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Herbert D. Bouland

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CHANGES IN SEAFOOD PROCESSING TECHNOLOGY

BY

Heber D. Bouland
Supervisory Operations Research Analyst

Paul E. Staley, Jr.
GAO Evaluator

U.S. General Accounting Office
Washington, D.C.

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SUMMARY: Much of the world's fish supply is found off U.S. shores; yet we import two-thirds of our fish products. One reason is U.S. harvesting and processing technology lags behind foreign methods. Perhaps agricultural engineers with their expertise in processing perishable food products can help solve this problem.



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Changes in Seafood Processing Technology

By

Heber D. Bouland and Paul E. Staley, Jr.*

Twenty percent of the world's supply of fish is found off the U.S. Coasts. Yet we import 2/3 of the fishery products we consume. There are millions of bottomfish available off America's shores to relieve some of the pressure for food, to provide valuable protein and improve our balance of trade. Yet American fisherman catch a small share of the world's harvest. One reason for this ironic situation is that U.S. harvesting and processing technology, especially for bottomfish, lags behind foreign technology. Perhaps agricultural engineers with their expertise in harvesting, storing, conditioning and processing perishable food products can make a contribution and help the U.S. fishing industry.

But first, why would an accounting office be concerned about seafood processing? It is because the U.S. General Accounting Office, (GAO) is the principal arm of Congress responsible for achieving accountability of public expenditures. GAO major functions are to

- assist Congress in its legislative and oversight responsibilities,
- audit and evaluate Federal programs, and
- carry out financial control of government operations.

In the last 15 years GAO has undergone dramatic change in the scope of its activities and has been focusing on broader issues than are traditionally the concern of accounting. GAO has not only been looking at how funds are spent but also on how well these expenditures are achieving their intended objectives. And there are a number of Federal laws, programs and policies related to fisheries that impact on processing technology. Four examples are:

1. The Fisheries Conservation and Management Act of 1976 which established the 200 mile fishing limits for various kinds of fish that foreign fisherman are allowed to take. Many believe this has assured U.S. fisherman a steady supply and consequently they are willing to invest in new equipment.
2. National Marine Fisheries Services (NMFS) Guaranteed Loan Program and tax incentive for capital investment in vessels and gears.

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3. Saltonstall-Kennedy funds - where 30% of import fees are used for fishery development and demonstrations.
4. National Oceanic and Atmospheric Administration's (NOAA) system of more than 20 fishery laboratories performing research on resource assessment, ecosystems, fishery engineering,

Recently GAO has completed two studies relative to the industry. The first discusses the extent and impact of foreign investments in U.S. seafood processing industry and the second the federal role in developing markets for fish not traditionally harvested by the U.S.

U.S. Not Meeting Its Potential

Ocean and inland waterways provide only about 3% of the world's directly consumed protein. But in some areas of the world fish provide a vital source of food. For example, while U.S. per capita consumption is only 13.3 lbs per year, it is over 79 pounds in Japan and Iceland. Also with increasing population and pressure on land resources, fisheries may well play a more important role in the future.

Much of the world's supply of fish is off the U.S. shores; 20% of the world's fish resources are within the 200 mile fishing limits of the U.S. yet we are a net importer of fish products. We export about 1/2 billion pounds per year while importing almost 2 1/2 billion pounds. This is resulting in a balance of trade deficit of 1.7 billion dollars a year. Also, in 1950 the U.S. commercial catch represented about 12% of world catch. In 1980 it was only 5%.

There are a number of reasons which we will only briefly highlight on why the U.S. with abundant fish supply has to import fish and is falling behind the rest of the world in harvesting fish. The following summarize the reasons given in the literature and in presentation by experts:

1. Foreign governments, e.g. Iceland, heavily subsidize their fishing industry and make it difficult for the U.S. to compete with them.
2. Until 1977 most anyone could fish in the waters around the U.S. and take advantage of our abundant supplies.

3. Countries that depend heavily on fish as food, e.g. Japan, Norway and Iceland, have developed better harvesting and processing technologies than the U.S., particularly for bottomfish.
4. Seafood processing is a high-risk, cyclical industry and not especially appealing to U.S. investors.
5. The U.S. fishing industry is composed of too many small, inefficient operators.
6. The U.S. lacks adequately equipped ports and harbors.
7. Government regulations unnecessarily restrict the industry.
8. Import quotas and tariffs imposed by other nations on U.S. fish products restrict our foreign markets.

We are not prepared to evaluate these allegations. But we will cover some of the issues related to technology. First let's look at the total harvesting-processing-marketing system.

