ON THE FACILITATIVE ROLE OF THE ECONOMIST IN ECONOMIC DEVELOPMENT— CASE STUDY OF A GEORGIA SHRIMP HARBOR INVESTMENT

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INTRODUCTION

The major premise of this paper is rather simple, but hopefully provocative to those economists concerned with real world problems and willing to enter controversial situations. Economic development, as typically encountered, is often controversial. Seldom in the modern economy do we find a Pareto optimum development that makes some people better off while leaving no one worse off. Even when this ideal is realized in the long-run, lack of instantaneous adjustment to new parameters of development means that new investment or organizational change is threatening to someone. Furthermore, both those threatened by development and those who stand to gain may have recognized relative merits of a particular development long before it comes to an economist's attention. This speaks well of the free enterprise system, but may be disconcerting to the ivory tower economist whose hope is that "my results" will be used by other economists or decision-makers who will, in turn, produce development efforts. Although the domino theory may be valid, all too frequently the dominoes fail to fall because of the scarcity of practicing economists in active development efforts.

Perhaps timeliness is the key word in efforts to work in the real world. Unless the development economist makes his input when needed, the world will continue to pass him by. Decisions will be made with or without data and economic analysis. Hopefully, economic analysis can improve or even speed the decision-making process. This is, by definition, the facilitative role and there is some evidence that both improvement and speed result from a recent study of the Georgia fishery.

THE GEORGIA FISHERY

This study of the Georgia commercial fishery was concerned with demand for new port facilities that would best serve the shellfish industry, shrimpers, middlemen and consumers of fishery products. According to Carley, the shrimp fishery, in most years, makes up more than 80 percent of the value of all species landed [3]. Current shrimp landings are around eight to nine million pounds annually. In recent years fishermen have complained that facilities on Georgia's coast have become inadequate for docking space, for adequately disposing of wastes, for fueling and icing trawlers and for unloading modern shrimp trawlers.

Complaints by fishermen concerning possible price discrimination and the general development of the fishing industry in Georgia were the source of proposals to construct at least one new port facility as a demonstration. This facility would provide dock space, fuel sales, ice sales, boat and engine repairs and other services. Outlets would be provided for sale of products to handlers or processors locating within the facility. Product handlers would be exposed to larger volumes of product, possibly attracting more investment to the area by processors, dealers and support industries.

The University of Georgia was invited by the Coastal Area Planning and Development Commission (APDC) to study these complaints and to make recommendations concerning a new dock feasibility. Initially, this request referred to the feasibility of building a modern harbor large enough to service the entire Georgia coast. However, the problem falls naturally into the class of economic problems such as

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Miller [8], Stollsteimer [10], Baritelle [1], Holland [5] and Kloth [7] have described as one of optimum number, size and location of facilities.

INSTITUTIONAL FRAMEWORK OF THE PROBLEM

The problem of poor facilities has been an object of concern among fishermen for several years. Prior to the APDC's request for a University of Georgia study, a group of fishermen had asked the University Marine Extension Service to help in forming a cooperative to market shrimp. Activities of this group continued apart from the prescribed study. As news of this feasibility study circulated, the fishermen were increasingly interested in applying for a grant from the Coastal Plains Regional Commission (CPRC). Many saw this study as a repeat performance of an earlier study of Wanchese Harbor in North Carolina [6, p. 99]. This study, conducted in the Agricultural Economics Department, was coordinated through the Institute of Natural Resources with significant help from its Marine Extension Service in contacting fishermen. An earlier, site-specific, conceptual design for a commercial dock had been published and widely circulated by senior students in Landscape Architecture [2]. Still another study of fishermen was underway in the Sociology Department of the University, financed by the Sea Grant Program.

The matter of a new dock became a topic of conversation among many different interest groups including chambers of commerce, mayors and commissioners, county-city and area planning staffs, dock owners and fishermen. Other interested parties included local county commissioners, the Environmental Protection Agency (EPA), the Marshlands Protection Office of the State Department of Natural Resources, the Governor's Office of Planning and Budget, and the Institute of Natural Reousrces of the University of Georgia, where long-range studies of expanded investments in fisheries had been in progress for several years. None of these groups were independent. This framework was an important factor in interpretation of study results by area residents, with many conflicts spawned before study results were publicly known.

