ENHANCING SMALL BUSINESS EXPORT
IN FRAGMENTED INDUSTRIES

SBA Grant No. SB-1A-00005-01-0

February 27, 1981

Conducted under SBA contract/grant. Statements and conclusions herein are the contractor's/grantee's and not views of the U.S. Government or Small Business Administration.

Prepared for
U.S. Small Business Administration
1441 L Street, NW
Washington, D. C. 20416

by
Development Sciences Inc.
Post Office Box 444
Sagamore, MA. 02561
TABLE OF CONTENTS

CHAPTER I - OVERVIEW

Introduction 1
Study Methodology 2
Study Findings 5
Recommendations 8
Report Organization 10

CHAPTER II - THE FRESH GROUND FISH INDUSTRY

Introduction 11
The Legislative Context 12
Industry Structure 14
Case Studies 17
Brokerage 17
Fish Purchaser/Processor 19
Fishing Cooperative 20
Integrated Gulf Coast Company 22
New Export Firm 24
Alaskan Fisheries 25
Implications 27

CHAPTER III - THE SOLAR INDUSTRY

The International Context 31
The Solar Industry 33
Impediments to Export 36
Market Immaturity 39
Lack of Market Information 40
Distance to Market 41
Lack of Management Skill 41
Inadequate Financing 42
Patent Infringement 42
Federal Policies and Programs 43
Implications 47

CHAPTER IV - THE COMPUTER SOFTWARE INDUSTRY

Industry Overview 49
Role of Small Business 51
Software Industry Structural Factors 59
Export Potential 58
Economies of Scale 60
Product Differentiation 61
TABLE OF CONTENTS - Page 2

CHAPTER IV - THE COMPUTER SOFTWARE INDUSTRY (Cont'd)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Requirements</td>
<td>63</td>
</tr>
<tr>
<td>Switching Costs</td>
<td>64</td>
</tr>
<tr>
<td>Access to Distribution Channels</td>
<td>67</td>
</tr>
<tr>
<td>Legal Protection</td>
<td>69</td>
</tr>
<tr>
<td>High Strategic Stakes</td>
<td>70</td>
</tr>
<tr>
<td>Implications</td>
<td>71</td>
</tr>
</tbody>
</table>

CHAPTER V - GOVERNMENT ASSISTANCE: THE NEED FOR WIDER OUTREACH

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Problems Noted</td>
<td>73</td>
</tr>
<tr>
<td>Communications</td>
<td>73</td>
</tr>
<tr>
<td>The Quality of Offered Services</td>
<td>74</td>
</tr>
<tr>
<td>Barriers to Government Services</td>
<td>75</td>
</tr>
<tr>
<td>The Nature of Government Activity</td>
<td>76</td>
</tr>
<tr>
<td>Improved Outreach: The Use of Intermediaries</td>
<td>77</td>
</tr>
</tbody>
</table>

CHAPTER VI - STRUCTURAL IMPEDIMENTS: THE NEED FOR NEW APPROACHES

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Analysis</td>
<td>81</td>
</tr>
<tr>
<td>Economies of Scale</td>
<td>82</td>
</tr>
<tr>
<td>Product Differentiation</td>
<td>83</td>
</tr>
<tr>
<td>Capital Requirements</td>
<td>85</td>
</tr>
<tr>
<td>Switching Costs</td>
<td>85</td>
</tr>
<tr>
<td>Access to Distribution Channels</td>
<td>86</td>
</tr>
<tr>
<td>Government Policy</td>
<td>86</td>
</tr>
<tr>
<td>Bargaining Power of Buyers</td>
<td>87</td>
</tr>
<tr>
<td>Bargaining Power of Suppliers</td>
<td>87</td>
</tr>
<tr>
<td>Passive Policy Recommendations</td>
<td>88</td>
</tr>
</tbody>
</table>

CHAPTER VII - SOME FURTHER CONSIDERATIONS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Goal of Government Intervention</td>
<td>92</td>
</tr>
<tr>
<td>The Role of Others</td>
<td>93</td>
</tr>
<tr>
<td>Federal Organization</td>
<td>95</td>
</tr>
<tr>
<td>An SBA Role</td>
<td>96</td>
</tr>
</tbody>
</table>

DEVELOPMENT SCIENCES INC.
CHAPTER I
OVERVIEW

Introduction

Perhaps as never before, the economic vitality of the United States depends upon international trade. Where once America could rely upon the commanding fact that within its borders lay a market of such size and power that attention to export was of secondary importance, today recognition has come that aggressive export is essential. The nation has now experienced more than a decade of enormous economic erosion: during the seventies spiking oil prices and the emergence of other industrial giants yielded trade deficits of historic proportions.

The decade now passed witnessed more than vast deficits, however. American firms moved to expand exports and by 1980 this nation's trade and current account positions had significantly improved. From 1970 to 1980, net exports of raw materials such as agricultural goods increased from $300 million to $27 billion. During the same period net exports of manufactured goods grew from $4.1 billion to $26 billion. Services also showed a marked net increase, from $3 billion to $35 billion. Finally, and perhaps of greatest long-term import, by 1980 exports accounted for one-fifth of U.S. manufactured products, compared to less than one-eighth in 1973.*

Whether recent trade numbers signify a permanent return to positive balance or merely a momentary escape from the red, the United States has manifestly not equaled the export achievements of others. Moreover,

and more to the point, the United States has not yet reached its own export potential. The Department of Commerce estimates that as many as 20,000 firms can export and don't -- this, compared to an estimate of fewer than 2,000 firms accounting for the bulk of current exports. Of those 20,000 firms, 18,000 are of small or medium size.

Small firms have historically played a pivotal role in the economic life of the United States. Not only do small firms provide employment for almost half America's workforce, they represent a consistent source of technological and service innovation. The National Science Foundation noted in 1977, for example, that almost half of the major technological innovations generated during a 20 year period stemmed from the activity of smaller firms. Since product differentiation is a critical determinant of a product's exportability, the innovative nature of small firms suggests that such companies can achieve major export with the proper assistance.

Study Methodology

The study effort reported on herein has examined the export experience of small businesses in industries which are fragmented -- that is, industries comprised in significant part of smaller and medium sized firms and which explicitly are not dominated by a limited number of larger corporations. The aim has been to identify approaches which government, particularly federal agencies, can take to enhance the capacity of small businesses to participate in American overseas trade.
As an earlier SBA-sponsored study* has noted, understanding of small firms and of their particular characteristics which facilitate or impede their commercial activities is limited. This previous study found, for instance, that while there is a tendency to take the concepts developed for large corporations and extrapolate them to small businesses a significant discrepancy does exist between the perceived matters of import to large and small firms. Having carefully analyzed the generic problems of small firms, the authors of this earlier study proposed a management model to allow small firm executives as well as those in the academic and public sectors to better deal with small business export difficulties. The authors identify critical factors such as the availability of necessary management skills which affect the ability of small firms to export.

Other studies and the frequent comments of small business executives and of trade association representatives echo the "traditional" impediments to small business export noted in this earlier SBA sponsored study. Among the problems commonly noted are these:

- Limited management resources to handle the increased burdens of overseas trade,
- Limited management expertise in the procedures of export, including letters of credit and licensing agreements,
- Differences in language and/or social customs,
- Insufficient financing, and
- Unawareness of export markets.

These problems are real, and they surfaced repeatedly during the course of this study. They are called "traditional" here because their existence

---

has long been noted and programs by government agencies and others have normally been directed at their mitigation.

Small firms are of course different than large and, as a consequence, their ability to export is frequently less than that of their larger competitors. It is important to note, however, that these firms operate in industrial contexts which vary markedly, industry to industry. It is to this variation that this study has been aimed since while small firms may find it difficult to export because they are small, their export efforts may also be impeded by structural barriers inherent to their respective industries. This industrial environment must be comprehended and incorporated into the design of government policies and programs if public sector activity is to have the desired impact of enhancing small business export.

As noted, this current study has focused upon fragmented industries. Specifically, three were chosen for analysis: the fresh groundfish industry, the solar hardware industry, and the computer software industry. These industries were selected for several reasons:

- First, the project team possessed in advance of the study an extensive understanding of the industries involved. In the area of groundfish, for example, team participants had worked on numerous government and private sector projects dealing with many of the issues central to small business export. This pre-existing knowledge allowed a greater breadth and depth to the study and its findings than would otherwise have been possible.

- Second, the three industries are clearly fragmented. Economic power is not concentrated in the hands of a limited number of firms. Indeed, the very nature of each of these industries is that of high small business participation. The solar industry, for example, is marked by the active involvement of hundreds of small firms: the industry is so fragmented that government agencies are not even clear as to how many firms, large or small, are involved.
The industries chosen lie each in one of the three broad industrial groupings of commodities, manufacturing and service. By selecting an industry from each of these classes, it was hoped that findings could be generated which would be not only specific to a single industry, but would also highlight the kinds of characteristics one could expect to find within other industries of similar class.

In sum, the study methodology chosen was one of comparative analysis. Interviews were conducted with individuals in government agencies, trade associations, and private firms involved in export. The approach chosen was designed to generate as far as possible within the limitations of resources an accurate appreciation of those considerations central to small business export within different industries.

**Study Findings**

Several central findings emerged during the course of this study. More fully considered in later chapters, these key findings are presented below.

The comparative analytical approach adopted for this study clearly identified the value of viewing small businesses in their respective industrial contexts. While the interviews, literature reviews, and analyses did reveal generic considerations generally common to the small businesses of the three industries examined, far more apparent was the realization that a small business's capacity and opportunity to export depends specifically on the structure of the individual industry of which it is a part. Thus:

- The first and paramount finding of this study is that, in addition to the generic characteristics common to small businesses, structural factors inherent to specific industries play a major part in determining whether a small firm can reasonably consider export.

The second finding relates closely to the first. While other industries were investigated, three industries were targeted for case analysis in this study: the fresh groundfish industry, the solar hardware
industry, and the computer software industry. It was revealed through these case analyses that the feasibility for small export varies significantly among the three industries. While in general small firms have a demonstrable role to play in national export efforts, in specific industries small business export may simply not be reasonable to expect. Such was found to be the case to some extent in all three industries examined, but was particularly so in the computer software industry. Thus:

- The second finding of this study is that while in general small firms can be expected to play a role in national export, close examination of such companies in their respective industries can suggest otherwise.

The third finding of this study concerns the ultimate goal of government policies and programs in this area of activity. In legislation, committee reports, administrative position papers, and political statements, the government has established that it wishes to increase small business export. It has established and operates numerous programs designed to obtain this goal. However, during this study it became apparent that in fact there are two goals in operation and that each should receive separate attention. The first is to assist small firms. The second is to improve the American trade position. While connected, these two priorities should not be treated as one and need not lead inevitably to effort to advance small business export. Thus:

- The third finding of this study is that government activity appears to be based upon the straightforward goal of supporting small business export where, in fact, it should be based upon two connected but independent goals: improving America's trade position and assisting small business.

In the course of this study, it was repeatedly observed that while the federal government may provide a range of services, most small firms remain unaware of them. Indeed, the problem of inadequate communication has
reached the point that organizations such as the Small Business Association of New England are taking the initiative to develop and disseminate their own export publications which contain information offered independently by federal agencies. Thus:

- The fourth finding of this study is that federal agencies continue to face a serious problem in conveying both the existence and the substance of their services to small businesses.

While some of those interviewed did note that government officials had provided valuable assistance, the general response to the quality of federal services was in the negative. The speed with which requested information was provided was perceived to be inadequate as was the specificity of the information itself. Additionally, executives and trade association representatives referred to the continuing difficulty of dealing with government personnel more oriented to the internal requirements of their own agencies than to the actual problems of the firms. Thus:

- The fifth finding of this study is that federal agencies continue to face serious difficulties in providing, with necessary dispatch, the kind of services small firms desire.

In addition to questions of speed and quality, critics of government programs noted the significant barriers which act to deter small businesses from working with federal agencies. Problems noted included long delays in processing and extensive paperwork requirements. Thus:

- The sixth finding of this study is that federal agencies continue to erect barriers which undermine the willingness or capacity of small firms to take advantage of government programs. Barriers are to be found in areas of direct aid and procurement.

The most sweeping criticisms directed at federal export efforts noted the tendency of government to avoid exposing itself, thereby undermining the effectiveness of programs. Government programs will act to avoid lawsuits
and, as a consequence, will freely provide lists of names (e.g., export management companies), but will not advise as to which of those named are better or worse than the others. Similarly, in their desire to avoid failure, program officers, even in matters of R&D, will select established firms over small companies for the granting of funds. Thus:

- The seventh finding of this study is that federal agencies significantly undermine the capacity of government to encourage small business participation in international trade through its own programmatic behavior.

The above represents seven central findings of this study. Other findings, particularly those germane to one industry or another, are discussed in the chapters which follow.

Recommendations

Flowing from the work of this study have been measures which federal agencies can consider to enhance their capacity to support small business participation in international trade. While these recommendations for policy and program changes are presented throughout the chapters which follow, immediately below is a brief discussion of several.

Clearly, the federal government does not possess a monopoly on efforts to assist small firms in their efforts to export. State and regional agencies have had marked success in operating their own trade programs. Indeed, on occasion federal programs have been compared to these efforts and been found wanting. Additionally, non-government organizations such as trade associations are visibly working to help their memberships in this area. Thus:

- It is recommended that federal agencies more aggressively capitalize upon the willingness and capacity of others to contribute. In this way agencies could obtain significant
leverage for their funds as well as help to overcome the perceived inability of federal programs to recommend or advise.

As noted, it was a clear finding of this study that structural factors can seriously impede the capacity of small firms to export. In the computer software industry, for example, small firms face important barriers to export including economies of scale and product differentiation. These structural impediments can be addressed in several ways. Thus:

- It is recommended that the federal government consider legislation which would more effectively permit small firms to openly collaborate for export through the operation of trading companies, export cartels, or other such joint actions.

- It is recommended that the enactment of further tax incentives be considered designed to encourage the flow of capital to small firms engaged in export. Tax incentives could also be considered to encourage American firms to substitute American product for that which is now imported.

- It is recommended that the government consider a program in which the overseas receivables of small firms can be purchased, thereby easing cash-flow financing difficulties.

- It is recommended that New Exporter Coupons be considered as a means to support the capacity of small firms to obtain new overseas trade. Such coupons would be convertible into cash or service and would subsidize the efforts of small business to break into new markets.

