presence of strategic groups (for example, initial differing strengths and weaknesses and time of entry into the business), firms in a particular group tend to become similar in ways other than the broad strategies they pursue. They might have the same size market share, and they can be expected to respond to external and internal events in a similar manner. Since this is the case, there are not only

barriers to entry into the industry, but mobility barriers that can prevent a firm from switching from one strategic group to another. Additionally, different groups have different mobility barriers, and this influences the profitability of firms. Strategy formulation, then, involves choosing a strategic group in which to compete (23:129-130,133-134,149).

Broadly stated, the choice of which strategic group to enter can be made by finding the optimal match between a firm's strengths and weaknesses and the opportunities and risk in the environment. By enumerating the following factors, a firm can identify its strengths and weaknesses:

Strengths

- * factors that build the mobility barriers protecting its strategic group;
- * factors enhancing the bargaining power of its group vis-a-vis buyers and suppliers;
- * factors insulating its group from rivalry from other firms;
- * greater scale relative to its strategic group;
- * factors allowing lower costs of entry into its strategic group than others;
- * strong implementation abilities vis-a-vis its strategy relative to its competitors;
- * resources and skills allowing the firm to overcome mobility barriers and move into even more desirable strategic groups.

Weaknesses

- * factors that lower the mobility factors protecting its strategic group;
- * factors worsening the bargaining power of its group vis-a-vis buyers and suppliers;
- * factors exposing its group to rivalry from other firms;
- * smaller scale relative to its strategic group;
- * factors causing higher costs of entry into its strategic group than others;
- * weaker implementation abilities via-a-vis its strategy relative to its competitors;
- * the lack of resources and skills that would allow the firm to overcome mobility barriers and move into even more desirable strategic groups.

(23:149)

The firm's strengths and weaknesses will help determine which strategic opportunities will be advantageous to its overall performance. There are several broad categories of opportunities:

- * The firm can create a new strategic group;
- * It can shift to a group that is better suited to its strengths and weaknesses;
- * The firm can either strengthen the position of the group as a whole or its own position in the group;
- * The firm can try to enter a new strategic group

(23:150).

Finally, the risks in the industry's environment should be evaluated. There are two types of risk. The first are threats to the firm's current position, or risks of inaction, and the second are the risks of taking advantage of opportunities. Threats to a firm's current position include the threat of entry from other firms into the strategic group and the threat of weakening the five forces of competition at work in the strategic group. Risks from pursuing other opportunities, on the other hand, include the risks that are associated with investments that erect mobility barriers and the risks that stem from actions taken to overcome mobility barriers when entering new groups.

The appropriate strategy for a firm, then, is derived from an analysis of all these factors. According to Porter, structural analysis is the most crucial determinant of strategy because many important strategic breakthroughs are

the result of changing structure. By analyzing the firm's position in the industry and the structure of the industry, therefore, it is possible to evaluate and predict performance in the market place (23:151-152).

Industry Evolution. Although structural analysis provides the primary determinant for strategy formulation, an understanding of the evolution of the industry is also important because it will help the decision maker to predict change. A firm that can correctly ascertain the process of the industry's growth has an advantage because the costs of acting strategically increase as it becomes apparent that change is needed. In other words, the firm that first detects the need for change will incur lower costs to react to this need (23:156).

Perhaps the most well known concept for predicting industry evolution is the product life cycle. This "model" asserts that industries generally follow an S-shaped curve as they progress through the four stages of the life cycle. These stages are introduction, growth, maturity, and decline. The S shape is derived from the assumption that that growth is flat in the introductory phase due to the difficulty of establishing a product in the marketplace. Once the product becomes successful, growth sharply increases through the remainder of the growth phase as competitors rush to enter the market. The curve then tapers off as the market becomes saturated, and finally, growth declines as substitute products are introduced (23:157-158).

Although this concept is useful as an illustrative tool, it seems less effective in actually predicting evolution. The criticism it has elicited centers on the fact that it tends to oversimplify the pattern of growth. For example, it posits an S-shaped curve regardless of the type of industry under consideration; yet, the duration of the stages can vary among industries. In fact, not all industries necessarily progress through the four stages. Furthermore, companies can affect the shape of the firm by their strategic decisions (23:158,162).

Rather than describe industry evolution, Porter contends it is more useful to look at the processes that comprise evolution. While the initial structure of an industry is determined by the economic and technological characteristics of the industry itself and the skills and resources of early entrants, the "potential structure" of an industry describes the structures an industry could achieve, given the accuracy and success of its competitors' decisions in response to various dynamic processes (23:163-164).

Change in Growth and Buyer Segment. The foremost of these processes is long-run change in growth. The prospect of growth in an industry makes that industry attractive for investment. Consequently, growth determines how intense the rivalry will be. Changes in the buyer segment also influence industry evolution because it can have an impact on industry structure. For example, firms may have to strive to take advantage of economies of scale or scope when

a product that had been marketed to a select group of buyers is demanded by another group (23:169). This happened with both electronic calculators and personal computers.

Learning by Buyers and Reduction of Uncertainty.

Learning by buyers also has an impact on the industry. As the buyers become more sophisticated about products, they not only demand increased performance and service, but also could pose a credible threat of backward integration. The industry, then, must find a way to offset buyers' experience. Learning also takes place among the industry's competitors. As they learn more about the nature of the products and customers, they reduce their uncertainty. Although this process allows them to refine their operations, the reduction of uncertainty may attract new entrants (23:170-171).

Diffusion of Proprietary Knowledge and Accumulation of Experience. Similar to reduction of uncertainty is the diffusion of proprietary knowledge and the accumulation of experience. As technology, especially unprotected ideas, becomes entrenched in an industry, competitors and potential entrants learn about it through inspecting a firm's product (e.g., backward engineering) and through sources of information such as a firm's suppliers, buyers, and former personnel. The firm that has an experience curve, particularly when it stems from proprietary knowledge, influences industry evolution because it forces competitors to react to its strategy (23:172-175).

Innovations. Innovations of various types increase a firm's store of knowledge and experience. Three such types are product, marketing, and process. Product innovation can influence market structure by encouraging industry growth (i.e., increasing demand) or by enhancing differentiation. Either option can lead to increased barriers. Marketing innovations influence industries in the same way, but they achieve this through new ways of using the advertising media and distribution channels. Similarly, process innovations also erect economies of scale and other barriers by making operations more or less capital intensive (23:177-179).

Changes in Scale. As evolution progresses and an industry grows, it is increasing its scale. This expansion affects industry structure by increasing the number of strategic options available to a firm. For example, it can substitute capital for labor or seek to achieve economies of scale. It may even vertically integrate, which would erect barriers to entry and mobility. Entry and exit in general, therefore, will also affect structure because they change the concentration of competitors in the industry (23:175-176,182).

Structural Change in Adjacent Industries. The foregoing processes were alike in that the industry can exercise a relative amount of control over them. There are, however, other evolutionary processes generated in the industry's external environment that also affect the struc-

ture of the industry. One of these is structural change in adjacent industries. Adjacent industries include the industries of the firm's buyers and suppliers. As they undergo structural changes, such as changes in number of competitors and vertical integration, they affect the primary industry because they exert different amounts of power. In other words, these changes affect the forces of competition at work in the primary industry and, therefore, affect the strategic planning process (23:180-181).

Changes in Input Costs and Exchange Rates. Changes in input costs and exchange rates can also influence the structure of an industry because they affect both the supply and demand of the product and the shape of the cost curves. Input costs include wage rates, material costs, the cost of capital, communication costs, and transportation costs. Increases or decreases in these inputs affects all aspects of a firm's operations. For example, cost is a determinant in which channel of distribution to use, how to best capture economies of scale, etc. (23:176-177).

Government Policy. Because government policy erects barriers to entry, it also affects the structure of an industry. Policies that have the most profound effect on structure include sweeping regulations on entry into the industry, competitive practices, and profit structure. Policies that govern product safety and environmental issues influence the structure less directly because they often

result in increased costs to firms, which tends to eliminate smaller or less efficient competitors (23:181).

By determining how these evolutionary processes are at work in an industry, competitors can glean important strategic information that will help them predict industry changes (23:183-184). That is, a firm can guide its strategic planning process by analyzing each of these evolutionary processes. For example, by finding out what government policies are under consideration that affect the industry, a firm can make strategic decisions that either exploit or counter the policy.

Sustaining Performance

The concepts of structural analysis, generic strategies, and industry evolution are essential in describing and understanding the environment in which an industry or firm operates. They are the building blocks of strategy formulation. The choice of which competitive strategy to pursue depends upon both the attractiveness of the industry (i.e., the prospects for future profitability) and the firm's relative competitive position within the industry. Therefore, the choice of strategy and how effectively it is implemented determine how well the firm performs. The relationship between strategy and the environment, then, is circular: the selection of strategy is influenced by environmental factors and attempts to shape the environment (22:1-2).

Competitive Advantage. Once the structure of an industry is understood, a firm can use this knowledge to develop a competitive advantage. "Competitive advantage" refers to the way in which a firm implements a strategy in order to sustain superior performance. This advantage relies upon the value (the price a customer is willing to pay) a firm is able to create for its buyers that is in excess of the cost of producing it. To understand competitive advantage and the creation of value, it is necessary to consider all the separate activities that comprise a firm's operations. The competitive advantage, therefore, is the focal point of strategic planning and provides the context in which the actions of all functional areas of the firm takes place (22:3,25-26,33).