METHOD OF STUDY

These conflict situations and earlier delays in getting the feasibility study underway required a prompt, but statistically reliable survey with results tabulated in simple two-way tables for planning several alternative courses of action. A stratified random sample of 54 fishermen and a survey of 19 dock owners were completed and tabulated in approximately three months from design of questionnaire to completion of tables. As shown by Ersoz, distributions of key variables in the sample were similar to those of the population [4, pp. 39-43]. Budgeting techniques included construction of a landing cost function to show fishing costs as a function of distance traveled in fishing, and development of costs required for building a fishing port. Budgeting and development of a constrained optimization model of harbor location, number and size were accomplished in approximately three additional months. Final manuscript preparation and reproduction of reports required another three months for a total of nine months from beginning to end of the project.

PRINCIPAL RESULTS

The survey by Ersoz supported the contention that Georgia docks are technically inefficient in unloading shrimp and providing ice and fuel for return to fishing. Waiting time to unload averaged an hour and fifty minutes, or about three times longer than found in a modern port [4, p. 59] (Figure 1). Waiting for ice and fuel was a significant bottleneck which was nonexistent in a modern port, but usually required one to two hours in Georgia (Figure 2). Dock owners supported this view of deficiencies, listing as their number one investment priority an expansion of docks and unloading facilities.

While fishermen appeared to feel a need for new docking facilities, there was no clear first choice of location other than the general area in which they were currently located. Brunswick was the predomi-

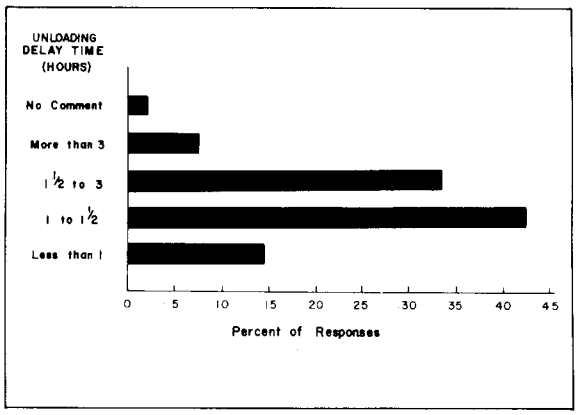

FIGURE 1. DISTRIBUTION OF DELAY TIMES IN UNLOADING SHRIMP, GEORGIA DOCKS, 1975

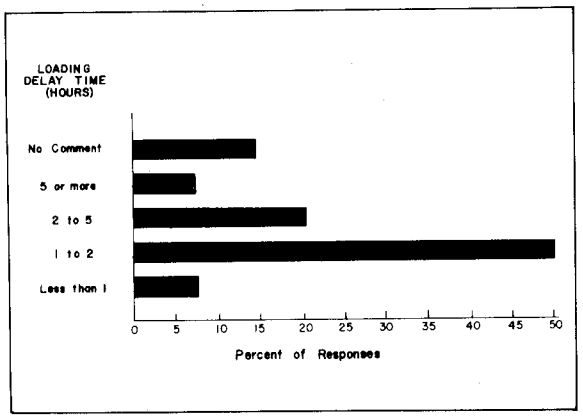

FIGURE 2. DISTRIBUTION OF DELAY TIMES IN ICE AND FUEL ABOARD SHRIMP TRAWLERS, GEORGIA DOCKS, 1975

nant first choice, but among only 30 percent of the fishermen. Most fishermen live within five miles of their docking area and are reluctant to travel more than 20 miles to a new dock. However, about one third indicated they might move to a new dock, even when its location was unknown to them. Preference for a nearby dock is probably consistent with the relatively high variable cost associated with fishing, seasonality of catch, and reliance on dock owners for credit and marketing services.

Fuel was the major cost associated with fishing, averaging 22 percent of total costs and estimated to be 2.5 million dollars per year for the Georgia commercial fleet. The relatively high variable cost of fishing was found to be a principal factor in determining harbor location.

The weighted average landing cost per pound for the fleet was estimated, from the sample, to range from 55 cents per pound for a round trip of five miles to $1.22 per pound for a round trip of 100 miles. Ersoz discussed the weighting procedure in detail and demonstrated that these costs can be estimated from the following landing cost function [4, pp. 84-90]:

$$LF = .54 + .0069\ MR$$

Where conceptually:

LF = sample weighted average cost per pound of landing shrimp

.54 = weighted average (weighted according to catch per fishing trip) trawler labor and docking costs not a function of distance

.0069 = weighted average (weighted according to distance traveled per fishing trip) trawler costs associated with distance traveled and

MR = round-trip miles traveled per fishing trip.