Finally, the work of this study suggests strongly that the federal government does not yet adequately incorporate small business considerations into trade programs. Industry by industry, the needs of small businesses vary extensively. While a central government office may deem that a certain industry has export potential, such a determination should be translated into small business terms. Indeed, a small business perspective cannot itself become a straightforward overlay imposed uniformly on all programs.
Discretion is needed so that government efforts can most effectively support small businesses when and where it is most appropriate. Thus:

- It is recommended that the SBA or some other office or agency be explicitly assigned the role of ensuring that program and policy choices are made which reflect the particular needs and special resources which characterize small firms.

Report Organization

This report is organized to reflect its central theme that not only are the problems of small firms significantly different than those of large corporations, but that industry characteristics are themselves of critical import in addressing the need to enhance exports. Thus, single chapters are devoted to the analysis of each of the three industries selected for examination. Following the chapters devoted to industry analysis are chapters which focus upon the findings and recommendations of this study. Thus, the chapters which follow this one are these:

Chapter II -- The Fresh Groundfish Industry
Chapter III -- The Solar Hardware Industry
Chapter IV -- The Computer Software Industry
Chapter V -- Government Assistance: The Need For Wider Outreach
Chapter VI -- Structural Impediments: The Need for New Approaches
Chapter VII -- Some Further Considerations.
CHAPTER II
THE FRESH GROUNDFISH INDUSTRY

Introduction

The United States international trading position is changing rapidly as worldwide economic relationships and patterns rapidly alter due to resource shortages, exchange rate disparities, and energy problems influencing national economies. The effects of these changes on U.S. national and international corporations are well-publicized. Their effects on local small businesses, operating without large capital resources, favorable credit access, and in-depth managerial skills can be severe. However, small businesses have certain advantages -- resilience, flexibility, and individual entrepreneurial ability -- which if properly fostered can make them internationally competitive. To better understand the opportunities and impediments facing small firms in the export field, three industries were examined during this study. This chapter considers the first of these, the fresh groundfish industry.

Before proceeding to the discussion of the groundfish industry, however, a word about the organization of this chapter and of the two which follow is in order. In the course of this study, the greatest attention was devoted to the investigation of the groundfish industry. While it was intended that other industries would be analyzed, from the start the study was designed to build from an early and in-depth appreciation of the groundfish industry. Indeed, although the project team brought to this

*Groundfish are those species inhabiting and feeding close to the bottom of the United States continental shelf.
study effort years of experience with the fishing industry, specific emphasis was given to developing case studies of individual firms which had been directly involved in export.

This chapter reflects this study design. In addition to general analysis, it presents specific discussions of individual firms which have in fact attempted in one form or another to engage in overseas trade. In comparison, the chapters dealing with the solar hardware and computer software industries are far more analytic, reflecting the fact that less emphasis was given to the preparation of individual case histories than to the development of an accurate analysis of small business export considerations.

The Legislative Context

The fresh groundfish industry -- indeed, the entire fishing industry -- operates within the context of the Fishery Conservation and Management Act (FCMA). Enacted in 1976, the FCMA established the American fisheries position, plainly stating certain national goals. The law extended United States jurisdiction over all fisheries to 200 miles off the coast, except for certain highly migratory species such as tuna. It provided for the development of administrative mechanisms designed to manage these fisheries, taking into account matters such as biological yield, social and economic criteria, and ecological factors. The stated intent of the law is to facilitate the conservation and management of fisheries in a manner which contributes to the development of U.S. industry to ensure food supply, benefit the consumer, and generate employment. Of greatest significance for American export potential, the FCMA decreed that U.S. fishing vessels and
processors are to have preferential access to the resources available within
the 200 mile zone before foreign harvest is allowed.

At the same time the U.S. passed FCMA, other nations facing the ocean
instituted similar regimes. This, together with scarcities of certain
species from overfishing, created severe dislocations in the supply, demand
and flow of fresh and frozen fish throughout the world. Given that one of
the most prolific and abundant world resources exists within the U.S.
200-mile economic zone, and given also that American vessels receive
preferential treatment, the potential for American export is significant.
In similar fashion, these circumstances suggest further that American firms
are well placed to substitute their own product for fish currently imported.

In sum, the FCMA and changes in the fisheries regimes of other nations
have created a favorable climate for the fresh groundfish segment of the
industry to expand. The federal government has suggested, for example, that
certain species* such as Alaskan groundfish, squids, whiting, mackerals,
Gulf mullet, dogfish and herrings have immediate and significant export
potential. Similarly, it has been suggested within the industry that
certain species can be harvested in such fashion as to replace imports.

While these opportunities do exist for fresh groundfish firms, as a
group these companies face severe obstacles. The industry characteristics
which make this so are considered below.

*The federal government terms many of these species "non-traditional." As
illustration of the government position in this matter, see the National
Marine Fisheries Service publication, "Fishery Products from the Eastern
Industry Structure

Internationally, the United States is seen by overseas producers as one of the most profitable and valuable groundfish markets in the world, absorbing over 700 million pounds of fish a year, much of it frozen.* Even with this consumption of imported product, the United States is the world's second largest fish exporter (after Canada), shipping $917 million worth of fish products annually. This export, however, is comprised primarily of non-groundfish, high value species such as shrimp, crab, salmon, and tuna. This product is normally shipped in frozen or canned condition by large, well-integrated firms with a long history of international trading.

Within this context, this study considers the fresh groundfish industry, one comprised primarily of small independent firms: in other words, one which is highly fragmented. If this industry is to benefit fully from the existence of the FCMA, it will need to overcome serious structural barriers.

Many of the obstacles impeding American groundfish export and import substitution represent well-known problems resulting from an inability to compete with the heavily capitalized and, in some cases since World War II, subsidized foreign companies which have been marketing quality, low-priced fish products in the United States for many years. Foreign fishing industries are frequently important components of national economies, providing extensive employment and contributing to favorable balances of payments. These overseas industries are often influential elements in the

*Figures cited in this chapter are derived from National Marine Fisheries Service published data sources.
domestic politics of these nations, a fact reflected in numerous ways, from the execution of diplomacy to the creation of both visible and invisible import barriers.

Added to these historical conditions is the depressing effect of years of foreign overfishing off the United States coast which the FCMA was formulated to reverse. The net result has been a lack of investment, little planning for long-term development, and a dearth of management skills -- in sum, a fragmented industry ill-equipped to take advantage of new export opportunities. Not surprisingly, overwhelming foreign fishing pressure has resulted in low domestic production of many species and the importation of quality, low-cost, frozen fish products.

Given this background, key characteristics of the American fresh groundfish industry can be observed. To begin with, the fisheries resource is not controlled by individual firms. Access depends on the vagaries of geographic, seasonal and climatic variations. Before fish are taken, they are a "common property" resource with availability a function of unpredictable abundance and locational factors. These factors mean large-scale uncertainties with respect to the size, composition and quality of catches.

A second characteristic of this industry is that firms specialize in particular aspects of their trade, purchasing from well-known suppliers and serving markets where they have obtained a long record of success. Knowledge of certain species, from harvest to processing to sale, is an important asset of any single company. Although large cash flows are generated by a fast-moving perishable product, very little time or capital is available for risk investment or management.
Another outstanding feature of the fresh groundfish industry is its lack of cohesion. Although an obvious community of interest exists among fishermen, packers, processors, marketers and consumers, each component functions adversely to all the others. While the specifics of the industry may vary from region to region -- even within regions -- this lack of cohesion is a dominant force.

Catching methods and techniques vary from specie to specie as well. Vessels ranging from sophisticated offshore trawlers with large crews to small artisanal boats owned and operated by individuals frequently serve the same markets.

Compounding the difficulties facing this fragmented industry is the fact that currently many of the species with potential for export and import replacement, particularly in waters off the West Coast and Alaska, are difficult to reach using traditional fishing vessels and operational methods. Furthermore, the harvesting of these species presents particular processing and freezing problems, requiring a larger scale of investment and longer term financial commitments than the domestic industry has so far been able to undertake.

Certain exportable species found off the East and Gulf Coasts, with the exception of silver hake, are for the most part pelagic -- living at varying heights in the water. Found in large, dense schools, they are often only available seasonally. Here the requirements are for onshore handling and processing facilities and the ability to utilize equipment and labor seasonally at a profit.

In sum, while species exist which the fresh groundfish industry could exploit for export or import replacement, the industry faces serious impediments to such activity.
Case Studies

In order to identify more closely the export problems facing the domestic industry, a representative group of companies was studied. Additionally, the West Coast fisheries export experience was examined.

The companies investigated include the following:

- a long-established export/import fish brokerage firm with 40 years involvement in every phase of the United States fishing industry on all coasts,
- a fish buyer/processor primarily serving vessels landing in outlying ports close to New England offshore fishing grounds,
- a fishermen's cooperative, landing and marketing a wide range of finfish available to the mixed trawl fishery,
- an integrated Gulf Coast firm previously concentrating on shrimp processing, distribution, and sales and now attempting to diversify, utilizing Gulf finfish not previously in high demand, and
- a company formed and incorporated with the specific purpose of exporting non-traditional fish species.

The case studies of these firms are presented in such fashion as to preserve company confidentiality.

Brokerage

In conjunction with a long-established, pre-existing business, a project was instituted by an export/import firm to aggregate product to supply the Japanese market as encouraged by federal programs. To achieve this, the company solicited individual processors who agreed to supply for containerized shipment certain products in certain quantities according to standards which would be provided. The necessary financing and credit arrangements for export were established.

Due to the cyclical nature of supply, immediate problems were encountered in obtaining, on time, the required volume of fish. The brokerage firm nonetheless did receive assurances from suppliers regarding

DEVELOPMENT SCIENCES INC.
the size and quality of their individual components of the aggregate shipment, and the container was delivered to the customer. On inspection it was found that no individual supplier had adhered to the standards prescribed. As a result the broker was forced into arbitration with the customer regarding the negotiated price. The firm was required to absorb severe financial losses which were not covered by the letter of credit conditions.

The original suppliers refused to take responsibility for their failure to achieve quality standards, regarding the entire venture as marginal to their main business. Rather than adjust to the demands of long term overseas market development, the suppliers preferred to fall back to traditional approaches involving quick sales and high cash flows.

The experience of this exporter/importer illustrates the frequent management difficulties inherent in any effort to achieve a collaboration among small fresh groundfish firms. While the customer required a specific product delivered within specified parameters and while the brokerage firm was able to pass these specifications on to individual suppliers, in the end the product failed to satisfy the customer's needs. Not only must standards be clear, they must be enforceable, and groundfish firms are frequently unwilling to yield to such imperatives.

This instance demonstrates an additional common difficulty experienced in the American export field, particularly with regard to commodities. American firms have historically valued the domestic market far more than the overseas market. The latter normally is perceived as an avenue to be pursued when surplus can not be absorbed domestically. Whether in America or elsewhere, however, markets require a stability of supply. If one source cannot provide that stability, other sources may be sought. The provision
of frozen citrus to the German market is a case in point. While American firms, in conjunction with federal programs, were largely responsible for developing this market, today Brazilian firms supply a large proportion of the citrus product. The American producers, having opened a new market, pulled out because they could obtain a better immediate return domestically. This short-term perspective is pervasive to the American export experience and was a factor encountered by the brokerage firm.

Fish Purchaser/Processor

The experience of a second firm interviewed during the course of this study echoed the difficulties of the brokerage firm in attempting to arrange contractual agreements which could lead to higher exports. This firm, an established purchaser and processor of fresh groundfish landings, recently built a processing plant to develop potential inland and export markets, particularly for frozen and salted fish in Europe and Africa. The firm launched efforts to sign contracts with foreign buyers for its product. With these overseas agreements in hand, the objective of the American firm was to purchase fish from independent vessels on an ad hoc or contractual basis. To date, these efforts have not met with any marked success.

Located as it is, close by ports likely to be frozen-in during the winter, and served by smaller-class vessels highly dependent upon weather conditions, the firm is constrained by two major factors: 1) the variability of supplies and 2) expensive and time-consuming methods of transportation (the processing plant is inland). Efforts to develop foreign markets have been slow and difficult. Negotiations with foreign buyers have proven to be time-consuming and difficult to finalize.
The firm finds itself in an exposed position: not owning vessels of its own, it must rely upon the uneven ability of independent fishing vessels to provide its raw material. Complicating the financial position of the company has been its expenditures to install the necessary equipment to fillet, salt and freeze the fish for export. The cyclical and uncertain nature of supplies has resulted in long periods in which capacity to process has gone underutilized.

At the time of interview, arrangements for export had not yet been consummated. Supply uncertainties, legal cases regarding various purchasing agreements, and the uncertainties of export demand had combined to the firm's detriment. The firm continues to believe, nonetheless, that export is feasible. The firm does note, however, that government programs have been "virtually useless." The strains imposed by day-to-day operations have not freed personnel to pursue export contracts in a long-term and well-supported manner.

Fishing Cooperative

A leading fishing cooperative whose members are primarily small businesses was interviewed to determine its experiences in export. The cooperative specializes in the sale of fresh fish, trucking its product to central markets. The cooperative has arranged to sell finfish to a major Mid-Atlantic fish buyer when the supply is abundant and the price is low. Additionally, arrangements exist with a near-by seafood processing firm for that firm to process, package and sell for export certain underutilized species. The primary export markets served are Japan and Europe.

The domestic and international experience of this cooperative reflects again the difficulties of obtaining sufficient and adequate product for stable export. The members of the cooperative are the owner/operators of
the fishing vessels. Acting independently in response to weather and potential prices, they collectively establish the cooperative's fishing "strategy." The cooperative itself has limited power to fashion a strategy: management does often announce that certain species will not be purchased due to low prices, but in the end the fish brought in reflect the short-term perspectives of the owner/operators.

The arrangement with the Mid-Atlantic processor is designed to provide "floor prices" when other markets fail. The arrangement with the neighboring processor provides for the purchase of supply without cooperative membership absorbing high overhead costs. Experiments are also underway with the neighboring processor to develop new product forms for both export and the replacement of imports.

In the course of the cooperative's marketing efforts, a cooperative member was sent overseas to explore the potential for export. As others have found, so the cooperative determined that aggregated supplies are necessary. Serious issues arise, however, when the cooperative considers providing such supplies. For example, difficulties of cash flow must be resolved: the owner/operators are accustomed to immediate payment while overseas purchasers may take a month or more to settle accounts.