Porter cautions against merely listing the steps needed to implement a specific course of action. He stresses that the course of action should be tied to the attainment of a specific competitive advantage. For example, he states that many firms use market share as a gauge of their competitive position. That is, they espouse the goal of achieving leadership positions in each of their markets. Although this may seem to be a specific and clear goal, Porter argues, "While market share is certainly relevant to competitive position . . . , industry leadership is not a cause but an effect of competitive advantage" (22:25-26). In order to effectively implement strategic planning, Porter offers the "value chain" as an analytical tool for examining the active-

ities a firm performs and, thereby, identifying sources of competitive advantage (22:33).

The Value Chain. All firms perform activities that center on the designing, producing, marketing and distributing of their products or services. The manner in which they perform these activities can enhance both their cost position and their basis for differentiation. The value chain breaks down a firm's activities according to their strategic relevance in order to understand the underlying cost structure and sources of differentiation. By performing these activities better than competitors (i.e., more cheaply, effectively, or efficiently), a firm develops a competitive advantage (22:33-34).

A firm that is able to perform these activities better than its competitors will be profitable. That is, its cost of creating value will be less than the value it produces, which is the goal of any strategy. So value, rather than cost, is the appropriate measure of competitive position because firms pursuing a differentiation strategy sometimes inflate costs so that they can command a higher price for premium products (22:38).

Porter elaborates further on the necessity of analyzing the value chain, as opposed to value added, when examining competitive position:

Value added (selling price less the cost of purchased raw materials) has sometimes been used as the focal point for cost analysis because it was viewed as the area in which a firm can control costs. Value added is not a sound basis for cost analysis, however.

because it incorrectly distinguishes raw materials from the many other purchased inputs used in a firm's activities. Also, the cost behavior of activities cannot be understood without simultaneously examining the costs of the inputs used to perform them. Moreover, value added fails to highlight the linkages between a firm and its suppliers that can reduce cost or enhance differentiation. (22:39)

Value Activities and Margin. Total value is comprised of two major elements: "value activities" and "margin." Value activities, as mentioned earlier, are the discrete activities a firm conducts to bring its product to market, so they are the means by which a firm creates a valuable product. Margin reflects the difference between the total value created and the aggregate cost of creating it (22:38).

All value activities have common characteristics. They all use purchased inputs, human resources and technology, and, perhaps most importantly, they all create information. This information includes buyer data that can be gleaned from order entry, performance parameters determined through testing and product failure statistics. In addition to providing information, these activities can also create financial assets and liabilities such as inventory, accounts receivable, and accounts payable (22:38). The information produced by value activities is important because it also can provide a way to measure margin. Porter asserts that margin can be measured in a number of ways (22:38), yet he does not elaborate on this point. It seems reasonable, however, that since he stresses the importance of examining

the process of creating value, the information the processes yield, such as those mentioned above, provide ready performance measures.

Primary Activities. There are two types of value activities, primary activities and support activities. Primary activities are those that are involved in the actual creation, sale and distribution of a product, as well as any after-sale service assistance. Regardless of the product, primary activities fall into one of the following five generic categories: inbound logistics, operations, outbound logistics, marketing and sales, or service. Each of these activities can be further subdivided into any number of distinct activities (22:37-38).

Inbound logistics are those activities that are concerned with receiving, storing, and distributing inputs to the product. Such activities include material handling, warehousing, and inventory control. Operations are the actual creation of the product and consist of activities such as machining, packaging, assembly, and testing. Outbound logistics activities include finished goods warehousing, order processing, scheduling, and all other activities required to collect, store, and distribute the product to buyers. Marketing and sales provide both a means for a buyer to obtain a product and a method for inducing them to do so. These activities include advertising, sales, promotion, and pricing. Finally, services are activities that allow a firm to maintain or enhance the value of a product.

Example of these activities are installation, repair, training, and parts supply (23:39-40). The relative importance of each of these activities as a source of competitive advantage will vary depending upon the industry. For instance, a service firm that provides the service on the premises, such as a restaurant or hair salon, may have little need for outbound logistics, while a distributor would emphasize both inbound and outbound logistics (22:40).

Support Activities. Support activities, like primary activities, also consist of generic activities that can be broken down into distinct activities. There are four generic support activities: procurement, technology development, human resource management, and firm infrastructure (22:37,40).

Procurement is the act of acquiring the inputs to a product. These purchased items include both consumables, such as raw materials and supplies, and durable items such as machinery and buildings. Technology in some form is also inherent in each value activity. Examples of types of technology are knowledge, process, and innovations in process equipment. Generally, technology development is employed to improve the product and process. It includes basic research, product design, media research, process equipment design, and servicing procedures. Human resource management is concerned with the recruiting, hiring, training and development, and compensation of employees. Because it provides a means of determining the skills and motivation

of employees as well as the costs of hiring and training, human resource management affects competitive advantage. In labor-intensive industries, like the military, it can hold the key to competitive advantage. Firm infrastructure is unlike the other support activities because it supports the entire value chain rather than specific activities. General management, planning, finance, accounting, legal, government affairs, and quality management are examples of a firm's infrastructure (22:40-43).

Linkages. In addition to the primary and support activities, a third important characteristic of the value chain are linkages. While value activities delineate the building blocks of competitive advantage, it is important to note that these activities are interdependent and form a system of activities. Linkages provide the means for this interdependence by establishing the relationships between the performance of one activity and the cost or performance of another (22:48).

Linkages can lead to competitive advantage through optimization and coordination. For example, a manufacturing firm can reduce scrap and simplify production by purchasing high-quality, pre-cut steel sheets. Reducing the need for inventory throughout the firm by better coordination is another example of how linkages can foster competitive advantage. Information systems can be extremely helpful in providing the information that enables a firm to recognize

and exploit these types of relationships among activities (22:48-50).

Linkages occur not only within a firm's value chain, but also between a firm's chain and those of its suppliers and channels (channels provide services such as sales and advertising). Porter calls these relationships "vertical linkages." Since suppliers provide inputs to a firm, their performance affects the cost or performance of the firm's activities. Therefore, these linkages also provide opportunities to improve competitive advantage. In fact, optimization and coordination can help both the firm and its suppliers simultaneously improve their performance. Collaboration, in other words, can be mutually beneficial (22:50-51). This argument has important implications in the public sector where organizational success often depends upon collaboration rather than competition (6:28).

A firm's value chain also interacts with buyers' value chains because the firm's product is an input into the buyer's chain. The way in which the chains interact results in differentiation. A firm seeks differentiation by creating value for the buyer by either lowering the buyer's cost or raising its performance (that is, increases its satisfaction). As in the interactions of all value chains, the points at which activities intersect (which Porter calls "contact points") provide potential sources of differentiation (22:52-53).

By identifying its primary and support activities, along with the linkages among activities, a firm can determine potential sources of competitive advantage that will help it implement its chosen strategy and sustain superior performance. The checklist at the appendix summarizes Porter's framework for performing the analysis that will help a firm both determine the appropriate competitive strategy and measure its performance.

Chapter Summary

This chapter contained a discussion of the Michael Porter's competitive analysis model that is used in Chapter IV to analyze the case studies. The concepts of competitive strategy were discussed in the first section. This consisted of a framework for performing a structural analysis of an industry, a discussion of the three generic competitive strategies, techniques for performing a structural analysis within an industry, and a method for predicting the evolution of an industry. These tools offer the means by which a firm chooses its competitive strategy.

The second section built on this framework. It presented the concept of competitive advantage which addresses how a firm actually implements a generic strategy. The underpinning of competitive advantage is the value chain. This is an analytical tool in which a firm disaggregates its operations into discrete activities in order to identify the

potential sources of advantage that will help the firm to sustain performance.

Finally, the checklist at the appendix summarizes the ideas behind competitive strategy and competitive advantage and depicts the process by which the case study analyses in Chapter IV were performed.

IV. Analysis

Introduction

The analyses of four case studies using Porter's model are presented in this chapter. While all cases focus on strategy formulation, implementation, or evaluation, both the decisions facing the firm and the operating environment are very different. The first two cases center on the electronic components distribution industry. Raytheon, a major manufacturer of electronic components, is considering entering the distribution industry. Cramer Electronics, on the other hand, is a national distributor of electronic components that is seeking to shore up its eroding competitive position. In the third case, Mobil Corporation has undertaken strategic petroleum exploration in an effort to increase its reserves of crude oil. Finally, the fourth case considers the welfare services program in Lincoln County, New York, and its attempt to improve the performance of its Title IV-D program.

Diverse cases were selected in order to demonstrate the flexibility in the application of this model. Both private sector and public sector organizations are included, and these agencies operate locally, nationally, and internationally. In addition, these cases consider strategic decisions at all levels of the organizational hierarchy. The checklist at the appendix was used to evaluate all cases.

Raytheon Company

Raytheon Company is located in Lexington, Massachusetts. In 1975 it was the 124th largest company in the United States, with sales of 2.2 billion dollars. Previously, the U.S. government had been Raytheon's primary customer, but the company had been actively diversifying so that by 1975, 63 per cent of sales came from commercial sources. This policy of diversification was largely responsible for Raytheon's 15 per cent growth in earnings per share over the previous ten years (21:19)

Given its success with diversification and considering that it is both a manufacturer and a major purchaser of electronic components for use in many of its divisions, Raytheon is considering entry into the electronic components distribution industry. This vertical integration would also offer the potential for outside sales. The company is aware that there are a number of distributors available for purchase, but first senior management wants to develop the best strategy for entry into the industry (21:19).