The Harvesting-Processing-Marketing System

The U.S. system is structured with the following components:

A. Fishing vessels-

There are about 173,000 commercial fisherman in the U.S. with over 100,000 vessels. Coastal fishing is done by many small day-type boats found along the coast and inland waters. Deep sea fishing is done with fewer but larger vessels-many 175 to 180 feet long, well equipped with sophisticated electronic gear, and some costing over \$5 million.

B. Port Facilities-

These include the docks, piers, and handling systems. Dutch Harbor, Alaska, and Kodiak, Alaska, are two of the U.S.'s highest valued ports.

C. Processing Plants-

There are about 1,700 plants in the U.S. employing over 80,000 peak seasonal employees. Most of the plants are located in either Alaska, Florida, Louisiana, Massachusetts or Washington. Processing involves sorting, rinsing, gutting, nobbing, filleting, skinning, and packing. Fish may be further processed as fresh, canned, or frozen, or processed into fish meal.

D. Transportation equipment-

Usually involves refrigerated trucks

E. Distribution facilities-

The display equipment and cold storage cabinets represent the last link in the system's chain.

There are three changes in the system we want to briefly discuss:

First, there is a movement toward integration of the system. This is especially true in countries with more centralized, planned economies, e.g. the Soviet Union and even Sweden, Norway, and Iceland. For example the Soviets have large fish factory vessels, where fish are harvested and processed. Quasi-governmental agencies in Scandinavian countries work in cooperation with individual firms to integrate many of the system functions. In the more competitive U.S. economy, smaller companies are being brought up by larger parent companies that have control over more segments of the system. Of course other factors besides type of economic system, such as the importance of fisheries to the country, are influencing this rate of integration.

Second, new processes are being used for non-traditional species. During the last several years some processors have begun to handle non-traditional U.S. species including Alaska pollack and Pacific whiting. These species, however, require U.S. fishermen and processors to learn new techniques and adapt existing equipment in order to meet new harvesting and processing requirements and to be cost effective and efficient in harvesting and processing these fish. For example, Alaska pollock is found in huge quantities off the Alaska coast but it is a relatively small fish (15" - 20") with only about a 20 - 25% yield of edible fish. U.S. processors have yet to perfect processing equipment to profitably fillet such fish. Currently they are adopting foreign technology.

Finally there is growing foreign investment in the U.S. industry. Seafood processing is a high risk, cyclical industry, not especially appealing to lenders or investors in the U.S. unless the processor has established a good track record. Therefore many processors are forced to seek financial assistance from other sources; foreign sources have become more and more important.

A recent GAO report (CED-81-65) noted in a survey of about 340 processors that 61 had received foreign loans or are partially or entirely owned by a foreign investor. Most foreign investors were from Japan and the Alaska and Washington processors were the major borrowers. Some feel this is bringing needed capital to update and improve the equipment in U.S. plants. On the other hand, some are concerned that this is bringing about foreign control of our fishing industry.

Details of Some System Components

The following slides furnished to us by the National Marine Fisheries Service illustrate some of the parts of the system:

1. A few of the varieties of edible fish
2. A Soviet stern trawler
3. A 280 ft. Japanese trawler
4. Hoisting nets on a Japanese ship
5. Heading machine on a Polish ship
6. Fish skinner
7. Filleting Pacific whiting
8. Machine for making protein concentrate
9. New machine for processing small crabs
10. Tester for measuring quality
11. Horizontal flat freezer
12. Packing Pacific whiting into fish blocks
13. The packaged product
14. The finished product

Role of Agricultural Engineers

With the exception of some work in catfish ponds, agricultural engineers for the most part have not worked in the area of fisheries. One reason for this may be because fisheries come under the jurisdiction of the Department of Commerce and not USDA and its Agricultural experimentation Stations, the major employers of agricultural engineers.

Also agricultural engineers are accustomed to working with the land; fish come from the ocean. Agricultural engineers work with products that are planted or bred for production, not harvested as they grow wild in nature, where one may have little control over who fishes in what one perceives as his waters. But there are commonalities between fish and agricultural food products. Fish are highly perishable food and must be sorted, cleaned, packaged and stored.

There are three areas where we feel the agricultural engineer can contribute to the industry. One area is the field of operational analysis. This involves the use of computer models, statistics, time studies and work sampling to improve the efficiency of the systems and lower cost. For example, this means integrating the system of sorting, eviscerating and packing.

A second area is the field of quality maintenance and preservation. Agricultural engineer expertise in freezing, drying and canning food products should be applied to fish products. Finally, expertise in the development of electronic-mechanical equipment to catch, transport and process fish is needed.

Fish technology is changing; more precise sophisticated, efficient equipment is being used. You may want to lend your expertise to this challenging field.

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