While the cooperative determined that overseas markets require steady quantity, it itself was and is oriented toward the fresh fish market and day-to-day landings. Supplies are cyclical. The fishermen who are members compete one with another and prefer to make daily comparisons.

For these reasons, the cooperative has adopted the strategy of allowing another firm (the local processor) to invest in overseas marketing activities. However, the cyclical nature of supplies has made the demands on the processor difficult and meant that the processor has excess capacity.
most of the time. Because the cooperative cannot order members to fish for a particular specie and because members "fish for the dollar," penetration into export markets has been relatively small -- even though the "right" species are available. The cooperative remains a fresh fish marketing entity for the great bulk of its business.

The cooperative pursued its export inquiries by sending a member overseas, examining government publications, and interacting closely with foreign delegations seeking supplies. In all cases the day-to-day pressures of business interfered with long-term planning. Government assistance was felt to be minor and, when available, of a catalogue rather than discriminatory nature.

As the experience of this cooperative demonstrates, the nature of the harvesting business and interboat competition clearly conflict with the need for collaboration to meet overseas demand. In the end, the cooperative was forced to forego the valued-added benefits of exporting, leaving it to the nearby processor to do what it could.

Integrated Gulf Coast Company

An attempt is being made by a firm located on the Gulf Coast to more efficiently utilize available species through the manufacture of a "surimi"* fish product. The firm projects that this product can be successfully marketed in Japan and potentially in the United States.

The firm entered this venture as a consequence of participating in an overseas marketing trip sponsored by the Department of Commerce. At the

* "Surimi" is a minced fish product formed of deboned fish flesh.
same time the firm's principal met an export broker specializing in fisheries products who subsequently participated in the marketing effort.

Supported by federal funds and assistance from Japan, the company initiated pilot production. It launched its marketing effort by first testing various species to determine whether a product suitable to the Japanese market could be produced. These initial efforts were successful with the firm's samples receiving a prize at an annual Japanese fisheries competition.

In the course of its production and marketing, the firm discovered a potential for its product within the United States. The need for such a domestic market became apparent as costs remained too high for the Japanese market alone to justify production. The company is now attempting to lower its costs through larger-scale production with further government assistance. The goal is to develop full-scale facilities, possibly employing additional fish species from regions other than the Gulf. The company is also following up interest in the product from a major U.S. food manufacturer.

The experience of this firm demonstrates that government assistance can facilitate American export. The initial contacts which led to a series of steps aimed at export (as well as potential domestic sales) stemmed from a Commerce Department program to introduce firms to overseas markets. While acknowledging the importance of federal support, the firm did note, however, that international trade negotiations can be long and tortuous, a phenomenon not always incorporated into the government's program design.
New Export Firm

The experience of this firm, formed explicitly to capitalize upon the widely perceived opportunities to export species not traditionally harvested by American firms, illustrates the difficulties inherent in enterprises of this kind. The firm's goal has been to harvest and process squid, exporting the product to identified markets in Japan and Southern Europe.

The company has resorted to both government and private sources for financing and has found both sectors to be averse to the risks associated with fish export. Of particular note for this study was the fact that the federal agencies which were approached adopted this "no-risk" posture. Requirements placed on a potential deal were sufficiently burdensome, complex, and time-consuming as to lead the firm to conclude that the potential benefits of government assistance were not worth the effort.

In general, the firm's executives criticized the program officers with whom they dealt for not having a brief to engage in or conclude complex and sophisticated financing deals designed to encourage export. There appeared to be a lack of discretionary responsibility: unless a relevant precedent existed, the officer would not act.

The firm's experience illustrates the difficulties which are encountered when government agencies are called upon to provide more than "informational" support. As a rule, agencies are equipped to respond with pamphlets, brochures, lists, and other non-discretionary, non-risk forms of aid, but, as this firm discovered, whatever the rhetoric it is quite difficult to get a program to go out on a limb. Standards and procedures simply did not exist to assess the relative merits and drawbacks of the venture. This firm's entrepreneurial activity could not be accommodated within the government programs.
Alaskan Fisheries

Perhaps the most cogent demonstration of the structural problems confronting small fishing firms involves the utilization of the Alaskan fisheries. While the potential for development is considered by many to be extensive, the obstacles a small firm must overcome suggest that without change others than the American fresh groundfish industry will be the ones to capitalize on the opportunity.

The existing fisheries activity in the region is focused toward high value shellfish such as crabs, halibut and salmon. Although markets exist for these species, prices are subject to worldwide conditions. Finfish production represents the area of greatest immediate potential: primarily pollock and black cod, over one million metric tons of finfish are available to American fishermen.

For this resource to be exploited, serious problems must be overcome. First, since long distances must be traveled to get to and from the fisheries, large and highly capital-intensive vessels are required, vessels with in-board holding and processing capabilities. Second, current on-shore facilities are not geared for export markets; rather, they are focused toward the existing crab and salmon markets.

A third obstacle, one seen in earlier cases, involves the requirement for a large and steady flow of product. The distribution system to the most economical market to serve, Japan, requires an aggregation of supply that historically independent vessels have been unable to provide. Not surprisingly, Japanese demand has traditionally been met by large non-American factory fleets.

Structural problems such as these must be overcome if American vessels are to successfully participate in this fishery. One solution may be joint
ventures with foreign (e.g., Japanese) partners who will provide capital, experience and technology while the American industry provides the manpower and the access to the fishery.

In the end, however, the characteristics of the Alaskan fishery suggest that certain structural circumstances may resist change. The small margins available from the sale of low-value species overseas, for example, may simply not be sufficient to justify the development of on-shore processing facilities. It may end up that it will be economical to harvest finfish off Alaska only if processing is handled on-board. As noted, vessels with such capacity are already operating in these waters. Since the cost of a single such ship is in the millions of dollars, small firms may simply find themselves unable to participate.*

Before proceeding to an assessment of the material generated in the course of these case studies, it is valuable to consider briefly the success of a USDA program. The experience of this program, operated by the Department's Horticultural and Tropical Products Division, contrasts sharply with much of what has been reported on above. The Division's Export Incentive Program suggests that structural impediments can be overcome.

During the 1970's, for example, a cooperative effort was launched involving the federal government and American firms wishing to export wine. The program developed was designed to open up new markets so that American

*The implications of such economies of scale will be seen in later chapters as well.
firms could enter successfully. It was understood that a consistency of commitment would be required on the part of participating firms.

The wine export effort was designed for all firms in the industry. Initially, only smaller private firms were responsive but eventually more firms participated through the California Wine Institute. During the first three years, difficulties were encountered owing to the necessity of orienting firms toward export marketing opportunities. Considering the magnitude and diversity of program tasks, the funds allocated were small: $200,000. Activities have included market intelligence and analysis, sales contacts, food shows and exhibits, wine tasting, and the organization of buying and selling teams. Private firms promoted their own products, but in conjunction with and coordinated by the USDA. Results have been a 200 percent overall increase in U.S. export wine trade.

Essential to the success of the program has been an adherence by all exporters to certain standards pertaining, first, to quality as judged by competitive wine tastings and, second, to packaging according to European metric measures.

The experience of the USDA approach, not limited to the wine industry, has implications for the wider U.S. government export effort. While the fact that the USDA program is directed toward commodities is an important caveat, this program does suggest that structural and organizational barriers can be addressed.

**Implications**

This analysis of the fresh groundfish industry suggests that a clear opportunity does exist for the firms comprising this fragmented industry to
enter more fully into international trade. It suggests as well, however, that serious structural problems inherent in the industry must be addressed if the potential is to be realized.

Export places demands upon a small firm which are quantitatively, if not qualitatively, greater than those normally encountered in the domestic market. Small firms must adapt to the imperatives of overseas demand; yet, such change, particularly in the groundfish industry, is hard to accomplish. While government has defined a role for itself to help such firms export, the experience of this industry is that very often the proffered assistance is neither relevant nor sufficient.

Most groundfish firms have concentrated historically first on local and regional markets, then on national markets, expanding step by step as opportunities emerge, investing with slowly accumulating profits and cash reserves. Major costs, large investment and increases in distribution expenses are not always necessary to stay competitive. However, as has been seen, an immediate and major requirement for successful fish exporting is the large injection of risk capital and funding to cover necessary cost increases to adapt to the diverse standards and requirements of a multiplicity of markets. No matter how potentially profitable an export market may appear, it is plainly beyond the financial and management capabilities of many of the small businesses found in this industry to serve these markets.

The financial programs available to the small businesses interviewed did not contain a risk component commensurate with the efforts required to be successful. Available assistance programs appeared based on precedent and criteria formulated to further domestic efforts, but certainly not...
overseas exporting where the risks are unknown and, at the initial stages, unquantifiable.

Most small fishing businesses have tight and pressing time schedules presenting difficulties in overcoming communications, currency, language and cultural barriers. Of the export ventures examined, only the "surimi" project overcame these constraints. Even this example suggests that these factors were a formidable barrier, solved only through a skilled international export agent intermediary.

Not only are the costs of adapting to international standards prohibitive, but the need for a correct understanding of such standards by small businesses either is not recognized or is ignored by firms in this industry. As illustrated by the experience of the brokerage firm which attempted to aggregate product for overseas shipment, standards may have to be imposed by a third party to be acted upon. A responsibility for demonstrating the profitability of achieving set standards will probably also have to be assigned to a third party to assure the incentive for changing individual company attitudes and performance.

The need for an "industry association" to overcome export barriers and through which funds and time can be pooled emerged throughout this industry analysis. Clearly, the USDA could not function as effectively as it does without the "single source" reference of the Wine Producer's Association.

Many informants commented on their difficulties in dealing with government officials. The unfamiliarity of many officials with small business needs and an unwillingness to take risks were cited as serious problems.

The experience of those interviewed suggested that government programs were more geared to large corporations rather than to smaller businesses.
This phenomenon was experienced by the established fish wholesaler attempting to process and market locally produced species overseas. Large scale assistance appeared available at single points in time with the object of producing dramatic results quickly -- this, despite a clearly stated need for incremental, longer-time scale aid.

The Alaskan situation is perhaps as formidable as any facing the U.S. fresh groundfishery. The location and scale of the available resources, combined with the other factors previously noted, place the exploitation of this fishery far beyond the resources of a single small firm, let alone those of a large corporation.

In sum, unless these structural factors are addressed, it is doubtful small fishing businesses, with some exceptions, will be able to export successfully or compete internationally in global fish markets. Neither does it appear likely that domestic producers will be able to replace imported products to any extent since foreign suppliers already have the experience and skills necessary to sell to markets in this country and abroad as market conditions require.
CHAPTER III
THE SOLAR INDUSTRY

The International Context

As numerous studies have indicated, the solar industry appears to possess enormous growth potential. Rising oil prices combined with increasing concerns over the environment have generated great interest in both immediate and long-term applications of solar technology.

The eventual extent of this growth remains unclear. Domestically, President Carter established the goal of supplying twenty percent of the nation's energy needs through solar technologies by the year 2000. The Department of Energy has noted that by that year seven quads of energy can be supplied by solar technologies. On the other hand, the National Academy of Sciences Committee on Nuclear and Alternative Energy Systems has suggested a lower figure of two quads for that date.*

Internationally, renewable technologies have long played a major role in the supply of energy. While developed nations have relied upon petroleum, natural gas, and other "commercial" fuels, lesser developed countries have depended to a greater extent upon "traditional" fuels such as charcoal, firewood, and hydropower. As one witness noted in testimony before the Senate:

"...the traditional renewable based fuels and other renewables, particularly hydro, provide a large, if not major, share of the overall national energy consumption in most developing countries. For example, in Bangladesh these sources account for approximately 74 percent of total consumption although, uncharacteristically, firewood is less important than agricultural

residues. Openshaw (1977) estimates that between 40 and 50 percent of the world's population relies on firewood for cooking and that firewood supplies about one-fifth of the world's fuel requirements. Parikh (1978) has estimated that commercial energy sources supply less than 10 percent of total energy in such countries as Nepal, Tanzania and Mali, while in Central and Northern Africa less than 35 percent of total energy consumed is commercial - some 10 percent is agricultural residue while over 55 percent is fuelwood. The majority of the developing countries lie in a range from 30 to 80 percent or more in overall reliance on traditional fuels. Furthermore, the importance of these traditional fuels is not decreasing but is, in many instances, increasing within the developing nations.

This international dependence upon renewable energy supplies is expected to continue. Lesser developed countries are placing increased emphasis on technologies which employ renewable resources. Indeed, the price of commercial fuels has suggested to some that developing nations may end up following the novel course of moving from one form of renewable energy (low technology) to another (high technology), skipping as much as possible the conventional developmental shift to petroleum, natural gas, and so forth.

In the United States and abroad, governments are directing significant attention toward solar technologies.** Concern exists in the Third World for spreading deforestation, for the inability of LDCs to pay for higher energy imports, for the impact energy bills are already having upon development plans, and for political stability. The more developed nations have equivalent concerns relating to the protection of the environment, the

---


**Incorporated throughout this chapter are the first hand observations of members of the study team who have spent extensive time overseas dealing with the application of solar technologies.
recycling of petrodollars, the inflationary impact of higher fuel prices, and for the political stability of petroleum rich regions.

In the last several years, the United States government has significantly upgraded its support for the American development of solar technologies. In addition to vastly increasing the funds flowing to the solar energy field, the government has enacted numerous laws directed fully or partially toward enhancing the eventual position of an American solar industry. These federal enactments (often paralleled at the state level) involved both the establishment of new solar programs and the placement of a solar emphasis on existing non-solar programs such as those dealing with construction.

This extensive public sector involvement in the development of solar technologies has been and will remain for some time a critical factor in the life of the solar industry. As will be noted later, a significant proportion of the comments made by solar activists and by those in the solar industry relate directly to the "non-trade" programs and policies of the federal government.

The Solar Industry

The American solar industry is highly fragmented, comprised of hundreds of small businesses as well as several larger firms. Frequently undercapitalized, companies in this industry come and go. Indeed, its newness and its fluidity render it particularly difficult to assemble definitive statistics on this industry.*

*See, for example, United States House, Committee on Small Business Report: "Role of Government Funding and its Impact on Small Business in the Solar Energy Industry," 1980, p. 41. The Committee criticized the Executive Branch for its inability to provide exact numbers on the solar industry.
The solar industry is itself an aggregation of several more specific industries. In effect these several solar industries are defined by the individual technologies they deal with:

- **Photovoltaic** -- the direct conversion of sunlight into electricity through the use of semi-conductor cells made with materials such as silicon and cadmium sulfide.