Structural Analysis of the Industry. The electronic component distribution industry can be characterized as a fragmented (no firm has a significant market share) service industry. Distributors service a broad range of customers, from very small one or two-person shops to large firms like General Electric. In fact, for small customers, distributors are often the only source of supply because manufacturers are unwilling to fill small orders. Regardless of size

however, all customers are interested in quick delivery because components are generally crucial inputs to their products. By offering rapid delivery and servicing small accounts, distributors handled 23 per cent of component sales in 1975 (21:3-4).

This industry grew alongside the electronics industry itself, distributing semiconductors, capacitors, resistors, connectors, and other components. Products are grouped into two categories: active and passive. Active components act upon the electrical currents that pass through them. These products, which include vacuum tubes, transistors, integrated circuits, large-scale integrated circuits, and microprocessors, have tended to have a revolutionary effect on the electronics industry by reducing the size of the components while increasing the number of functions they can perform. Passive components, on the other hand, influence the behavior of electrons emitted by active components. These products include resistors, capacitors, inductors, transformers, and connectors. Passive components are considered to be on a technical plateau, are easy to produce, and are seen as standard, off-the-shelf items (21:3-5). The difference in the nature of these components has an effect on the structure of the industry.

Barriers to Entry. In general, there are few barriers to entry in this industry. Order processing, a major function of the industry, is not considered to offer economies of scale. Furthermore, both active and passive

components are highly standardized. Since components are relatively inexpensive, there are no difficult capital requirements. Most items are valued at less than 50 cents, with the range running from a fraction of a cent for some items to 20 dollars for a microprocessor. There are no switching costs in the industry, and customers change distributors frequently. In addition, there appears to be easy access to distribution channels. Distributors use everything from forward stocking locations to air freight. Finally, there are no cost disadvantages independent of scale (21:4,6-9).

Substitute Products. Since there are no other products that can perform the function of electronic components, this competitive force has no impact on the industry.

Bargaining Power of Buyers. Buyers tend to exert a strong competitive force overall, although many of the characteristics of a powerful buyer are not present in the industry. For example, there is no single, very large customer, and the buyers are not concentrated. Although there is some concentration of buyers in certain geographical markets (e.g., California, Massachusetts, and Texas), customers are located nationwide. Similarly, customers do not tend to spend a large amount of their resources on components (because components are fairly inexpensive); however, these components are extremely important to the customer and are used in a wide variety of products. As noted above, the industry produces undifferentiated prod-

ucts, so there are no substitutes. Although this would tend to make the buyers dependent on the distributors, the fact that customers incur very few switching costs means that they are able to shift allegiance easily. The threat of backward integration varies depending upon the size of the customer. While small companies pose little threat, large firms, such as Raytheon, pose a very credible threat. Perhaps the biggest threat that buyers present to the distributors is the fact that they know the maximum retail prices because manufacturers publish price books. Although buyers do pose a significant threat to distributors, it is not as powerful as that presented by suppliers (21:4-10).

Bargaining Power of Suppliers. Unlike the buyer group, the supplier group meets nearly all of the characteristics that comprise a strong competitive force. It has been established that the distribution industry is fragmented; additionally, the manufacturers of active components are highly concentrated, while manufacturers of passive components are less so. In 1973, for example, the top four manufacturers of active components accounted for over 60 percent of the market, and all were experiencing rapid growth. Since there are no substitute products, the fortunes of distributors are tied to the manufacturers. The distributors are not unimportant customers of the suppliers because the distributors fill a gap in the services provided by the manufacturer. However, the relationship between suppliers, especially active component manufacturers, and distributors

is adversarial. For example, while manufacturers do set up franchises that allow distributors to sell their products, these deals do not include exclusive rights to an area or protection from competition. In fact, manufacturers have been known to set up additional franchises in a territory if the distributor accounted for more than 10-15 per cent of the manufacturers sales. Additionally, manufacturers often compete with distributors for large orders. Also, the suppliers provide the industry with an extremely important product. The electronic components distribution industry would not exist if it were not for the electronics industry. Not only do suppliers exert a competitive force through their bargaining power, but their relationship with distributors also affects the nature of competition within the distribution industry (21:4,8-10).

Intensity of Rivalry. The competitors in this industry are concentrated. Although there are hundreds of firms that service regional markets, these distributors have been steadily losing ground to the few large national firms. In 1975, for example, the top two firms accounted for 29.7 per cent of sales, and the top five firms were responsible for 46 per cent. Despite these figures, there is no clear leader in the industry. Since the distribution industry is linked to the electronics industry, which has been expanding quickly, it has enjoyed growth of almost 15 per cent a year. These factors, along with the fact that capacity does not need to be added in large increments and there are few exit

barriers, tend to decrease the intensity of the competition. However, in 1975, the industry was affected by the general recession which resulted in increased inventories and high fixed costs due to inflation. The recession, and the fact that the industry deals with undifferentiated products, helped to increase competition. The competition was diverse in terms of strategies, with some firms competing in different scopes and specializing in different product lines. Additionally, many firms were seeking high strategic stakes by cutting prices. These factors tend to intensify competition. Strong competitive forces, then, are exerted by the threat of entry, strong suppliers, relatively strong buyers, and intense rivalry (21:3,10-12). Since Raytheon is trying to define the strategy it would use if it entered the market, it is appropriate to first look at its position in the electronics industry.

Structural Analysis within an Industry. This case indicated a number of strengths Raytheon possesses. First, it is considering buying a distributorship and has an excellent track record with its diversification efforts. Also, the company enjoys very good relationships with its subsidiaries, which, given the usual adversarial relationship between manufacturers and distributors, could translate into a competitive advantage. Also, not only is Raytheon one of the largest purchasers of electronic components in the country, but also some of its divisions develop prototype components for new uses. Furthermore, the company has an exten-

sive engineering capability that allows it to devise a broad range of applications (21:20-21).

These strengths are partially offset by a weakness. Raytheon's Semiconductor Division had been neither an important profit center within the company nor an important force in the semiconductor manufacturing industry. Still, the company is in a good position to take advantage of the strategic opportunities present in the industry. First, the active component industry believes there is a learning curve in the industry. Consequently, it tries to force down unit production costs by through standardization and price cutting (21:5,21). This affects the price that distributors can charge. Raytheon, then, is in a position to create a new strategic group with its distributor, perhaps by competing through service and a different price policy. Additionally, Raytheon's distributor could enter an existing strategic group and enhance the position of that group. Regardless of how it chooses to compete, the company is at very little risk for taking no action at all. It is acting from a position of strength in that it is seeking to diversify in an attempt to enhance its current position, rather than trying to counteract an eroding one. If it does nothing, it will not be worse off. Similarly, the risks from diversifying are fairly low. A distributorship requires relatively little capital investment, and if it fails, Raytheon can simply return to the way it has always done business. Any

strategy the company pursues, however, should capitalize on its strengths.

Generic Strategy. Considering the strengths of Raytheon and the current state of pricing in the active component industry, the company should consider having its distributor compete on the basis of differentiation. Although the products cannot be differentiated, there are many opportunities to differentiate based on service. Furthermore, the uses for the product are diverse.

Raytheon possesses many of the skills, resources, and organizational requirements to implement such a strategy. For example, it has the product engineering capability and a capability in basic research (such as in the prototyping of components), along with the ability to attract skilled people. Additionally, it has a long tradition in the industry. These skills and resources could be used to fill a void that exists in servicing customers since no distributor currently has an engineering staff that can address technical questions. Since Raytheon traditionally enjoys good relationships with subsidiaries, it would be easy for them to provide its distributor with this capability. Furthermore, Raytheon has proven that it is committed to its subsidiaries by allowing them autonomy, providing them with resources and access to corporate management, and fostering technology transfers (21:7,21). Raytheon could continue to pursue a strategy of differentiation as long as it remained aware of changes in the industry.

Industry Evolution. Raytheon has already demonstrated that it monitors changes in the industry by its desire to diversify. As the industry has evolved, the buyer segment has changed as more applications are found for components. Consequently, evolution has also been characterized by learning by buyers as they become more sophisticated. Also, since distributors are so reliant on manufacturers, any changes in that industry are bound to affect the distribution industry. Perhaps the most important factor in industry evolution, then, has been the explosion of product innovations. In the active component segment in particular, successive products have revolutionized the industry. The changes in the industry, competitive forces at work, and position of the distributor all help determine the appropriate strategy. Sustaining performance, however, depends upon the distributor's ability to perform value activities better than its competitors.

The Value Chain. The primary activities of distributors are holding and managing inventory, holding and managing accounts receivable, providing fast service in meeting orders, and servicing small orders (21:4). The way in which order processing, warehousing, inventory control, returns to manufacturers, packaging, shipping, advertising, sales calls, pricing, and other operations related to these primary activities is accomplished will affect a firm's performance. Support activities similarly affect the level of performance of a firm in this industry. Procurement is

vital in this industry. If a distributor is not able to negotiate with a manufacturer for components, its chances of overwhelming success are slim. Also, since this industry is service oriented, human resource management is also important. It is well established that a knowledgeable sales staff is needed, and there are strong indications that the ability to recruit technical personnel will help a firm achieve a competitive edge.