Survey results also yielded the first available estimates of shrimp population density in 31 major fishing grounds used by Georgia shrimpers. Density of catch ranged from 100 to 36,000 pounds per square mile of open water. Highest density recorded was in the sound near St. Catherines Island.

Capacities for 32 docks were estimated from survey results and showed annual dock volumes ranging from 44,000 to 875,000 pounds per year. Furthermore, these annual volumes were found to be about as stable as the total industry catch, which averaged 7,458,000 pounds per year for the most recent 15-year period. The survey estimate for the industry in 1975 was 8,139,000 pounds which is within the range of 6-9 million pounds observed in the 15-year period.

The landing cost function, fishing ground density and dock capacities provided bases for a location model of the following type. Given I fishing grounds, each of which produces a specified quantity X_i of total annual catch to be handled at one of L possible investment locations, what is the optimum size and location of a new harbor that will minimize costs of landing the total annual industry catch, assuming existing docks will handle annual volumes that are less than or equal to their historical average. Let:

TLC_d = total landing cost (fishing, hauling/transporting) for each location, L_d

L_d = potential new locations for investment, d = 1, ---6

X_j = quantity of shrimp landed at dock j, j = 1, ---32

X_i = quantity of shrimp caught at fishing ground i, i = 1, ---31

X_{ij} = quantity of shrimp caught at fishing ground i and landed at dock j

C_{ij} = unit cost of shrimp landing, from fishing ground i to landing at dock j.

Then the procedure is to minimize TLC_d for a given value of d.

$$TLC_{(d)} = \sum_{i=1}^{31} \sum_{j=1}^{32} C_{ij} X_{ij} \qquad (1.1)$$

with respect to

$$\sum_{j=1}^{32} X_{ij} = X_i \qquad (1.2)$$

$$\sum_{i=1}^{31} X_{ij} \leq X_j \qquad (1.3)$$

for 31 docks and

$$\sum_{i=1}^{31} X_{ij} \geq 0 \text{ for dock } L_d. \qquad (1.4)$$

Under these circumstances, the problem of minimizing equation 1.1 is a six-step process with a minimum cost solution for each potential location for a new harbor. The solution for which industry total landing cost TLC_d is a minimum over all solutions will be chosen by inspection as the optimum solution.

This model is very short-run relative to many approaches that have been taken to the general plant location problem. For example, Stollsteimer, in an early work on this subject, analyzed the data as though there were no restrictions on capacity at any location [4, pp. 567-575]. However, this research was designed to answer the question of how to implement investment that will take place in an industry with many firms, most of whom will resist any further entry by other firms. Thus, this is a model of the best entry point into current competitive industry structure. Given the current institutional framework of the industry, this would appear to be more appropriate than a more global minimization approach.

Analysis of model results showed the best entry point for expansion to be Sunbury (Table 1). Annual landing cost savings relative to expanding at Pine Harbor, the next best site, were about $66 thousand per year. If the total volume that could be landed at Sunbury (Table 1) is divided by average trawler size, this would dictate facilities for about 50 trawlers. Because of the nearby concentration of shrimp, about 25 trawlers are already owned by shrimpers in this area who currently dock elsewhere.

Port operation appeared to be a profitable enterprise for all operators interviewed. No port owners were willing to move their base of operation to a new facility, and only a few operators of leased facilities were interested in moving. Thus, any new commercial-industrial port would be expected to compete with existing ports for some time to come. Operators of existing ports indicated they would make new investments in both icing and fueling equipment, as these were problem areas emphasized by both fishermen and dock owners. As dock owners expand their capacity and increase efficiency, estimated advantages of Sunbury as an expansion point diminish. Thus, this study appears to establish the upper limits to size of port as well as establishing services demanded by fishermen. Given inefficiencies in icing, fueling and unloading documented by both fishermen and dock owners, there seems to be little doubt that expanded investment is demanded.

Ersoz has shown that the payoff for operating a new port of desired size is minimal when operated at costs competitive with existing docks. Thus, the principal payoff for development of a commercial port facility is more efficient services for fishermen at dock locations nearest existing shrimp supply [4].