- **Active Solar Heating/Cooling** -- the use of collectors, heat exchangers, energy storage, distribution pipes and ducts, and, in the case of cooling, a heat pump to heat or cool space or to heat water.

- **Passive Solar Heating/Cooling** -- the use of materials and structural design such that the natural processes of conduction, convection and radiation will heat or cool space.

- **Wind** -- through which electricity can be generated or work, such as the pumping of water, accomplished directly.

- **Solar Thermal Electric** -- by which sunlight is concentrated to heat a fluid which in turn drives an electricity generator.

- **Biomass** -- the conversion of plantlife into fuel, chemical feedstock, heat, or electricity.

- **Low-head hydroelectric** -- the conversion of the energy of falling water into electricity.

- **Ocean Energy Conversion** -- by which advantage is taken of the energy found in waves, currents, salinity gradients, and the thermal differences between ocean layers.

Certain of these technologies are in use today. Others, such as those involving ocean energy, require additional research and development. With regard to export, three industry groups are the most significant: photovoltaics, active solar heating (active solar cooling remains a technology primarily of the future), and wind.

The photovoltaic industry is comprised of a limited number of firms, with the exact number open to dispute. Many of them are small, but several are connected to large corporations. By far, these large firms account for
the vast majority of sales of photovoltaic modules (a single photovoltaic cell mounted and encased) and arrays (a group of modules). Both large and small firms manufacture systems which include the photovoltaic arrays plus devices to both convert and use the electricity (e.g., PV-powered refrigeration systems, small DC power packs, self-powered signaling and communication systems, corrosion protection systems).

Relative to its total volume of photovoltaic sales, the industry is heavily engaged in export: $14 million out of a total business volume of $31 million in 1979.* Most of the export business is modules and not systems; however, systems are felt to be the growth market for the future.

It is similarly difficult to establish the number of firms engaged in the active solar heating business. Estimates in the range of 300 to 350 are common. The active solar heating industry exports far less a proportion of its total volume, $4.2 million out of $113 million in 1979.** In this segment of the industry, systems composed of collectors (panels) and heating devices are manufactured and sold.

---


** Ibid., p. 24.
The wind industry is composed of a limited number of small firms, again with the exact number open to dispute. The wind industry exported $1.5 million in 1979, out of a total business volume of $8.5 million.* In the wind industry, manufacturers of devices converting wind directly into mechanical power are mostly small businesses while firms manufacturing electricity generating windmills are large as well as small.

U.S. mechanical power windmills have been sold overseas for many years. Aeromotor windmills for shallow water pumping can be seen in almost every country in the world where the wind regime is adequate. Many of these are no longer working, however, for several reasons: a) the introduction of rural electrification undercut the competitiveness of mechanical pumping, b) the supply and maintenance infrastructure was not adequate, and c) aquifer or agricultural practices changed which made wind pumping impossible or uneconomical compared to diesel powered pumps.

Impediments to Export

The solar industry is striking in the high degree to which it has entered the export market. Most industries, particularly in their formative years, emphasize domestic sales. Only when the domestic market is saturated do American firms customarily turn overseas. In the case of solar, however, export has occurred quickly. In part this may be due to overcapacity, in part to overseas demand.

* Ibid., p. 41.
The American solar industry is generally perceived internationally as a leader, possessing not only advanced technology, but also a domestic market of sufficient size to facilitate the achievement of production-related economies of scale. Interviews echoed frequent statements in the literature that American firms are often approached about exporting their products.

The experience of a Massachusetts firm is a case in point. Employing a cellulose-based material for the low-cost production of collectors for the heating of water, this firm has been approached by an Italian manufacturer and a Philippine importer. The former has opened negotiations concerning a licensing agreement; the latter has inquired about the direct importation of finished product. Because firms experienced in international trade have taken the initiative, many of the customary export difficulties, such as a lack of understanding of trade procedures, have not been encountered.

A wind energy firm interviewed during this study similarly finds itself responding to export inquiries. While eventual overseas sales are few due to the costly need to send an engineer to the site for the installation of the turbine generator, 20 percent of the 300 monthly inquiries to this firm originate overseas. Indeed, the firm notes that it has never even advertised its product: the coverage it has received in the New York Times, Money Magazine, Popular Science, and elsewhere has been sufficient to generate extensive overseas interest.

Photovoltaic firms, more than any others in the solar industry, experience this international demand. PV cells are cost effective for application in isolated rural areas which do not have easy access to a central electricity grid. Even in Europe, American PV cells are in demand due to their high quality and lower cost.
It is important to note, however, that the international solar market remains highly fluid: a lead today in technology may not equate into market dominance, today or tomorrow. In the photovoltaic field, for example, American technology is generally considered to represent the state of the art. Moreover, the only serious international competition currently comes from Germany. This current American predominance given, Japanese firms and AEG Telefunken of Germany will likely be major competitors in the future. A SERI report sums up the future of the U.S. in PV:

At present, Japan is not a major factor in the photovoltaic power system market; the U.S. is. Despite this fact, the authors believe that Japanese firms have the potential to capture the major share of the world market in a time frame of about 20 years. This will become true if several assumptions are valid concerning the probability of technical and manufacturing breakthroughs in PV power, growth of market demand, a determined national push by Japan and a lack of concerted effort to promote U.S. PV exporters.

Similarly, in the active solar heating market, the predominance of American technology does not necessarily result in market position. The major U.S. firms in hot water heating systems have substantial competition from European and Japanese manufacturers, particularly in Africa, the Near East and Asia. In Latin America, U.S. manufacturers have less competition; however, Mexican and European firms are becoming more visible. Firms exporting active heating systems, moreover, encounter the strong desire on the part of the importing nation to develop its own indigenous solar industry, something quite feasible considering the lower level of technology involved.

Given this fluidity in the international solar markets, American firms, particularly smaller companies, note specific obstacles which impede their efforts to export. As discussed below, these obstacles include:

- Market Immaturity,
- Lack of Market Information,
- Distance to Market,
- Lack of Management Skill,
- Inadequate Financing,
- Patent Infringement, and
- Federal Policies and Programs.

Market Immaturity

Many of the markets in which American firms attempt to sell their solar products are relatively immature. Solar technologies can be advanced; moreover, as a group such technologies carry the image that they are of the future, not today. Thus, firms entering overseas markets, particularly those found in lesser developed countries, find themselves confronting a lack of understanding by potential customers of current opportunities in this field.

Compounding this problem is the fact of different national lifestyles. In the United States hot water is perceived as a basic necessity. Usage patterns are established and well understood. In developing countries, on the other hand, hot water is often viewed as a luxury, and patterns of use are frequently not well delineated. Additionally, plumbing codes may not exist, and an American system designed for American practices may require substantial modification to be accepted in a rural, undeveloped location.
The immaturity of the market undercuts the capacity of American firms to place their systems overseas in other ways as well. For example, the infrastructure necessary to maintain the technologies, let alone install them, may not be present. Parts and trained personnel may be hard to obtain. Thus, while a national government may desire to encourage the use of solar technologies, actual opportunities for their application may in the end be restricted by the reality that competing technologies such as diesel engines, while perhaps more expensive than solar alternatives, are at least understood and maintainable at the village level.

Lack of Market Information

Most solar firms are small and do not possess the resources to identify which markets are most appropriate for their products. Nations vary enormously in the extent to which they support solar technologies. In Tunisia, for instance, the government at one point pledged to enact important solar tax credits, thereby facilitating a trade arrangement between an American and Tunisian firm. When that pledge was effectively withdrawn, the economics of the arrangement disappeared and the production-licensing deal fell apart. Other information bearing upon the appropriateness of a market involve meteorological data, the previous exposure of the market to solar technologies, and trade procedures and regulations peculiar to each country.

This lack of market information is a particularly important impediment for small firms. Such a company operates under clear financial pressures: it must have a reasonable expectation that a marketing investment will pay off well and will do so relatively quickly. Except in the photovoltaic area, however, there is very little information on foreign short-term solar
markets. There are numerous reports on the foreign PV market, and the major
PV firms have the financial capability to sustain marketing in anticipation
of longer term return. The small firms in the solar field seem not to be
able to get enough information to risk much marketing effort; consequently,
their attempts to enter foreign markets are often inadequate even in those
areas where there is a demand.

**Distance to Market**

The existing foreign solar market for U.S. manufactured goods, except
for PV systems, is principally in non-industrialized countries. Industrialized
countries are meeting wind and solar hot water needs with their own or nearby-country technologies. Because many solar powered
systems are only marginally competitive with other alternatives, distance
from market can be an important component in system cost. Shipping,
maintenance, and replacement of inoperative equipment can increase the cost
of an American supplied system to the point that it cannot compete with
similar systems from Europe or the Near East.

Distance to market also affects the currency of a firm's knowledge of
that market. Generally, the more distant a market is from a supplier the
more trouble he will have in getting sufficient current data on short term
opportunities. Thus, small companies face increasing economic and risk
disincentives as the distance to the market increases.

**Lack of Management Skill**

When small, solar firms are similar to those of other industries in
that their lack of experience in trade procedures impedes their willingness
and ability to export. While larger firms establish export departments
indeed, an interviewed executive of a highly successful commodity exporting cooperative stated that the first thing one must do is to establish an export office within the sales/marketing division), smaller firms must rely upon domestically oriented sales staff or agents.

Inadequate Financing

An observation voiced by almost every industry, the inability of customers and of the exporting companies to finance a sale is noted repeatedly in the solar industry. Small firms face particular difficulties in this area when competing with the larger American or foreign solar corporations. As one study has noted,

While the United States is currently superior in terms of cell and module cost and quality (to the extent of supplying such components to the foreign systems competition), this does not translate into overall market supremacy unless photovoltaic systems marketing and financial assistance is given greater emphasis by the U.S. Government.

There is also the fact that many other governments provide more favorable financing for their exporting industries than the U.S. This up-front financial encouragement of the industry and the down side protection against non-payment or in-country problems minimizes the risk some companies must take. As risk is minimized or exportation is facilitated, a company can afford to invest more in developing a market. This additional investment can often make the difference between success and failure.

Patent Infringement

Firms note that they frequently receive inquiries from overseas requesting detailed specifications of their products. On other occasions,

an offer is made to purchase a single device. Instances such as these highlight the serious problem for small firms of protecting whatever patents they hold on their products.

The problem of patent infringement relates directly both to the sophistication of the technology and to the desire of the importing nation's government to protect American technology. With regard to the former, copying of active solar technologies is particularly easy since the approach involved is relatively straightforward. And if a government chooses to turn a blind eye toward patent infringement because of its desire to develop an indigenous solar capacity, a small American firm has little recourse.

Federal Policies and Programs

Ironically, while federal support has been a prime agent for the development of the solar industry, federal activities commonly come under severe attack, particularly by those concerned for the survival of smaller firms. Putting aside for the moment federal activity in the areas noted above, frequent complaints are directed at other activities which undermine the smaller solar firm. Of specific note are procurement and the federal R&D approach.

- Procurement. The federal government has long been criticized for its propensity to procure goods and services from large corporations. Evidence suggests that this preference for large firms reaches into the solar market. This pattern is doubly damaging since, first, the solar industry is so dependent upon Washington for support and, second, small firms are historically an enormous source of innovation, something clearly to be desired in this area of high technology.
Compounding the difficulties of small solar firms are the procurement procedures employed by government agencies. Small firms find it particularly difficult to generate lengthy proposals in response to complicated RFPs, especially when more than a year can pass before an award is made.

A recent NASA RFP for solar powered systems for a renewable energy project in Africa is a good example of additional problems with government procurement. NASA operates a program to stimulate demand for PV systems and build industrial capability to design and supply these systems. In its Africa RFP the Agency suggested that bidding firms offer to share the cost of the project. Further, the agency established extensive requirements for design, warranty and service. In sum, NASA effectively precluded small firm bids.

Even in programs directed specifically at assisting small firms and independent inventors, delays can be of remarkable duration. The Inventions Support Program run jointly by the National Bureau of Standards and the Department of Energy often takes more than two years to evaluate a request for assistance and provide whatever aid is decided upon. And this is a program which has received much praise for its work.

- The R&D Approach. Federal agencies, particularly the Department of Energy, are frequently criticized for their overemphasis of research and development at the expense of market development. Critics note that while billions of dollars are spent in universities and national laboratories to perform basic or applied research and to test new technologies, far less is devoted toward enhancing demand for those improved technologies ready for commercial use. Put another way, critics suggest that the federal
government relies too much upon knowledge-push tactics and too little upon demand-pull approaches.

Ironically, the federal government has successfully employed demand-pull tactics. More than two decades ago, the federal government, primarily the military, created and sustained a demand for computers. Based upon that public sector demand, a new industry developed. Eventually, the industry outgrew its dependence upon Washington, and today it leads the Department of Commerce list of industries with export potential.

The Office of Technology Assessment has noted this tendency of federal agencies to emphasize knowledge-push. Speaking of active solar hot water and space heating systems, OTA argues that the adoption of these technologies "can now be accelerated more by market development activities...than by federal R&D efforts."

Compounding the difficulties is the federal tendency to avoid risk, a surprising but common posture in matters of R&D. Critics note repeatedly the tendency of program managers to award grants and contracts to firms they are familiar with, usually of larger size. If a small firm fails to complete a project, the government official feels exposed. If a large firm fails, then no one can accuse the official. It is an approach which militates against the capacity of small firms to innovate.

It is to be noted, of course, that matters of procurement and federal R&D do not appear to relate directly to the export of manufactured goods. Yet, in the solar field, the relationship between public and private sector is particularly close. As with computers, the federal government has assumed a central position in the domestic as well as overseas development.

of this industry. NASA has a major developing-country PV system program; AID has a renewable energy program in Washington and at the mission level; the Department of Commerce has trade shows and has placed emphasis on solar technology; other agencies are active as well. While certain firms interviewed did not connect their activities to federal programs and policies, the common response lay in the opposite direction.

One firm, engaged in the distribution of active solar hot water equipment, when asked about federal efforts in the area of export, immediately drew the conversation back to the domestic side. The executive argued that the most important thing Washington could do to assist exports would be to better support the capacity of the industry to market within the United States.