The linkages among these activities are numerous. For example, the number and location of the warehousing operations affects inventory control, and the efficiency of the shipping department affects the relationship between the sales force and the buyer. There are also linkages with both the buyer and the supplier. For instance, the ability of the distributor to get the part to the supplier quickly, or when needed, has an impact on the production of the end item. Similarly, the pricing policies of the manufacturers affects the profit potential of the distributor.

These linkages provide information that can help a firm determine how well it is performing. The firm should be particularly concerned with the activities that are the cornerstone of the strategy. If Raytheon chooses to compete in the electronic component distribution industry with a differentiation strategy, for example, it would be concerned with providing excellent customer service. Appropriate measures of success could include the percentage of on-time deliveries, the accuracy of the order processing function,

length of time for delivery, incidence of stock outs, and inventory turns. Improving the way in which inventory control and shipping interact can increase the percentage of on-time deliveries, for example. This could be achieved by streamlining activities or by introducing a computerized tracking system.

The possibilities of improving linkages are almost endless, and the information they provide yields a much better measure of how well a firm is performing and implementing its strategy. While traditional financial measures such as market share and ROI may provide an indication of the viability of the firm, they do little to actually assess performance. The succeeding cases provide additional examples that illustrate this point.

Cramer Electronic

This case also deals with the electronic component distribution industry. It was selected because it provides a different strategic decision. Whereas Raytheon was making a decision regarding corporate strategy, Cramer Electronic was trying to retain a competitive edge in its business, so it was concerned with line of business strategy. Since the industry analysis was already presented in the Raytheon case, this analysis will begin with the generic competitive strategy.

Cramer Electronics, Inc. is located in Newton, Massachusetts. By 1976 it was the country's largest distributor

of electronic components to industrial customers. As the electronics industry grew, so did Cramer. From the mid 1960s to 1970 the company experienced a compound growth of nearly 22 per cent a year. After 1970, however, sales began falling off, culminating in profits in 1975 that were 96 per cent lower than those in 1974. The recession contributed to this trend, and as the economy recovered in 1976, Cramer's sales rose substantially. With Cramer's management optimistic about growth, the question its executives faced was the best way to capitalize on the growth opportunities in the industry. Specifically, Cramer wanted to determine how they would deal with the microprocessor (21:31).

Introduced by Intel Corporation in 1974, the microprocessor was seen to be nearly limitless in possible applications. The microprocessor differed from other active components in that it was actually a computer, requiring input/output linkages, memory, and programming languages to make it operational. Distributors believed that by capitalizing on the programming aspects of the microprocessor, they could increase their role in the electronics industry by helping customers with this function. To accomplish this task, many distributors set up microprocessor centers where a customer's engineers could come in and configure the hardware and write the software. Distributors hoped that by providing this service, customers would be enticed to buy not only the microprocessors from the distributor, but also

the necessary linkages and other devices (21:5-6). Cramer was in a position to fully exploit this opportunity.

Generic Competitive Strategy. Cramer was pursuing a strategy of differentiation. It carried the largest and broadest product line of all competitors in an attempt to garner a reputation as the place for one-stop shopping. It carried a full line of both active and passive components, totaling over 265,000 items provided by 76 suppliers and divided into 96 product lines. Cramer's management believed their strategy provided customer service, since buyers could get everything they needed to complete an assembly in one place. Also, management felt, carrying a broad line would enhance customer awareness of the Cramer name. Finally, Cramer thought that it was necessary for a distributor to carry a full line if it wanted to remain competitive and increase sales (21:33-34).

As noted in the Raytheon case, differentiation is a viable strategy given the competitive forces in the industry. The appropriateness of the strategy, however, rests on the commitment of the firm in pursuing the strategy and on its skills, resources, and organizational characteristics. Also, the firm should consider whether the its strengths and weaknesses are consistent with the desired strategy.

The firm does seem committed to pursuing its strategy. In fact, Cramer developed the Cramer Kit to take advantage of the microprocessor. This kit contained everything needed to make a microprocessor operable and included the micropro-

cessor, packaging board, memories, testing and debugging programs, documentation, schematics, software, and two hours of time at one of Cramers many design centers. On the other hand, of the skills and resources that are generally required to successfully implement a strategy of differentiation, Cramer has only two. It has a strong marketing campaign and a long tradition in the industry, dating from 1945 (21:31,38,45). Unfortunately, its weaknesses seem to far outweigh its skills, resources, and strengths in pursuing differentiation.

Structural Analysis within the Industry. Cramer's strengths are that it does carry a full product line, which is certainly one way to differentiate. Additionally, it enjoys fairly good relationships with suppliers because its management thinks that suppliers are as important as customers. Cramer often holds joint promotions with manufacturers to boost sales of the manufacturers products to Cramer customers. These promotions, along with Cramer's additional marketing campaigns through catalogs and print ads, have also helped Cramer establish itself, but management is unable to quantify this contribution (21:35,38).

Cramer's weaknesses, however, make it very difficult for the firm to compete successfully with a differentiation strategy. First, it has to deal with the problem of declining profits. This is partly attributable to its acquisition of Electronic Wholesalers. This company had been losing money for several years and was a drain on Cramer's resourc-

es. Additionally, Cramer was not able to exercise the proper control of its activities during its own rapid growth. Some of these control problems were manifested in the firm's inability to determine gross margin information on its products, delays in order processing that resulted in delayed deliveries, insufficient inventory management, and increasing expenses relative to sales. For example, although Cramer maintains stocking locations nationwide, with 25 per cent of its inventory in Massachusetts, 25 per cent in California, and the rest divided among 29 regional warehouses, there is no computer-based system to link these locations (21:32-33,39).

Another problem with inventory is the duplication of items. Because Cramer stocks many different brands of the same components, approximately one-third of the inventory consists of duplicate items. Furthermore, although Cramer competes nationwide, it has not penetrated all of the major geographic markets. It is essentially being haphazard to its approach in being all things to all people. The eventual failure of the Cramer Kit further illustrates this point.

When the kits were first advertised, Cramer received over 55,000 responses. A decision was made to follow up each response with a field visit; however, the sales force was not technically knowledgeable, and they found themselves dealing with engineers asking detailed questions that sales could not answer. Cramer stopped the follow-up calls, and sales amounted to only 500 kits (21:36,41-42).

The failure of the Cramer Kits points to another weakness in Cramer: the sales force was untrained and largely inexperienced in sales. Sales personnel were divided into inside sales and outside sales. Outside sales representatives were subdivided into regions and did not place orders; they were expected to be goodwill ambassadors and court Cramer's customers. The inside sales force initiated nearly all of Cramer's orders. Each stocking locations had inside sales personnel who responded to telephoned bid requests. There were no requirements for inside sales personnel to have technical education or experience, and they received little training at Cramer. Yet the inside sales force, like the outside sales force, was expected to service the entire product line, and the manning was equal for each force. Compensation also varied for the two forces. Outside sales received salary plus commissions based on total order volume, while inside sales received mainly salary plus a small commission. In addition to the sales personnel, Cramer maintained a staff of product specialists who determined product mix, inventory levels, reordering points, and the tradeoff between gross margin and sales volume. Like the sales force, the product specialists were not engineers and received little training. These people tended to move up through the ranks as former buyers, which is where they gained their experience. Product specialists received salary with some small bonuses (21:37).

Finally, Cramer was also experiencing financial difficulties. It was one of the few publicly held major distributors. Although its initial stock was offered at eight dollars a share, it was being thinly traded at three dollars a share by 1976. In addition, Cramer entered into a three-year, 30 million dollar revolving loan that was secured by all of its inventory, accounts receivable, and some cash. This create a financial strain and limits Cramer's strategic options (21:39-40).

Despite these constraints, Cramer is in a position in which it has to act. Since it is not competing effectively in its current strategic group, Cramer's best opportunity is to attempt to move to a new strategic group, perhaps by altering its basis for differentiation. If Cramer does not act, there is a very real threat of entry, and Cramer could lose even more of its competitive position. By switching to a new group that capitalizes on its current strengths, Cramer could be in a more secure position that allows it to compete effectively while it addresses its operating problems. If, however, it makes a move and fails, Cramer could very well find itself in an untenable competitive position. Despite this possibility, it is almost certainly better to make a move because the risks of doing nothing are inevitable. It should start by exploiting what it already does better than its competitors.

The Value Chain. The primary and support activities in the electronic component distribution industry were enumer-

ated in the Raytheon case, as were some of the possible linkages. One linkage that Cramer should investigate is that between its value chain and the manufacturers'. Since Cramer already enjoys a rather good relationship with manufacturers compared to other distributors, it could use this as a source of competitive advantage. For example, Cramer could still carry a broad line of products if it wanted to differentiate, but it could pare down the number of each to include just the top brands of each type. It could try to develop long-term agreements with manufacturers for protection from competition in exchange for accepting lower price ceilings. It could also try to bargain for exclusive franchising rights in those areas in which it has not developed a strong presence. Since Cramer is operating with a restricted cash flow, measures of this type will enable it secure a market niche and try to rebuild its competitive position. In addition, it could try to set up a joint venture with manufacturers of the microprocessor to ensure the success the Cramer kit or additional endeavors. For example, it could ask the manufacturers to provide technical assistance in exchange for a percentage of sales. Measures to determine the success of these endeavors might include, respectively, the number of long-term contracts, the equivalence of the proportion of sales in a given market relative to the proportion of nationwide customers the market represents, and the volume of sales of Cramer Kits (if it chooses to reintroduce them).