TABLE 1. ANNUAL INDUSTRY COST OF SHRIMP FISHING IF LANDINGS ARE MADE AT EXISTING DOCKS AND AT ONE EXPANDED HARBOR, LOCATED AT SELECTED SITES ALONG GEORGIA'S COAST, 1975

Prospective Port Location (L_d)	Total Industry Annual Landing (lbs.)	Total Annual Landing at Each Point (lbs.)	Annual Landing Cost of Landing (dollars)
Sunbury	7,458,250	1,283,258	8,871,423
Pine Harbor	7,458,250	1,281,158	8,937,672
Darien	7,458,250	1,500,428	8,963,638
Savannah Area	7,458,250	1,634,362	8,969,020
Brunswick	7,458,250	1,269,945	9,011,809
St. Marys	7,458,250	134,350*	9,108,425

*The very small amount of shrimp landings at St. Marys location shows the insignificance of this site for a new dock.

USE OF STUDY RESULTS

Given results of the economic study, it is clear that dock owners, in general, would not be the primary recipients of development benefits in the short-run. In order to gain even long-run benefits some owners would be faced with either giving up a currently profitable small dock for an uncertain move to the larger facility, or taking the risk of a larger investment if they are in the favorable location at Sunbury. The institutional framework is also a significant factor. Some word-of-mouth information concerning the need for expanded facilities indicated that such an investment would be forced by compliance with EPA guidelines on sewage treatment facilities. Inter-city rivalry no doubt plays a part since the principal urban areas, Savannah and Brunswick, are at opposite ends of the Georgia coast and perennially vie for many investments.

A very important part of the institutional framework is the relationship between dock owners and fishermen. Most fishermen look to the dock owner not only for the rather simple services of unloading, icing and fueling, but also as the principal source of operating credit and marketing services. The possibility of reprisal is great for the fisherman who is vocal and aggressive in seeking change.

Various sub-groups of people in the area are transmitting political signals to mayors, councils and county commissioners forming the APDC board as well as to the Governor's office where APDC requests for funding are approved. Other groups may be by-passing all of these routes by direct communication with involved federal agencies. The University community, including the Marine Extension Service, is no doubt involved in many of these communication processes.

Against this background it should not be surprising that at the first public meeting called to consider this study there was a solid, vocal protest from dock owners. At the meeting, extrapolation of sample results to population estimates was labeled as unreasonable and the source of inaccurate estimates. Certain investment costs were labeled as 100 percent inaccurate based on the personal experience of the commentator. The Savannah Morning News (October 14, 1976) reported the next day after the meeting that, "Following a slide presentation detailing the study, members of fishing cooperatives along the coast generally denounced the findings in the study as inaccurate and as not providing answers to the problems of coastal shrimpers." The reporter was probably not aware that denouncements by fishermen were from fishermen who were also dock owners. A group of independent fishermen at the same meeting praised the study in private as forward-looking and in touch with their needs.

Presentation of such facts at a first public meeting are likely to be ignored by any group having a preconception that a plan is detrimental to their welfare. Individuals to whom development is a threat are not to be pacified with facts. The person who spoke the longest in denouncing the study was quoted in the Savannah paper as saying, "he was invited to the meeting, but was told his comments were too lengthy. My summation of the attitude of the leadership of the APDC is railroading . . . if they don't like what you have to say they don't listen."

Of course, an economist must listen. Those at a disadvantage by development represent a serious economic problem and have a rightful claim on developmental efforts that will help them. Still, all dissident voices are not disadvantaged, some merely represent sour grapes. As one mayor said, "I would not favor the dock idea even if my city were selected as the site." It wasn't.

What was accomplished at the meeting was the committment of funds to invest in a dock facility organized independently by a group of shrimpers to serve their needs. This investment now totals 1,000,000 dollars of private investor, public development agency and bank funds to begin construction in the fall of 1977 in a port on Kilkenny Creek near the best site identified by this study. It was clear that both the study and the public meeting to discuss it brought to a focus and helped to complete a decision to invest in a port. While the amount of investment is less than was recommended, it is near a recommended location and there is little doubt that the study reported here contributed to the timing of the decision. This study illustrates that timely economic studies do crystalize and help bring to a climax economic decision-making which, at times, takes place in a complex environment of community cooperation and disagreement.

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