A second solar firm interviewed for this study noted its total involvement with federal programs. Not only had it received a grant from the Department of Energy to pursue the marketing of its product, the firm had also been introduced to the export market by a program manager within DOE. He expected to be attending an overseas trade fair, again in part through the efforts of DOE.

With regard to export, however, it is important to note that overall contact between the federal government and individual solar firms is uneven at best. Firms interviewed had markedly different degrees of contact, some a great deal, others virtually none. A wind energy company, for example, had essentially no contact with federal programs. Only once had it been contacted by the Department of Commerce, and then only to fill out a form. A SERI study notes, in fact, that only nine percent of the solar firms
exporting did so in connection with the programs of the Department of Commerce.*

Implications

Of the industries examined for this study, the solar industry suggests the closest connection between overseas trade and government activity. Certain firms were conscious of federal programs, one clearly noting the centrality to its own success of DOE efforts. Other firms were quick to criticize federal policies and programs as being inadequate or mis-directed. This speed to criticize itself represents a strong indication of the importance of federal involvement.

As noted earlier, however, the nature of federal involvement lies far more in the direction of supporting the overall development of the industry than in helping single firms to export. In effect, then, the government is primarily addressing industry-wide structural considerations and only secondarily attempting to solve export related difficulties.

This industry analysis indicates that there are in fact programmatic steps that federal agencies can take to enhance small firm export. In the area of market information, for example, studies can be financed (and the results better disseminated) concerning where and when opportunities will exist for the export of non-photovoltaic products.

The analysis also suggests that the government can enhance small firm export by addressing the problem of market immaturity. Agencies such as AID could consider additional aid programs directed at increasing the indigenous capacities of developing countries to accept and maintain solar technologies. Indeed, a program could be offered in which technicians would be

brought to the United States and trained in the installation and repair of solar devices. Upon return to their own countries, these individuals would understandably be pre-disposed to American technologies.

The impediment posed by patent infringement can also be addressed. The Office of the U.S. Trade Representative already works to eliminate barriers of this kind. Greater attention to the concerns of solar firms could yield important export benefits.*

Finally, the government can do more to focus American solar firms on the opportunities existing in Latin America. Government programs frequently emphasize the application of solar technology in regions such as North Africa and the Far East where competing nations (e.g., France, Japan) have more established economic relationships. In attempting to market to such areas American firms find themselves with important competitive disadvantages: they are further away from potential clients and possess far less developed networks for distribution and service. These very factors, however, favor American firms looking to Latin America for sales. We are closer than our competitors to this region, and we possess far more advanced relationships in this area than do European nations or Japan.

These potential programmatic shifts noted, however, it is important to recognize that the major export problems of the solar industry are, once again, structural in nature. These structural considerations are considered again in Chapter VI. Chapter IV, following immediately, examines a third industry, Computer Software. As will be seen, structural factors emerge once more as pre-eminent considerations.

*As noted in the next chapter, firms in the computer software industry share this concern over product protection.
Chapter IV
THE COMPUTER SOFTWARE INDUSTRY

Industry Overview

The computer software industry has experienced staggering growth over the past decade. In 1969, according to EDP magazine, total sales of software products stood at $40 million. By 1979 the same source reported sales of $2,375 million, a growth of over 5,800 percent. In 1980, EDP projected growth of an additional 30 percent to $3,460 million.*

Table I shows the annual sales of computer software from 1969 through 1980. Over this period sales averaged an annual compound growth rate of 49.2 percent.

Until 1969 the software industry did not really exist. Prior to that year hardware and software were thought of by purchasers as an integrated package. The independent software industry was launched as a consequence of the decision by International Business Machines to "unbundle" its services. This decision meant that, henceforth, IBM would price and sell its hardware and software as separate items.

This pattern was rapidly emulated by other hardware manufacturers, making it easier for independent software producers to compete. With extensive transferability of their basic skills, computer programmers found a wide market for their services. While this market had always existed, the systems pricing which predominated prior to the unbundling decision had precluded most opportunity for independent entry.

* Compiled from EDP, February 23, 1979, p. 3, and March 2, 1980, p. 3.
Table 1

UNITED STATES SOFTWARE SALES

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Sales ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>40</td>
</tr>
<tr>
<td>1970</td>
<td>75</td>
</tr>
<tr>
<td>1971</td>
<td>102</td>
</tr>
<tr>
<td>1972</td>
<td>183</td>
</tr>
<tr>
<td>1973</td>
<td>239</td>
</tr>
<tr>
<td>1974</td>
<td>855</td>
</tr>
<tr>
<td>1975</td>
<td>1,020</td>
</tr>
<tr>
<td>1976</td>
<td>1,225</td>
</tr>
<tr>
<td>1977</td>
<td>N/A</td>
</tr>
<tr>
<td>1978</td>
<td>1,895</td>
</tr>
<tr>
<td>1979</td>
<td>2,375</td>
</tr>
<tr>
<td>1980</td>
<td>3,075</td>
</tr>
</tbody>
</table>

The unbundling decision coincided with, and some believe was motivated by, a growing shortage of trained computer programmers. The highly competitive nature of the demand for their services provided substantial incentive for fragmentation of the industry. This pattern has intensified over the intervening decade. The breadth of user needs, exemplified by the range of products shown in Table II, created numerous niches for independents. Figures compiled from Business Week and the Association of Data Processing Service Organizations show that by 1979 there were some 7,000 firms offering 8,000 software-related products to 30,000 customers.

The influx of small enterprises into the marketplace was soon followed by the arrival of larger organizations. Foremost among these were the large aerospace firms. Their own substantial needs for data processing services required large in-house staffs. With this investment already in place, it took little to achieve a foothold in the market-place. The marginal cost was easily justifiable to take advantage of a market growing by 50 percent per year. Table III provides a listing of the top 30 firms in the computer software and services industry at the end of 1979 according to Datamation magazine.

Role of Small Business

Two factors are primarily responsible for the high fragmentation of the software industry. The first is the overwhelming demand for software. There is a consensus within the industry that the growth of the entire information processing industry is constrained primarily by the availability

*Business Week, September 1, 1980, p. 52
**Datamation, July, 1980

DEVELOPMENT SCIENCES INC.
<table>
<thead>
<tr>
<th>Type of Software</th>
<th>Purpose</th>
<th>Suppliers</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Base Management System</td>
<td>Organizes data in line with the informational needs and organizational structure of a user. Facilitates accessing and updating the files.</td>
<td>Computer Vendors</td>
<td>Starts at $7,000 (for use with a minicomputer) and runs to more than $100,000 (for use with a mainframe computer or custom programming).</td>
</tr>
<tr>
<td>Networking</td>
<td>Enables computers in one building or across the country to communicate.</td>
<td>Primarily Computer Vendors</td>
<td>$5,000 to $15,000 in a minicomputer network and $30,000 to $75,000 for each mainframe computer in a network.</td>
</tr>
<tr>
<td>Transaction Processing</td>
<td>Permits users to carry on a dialogue with the computer, typing information and getting an immediate response. For use with such commercial applications as check processing and order entry.</td>
<td>Computer Vendors</td>
<td>$15,000 and up.</td>
</tr>
<tr>
<td>Programming Table</td>
<td>Helps programmers write applications by automatically testing software codes and identifying errors. Also known as &quot;debuggers.&quot;</td>
<td>Computer Vendors</td>
<td>$1,000 to $5,000 (for a minicomputer) and $5,000 to $75,000 (for a large mainframe computer).</td>
</tr>
<tr>
<td>Queries and Report Generators</td>
<td>Aid the novice user in extracting information from a computer memory and formatting it into a report.</td>
<td>Computer Vendors</td>
<td>Systems Software Companies</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Applications Generators</td>
<td>Generate applications software programs without the need for an experienced programmer.</td>
<td>Major Computer Vendors</td>
<td>$5,000 and up.</td>
</tr>
<tr>
<td>General Financial</td>
<td>Automates the accounting functions of a business, including billing, inventory control accounts payable, accounts receivable, general ledger, and payroll.</td>
<td>Computer Vendors</td>
<td>Packages range from $1,000 to $20,000 (for mini-computer systems) and from $20,000 to $70,000 (for large mainframe computers).</td>
</tr>
<tr>
<td>Manufacturing Resource Planning</td>
<td>Helps the user gain better control over the entire manufacturing process from production planning and inventory control to materials monitoring.</td>
<td>Large Computer Vendors</td>
<td>$50,000 and up for standard packages. $100,000 and up for custom software.</td>
</tr>
<tr>
<td>Financial Planning</td>
<td>Simulates profit-and-loss scenarios for a company based on revenues, sales force location, commissions, and other controllable variables.</td>
<td>Primarily Applications Software Companies</td>
<td>$5,000 to $45,000 for packages; custom work begins at $250,000.</td>
</tr>
<tr>
<td>Cash Flow Management</td>
<td>Assists financial managers in getting the best use of funds within a business.</td>
<td>Primarily Applications Software Companies</td>
<td>$25,000 to $75,000 for packages; custom software begins at $150,000.</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Management Support Systems</td>
<td>Combines software packages such as color graphics and business modelling that aid the manager in making decisions.</td>
<td>Primarily Applications Software Companies</td>
<td>Depends on the packages selected.</td>
</tr>
</tbody>
</table>

Source: Business Week, September 1, 1980.
Table III
COMPUTER SOFTWARE AND SERVICES

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>1979 Data Processing Revenues ($ mil.)</th>
<th>Percent of Total 1979 Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Sciences</td>
<td>416.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Automatic Data Processing</td>
<td>400.8</td>
<td>98.0</td>
</tr>
<tr>
<td>General Electric</td>
<td>350.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Electronic Data Systems</td>
<td>311.5</td>
<td>95.9</td>
</tr>
<tr>
<td>McDonnel Douglas</td>
<td>253.0</td>
<td>4.8</td>
</tr>
<tr>
<td>Tymshare</td>
<td>176.0</td>
<td>91.1</td>
</tr>
<tr>
<td>System Development</td>
<td>163.1</td>
<td>100.0</td>
</tr>
<tr>
<td>United Telecom</td>
<td>138.4</td>
<td>7.7</td>
</tr>
<tr>
<td>Bradford National</td>
<td>120.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Planning Research</td>
<td>119.6</td>
<td>48.1</td>
</tr>
<tr>
<td>Informatics</td>
<td>112.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Dun &amp; Bradstreet</td>
<td>110.0</td>
<td>11.6</td>
</tr>
<tr>
<td>Reynolds &amp; Reynolds</td>
<td>109.5</td>
<td>57.9</td>
</tr>
<tr>
<td>Boeing</td>
<td>96.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Wyly</td>
<td>89.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Shared Medical Systems</td>
<td>48.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Martin Marietta</td>
<td>67.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Comshare</td>
<td>66.9</td>
<td>100.0</td>
</tr>
<tr>
<td>The Sun Company</td>
<td>64.0</td>
<td>0.6</td>
</tr>
<tr>
<td>National Data</td>
<td>54.4</td>
<td>100.0</td>
</tr>
<tr>
<td>First Data Resources</td>
<td>50.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table III, Page 2

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>1979 Data Processing Revenues ($ mil.)</th>
<th>Percent of Total 1979 Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commerce Clearing House</td>
<td>49.3</td>
<td>23.3</td>
</tr>
<tr>
<td>American Management Systems</td>
<td>48.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Manufacturing Data</td>
<td>45.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Interactive Data</td>
<td>42.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Anacomp</td>
<td>35.8</td>
<td>71.2</td>
</tr>
<tr>
<td>Optimum Systems</td>
<td>35.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Grumman</td>
<td>35.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Management Science America</td>
<td>35.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Cincom Systems</td>
<td>30.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Datamation
of software products. Frederic G. Withington, an industry specialist with Arthur D. Little Inc., makes the point forcefully in a recent Business Week article. "We expect revenues of data processing companies to grow to $95 billion in 1984, [but] if there were no software constraints, sales would be even higher -- maybe $125 billion." The shortage of skilled programmers is one of the principle factors in this supply shortage. Current demand outstrips personnel availability by as much as 50,000 creating ample opportunity for any entrepreneurially minded individual with a salable idea. Demand for programmers is projected to reach 1.5 million by 1990, three times the number in today's labor force.*

The second major factor favoring small businesses is the lack of any substantial economies of scale in the production of software. As Michael D. Godfrey, Director of Research for the Univac Division of Sperry Corporation notes, "The creation of software is not like engineering as we know it. It's more like creation in the performing arts."** As a consequence, management of software production is an excruciatingly difficult task. Efforts at "structured programming" and "structured analysis" during the 1970s, intended to formalize the software production process, met with only limited success. Without the ability to standardize the process of software production, there is little opportunity to employ division of labor, the fundamental production concept which establishes advantages for larger "manufacturing" enterprises.

**Ibid., p.50.
Beyond these major factors which limit the advantages usually available to large companies in other industries, there are several ancillary considerations which equalize the position of small companies.

Small firms are perceived as having a better record of developing new and innovative products in the software industry despite the development staffs of larger companies. This is generally attributed to the personality characteristics of creative individuals. Further, because of a more limited range of interests, smaller companies are in closer touch with their markets. They are frequently valued for their expertise and generally respond more quickly to client needs.*

Finally, large companies have little in terms of favorable access to resources relative to smaller firms. As noted, a single individual with a good idea can start a software business with relatively little capital. Smaller firms may even have an advantage in terms of their appeal to the most essential resource -- people.

Export Potential

According to David Sturtevant of the Association of Data Processing and Service Organizations,** there is a wide awareness on the part of software producers of the excellent export potential for their services. The foreign market, while lagging behind that within the United States, is


**Interviewed for this study. Unless noted otherwise, statements by individuals cited herein were obtained through such interviews.
essentially paralleling its development. The growing use overseas of data-processing equipment has created a corresponding need for software support. The recognition of this fact is further emphasized by the decision of the U.S. Department of Commerce to highlight this industry as one possessing exceptional export potential. Recent announcements by IBM, AT&T and Exxon to enter the software business are seen as further evidence of the internationalization of the market for these products.*

Despite these glowing assessments, the Association of Data Processing and Service Organizations estimates that export sales accounted for only $600 million of American software and services sales in 1979. For the most part, this is attributable to industry structural factors. These structural factors manifest themselves for the most part in the marketing dimension of a firm's activities. And, beyond business disciplines such as production, finance and planning, export is primarily a marketing exercise.