Mobil Corporation

Mobil Corporation ranked as the third largest industrial corporation in the United States and the fifth largest in the world in the early 1980s. Petroleum comprised the largest portion of the business. Mobil Oil, a division of Mobil Corporation, accounted for 85 per cent of Mobil's revenues and was one of world's seven largest integrated petroleum companies. Mobil Oil has an operating presence in 16 countries, maintains interests in 38,000 miles of pipeline in various nations, operates a fleet of almost 100 oceangoing vessels, and marketed its products in over 100 countries. In addition, Mobil owns the Mobil Chemical Company, which is primarily a petrochemical company and manufacturer of disposable plastic packaging; the Container Corporation of America, the country's leading manufacturer of paperboard packaging; and Montgomery Ward, a retail department store chain. This case centers on two Mobil initiatives. The first is to increase its reserves of crude oil in order to bring internal production into balance with refinery capacity. Secondly, it is seeking to streamline the transportation of crude to the refineries and the distribution of refined products to their markets. (26:779,784-785).

Structural Analysis of the Industry. There are several strong competitive forces at work in the integrated oil industry.

Barriers to Entry. While this case does not specifically address all barriers to entry, assumptions can be made from the information that is presented. For example, it is reasonable to expect that significant economies of scale exist in the oil industry because potential competitors are forced to enter the market on a large scale. Product differentiation is very low in this industry. While there is no differentiation in crude oil (26:182), there is some possibility of differentiation in refined products, but this is a weak barrier to entry. Capital requirements, on the other hand are quite extensive, and include refineries, pipelines, and tankers. These requirements have an impact on access to distribution channels. Although there is access to channels, the capital investment in tankers and pipelines is extremely high. Switching costs do not present a barrier to entry. Since the industry produces relatively undifferentiated products, buyers incur few penalties if they switch suppliers. Two other significant barriers to entry include cost disadvantages independent of scale and government policies. Although there is some proprietary product technology in refined products, the primary cost disadvantage is gaining favorable access to raw material. Since petroleum is a fossil fuel, reserves are limited. Finally, governments throughout the world regulate their respective oil industries to some degree. The Federal Energy Administration, for example, limits both prices oil

companies can charge and customers to which they can sell crude (26:787-789).

Substitute Products. Although there is little differentiation among products in the oil industry, alternate sources of energy are substitute products. Coal, solar power, electricity, natural gas, nuclear energy and synthetic fuel all compete with oil in various uses.

Bargaining Power of Buyers. Buyers exert a competitive force that is more moderate than significant. There is no single, dominant buyer or buyer group, and buyers pose little threat of backwards integration. Also, buyers do not, in general, tend to spend a large amount of their resources on the industry's products, and these products are crucial to customers (26:738). Customers of the oil industry range from industrial and commercial customers to individual consumers. Their bargaining power derives from the fact that the industry produces undifferentiated products, so buyers can switch suppliers without incurring any real penalties. Also, the oil companies' products are generally end items (with the exception of petrochemicals), so buyers are not using them as inputs to their own products (as noted above, Mobil Oil accounted for 85 per cent of revenues in the early 1980s). Finally, retail customers have access to price information, which also gives them bargaining leverage. The power buyers exert, however, is not as important as the bargaining power of suppliers.

Bargaining Power of Suppliers. As in the buyer group, not all the characteristics of bargaining power are present in the supplier group. In fact, only three of the six characteristics hold to an appreciable degree, but these three are critically important to competitors in the oil industry. First, the supplier group is fairly concentrated, a condition that is amplified by oil cartels. Second, the supplying nations provide the oil industry with the primary reason for its being in business, and finally, suppliers do have a capability to integrate forwards (26:746). On the other hand, the oil companies are important to suppliers in that they transform crude oil into products that are in demand worldwide. Also, the fact that there are a number of substitute forms of energy and that crude oil is an undifferentiated product do tend to mitigate suppliers' power to a degree. This factor could, in the future, lead to diminishing power of oil suppliers. Petroleum companies are diversifying into other forms of energy because it is believed that oil will not be sufficient to meet the world's demand for energy (26:751), and that additional exploration would not be productive (26:788). At this time, however, the bargaining power of suppliers remains a formidable competitive force. The intensity of rivalry might, however, be considered the strongest force.

Intensity of Rivalry. Mobil Corporation, as an integrated petroleum company, competes on an international scale as one of the so-called "Seven Sisters." These firms

are all relatively equal in terms of capability and resources, although Exxon has ranked as the largest throughout the twentieth century (26:731). Furthermore, the oil industry is experiencing declining demand in for refined products (26:747). Although variable and fixed costs were not specifically provided in this case, in 1979 total costs equaled 95.8 per cent of revenue (26:780). Given the extensive capital requirements in the industry, presumably fixed costs are high. Additional factors that increase the intensity of rivalry are the undifferentiated products, the diverse competition (including different strategies, different degrees of diversification, and operations in different cultures), and high exit barriers due to the specialization of much of the equipment. In this industry where there are so many strong competitive forces at work, it is particularly critical that integrated oil companies formulate and implement a competitive strategy that is compatible with their strengths and weaknesses.

Generic Competitive Strategy. Although Mobil's competitive strategy is not definitively stated, the corporation appears to be pursuing primarily a cost strategy. It also shows indications, however, that it is attempting to differentiate in some areas. First, it competes industrywide as one of seven integrated oil companies. Second, it has invested in efficient facilities. For example, it invested in 18 very large crude carriers (VLCCs) and is chartering more low-cost vessels. Mobil also plans to outfit the VLCCs

with diesel propulsion which is a more cost efficient mode of power than their current steam turbines. In addition, they upgraded refining facilities to increase yields of gasoline and distillate fuels. This action suggests they are seeking economies of scale (26:787), and all of these actions are consistent with a cost strategy. Mobil, however, is also considered an industry lubricants and has stated that the sustainment of this position is a continuing strategic goal (26:787). Since these goals are virtually mutually exclusive, it is questionable how successful Mobil can expect to be.

A strategy of overall cost leader is especially appropriate, considering the competitive forces that affect this industry, for the following reasons: 1. customers incur few switching costs, so they will be motivated to seek the best price, 2. the industry produces a commodity-type product, 3. there are few opportunities to differentiate products, and 4. buyers tend to be similar in what they are looking for in the product. It is unclear, however, whether Mobil has the skills, resources, and organizational structure to successfully implement this strategy. It has, however, demonstrated a commitment to capital investment through its improvements in its tanker fleet. Furthermore, the success of their lubricants suggests they have some process engineering skills. There is no indication, though, that it has implemented cost control measures, nor is it obvious whether it has a low-cost distribution system.

Similarly, not all of Mobil's actions support the pursuit of a cost strategy. For example, Mobil stated a strategic goal of attaining self-sufficiency through the addition of new sources of reserves. While ownership of new reserves would help it to become a cost leader, Mobil's actions belie its commitment to this objective. In fact, it has a reputation of following one of the least adventurous exploration programs in the industry (26:786). In addition, Mobil has acquired Marcor, Inc. which consists of the Container Corporation of America and Montgomery Ward. These acquisitions were undertaken not to provide a source of cash for exploration or other endeavors in the oil industry, but to hedge against increasing government intervention and the vagaries of the industry's business cycle (26:788-789). Mobil's current competitive position in the industry could prevent it from achieving either a cost leadership position or a position based on differentiation.

Structural Analysis within the Industry. Like all organizations, Mobil has both strengths and weaknesses. However, its greatest strengths do not necessarily enhance its possibility of becoming a cost leader, while its weaknesses could prevent it from achieving excellent performance regardless of strategy. Some of Mobil's strengths have been discussed earlier. The company is an acknowledged leader in lubricants, and it has upgraded facilities and equipment. In addition, it has a management team that is well thought of in the industry, and its petrochemical division (which

makes Hefty trash bags) is very profitable. In 1979 it contributed 5.6 per cent of Mobil's net income on only 3.4 per cent of revenues. An additional strength is that the company has three billion dollars in capital resources that can be used to strengthen its portfolio (26:784,800,806).

Several of Mobil's weaknesses appear to be interrelated. For instance, it has excess refinery capacity, low domestic earnings, and a weak exploration program. Furthermore, it has seen only mediocre performance from both elements of Marcor. Finally, the strategy stated in successive annual reports appears to be contradictory, changing from becoming a diversified energy company to emphasizing petroleum (26:784,793,799,805-806).

Regardless of how effectively Mobil's strengths and weaknesses allow it to compete, there are several strategic opportunities in the oil industry. For example, successful exploration will allow it to integrate backwards and become its own supplier. It can also attempt to penetrate new markets by gaining access to countries in which does not currently operate, and it can investigate more fully opportunities in other energy industries, which could be a possible basis for differentiation. Mobil risks losing market share if it does not change its practices and direct its activities towards implementing its stated strategy. If, on the other hand, it pursues a more aggressive exploration program or attempts to diversify into other forms of energy, the risks of failure are mainly monetary, and this risk is

somewhat mitigated by the capital resources it has available for such a venture. An assessment of the evolution of the industry can provide additional guidance concerning the most appropriate strategy.

Industry Evolution. Some possible trends in the oil industry have been suggested earlier in this discussion. For instance, it was noted that the demand for refined petroleum products had reached a peak and were declining by the early 1980s. This suggests learning by buyers and indicates that buyers are interested in the availability of alternate sources of energy, whether out of environmental concerns, an aversion to dependence on foreign oil, or some other factor. If this trend continues, diversifying accordingly could be a very attractive option for Mobil. Similarly, the introduction of new, refined oil products demonstrates that there are process innovations in the industry. Taking advantage of these could enhance a strategy of either differentiation or cost leadership. Government policies, for example, bills introduced in Congress, also provide definite information on the future of the industry. Likewise, changes in tariffs, taxes, and exchange rates provide clues about how relationships with foreign governments may change. All evolutionary processes, then, suggest a strategy. Consequently, the possibilities for improving performance in a company of this size are innumerable because of all the linkages that present opportunities for creating a competitive advantage.

The Value Chain. An integrated oil company performs a myriad of activities. The primary activities are concerned with moving the oil from the ground to the user. This process is accomplished in five main steps: 1. finding and producing the crude oil (exploration), 2. transporting the crude to the refinery, 3. refining the product, 4. transporting the refined products to the regions in which they will be marketed, and 5. distributing the products at retail locations (26:738). Each of these steps can, of course, be further broken down into discrete activities. For example, one activity in exploration is dispatching seismological teams to the proposed site to determine the probability of a wet well.

The support activities performed by a company such as Mobil are equally as diverse as the primary activities and can also be disaggregated into more detailed activities. Procurement involves activities like the acquisition of equipment such as tankers and refineries. The development of refining processes relies on technological innovations. Human resource management includes recruiting scientists and tanker captains. Infrastructure activities ensure that good public relations are maintained with the government (26:784) and that the quality of the refined products meets standards. Support activities are also as easily disaggregated as primary activities are. The technological development required in a new process, for example, could require new software development, machine design, and plant layout.

At any level of disaggregation, information will be produced by the interaction of two activities. Again, it is this information that indicates how well the activity is being performed. By determining what activities are essential in successfully implementing a strategy and doing those activities well, a firm will ensure that its strategic goals and daily operations are consistent and mutually enhancing. If Mobil were seeking a cost leadership position, it would seek to perform a number of activities more efficiently than competitors. For example, if Mobil determined that self-sufficiency were necessary for success in sustaining an overall cost leadership position, the success of a seismological team would have an impact on the degree to which this is accomplished. To determine how well the team is doing, performance could be based on the percentage of wet wells to total wells drilled. At a higher organizational level, self-sufficiency could be measured by the numbers of barrels extracted from Mobil reserves versus the number from foreign reserves.

Lincoln County Welfare Services

The Title IV-D agency in Lincoln County, New York is trying to justify additional funds for staff increases in its upcoming budget request. Approval for this request is in jeopardy because the agency's past performance has been somewhat lackadaisical. Although a new program coordinator, James Jones, has had initial success in improving perfor-

mance, he has not established a track record because he has been in the job for only four months. Jones' supervisor, Dr. Anderson (the county welfare services commissioner), has just informed him that the local board might be willing to fund two additional positions, but Jones would have to show a return of three dollars in collections for every dollar in expenditures (26:879).

The Title IV-D program falls under the auspices of the Title IV-A program, which is the classic welfare system. Title IV-D was developed to locate absent parents of families who are receiving assistance and to collect court-ordered child-support payments from them. These collections would minimize the amount paid out in programs such as Aid to Families with Dependent Children (ADC). An interesting characteristic of this program is that it is expected to collect at least much as it spends for operations. In fact, it was expected to show a profit (26:869). It is this expectation that is behind the board's three-to-one collection/expenditure ratio.

Structural Analysis of the Industry. Competitive forces in this case are generally much weaker than those in the previous cases analyzed. This is due in part to the fact that the Lincoln County Welfare Services is a public organization.

Barriers to Entry. As Bryson and Roering point out, there are often few new entrants in many public sector organizations (6:27). This case is no exception. Although

there are a number of social service programs in Lincoln County, they perform different functions, and there is no need to have more than one agency handle a given program.

Substitute Products. For reasons similar to those described above, substitute products are not an appreciable competitive force in the social services industry. Although Titles IV-A and IV-D are both welfare agencies, they have different responsibilities in administering the program (26:870).

Bargaining Power of Buyers. The customers, or beneficiaries, of the Lincoln County Title IV-D program do wield some power, but not for the traditional reasons. Since Title IV-D is the only source for a certain type of financial support, and the clients are very dependent upon this support, they logically should have little influence over the program's administrators. The agency, however, has recently effected a major change in the method by which it makes payments, and this change influences the balance of power. Formerly, Family Court ordered child-support to be paid directly to the family. ADC considered these payments as income and calculated its assistance based on them. Under the new system, the government acts as a creditor. The ADC family waives its support rights, and the government guarantees full funding regardless of whether support has been collected from the absent parent. This method gives families who receive support "power" because it affects the

agency's ability to realize a profit, especially since many parents are difficult to locate (26:869-870,878).

Bargaining Power of Suppliers. In this industry, the suppliers are those who have authority to provide funding and who exercise authority over the welfare agencies. The actual supplier differs at various levels of the program. In Lincoln County the county officials determine funding and staffing levels in the budget, while the New York State Office of Child Support Enforcement (OCSE) ensures local agencies comply with state and federal guidelines. Suppliers, then, are very concentrated and dictate the terms of business. Since the product that the county officials supply is funding, which is an extremely important product to the agency, there are no substitute products that the Title IV-D agency can turn to (26:870-871). Finally, although officials themselves are not likely to integrate forwards, they do have the power to replace personnel. Suppliers, therefore, exercise not only power over the industry, but authority as well.

Intensity of Rivalry. Like the bargaining power of suppliers, rivalry is a significant competitive force in this industry. First, there are a number of competitors in the industry. Since the Title IV-D program is implemented at the federal, state, and local levels, Lincoln County competes not just with other county social service agencies, but also with other counties in New York state, which competes with other states in the union. In addition, the

strategies of New York counties implementing Title IV-D are also diverse. Some counties concentrate on investigation, or finding the absent parent; some focus on performing clerical duties, such as processing new cases, efficiently; and some are interested in enforcement and ensuring that absent parents are actually making payments. Furthermore, the industry can be said to be experiencing slow growth in terms of available resources, if not in terms of need. Although budgets have not grown rapidly, the number of ADC cases in which there was an absent father increased from 45.5 per cent in 1945 to 66.7 per cent in 1961 to 85 per cent in 1975 (26:869,871). The competing demands for limited resources has made it difficult for Jones to procure the assets needed to make improvements in his program.

Generic Competitive Strategy. The strategy that the Title IV-D agency is currently pursuing is "stuck in the middle." By default, it must pursue some type of focus strategy since it services a particular segment of the welfare program for the county rather than the entire spectrum of programs. Beyond this, there appears to be no formal plan or sense of how to accomplish the mission. For example, Dr. Anderson realized that the program was "make-shift," and he was unsure of where it should be heading. These are among the reasons that he hired a new coordinator (26:871).

In his job interview with Anderson, Jones offered some ways in which he would improve Title IV-D. He was familiar

with Title IV-D due to his previous ten years of experience as a case supervisor in Title IV-A, and he suggested two sources of problems. First, the personnel did not see their role in the bigger picture of the welfare services. Second, inefficient management prohibited the location of the maximum number of parents. His goal was to make Lincoln County Title IV-D a model of efficiency and effectiveness for the rest of the social services department (26:872-874).

Under Jones, the program has made some progress, but there is some question concerning the measurement of effectiveness. He was undecided whether it should be measured in terms of cost effectiveness or mission accomplishment, and he thought the two approaches were incongruous (26:871,877-878). This decision has a direct bearing on strategy because it determines the essential activities the agency should perform. Jones decided, for example, that attempting to decrease operating costs would require paring the staff size to a minimum. Cost effectiveness would be enhanced because many absent parents remain in the area, so tracking them would not entail expensive investigations. Although collections would be small, so would expenditures, and the ratio between collections and expenditures would be impressive. If, however, the mission was assumed to be ensuring that payments are received from all absent parents, then additional expenditures might be warranted to address the backlog of cases. Despite his stated goal to Anderson, Jones was not committed to a particular strategy. He did

know, however, that he would be evaluated in terms of total collections (26:877-878). The agency's strengths and weaknesses need to be evaluated in terms of its mission in order to implement a plan.

Structural Analysis within the Industry. The facts presented in this case suggest no obvious strategic strengths. There are, however, some indication that the agency is trying to develop a strategic plan, and there are some factors it could exploit to help this process. The most notable of these is Jones himself. He is enthusiastic and is aware of the need to implement a strategy. Also, he reorganized his staff of six investigators and two support collectors into two teams of three investigators and one collector apiece. The staff had previously worked alone, and this move served to increase their sense of teamwork and improve morale. The county board had also heard of this accomplishment and felt that the Title IV-D program finally might become more successful. Their expectations have been partially borne out. By the end of Jones' first four months, the number of cases receiving collections increased from 13 per cent to 20 per cent (26:877-878).