Software Industry Structural Factors Hindering Small Business Exporters

With regard to export, there are seven factors which are endemic to the structure of the software industry which militate in favor of large firms to the detriment of smaller firms. These factors are:
- Economies of Scale,
- Product Differentiation,
- Capital Requirements,
- Switching Costs,
- Access to Distribution Channels,

Legal Protection, and
- High Strategic Stakes.

Each of these barriers to entry into the export market is discussed below in some detail. Also presented are generally accepted means of responding to these problems which may serve as the basis for policy recommendations.

Economies of Scale

Economies of scale refer to declines in unit costs which occur as the absolute volume produced in each period increases. Economies of scale deter entry by forcing a new firm to come in at a large scale and risk strong reaction from existing firms or come in at a small scale and accept a cost disadvantage.

As was pointed out earlier, economies of scale are not a significant factor in the production of software. Indeed, this is one of the major factors allowing small firms to coexist with large companies in the domestic market. With regard to export, however, economies of scale do surface to the clear detriment of small firms. In areas of marketing, service, and research and development, large companies are seen to possess significant advantages.

As was noted by an executive of one small New York financial services time-sharing company, "We have very creative people with excellent ideas for new general purpose software packages. We are hampered by a lack of programming people who can service our existing customer base and their particular needs." This executive noted that while his firm "would dearly love to put the people with a good idea in a room somewhere to work on it," the company has "a crying need for these people to be in the field." "A big company like National CSS," he added "has the capacity to do both."
There are several ways in which the problem of economies of scale might be addressed. One approach would be to develop a mechanism whereby smaller firms might share operations or functions in an export market. This may be particularly valuable in matters of sales and service. Here, it is possible to treat the overhead of the operation as a joint cost, both in direct marketing and subsequent customer support. Since the service component also uses a scarce resource, that is, technically competent personnel, the ability to collaborate in this area could yield substantial economies to firms without an adequate initial client base to support such costs.

Such an activity might serve as a representative office for several small software suppliers who would share the overhead. Personnel could be trained to represent each company's particular products. It is most likely that an arrangement of this sort would tend to specialize by application, such as accounting and finance, inventory control, and scheduling.

Alternatively, joint promotional activities such as trade shows or sales missions could provide assistance to small business in overcoming this obstacle. At the very least such activities, if carefully planned, could assist potential exporters in determining the level of interest in their product offerings. Sufficient interest might justify the initial export of product and further efforts at market development.

Product Differentiation

Software products are highly differentiated, offering a variety of options in what frequently are basically similar packages on a conceptual basis. Conversations with industry representatives focused on the critical nature of suiting a product to a well-defined market segment.
A venture capitalist specializing in software companies remarked, "While we like to get in on a general purpose program, such opportunities are rare. Far more frequent, and generally more profitable at the margin, are the really specialized packages that serve a unique set of needs in a narrow market segment. Just think of the marginal profits somebody like a Schlumberger makes off of its proprietary oil-field services packages."

Due to this aspect of the industry, small firms are frequently at a disadvantage in export. Differentiated products require a substantial investment in promotional materials to acquaint potential users with the unique attributes of the product. This effort usually involves start-up losses and may take an extended period of time. Such investments, particularly if they are overseas, are risky because they have no salvage value if entry fails.

The task is further complicated by the unfamiliarity of small businesses with foreign business environments. In a highly segmented market, the need to provide a uniquely valuable product to each segment requires a thorough familiarity with the business. The prevalence of this pattern is emphasized by one estimate that 50 percent of independent software sales in the U.S. in 1978 were custom assignments.*

Scale economies reinforce the implications of product differentiation. Firms providing a broad range of task-oriented services, such as accounting firms, banks and consulting firms, possess the in-depth industry knowledge to better serve client needs.

*Computer Business, June 30, 1980, p. 4
Finally, there is the enormous risk of potentially having to contend with such dominant "brand" names as IBM, Exxon or General Electric in environments where they are far more comfortable. Entry of one of these giants with their well-established product identities into a market carefully cultivated by a small business could easily mean total loss of position.

Again, there are several avenues which small business might take to overcome these obstacles. One is to form an alliance with a foreign or domestically based service firm to provide software capabilities. This would be most likely with foreign based firms which do not have such a capability, but who would benefit from offering it to their existing clientele. As noted later, however, serious problems exist for the smaller firm which depends upon others to market its product: ideas are easily stolen, slightly modified, and marketed as competition.

Another alternative would be the collaboration of several domestic firms, perhaps through a trade association, to develop a trademark that members might use. It would probably be necessary to do this in conjunction with the adoption of some quality standards to impart meaningfulness to the trademark. Such an approach would also provide an umbrella for trade shows and other promotional activities.

Capital Requirements

The need to invest large financial resources to compete creates a significant barrier to entry. This problem exists for several reasons.

First and foremost, software development, marketing and service are people intensive activities. Even if packages rather than custom software are the sole offering of the exporting firm, overseas sales and service
personnel are still required. Estimates of the cost of launching a foreign office with accompanying promotional expenses usually begin at $250,000. Without service support, no firm would consider itself as making a serious commitment to the export market. Further, the risk of such an investment is significantly higher than for a similar expenditure domestically.

Access to capital is particularly difficult for software companies, even in the case of the larger, more established names. Part of this is due to the bad experiences of investors with software companies during the early 1970's. Some publicly traded firms lost as much as 98 percent of their market value during this period. While money has become more available to the industry lately, it has been primarily restricted to firms with a substantial operating record.

Other than through direct intervention by the government to provide low cost loans or investment capital, or advantageous alteration of tax laws to favor such investments, a shared cost approach is the most likely answer to this problem. Beyond the trade association activities suggested earlier, little opportunity exists to use this option. This results from a legal climate that tends to view any such action as a combination in restraint of trade.

Switching Costs

A barrier to entry is also created by the presence of switching costs. This is the cost associated with changing from one software supplier to another. Having invested $100,000 in an inventory management and cost accounting system, for example, a customer in need of cash flow management services is most likely to return to the same supplier if the latter offers such a service.
The implicit costs of going to another supplier occur in several areas. Among these would be a potential lack of compatibility between the two operating systems, the need to allow interaction between data-base management systems, and the uncertainty attached to cost estimates from suppliers unfamiliar with the user's needs in an industry where cost overruns of 200 percent to 300 percent are not uncommon.

The recent experience of the American Stock Exchange illustrates this point. The exchange decided to install a computer-based market research and analysis system. It retained the services of a software firm, negotiating a fixed price contract. In the end, exchange staff felt that the costs to the supplier exceeded the initial estimate by as much as 300 percent. The American Exchange also hesitated to seek out other suppliers for other services in which the existing vendor was weak. It simply didn't wish to have to pay the price for another vendor to learn in detail the exchange's needs.

Industry interviews confirm that while there is substantial switching among suppliers the task is usually not done easily. Users develop strong relationships with software vendors through frequent interaction with technical service personnel. In-house staff become acquainted with one system, and to switch to an alternative system some degree of retraining is usually required.

Much of the burden of these switching costs is frequently assumed by software vendors attempting to obtain new business. Such an assumption involves a heavy commitment of technical personnel to smooth the transition from one system to another. In addition, switching usually occurs because of a client's dissatisfaction with the prior vendor. This puts an
additional burden on the new vendor to secure the account by investing effort in extra quality assurance.

Beyond cost-sharing arrangements, this problem can be viewed as an opportunity by new exporters. The number of computer service firms in foreign markets is generally far fewer than in the United States. This means that software exporters have access to a fertile market of first-time users. While more costly to prospect and develop, this clientele would permit small firms to build switching costs into a barrier that protects their foothold in the market.

Examples of such a strategy, or the threats of such a strategy, are commonplace in the domestic industry. It is not uncommon for a software firm to sell a client one product, say a data base management system, and then with this beachhead attempt to obtain contracts for various other programming tasks. Similar logic explains the advantage of large service firms in entering the industry, causing much anxiety among smaller software producers. Two examples can be drawn from the 1979 Annual Report of the Association Data Processing Service Organizations:

Douglas Jerger, President of Fortex Data Corporation, presented the Association's position in opposition to the CPA firms being allowed to enter the information products/services industry to the Senate Subcommittee on Governmental [sic] Efficiency and the District of Columbia. ...Jerger explained to the committee the unfair advantages a CPA firm would have in marketing information products/services through "tying" them to their auditing services. In addition, CPA's have almost unlimited product information when performing an audit.

*   *   *   *   *

One of the major competitive concerns of the Association in recent years has been the attempts governmentally licensed and regulated enterprises have made to engage in the information products/service industry in addition to their primary function. ADAPSO recognizes that these
specially positioned organizations [e.g. banks, AT&T], if allowed to compete freely in the information products/services marketplace, could use their economic power and special relationships with customers to compete unfairly.... Customers might well lean towards purchasing information services from the regulated/licensed companies with diminished regard to the comparative merit of the services offered.

Statements such as these illustrate the tendency of a customer to continue with a supplier with whom they are familiar. If such familiarity is bred by small firms in the nascent market for software exports, it could provide a potent basis for long-term growth.

Access to Distribution Channels

Distribution channels are a particularly severe barrier to entry in foreign software markets. Principally, access to most software packages by users (particularly in interactive and data base management packages) is through a conventional computer terminal. All routes between the developer of the software and this user constitute the distribution channel. In order to successfully market his product, therefore, the software vendor must identify a purchaser somewhere along the distribution channel.

Purchasers can be classified most generally as "in-house" or "outside." In-house purchasers are most often looking for packaged or custom-developed software dedicated to specific internal operations such as accounting, inventory, or order processing and scheduling. Sales to such purchasers overseas are particularly difficult for many of the reasons cited earlier. Foremost among these are unfamiliarity with the foreign business environment, service support costs and product awareness (differentiation).

Outside purchasers are of two basic types. The first, and most obvious, is time sharing services. While time sharing companies commonly
carry numerous packages of software for many users, they usually provide only one package for a given need. Thus, a seller of software must in essence gain the exclusive right to the distribution channel. Simultaneously, users of a time sharer's service wish to interact with software they themselves are familiar and comfortable with or, at least, have heard of. Thus, again, the software firm must achieve an awareness of his product -- at both the purchaser and user level.

The second type of outside purchaser is really a hybrid of insider and outsider. These are the administrators of computer services in a distributed data processing environment.* These individuals, while operating as part of the overall institutions, are usually separate from the actual users of the software.

In all these cases two factors are in evidence which are critical to successfully entering the market as an exporter. One is the need for the ultimate user to be aware of the proffered product. The second is an understanding of the decision-making framework in a foreign business environment.

The current approaches to these problems appear to be inadequate. Department of Commerce activities are geared toward providing generalized information and trade inquiries which are criticized as being too vague for a business where precise specification is important. None of the firms interviewed had availed themselves of these services in any meaningful way.

* A distributed data processing environment refers to a setting in which a single institution owns and operates a mainframe computer, access to which is obtainable, commonly by time-sharing, by users throughout the institution.
Legal Protection

A serious barrier to entry for small firms lies in the lack of adequate legal protection for their proprietary rights in their products. This results from the inability to patent software.

The nature of software products and of the actual programming instructions of which they are comprised is that they embody ideas. These ideas are translated into a series of logical instructions by which the hardware executes the programmer's commands. A group of program commands that accomplish a given task are collectively known as an algorithm. These algorithms are the creative constituents of software and can only be copyrighted. For any given task there may be several alternative algorithms which will accomplish the same objective.

Once a series of algorithms is combined to produce a particular software package, it is this entity that is eligible for copyright protection. However, any reasonably competent programmer can then usually substitute alternative algorithms in the software design. Once this is done he has created an essentially new price of software which, while performing the same task as the original, does not violate the copyright of the original program and can thus be marketed in competition.

Without adequate insulation from such pirating, small manufacturers have lost one of their primary advantages -- the uniqueness of their products. Many feel especially vulnerable to this threat in export markets due to their lack of familiarity with the local legal remedies at their disposal.
High Strategic Stakes

The final barrier to entry for small firms in the market for software exports is the presence of a diverse range of competitors, many of whom recognize the important strategic stakes at issue. National governments as well as large corporations understand the long term implications of successfully obtaining a major share of the international software market. Japan, France, and India, for example, visibly view software as a field where they can gain a worldwide competitive position in a high technology field.

The Japanese situation illustrates this international awareness of software. While nearly closing the gap with the United States in the market for computer hardware, the Japanese have lagged severely in software development. Their industry spokesmen have noted the threat of being relegated to secondary status in worldwide markets without a meaningful software program. As Business Week has reported, "Hitachi Ltd. is already at work on a development system that it expects will double programmer productivity. As usual, the Japanese government is backing such innovative corporate projects with strong financial support. In the four years ending in 1983, it expects to contribute $100 million to software projects."*

Corporations such as IBM, Exxon, and GE have also made major commitments to the industry. Consequently, a smaller firm can expect a serious challenge to whatever position it does obtain in overseas markets.

*Op. Cit., Business Week, p. 51. Computerworld noted in its July 14, 1980, issue that Japan exempts one-half of all revenues from packaged software from taxation for four years.
Finally, other large service firms such as accounting firms and banks are viewing this field with interest so as to preclude loss of their clientele to competitors utilizing newer technologies.

All these factors limit the opportunities available to small business. Nevertheless, such threats are of a longer range nature. There is presently a wide range of areas in which small business can compete domestically, despite the presence of giant corporations. It will take time before the foreign market is even as relatively saturated as the United States market is. In the interim there is ample opportunity to stake out and defend a market niche that can serve as a base for further growth or diversification.

Implications

The computer software field possesses enormous growth potential in this country and abroad. The Department of Commerce has placed computer and information processing hardware at the top of its list of industries with export potential and has acknowledged the clear connection between the software and hardware industries.

Whatever the potential for American firms overseas (or, for that matter, foreign firms in the United States), small firms find themselves confronting serious impediments to their export activity. They are barriers which relate far more to the innate structure of the industry in which they operate than to the characteristics specific to small firms themselves.

When interviewed, a representative of the Association of Data Processing Service Organizations, a trade association with significant small business membership, noted that small firms as a rule do not export. The domestic market provides adequate opportunity for growth for a firm
attempting to establish an initial market position. Indeed, the representative noted that in his experience a firm begins to look overseas only after it has achieved domestically a significant volume of business -- about $7 million. Thus, the very point at which a small firm is, in the eyes of federal agencies, ceasing to be small is that moment when the firm begins to realistically look to foreign markets.