In spite of these positive points, there are many weaknesses in the agency that have an adverse effect on strategy implementation. In addition to the lack of strategic guidance, the staff is inexperienced and untrained in investigations. Also, the rivalry among social service agencies in the county is manifested in the relationships

that Title IV has with Title IV-A and law enforcement agencies. For example, Title IV-A has been uncooperative in sharing information that would help Title IV-D investigators. Also, the probation office, on whom Title IV-D relied for help in getting collections, is resentful of the reimbursement Title IV-D receives from the federal government. The sheriff's department also helps Title IV-D with collections, but it is understaffed and overworked and gives Family Court warrants for absent parents the lowest priority. Furthermore, a recent review by OCSE (before Jones was hired) found internal organizational problems. Although most of these were of a clerical nature, such as referral forms containing incomplete information, some hinted at more serious problems that affect the performance of the agency. For example, they found that no efforts were being made to ascertain the parents' ability to support and that support orders were not being monitored (26:872-874, 878-879). Anderson was concerned about both the findings and the overall performance of Title IV-D, and he is very anxious to see Jones' plan on turning the agency around.

Since Jones has these orders, doing nothing is not an option. The risks of inaction, however, would all but ensure that he lose his job. The risks of action, on the other hand, are not nearly as great. For instance, he has no access to additional funds, so there is no risk of financial loss. If a plan of action fails, it will simply result in an unimpressive number of collections. This, too, engen-

ders financial consequences because full funding is guaranteed to the families. It seems improbable, though, that a failed plan would cost more in payments than the current program does. Since a focus strategy is dictated by the circumstances of the Title IV-D charter, Jones should try to develop his plan to make the agency profitable through a combination of effective investigations and efficient administration (26:874).

The Value Chain. Although the overlaps in the welfare service department are a cause of friction, they can, if approached correctly, be sources of increased performance through collaboration. There are a number of improvements that can be made in both primary and support activities.

The primary activities of the Title IV-D agency are processing new cases, conducting investigations, and ensuring enforcement of Family Court orders. The support activities include budgeting by which the agency procures inputs; operating the Parent Locator System, an automated system used in investigations; training investigators and collectors, a human resource management function; and maintaining good relationships with the county and state officials.

Many of the interrelationships and linkages in this system are easy to spot since they are built into the bureaucracy. For instance, cases are piling up because the number of families in the program is outpacing additions of manpower in all agencies. Better collaboration between these agencies can be mutually beneficial. For example,

Jones could try to improve communications with Title IV-A so that information on new cases is passed immediately to Jones' office. This would enable the investigator to get to work immediately on the case (this is important since information on parents changes rapidly), which increases the chances of collection. Since the Title IV-A agency administers the entire ADC program and reports results to state and federal authorities, a rapid collection by Title IV-D makes Title IV-A look good. Measuring the effectiveness of this communication could be achieved by tracking the length of time from notification by Title IV-A to collection by Title IV-D.

Getting better support from law enforcement officials also would greatly contribute to the success of Title IV-D. One problem in Title IV-D is that there is a cycle of parents being located and then lost again. Title IV-D uses law enforcement agencies to help track down these lost parents. Understaffing, however, is a problem in these agencies also. If Title IV-D could fund a liaison with law enforcement, this support would be nearly guaranteed. A possibility to explore is asking the county board whether Title IV-D could fund such a position if it achieves a certain profit level. Since the law enforcement agencies do not have the ability to earn profits, this solution would consider the needs of all involved. Title IV-D would get its law enforcement support without the sheriff or probation officer having to use more manpower. The rate of parental recidivism or the

length of time from when a parent is lost to when he is relocated might be effective measures of this relationship. The possible measures of performance are limited only by the number of linkages among and within these agencies.

Chapter Summary

This chapter contained an evaluation of four disparate organizations facing strategic decisions. Using Michael Porter's Competitive Analysis model, the author demonstrated how a firm can analyze its industry and its position in that industry to determine an appropriate competitive strategy. It was then shown that the firm can next identify its key activities and determine how these activities affect its chosen strategy. Finally, by analyzing the points at which various activities intersect, the author suggested ways in which a firm can develop meaningful measures of performance. The analyses in this chapter illustrated the flexibility of the model and showed that it can be used in a variety of situations.

In the first case Raytheon, a national electronic component manufacturer, faced a decision concerning line-of-business strategy in trying to determine whether it should enter the components distribution industry, and if it did, what strategy it would pursue. The outcome of this decision also affects Raytheon's corporate strategy since it is determining its mix of activities. The second case considered Cramer Electronics. Cramer was already in the elec-

tronics component distribution industry and, like Raytheon, faced a line-of-business strategic decision. It was losing its position in the industry and needed a new game plan to remain competitive. In the third case Mobil Corporation was making a corporate strategic decision in allocating its resources so that it could both achieve self-sufficiency in the integrated oil industry and become a diversified energy company. Finally, Lincoln County Welfare Services was analyzed in the fourth case. The county's Title IV-D agency had been achieving disappointing results in collecting support from absent parents. The new program coordinator faced an operational strategy challenge because he had to develop a plan to bring performance up to standards.

The next chapter considers these results in light of the problem faced by the Sustainability Assessment Task Force, and suggests how an examination of the processes that comprise sustainability could produce the information needed to develop its measure of merit.

V. Conclusions and Recommendations

Conclusions

The Sustainability Task Force is trying to develop a time-phased, dollar-based measure of sustainability that is militarily-meaningful and relates the addition of fiscal resources to improvements in sustainability. Days of Supply, the current measure, is dollar-based, but it aggregates costs in such a way that it is not particularly meaningful. Any measure based on the same assumptions as those underlying Days of Supply will be equally meaningless because DOS is a financial accounting measure, and such measures are incompatible with performance measures. The problem must be approached from a different perspective. This research attempted to describe an alternative framework in which to consider the development of a sustainability measure.

Recapitulation of Investigative Questions. The investigative questions outlined in Chapter I provided the foundation on which to build this case. The first question addressed the relationship between Air Force doctrine and strategy and the performance measures that assess how effectively these "policies" are being implemented. It is apparent, given the roles of air forces as outlined in Chapter II, that while Days of Supply is consistent with doctrine in that it attempts to measure the adequacy of the amount of supplies and equipment available to sustain operations, DOS

is unable to encompass the many activities that comprise sustainability. Researching the second question on the problems with DOS provided reasons for its inadequacy. DOS is a financial measure that incorrectly aggregates its variables. Although this characteristic is recognized in DOS, the Task Force is perpetuating the erroneous assumption that a financial accounting type of measure is needed to relate resource allocation to sustainability improvements. An enquiry of the underlying assumptions of the Task Force is posed in the third investigative question. The answer to the fourth investigative question, which concerned the measures of performance sustainability used in private industry, is extremely interesting because it indicates that industry is in the same position as the Air Force. That is, industry routinely uses return on investment to measure performance, yet this is a financial accounting measure that has little relevance to the actual activities a firm performs. In other words, the fact that there are many parallels between military and civilian organizations is meaningless in determining the usefulness and applicability of industry measures to the Air Force because the industry measures are also based on invalid assumptions. The parallels were more useful in that they served to support the author's contention that Porter's model could be used equally effectively in industry and in the Air Force. Finally, the fifth question asked what the appropriate methodology was for performing this research. The case study method was

found to be well suited to the problem because it facilitated a thorough analysis of a variety of organizations.

Key to Sustaining Performance. The crux of this paper was to show that strategy is the key for determining not only what activities an organization should undertake, but also how to determine if those activities are being successfully accomplished. In other words, the performance measures should relate directly to the activities, and the activities should comprise that process that is necessary to implement the strategy. Cost measures are helpful in providing standardized information by which comparisons among organizations can be effected. They also provide a baseline from which audits can be conducted and a summary from which stakeholders can gauge the relative health of an organization. However, cost measures are not helpful either in determining whether an organization is successfully performing operations, or in whether it is performing the essential operations to meet its strategic goals.

Strategy and goals must be formulated by evaluating the environment in which an organization operates. This entails identifying the threats that act upon the environment and determining the strength of these threats. The organization should then assess its internal strengths and weaknesses to determine its ability to counter these threats and successfully compete in the environment. It is then in a position to develop a strategy that is both commensurate with its current strengths and effective in deterring environmental

threats. The organization must next identify the activities that are needed to implement this strategy. The ways in which these activities interrelate provide information. It is this information that should be monitored to determine how effectively an activity is being performed and to suggest means by which performance can be improved. As threats, strengths, and weaknesses change, the strategy should be reevaluated for appropriateness.

The analysis in Chapter IV used Porter's Competitive Analysis model to illustrate this process and to suggest ways in which the organizations evaluated could measure their performance. The process described is very flexible and applicable to any organization because all organizations share common characteristics. All are created for some purpose; all operate in an environment that is acted upon by various influences, and all perform a set of activities to accomplish their purpose. Like the organizations analyzed in this paper, the Air Force could benefit from this sort of evaluation in solving the sustainability issue because this method is appropriate for all levels of strategy.

For example, Mobil Corporation was faced with a corporate-level strategy decision. It had to determine how to allocate resources to achieve its goals of self-sufficiency and to build a diversified energy company. Similarly, Raytheon's decision on whether to enter the components distribution market is also a corporate-level strategy decision because it affects the mix of businesses in the

company's portfolio. These situations can be considered analogous to the Air Force's role in developing grand strategy because the Air Force makes decisions on its mix of "businesses" by determining what new or existing weapon systems are needed to counter a threat and how these should be deployed. Raytheon's decision, along with Cramer's, also considered line-of-business strategy because each had to determine the best way for a particular business to compete in its environment. Military strategy is the approximate military equivalent of line-of-business strategy. Air Force strategists work at this level of strategy in the planning and execution of campaigns in a given theater of operations. Lincoln County Welfare Services was faced with a strategic decision at the operating level (as it pertains to civilian organizations) because it was concerned with how an agency department head should run his program. Tactics, that is decisions concerning the employment of air forces in a particular battle, are comparable to a civilian organization's operating level strategy. In the military strategic hierarchy, tactics address doing the job right, while higher levels of strategy are concerned with doing the right job (11:21). Performance measures should reflect this difference.

Recommendations

The Air Force should consider evaluating capability and sustainability in terms of the activities needed to imple-

ment its stated strategy. There are several benefits to investigating this approach. First, it would meet nearly all of the Task Force's minimum criteria (Chapter II) for the new measure. For example, performance measures would be easily understood in terms of what it was measuring. Also, it would take into account operating tempo, force size, and type of activity. Additionally, it would allow for separate measures of effectiveness for different types of activities. Finally, it would yield measures that would be meaningful to the Commanders-in-Chief and Defense Planning Resources Board in terms of their roles in planning, programming, and budgeting.

Another advantage of this approach is that activities (the value chain) performed by a function (e.g., civil engineering) can be disaggregated at many levels of detail, from very broad to very specific. These functions could then be analyzed in a number of ways. For example, the functions can be combined vertically, which might be appropriate for evaluating a number of disparate functions that work together for a common goal, such as the deployment of a wing of fighter aircraft. Alternatively, like functions can be aggregated horizontally, for instance to help in comparisons between similar functions in different organizations.

In addition, costs can be applied against these functions and activities and can be used to provide additional information on resource allocation. For example, a cost per combat turn figure might be calculated by determining the

number of personnel per weapon system, length of time, amount of fuel, and any other relevant variables. Since these types of cost are not calculated in the same manner that financial accounting measures are, they avoid the pitfalls of double-counting and incorrect aggregation. In addition, these costs would bear directly on the activities being performed and would be useful in relating increases in resources to improvements in sustainability. Such cost measures are similar to the railroads' cost-per-ton mile that was discussed in Chapter II.

Finally, exploring this approach would not require any extensive investment in resources because it entails only a change in perspective. A plethora of information is already being monitored at all levels of the Air Force. An evaluation of the need for all this information should be conducted. If it is not useful in determining the effectiveness of mission accomplishment, it should be eliminated. Much of it will be useful, though, and additional information will also be determined to be useful. This paper proposes simply that sustainability be measured in terms of information that indicates the level of performance of activities that are essential in implementing strategy.

Chapter Summary

This chapter reiterated the problem with using a financial accounting measure to evaluate organizational performance. The role of strategy in determining the effective-

ness of performance was then restated, and the results of the case analyses were compared with strategic decisions at various levels of the Air Force. It was then suggested that the framework presented in this research would be useful in developing a new measure of sustainability. The benefits of this approach were outlined, including its compatibility with the Sustainability Task Force's criteria, its flexibility in addressing all levels of organization, and the ease with which it could be implemented.

Appendix: Checklist for Analysis

The following checklist is intended to be used as a guide for the researcher in conducting the analysis and as a quick reference for the reader. A comprehensive discussion of each item can be found in Chapter 3.

I. Structural Analysis of the Industry (If these questions are answered affirmatively, they indicate that the respective competitive force has an impact on the industry.)

1. Are there barriers to entry?
 - a. Are there economies of scale?
 - b. Is there product differentiation?
 - c. Are there capital requirements?
 - d. Are there switching costs?
 - e. Are distribution channels saturated?
 - f. Are there cost disadvantages independent of scale?
 - g. Do government policies affect the industry?
2. Are there substitute products?
3. Do buyers have bargaining power?
 - a. Is the buyer group concentrated or does it comprise large portion of total sales?
 - b. Does the buyer spend a large amount of its resources on the industry's product?
 - c. Does the industry produce undifferentiated products?
 - d. Does the buyer incur few switching costs?
 - e. Does the buyer earn low profits?
 - f. Is the buyer able to integrate backwards?
 - g. Are the industry's products unimportant to the quality of the buyer's final goods and services?
 - h. Does the buyer have full information concerning demand and prices?
4. Do suppliers have bargaining power?
 - a. Is the supplier group concentrated and the industry it sells to fragmented?
 - b. Is there a lack of substitute products to compete with the suppliers?
 - c. Is the industry an unimportant customer of the supplier?
 - d. Does the supplier provide the industry with an important product?
 - e. Has the supplier differentiated its products?
 - f. Is the supplier in a position to integrate forward?
5. Is there rivalry among competitors?

- a. Are there a number of competitors, or are competitors fairly equal in terms of size and available resources?
- b. Is the industry experiencing slow growth?
- c. Are there high fixed or storage costs?
- d. Are competitors products undifferentiated?
- e. Must capacity be added in large increments?
- f. Is the competition diverse in terms of strategies, goals, organizational structure, or structure?
- g. Are any firms in the industry seeking high strategic stakes?
- h. Are there high exit barriers?

II. Generic Competitive Strategies

- 1. Is the firm pursuing a position as the overall cost leader?
 - a. Does it compete industrywide?
 - b. Is it minimizing costs relative to competitors?
 - c. Has it invested in efficient facilities?
 - d. Has it implemented cost control measures?
 - e. Is it seeking economies of scale?
- 2. Is the firm pursuing a differentiation strategy?
 - a. Does it compete industrywide?
 - b. Does it seek to make its product unique?
 - c. Does it produce premium products?
 - d. Does it try to foster customer loyalty?
 - e. Has it developed a reputation for excellence?
- 3. Is the firm pursuing a focus strategy?
 - a. Does it compete in a particular buyer group, geographic market, or segment of the product line?
 - b. Does the firm compete on the basis of differentiation, cost, or both? (see questions 1 and 2)
- 4. Is the strategy consistent?
 - a. Does the firm have the necessary skills, resources, and organizational requirements to implement the strategy?
 - b. Is the firm committed to pursuing the strategy?

III. Structural Analysis within an Industry

- 1. What are the firm's strengths?
- 2. What are the firm's weaknesses?
- 3. What are the risks of taking no action?
- 4. What are the risks of taking advantage of strategic opportunities?

5. What strategic opportunity will be advantageous to the firm's performance?

IV. Industry Evolution

1. Are there changes in growth or buyer segment?
2. Is there learning by buyers?
3. Is there a diffusion of proprietary knowledge, or does the firm have the advantage of an experience curve?
4. Are there, product, marketing, or process innovations?
5. Are there changes in scale?
6. Is there structural change in adjacent industries?
7. Are there changes in input costs or exchange rates?
8. Are there government policies on entry, competitive practices, or profit structure?

V. The Value Chain

1. What are the firm's primary activities?
2. What are the firm's support activities?
3. What linkages exist?
4. What are the potential sources of competitive advantage?

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Vita

Captain Moira D. Williams was born 17 July 1961 in Natick, Massachusetts. She graduated from Wilmington High School in Wilmington, Massachusetts in 1979 and entered Regis College, Massachusetts that September. In 1983 she graduated Regis with a Bachelor of Arts in Economics. After working briefly in the financial sector, she joined the Air Force and was commissioned through Officers' Training School. Subsequently, she attended technical school and was awarded a Logistics Officer AFSC in 1985. Her first assignment was as Chief of Mobility Plans for the 33TFW at Eglin AFB, Florida. In July 1987 she was assigned to the 475ABW at Yokota AB, Japan where she was first Chief of Mobility Planning and then Chief of Contingency Planning and War Reserve Materiel. There she was responsible for planning the mobility and base support planning for 79 units assigned to five MAJCOMs, 11 major DoD components, a numbered Air Force, and a subunified command. She also developed operations and contingency plans in support of CINCPAC plans. She left Yokota in May 1990 upon assignment to the School of Systems and Logistics, Air Force Institute of Technology.

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13. ABSTRACT (Maximum 200 words) This thesis proposes a framework for evaluating sustainability in the Air Force and for determining an appropriate measure of effectiveness that is both meaningful in a military sense and useful in planning and programming decisions. Following a literature review of organizational performance measures and strategy formulation, Michael Porter's Competitive Analysis model for strategy selection was presented. This model was then used to evaluate case studies in which organizations faced strategic decisions and to suggest measures by which these organizations could determine their effectiveness. The model was then shown to be applicable to the Air Force, and recommendations on implementing such a framework to develop a new sustainability measure were proposed. These recommendations would be easy to implement because they require no investment in resources, only a different focus in collecting pertinent information. Furthermore, the same process could be used at all levels of organization and decision making.

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AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. Please return completed questionnaires to: AFIT/LSC, Wright-Patterson AFB OH 45433-6583.

1. Did this research contribute to a current research project?

- a. Yes b. No

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it?

- a. Yes b. No

3. The benefits of AFIT research can often be expressed by the equivalent value that your agency received by virtue of AFIT performing the research. Please estimate what this research would have cost in terms of manpower and/or dollars if it had been accomplished under contract or if it had been done in-house.

Man Years _____ \$ _____

4. Often it is not possible to attach equivalent dollar values to research, although the results of the research may, in fact, be important. Whether or not you were able to establish an equivalent value for this research (3 above), what is your estimate of its significance?

- a. Highly Significant b. Significant c. Slightly Significant d. Of No Significance

5. Comments

Name and Grade

Organization

Position or Title

Address