To the extent to which it is federal policy to encourage small firm export, for its own sake, there are measures which can be taken. As noted earlier, for example, the government can facilitate the formation of trade groupings which will allow independent companies to pool resources.

In the end, however, this analysis of the software industry raises the critical question of how the government can most effectively expend its programmatic resources. The American software industry as a whole is in the forefront of international trade in this field -- an activity which deserves public sector support. Meanwhile, small firms are doing relatively well domestically.

In effect, then, the export experience of the software industry suggests that it is inappropriate for government agencies to simply overlay existing trade programs with a small business component since in some cases everyone may be better off if the smaller firms are left to concentrate on domestic sales. Once they have succeeded domestically -- once they have achieved a certain size -- then export can assume greater importance.
Chapter V
GOVERNMENT ASSISTANCE: THE NEED FOR WIDER OUTREACH

The Problems Noted

Over the course of the last decade, the United States government has devoted increased attention to the issue of export. Historically unprecedented trade deficits were just one of the factors highlighting the essential need for the United States to adopt a more aggressive posture in international markets. Today, the Departments of Commerce, Energy, Agriculture and State, the Small Business Administration, the Export-Import Bank, the Overseas Private Investment Corporation and others operate numerous programs directed at stimulating and supporting increased export.

During this last decade important reorganization of government activity has occurred. The Foreign Commercial Service was transferred, after more than 10 years of debate, from the State Department to the Commerce Department. Within Commerce itself, extensive reorganization took place which resulted in the formation of the International Trade Administration. Others have modified their postures as well: The Small Business Administration, for instance, has identified regional trade specialists.

Other levels of government have been similarly involved in recent years. In New York, the Department of Commerce has long been active in stimulating that state's exports.* In New England the Massachusetts Port

*Indeed, a decade ago the General Accounting Office used the New York program as a standard of comparison against which to judge the efforts of the federal Department of Commerce.
Authority has been operating a model effort designed to provide close, personalized assistance to individual firms. Other port and regional authorities as well as numerous states operate programs of their own.

Whatever the extent of government activity, small firms remain dissatisfied with the nature, quantity and quality of the public sector programs directed their way. In the course of this study, specific observations were made by small business executives and trade association representatives concerning federal activity. Among the problems identified were these:

Communications. It was repeatedly observed that while the federal government may provide a range of services, most small firms remain unaware of them. As noted earlier, for instance, a Solar Energy Research Institute study found that of the firms in the solar industry examined only 9 percent attributed their export to the programs of the Department of Commerce.

Dissatisfaction with the effectiveness of federal program outreach has reached the point that the Small Business Association of New England has taken the initiative to operate its own supplemental outreach efforts. SBANE is, for instance, putting together its own directory of export assistance. The SBANE directory is being written and organized so as to be convenient for business executives to read and will refer extensively to the wider universe of government publications and services to which the interested small firm can turn.

SBANE has employed another outreach vehicle, again, in effect, supplementing government efforts believed to be inadequate. SBANE has chosen to sponsor small business export conferences with a format markedly different than that often employed by government agencies. Instead of placing executives in an "audience" and having a panel of SBA, Commerce,
State, Ex/Im Bank, and other agency experts deliver their messages from "on high," SBANE arranges an open house in which public and private sector experts are spread across a large room in such a fashion that the interested executive can easily direct his questions on a one-to-one basis to the representative of the agency or service company most relevant to his concerns. If an executive requires introductory material, he can gather it from an SBA or Commerce representative. If more detailed information is needed concerning letters of credit or licensing requirements in certain nations, the executive can approach those who provide services in these areas.

In sum, federal agencies confront a serious problem in conveying both the existence and the substance of their available services to small businesses. In some cases, others have moved to fill the gap.

The Quality of Offered Services. While some of those interviewed did note that government officials in one or another agency had provided valuable assistance or were, at the least, committed to their tasks, the general response to the quality of federal services was in the negative. Several key problems emerged.

First, the speed with which requested information is provided is perceived to be inadequate. It was noted, for example, that while the Department of Commerce does report a large number of potential leads in its Trade Opportunity Program (TOP) periodicals, the leads frequently are received too late for the firm to respond with success.

Second, the specificity of proffered information was considered frequently to be inadequate as well. Again, with regard to TOP, executives complained that the information provided was insufficiently detailed making it that much more difficult for the small firm to know whether to pursue a
lead or not. Other sets of information provided by federal agencies also come under attack. Executives of small firms noted that government agencies will generate lengthy lists of export management companies, overseas distributors, financial institutions, and so forth, but will not advise the executive as to which is the best or most appropriate.

Third, executives and trade association representatives referred to the continuing difficulty of dealing with government personnel more oriented to the internal requirements of their own agencies than to the actual problems of specific industries. Frequently, it was felt, those in government charged with designing or implementing assistance programs simply did not possess sufficient in-depth knowledge of the firms and industries which they were attempting to help or affect.

**Barriers to Government Services.** Firms which do wish to avail themselves of government assistance of one kind or another frequently chose to forego this option. The pace of government programs, it was held, simply does not reflect the pace of for-profit firms who need responses far more quickly than is often the rule. A case in point is the experience of those who have requested federal support from the Energy Inventions Program, an effort run jointly by the National Bureau of Standards and the Department of Energy. While generally conceded to possess a conceptually superior approach, this program has been repeatedly cited for commonly taking more than two years to evaluate and act upon requests for assistance.

Extensive paperwork requirements were also seen as an important obstacle to small firms. Whether applying for assistance or submitting a competitive bid in response to an RFP for a procurement, firms with limited management resources simply cannot afford the time or personnel often needed to participate.
The Nature of Government Activity. The most sweeping criticisms directed at federal efforts to enhance exports addressed the very nature of the programs underway. Critics suggested that, whatever the improvements made with regard to the problems cited above, the tendency of government to avoid exposing itself -- to lawsuits or to failure -- would continue to undermine the efficacy of ongoing programs.

Not limited to export programs, but cutting across the full range of government activity, is the fear of litigation. Defensive postures -- designed to win, if not avoid, challenges in court -- are seen constantly in agencies as diverse as Commerce, EPA, DOE, and Interior. This unwillingness to expose one's program to litigation in large part accounts for the non-selectivity seen in the Department of Commerce's lists of export management companies, overseas contacts, and so forth. The Government will provide names, but it will avoid making statements about the relative merit of those named.

Federal agencies tend as well to operate programs such that risk is not taken and, consequently, failure does not occur. It was noted, however, that effective assistance, be it for R&D or for the support of exports, must assume that failure can and will occur in a significant number of cases. The interviews conducted during this study identified specific instances in which companies could have benefited in their export efforts if the government had taken a risk through the granting of funds in one form or another.
Improved Outreach: The Use of Intermediaries

Many solutions are conventionally advanced for improving government programs aimed at small business export. Commonly, the devotion of greater funds or the creation of new agency priorities are suggested.

Approaches such as these have important merit. One trade association representative noted during this study, for instance, that the government's trade programs do appear to be operating more efficiently now that a) the commercial attaches have been moved to Commerce, and b) the Department has organized an International Trade Administration.

Emerging from this study, however, is the conclusion that different approaches should be tried. More specifically, it is believed that agencies should more frequently rely upon intermediaries to overcome many of the difficulties they currently experience in delivering trade assistance.

Over the course of the last decade, for instance, trade associations have proliferated in Washington. While normally founded with the goal of influencing legislation and regulations, over time associations frequently assume the role of providing other services to their members.

A case in point has been the experience of a small business conservation program within the Department of Energy. This program has approached several associations and entered into joint efforts to produce and disseminate pamphlets telling association members how they can conserve energy. Those concerned in this effort have been pleased with the result. The government obtained significant leverage for its limited funds in this area. The trade associations demonstrated to their memberships the value of the services they can provide. And the members received information in a format specifically designed to meet their particular needs.
In sum, the explicit direction of additional resources to tap established trade association channels of communication can yield valuable benefits.

Another avenue open to agencies is to encourage the operation of non-profit organizations designed to give advice. As noted, the public sector will traditionally not expose itself by rating the relative merit of those operating in the private sector. Lists will be developed, and the government may go so far as to establish minimum standards for being included, but usually there the recommending stops.

Others do, however, exist to rate. Consumer Reports, Underwriters Laboratories and others have established a role for themselves performing just this function. Agencies can capitalize upon the ability and willingness of others to rate by funneling their resources in that direction.

As illustration, a federal effort can be launched to establish a non-profit organization whose purpose it is to pass upon export management companies. Individual firms interested in export are continuously frustrated by not knowing who is qualified and who is not. What they receive from Commerce is a list; what they need is advice.

Similar advice-giving entities can be supported throughout the trade program. There are, of course, important caveats which must accompany this kind of effort. For example, agencies should not enter a field already occupied by non-government actors. The use of intermediaries can, nonetheless, be an effective means by which the federal government can extend the impact and effectiveness of its programs.
Beyond moving to improve the outreach and impact of its current programs, the government can consider alternative approaches aimed at overcoming basic structural factors which, industry by industry, can act to impede small business export. Illustrative alternative approaches are developed in the next chapter.
Chapter VI

STRUCTURAL IMPEDIMENTS: THE NEED FOR NEW APPROACHES

A review of the case studies conducted for this project reveals a striking similarity in the reasons why small businesses do not engage in export activities. Contrary to many assumptions that underlie existing programs to encourage such commerce, small businesses are often
- interested in export markets,
- willing to take initiatives to explore these markets,
- capable of developing information when known prospects exist, and
- aware that demands for their products exist overseas.

What impedes successful exploitation of foreign market potential are barriers to entry arising from structural characteristics which are inherent to industries of which small businesses are a part. This chapter considers these structural barriers and advances potential measures which the federal government can adopt to help small firms overcome them.

The measures considered herein are to a large degree passive: that is, they primarily provide incentives for the entrepreneurially minded to be drawn into foreign sales. Additionally, they can be targeted toward encouraging American consumers of imported products to substitute American produced goods and services for what they now purchase from overseas.

The rationale for emphasizing such a passive approach is as follows. First, passive measures are designed to alter the characteristics of the competitive environment, not by penalizing currently successful firms, but by allowing firms which could not otherwise compete due to factors beyond their control to do so. Second, passive options can be more cost efficient for the government than programs of direct market development since by and
large they require far smaller staffs to operate. Third, the passive approach is desirable since it is designed to have an economic impact that is directly measurable and to which profit-minded businessmen will naturally respond. Fourth, approaches of this kind overcome the difficulties which flow from the government's desire to avoid risk. Fifth, the use of passive measures can dramatically reduce the time involved in taking advantage of government assistance. Finally, such measures will directly act in an area where government is the only force that can have a meaningful influence -- the area of industry and market structure.

Structural Analysis

In a business context, the essence of developing a strategy for effective competition is in analyzing the relationship of a company to its environment. In the current case, we are concerned with a class of companies, those defined as small businesses.

Despite the complexity of the overall environment in which any business must operate, the key aspect of this environment is the industry in which a firm operates. Thus, a truly thorough competitive strategy would require a detailed analysis of each industry targeted for emphasis. This, however, is beyond the scope of the current study. Rather, we wish to focus on those characteristics which emerged from our analytical studies and which are broad enough that policies addressing them will benefit small businesses in other industries as well.

Hand in hand with the focus on industry structure is the premise that competition in an industry is rooted in that industry's underlying economic structure and goes well beyond the behavior of specific companies. This is an important fact since responses to such a basic perspective will go a long
way toward ensuring the long-term viability of the policies to be developed.

Speaking in economic terms then, we wish to address those specific factors which can act to undermine a small firm's capacity to engage in export. Considered below are eight such factors:

- Economies of Scale,
- Product Differentiation,
- Capital Requirements,
- Switching Costs,
- Access to Distribution Channels,
- Government Policy,
- The Bargaining Power of Buyers, and
- The Bargaining Power of Suppliers.

**Economies of Scale**

Economies of scale deter entry by forcing the firm entering the export market to come in at a large scale or come in at a small scale and accept a cost disadvantage. Obviously in the case of small businesses under current circumstances, only the latter case obtains.

Scale economies can be present in nearly every function of a business including manufacturing, purchasing, R&D, marketing, service network, sales force utilization and distribution. In surveying the case studies undertaken for this project, it is not surprising to find that economies of scale are a recurring problem.

From the groundfish industry:

...the harvesting of these species [in Alaskan water requires] a larger scale of investment and longer term financial
commitments than the domestic industry has so far been able to undertake.

From the solar industry case:

Small firms find it particularly difficult to generate lengthy proposals in response to complicated RFPs.

From the software industry case:

...economies of scale do surface to the clear detriment of small firms. In areas of marketing, service, and research and development, large corporations are seen to possess significant advantages.

Policies addressing this structural problem will most likely be successful if they employ lessons learned from units of large corporations. The lesson of such units is that they can realize economies of scale if they are able to share operations or functions with other units in the corporation. Potentially shareable activities or functions subject to economies of scale can include sales forces, distribution systems, and purchasing.

The benefits of sharing are particularly potent if there are joint costs. Joint costs occur when a firm producing product A (or an operation or function that is part of producing unit A) must inherently have the capacity to produce product B. An example is air passenger service and air cargo, where because of technological constraints only so much space in the aircraft can be filled with passengers, leaving available cargo space and payload capacity. Many of the costs to put the plane in the air must be covered whether or not it carries freight in addition to passengers. Thus, a company that competes in both the passenger and freight markets may have advantages over one participating in a single market. Similar economies can be realized when the byproduct of one business constitutes an input to another business. Other areas where joint or shared costs can contribute to
economies of scale are in the joint exploitation of intangibles such as brand names or where the vertical integration of a process can be accomplished by the cooperation of separate businesses.

Product Differentiation

Product differentiation means that established firms have visible brand identities and customer loyalties which stem from past advertising, customer service, product differences, or simply being first into the market. Differentiation creates a barrier to entry by forcing new firms to spend heavily to overcome existing customer loyalties. This effort usually involves start-up losses and often takes a good deal of time.

In the cases reviewed, product differentiation appears to be most pronounced in the case of the software industry. Here it was seen that well-known service companies, particularly international consulting and accounting firms, possess a notable advantage in this regard.

Capital Requirements

The need to invest large financial resources in order to enter export markets creates a significant barrier to entry. Capital may be necessary not only for production facilities but also for things like customer credit and the maintenance of inventory supplies. This problem was evident in the solar industry:

...the inability of customers and the exporting companies to finance a sale is noted repeatedly in the solar industry. Small firms face particular difficulties in this area when competing with the larger American or foreign solar corporations.

The failure of government programs to deal with this problem was noted in the groundfishing industry:
...the firm's executives criticized the program officers with whom they dealt for not having a brief to engage in or conclude complex and sophisticated financing deals designed to encourage export. There appeared to be a lack of discretionary responsibility: unless a relevant precedent existed, the officer would not act.

Switching Costs

Another barrier to exporting is created by the presence of switching costs. These are one-time costs facing a buyer in switching from one supplier's products to another's. Switching costs may include employee retraining, the need for new ancillary equipment, the expense involved in testing or qualifying a new source, the need for technical help as a result of reliance on seller engineering aid, or even psychic strain involved in severing a longstanding relationship. If these switching costs are high, new entrants must offer a major improvement in cost or performance for the buyer to switch from the incumbent. This phenomenon was noted as being a particularly strong influence in the computer software industry.

Access to Distribution Channels

A barrier to entry can be created by the new exporter's need to secure distribution for its product. To the extent that logical distribution channels for the product have already been served by established firms, the new firm must persuade the channels to accept its product through price breaks, cooperative advertising allowances, and the like, which reduce profits.

The more limited the wholesale or retail channels for a product are and the more existing competitors have these tied up, obviously the tougher entry into the industry will be. Existing competitors may have ties with

DEVELOPMENT SCIENCES INC.
channels based on long relationships in which the channel is solely identified with a particular manufacturer.

Access to distribution channels was noted as a particular problem in the cases of the solar hardware and computer software industries.

Government Policy

The policies of other nations can pose significant trade barriers. Foreign governments can limit or even preclude entry to their markets with such controls as licensing requirements and limits on access to raw materials. Alternatively, foreign governments frequently subsidize domestic industries allowing them to operate at costs which the firms of other nations cannot match. This is a frequent case in the fishing industry. Similar problems are beginning to emerge in the computer software industry.

Governments can also provide support in different forms to industries with export potential, giving them effective advantages over competing firms from other exporting nations. This form of support was seen especially in the solar hardware case.

Bargaining Power of Buyers

The buyers of an industry's product can affect that industry extensively by forcing down prices, bargaining for higher quality or more services, and playing competitors against each other. While the power of each industry's buyer groups depends on a number of factors, in general a buyer group is powerful if the following circumstances hold true:

- The buyer group is concentrated or it purchases large volumes relative to the total sales of the industry involved,
- The products it purchases from the industry represent a significant fraction of the buyer's costs or purchases,
- The products it purchases from the industry are standard or undifferentiated,
- The buyer group faces few switching costs,
- The buyer group earns low profits,
- Buyers pose a credible threat of backward integration: that is, they can reasonably threaten to supplant the industry in question by opening their own production capacity,
- The industry's product is unimportant to the quality of the buyers' products or services, and/or
- The buyer has full information.

It can be seen that instances of buyer power emerged in all three case studies, but particularly in the cases of computer software and most notably in the fishing industry.

Bargaining Power of Suppliers

An industry's suppliers can exert bargaining power which acts to the detriment of potential exporters by forcing the latter to raise prices or reduce the quality of their product. This is particularly true when the exporter serves a brokerage role, as one example within the fish industry illustrated. The conditions making suppliers powerful tend to mirror those making buyers powerful.

A supplier group is powerful if any or all of the following apply:
- The supplier group is dominated by a few companies and is more concentrated than the industry to which it sells,
- The supplier group is not obliged to contend with other substitute products for sale to the industry,
- The industry is not an important customer of the supplier group,
- The suppliers' product is an important input to the buyer's business,
- The supplier group's products are differentiated or it has built up switching costs, and/or
The supplier group poses a credible threat of forward integration: that is, it can reasonably threaten to compete directly with the industry.

Passive Policy Recommendations

The preceding structural analysis leads to the following policy recommendations.

1. Legislation to allow small firms to combine for export.

Many bills have been introduced in past years to allow companies to cooperate for export purposes. Nothing has yet emerged to facilitate such an arrangement. While the Webb-Pomerene Act theoretically allows such combinations, in the view of many the vaqueness of the law poses too many business risks to be considered a viable option. Legislative authorization of some form of joint action, such as a trading company or export cartel, would help to overcome such entry barriers as:

- Economies of scale, by allowing the sharing of overhead and other joint costs,
- Access to distribution channels, by allowing marginal individual investment in market development efforts, and
- Bargaining power of buyers and of suppliers, by providing opportunities to operate at a sufficient scale to avoid the dangers of being "whipsawed."

2. Tax incentives to investors in a newly formed export development subsidiary of a small business or an export trading company.

By providing adequate investment incentives, the government can make capital more readily available to those seeking to develop export markets.


Small companies suffer most from cash flow shortages, and these are amplified in the long turnover periods frequently encountered in export.
great help would be a service that, upon shipment, would purchase from small domestic exporters the obligations of foreign importers. The government could retain the right to demand compensation from the exporter in the event that firm's performance for any reason results in non-completion of the sale. This would further alleviate the capital requirements of new-to-export firms.

4. New Exporter Coupons

Taking a lesson from domestic merchandisers, the government might provide "coupons" good for cash to foreign buyers. This program would help overcome the structural problems of product differentiation and switching costs. Such coupons could be valid for the first purchase by a foreign buyer of the products of a small American business engaging in export. The value of the coupon might be based upon the difference between a valid invoice reflecting the cost of a previous supplier and the cost of the new exporter, plus some percentage incentive. A ceiling relative to the total cost of the purchase could help prevent artificial inflation of differences. Such a scheme would always benefit the U.S. economy since it would always mean a net inflow of foreign currency.

In a manner of speaking, American foreign aid programs already incorporate this approach, providing funds for the purchase of American goods and services. The use of coupons would represent a significant expansion of the effort as well as a focusing on small business export.

It should be noted, of course, that these coupons need not be limited to cash. It is also possible to establish a system in which coupons could be convertible into a service of one kind or another. Thus, if a developing country were to purchase solar devices from a small American producer, under such a program as this that nation might be able to convert its coupons into
a U.S. government-funded program to train that importing nation's technicians.

5. Domestic substitution incentives.

As an adjunct to the above policies to spur exports, a program of tax incentives to foster substitution of domestic for foreign purchases would be useful. One scheme that might be employed would be to allow a deduction for some percentage of the amount of increase relative to the preceding year which a purchaser makes in the ratio of domestic to foreign amounts of a good. Since any number of domestic suppliers might be eligible, the desirable competitive incentive to improve productivity would not be dampened.
Chapter VII
SOME FURTHER CONSIDERATIONS

This report reflects the results of a six month examination of how the government can more effectively enhance the capacity of small firms to export. In the course of this study, the project team has interviewed executives of small and large firms who have been active in international trade, examined relevant programmatic efforts underway at the federal, state and regional levels of government, and obtained the views of representatives of trade associations which direct their efforts, in part, toward trade. Additionally, the project team reviewed much of the literature dealing with small business export which has been generated in the last decade.

As noted at the opening of this report, the approach emphasized in this work was to consider the issue of small business export in its fullest context: that is, to examine the industrial environment in which smaller firms operate to determine whether structural -- as well as scale-related -- factors play a role in facilitating or impeding small business export. As reported on herein, such structural considerations emerged during the study as having paramount importance.

Small firms, in whatever industry, do of course experience scale-related difficulties when they attempt to export. Their management resources are commonly less than adequate when it comes to addressing overseas requirements. Language barriers, cultural differences, increased cash flow demands, new trade procedures, inadequate market knowledge, inability to service product, patent infringement -- these and other problems arise to undermine the willingness and capacity of small firms to exploit foreign opportunities.
But when small firms are considered within their industrial contexts, structural difficulties can be seen to assume equal if not greater significance. The fresh groundfish industry may be well positioned to capitalize upon the consequences of the Fisheries Conservation and Management Act; however, its traditional inability to cooperate, its lack of investment capital, its focus on short-term sales, and other similar structural characteristics severely impede the efforts of those interested in taking advantage of the opportunities that do exist. Similar observations are possible for the solar hardware and computer software industries.

Government has a role to play in these circumstances. It can continue to operate programs directed at overcoming traditional small business export problems, and it can adopt more aggressive policies aimed at correcting structural problems. Suggestions in both these areas have been presented throughout this report and particularly in the two chapters which preceded this one.

This chapter proposes to present additional observations regarding government policies and programs for export. These conclusions stem from the numerous conversations conducted with the private and public sectors, the literature review, and, in effect, from the opportunity to step back and view afresh the entire question of small business export.

The Goal of Government Intervention

It is the belief of the project team that the ultimate goal of federal small business export efforts must be reassessed and more clearly stated. In legislation, committee reports, administrative position papers, and straightforward political statements, the government has established that
it wishes to assist small firms to export. It has established and operates numerous programs designed to obtain this goal.

During this study, however, it became apparent that, in fact, the government has two goals and that each must receive individual attention. The first is to assist small firms. The second is to improve the American trade position. While connected, these two priorities need not and should not be treated as one.

Consider, for instance, the position of the fresh groundfish industry. While there is surely potential for export here, there is also potential for import replacement. In fact, the analysis conducted for this study suggests that structurally the industry may be as well placed to handle import replacement as it is to engage in greater export. Import replacement is not export expansion, but it does reduce the trade deficit. It also works to benefit the small firms who can participate.

Similarly, in the computer software industry, small firms can most effectively establish market position by emphasizing domestic sales. Once they have achieved a certain size (suggested by one observer to be about $7 million sales a year), these firms can and do export with great success. Thus, in this industry, it may be more advantageous to the United States for the public sector to act primarily to ensure that small firms can survive and thrive domestically, leaving it to successful larger firms (i.e., formerly small firms) to expand overseas.

In sum, it appears that a different title could be chosen for a study such as this. Instead of "Enhancing Small Business Export," "Enhancing Small Business Participation in International Trade" might be more appropriate.
The Role of Others

Clearly, the federal government does not possess a monopoly on efforts to assist small firms in their efforts to export. Not only should this reality be accepted more fully, the willingness and capacity of others to help should be recognized and aggressively incorporated into federal programs.

State and regional agencies have had marked success in operating their own export programs. Indeed, on occasion federal efforts have been compared to these others and been found wanting. The experiences of New York State and the Massachusetts Port Authority illustrate the success which can be achieved.

In New York, the State Department of Commerce has been operating a visible and successful export program for more than a decade. The program has advertised overseas, solicited inquiries and provided New York firms with accurate and speedy trade leads.

In Massachusetts, the Port Authority has been operating for several years a program in which selected firms are provided intensive, personalized export assistance. Executives are briefed as to the demands likely to be placed upon them overseas; they are educated in the ways of export; they are taken overseas to attend trade fairs and meet individually potential customers; and, they are provided follow-up assistance.

The efforts of a third organization were mentioned earlier. The Small Business Association of New England has assumed an aggressive posture in attempting to support small business export. They sponsor and organize conferences; they are engaged in the production of their own small business export literature; they are actively working toward developing an export...
consciousness in the region and then toward establishing a network of private and public agencies upon which an export-oriented firm can rely.

The success of these and other government and non-government organizations suggests strongly that the federal government could obtain significant leverage for its own programs if it more consistently endeavored to collaborate. Such collaboration would not only expand the reach of its own efforts, but would also alleviate the problem inherent in federal aid: the inability to provide advice, to recommend.

The success experienced by non-federal agencies frequently relates to questions of scale and location. As other federal programs have discovered, agencies operating primarily from Washington simply cannot respond with the speed and specificity that offices in the field can. MassPort focuses on a handful of companies to achieve its success. SBANE knows the particular needs of its members. Where it is unlikely that federal trade programs will ever receive funding sufficient to spread a comprehensive network of offices across the nation, resort to others may represent the most cost-effective solution.

**Federal Organization**

A theme which emerged during this study concerns the organization of federal export efforts. Federal agencies continue to suffer from management difficulties when it comes to developing and delivering trade assistance.

For a decade, of course, most of the heat in this area was directed at the commercial attaches who, located within the State Department, appeared less than optimally interested in matters of commerce. With the transfer of the attaches to the Department of Commerce, the criticism has been reduced considerably.
Critics continue to state, however, that organizational difficulties exist. Some suggest, for instance, that fisheries export programs suffer because they are managed by an agency whose focus is not trade. Priorities such as R&D and conservation appear to overwhelm export development. The solar hardware industry also notes the organizational difficulties involved in dealing with the federal government in export matters. As critics note, everyone seems to be involved but no one seems to be in charge.*

An SBA Role

The Department of Commerce has established a list of 15 industries which are to receive special attention from federal trade programs. Included are computers and peripherals, telecommunications, medical instrumentation and equipment, construction machinery, electrical power generating machinery, metal working machinery, and analytical instruments.

Used, it is said, to focus federal assistance, the list reflects the views of commercial attaches as to which industries have immediate opportunities for export in their assigned countries as well as headquarter staff opinions as to which industries have significant growth potential.

What is missing, of course, is a small business perspective. The work of this study suggests that, industry by industry, the needs and opportunities of smaller firms will vary extensively. Thus, while a central


DEVELOPMENT SCIENCES INC.
government office may deem that a certain industry has export potential, such a determination must be translated into small business terms. Some industries may be concentrated, with only a limited number of large corporations dominating domestic and overseas sales. Other industries may be fragmented, possessing numerous smaller firms, but firms not well placed to export. It is the belief of the project team that someone must assume responsibility to ensure that a small business perspective is better incorporated into trade programs and that this someone is likely the SBA.

This study suggests, of course, that a small business perspective cannot become a straightforward overlay imposed uniformly. Just as small businesses differ from large, so one industry varies from another. As noted earlier, in fact, in some instances efforts to push small business export may make little sense.

The point is that it appears that currently this necessary small business perspective is not being adequately represented. If not the SBA, then some other office or agency should be charged with ensuring that program and policy choices are made which reflect the particular needs and special resources that characterize small firms.

* * * * *

Small business has a demonstrable role to play in improving America's trade position. The capacity to innovate, to generate employment, and to tailor product to an individual client's needs can contribute much to the United States economy.
Government programs can play a key part in capitalizing upon the small business potential. But to do so, programs must reflect the dual realities that small businesses are significantly different than large and that the industrial environments in which they operate can in large part determine the success or failure of overseas trade activity.