FLORIDA SEA GRANT PROGRAM

ECONOMIC STRUCTURE OF THE FLORIDA SHRIMP PROCESSING INDUSTRY

by

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INTRODUCTION

The development and location of Florida's shrimp processing industry parallel closely the historical development of the shrimping industry in the state. In 1902 the shrimping industry was begun in Fernandina by S. Salvador, a native of Sicily [4]. The industry developed in the following locations as listed: (1) St. Augustine; (2) the Northern Gulf Coast--Apalachicola Bay, the coastal waters from Cape St. George to St. Josephs Point, and Pensacola Bay; (3) the Key West grounds; (4) the lower West Coast--Naples, Fort Myers Beach, and Everglades City; and (5) Fort Myers and then Tampa as landing points for shrimp from the Campeche grounds located off the Yucatan Peninsula [4]. Today's shrimp processing industry was established primarily in Tampa during the 1950s and 1960s when the city was an important shrimp port. Miami and Key West were also important processing areas because of shrimp landings from the Dry Tortugas beds. With improved overland transportation and the significant increase in raw shrimp imports, the location of Florida's processing facilities has become less dependent upon the state's shrimping industry.

Florida is the most important seafood processing state in the Southeast Region of the U.S. with over $132 million in sales in 1972 compared to $491 million for the entire region. Processed shrimp products in Florida in 1972 were valued in excess of $88 million or approximately 70 percent of the total value of non-industrial seafood products. Of the total value of processed seafood products in Florida, breaded shrimp accounted for over 44 percent; raw, peeled, and deveined shrimp, 15 percent; and raw-headless shrimp, 8 percent [8].

Florida's shrimp processing industry has grown absolutely and relatively since 1960. In 1960 the industry processed about 34 million pounds of shrimp valued at more than $25 million. In 1972 about 61 million pounds valued at over $88 million were processed. Similarly, Florida's share of the U.S. processed shrimp market was 19 percent of volume and 21 percent of value in 1960, expanding to 23 percent of volume and 24 percent of value in 1972 [7, 8].

Shrimp landings in the state, however, declined significantly from over 51 million pounds in 1960 to 29 million pounds in 1973 (Fig. 1). The ratio of pounds processed in live-weight equivalents to quantity landed for 1960 was 0.92:1, increasing to 2.90:1 in 1970. Thus, at least two thirds of the raw

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product used by the Florida shrimp processing industry is obtained from imports. In 1971 U.S. imports of shrimp totaled 191.3 million pounds or 42 percent of total consumption [6]. This growing dependence of Florida processors on non-Florida landings causes concern about the stability and competition of the import supply source and the future growth potential and economic well-being of the processing industry.

This report provides information about the Florida shrimp processing industry based on 1972 data including the raw product supply situation, marketing channels and market structure, and conduct and performance. Changes and trends are identified to assist firms and potential investors in planning future participation in the industry.

The specific objectives of this study are to:

1. Delineate the organization and behavior of firms in the Florida shrimp processing industry by studying entry and exit, market concentration, product differentiation, and vertical integration.

2. Identify emerging changes and important trends--in procurement, processing activities, and product markets--that will influence the shrimp processing industry in Florida.

Both primary and secondary data were analyzed. Primary data were obtained through personal interviews collected during the latter part of 1973 (see Appendix).

The Florida shrimp processing industry is analyzed within the theoretical framework of market structure theory. The market structure of an industry embodies the conditioning environment within which enterprises behave [2, p. 266]. This behavior encompasses both the market conduct and market performance of firms.

Market structure is defined as the market organization characteristics that influence competition and pricing in the market [2, p. 7]. The number of sellers and buyers, product differentiation, barriers to entry, and vertical integration are important items of study in market structure.

Market conduct, the behavior patterns that enterprises follow in adapting or adjusting to the market in which they sell or buy, is determined by several factors. These include the firms' pricing behavior, product strategy, research and innovation activities, and advertising practices [2, p. 10].

Market performance refers to the composite of a firm or industry's end results in the dimensions of price, output, production cost, selling cost, and product design [2, p. 11]. The primary performance criteria used in this study were margins and productivity.

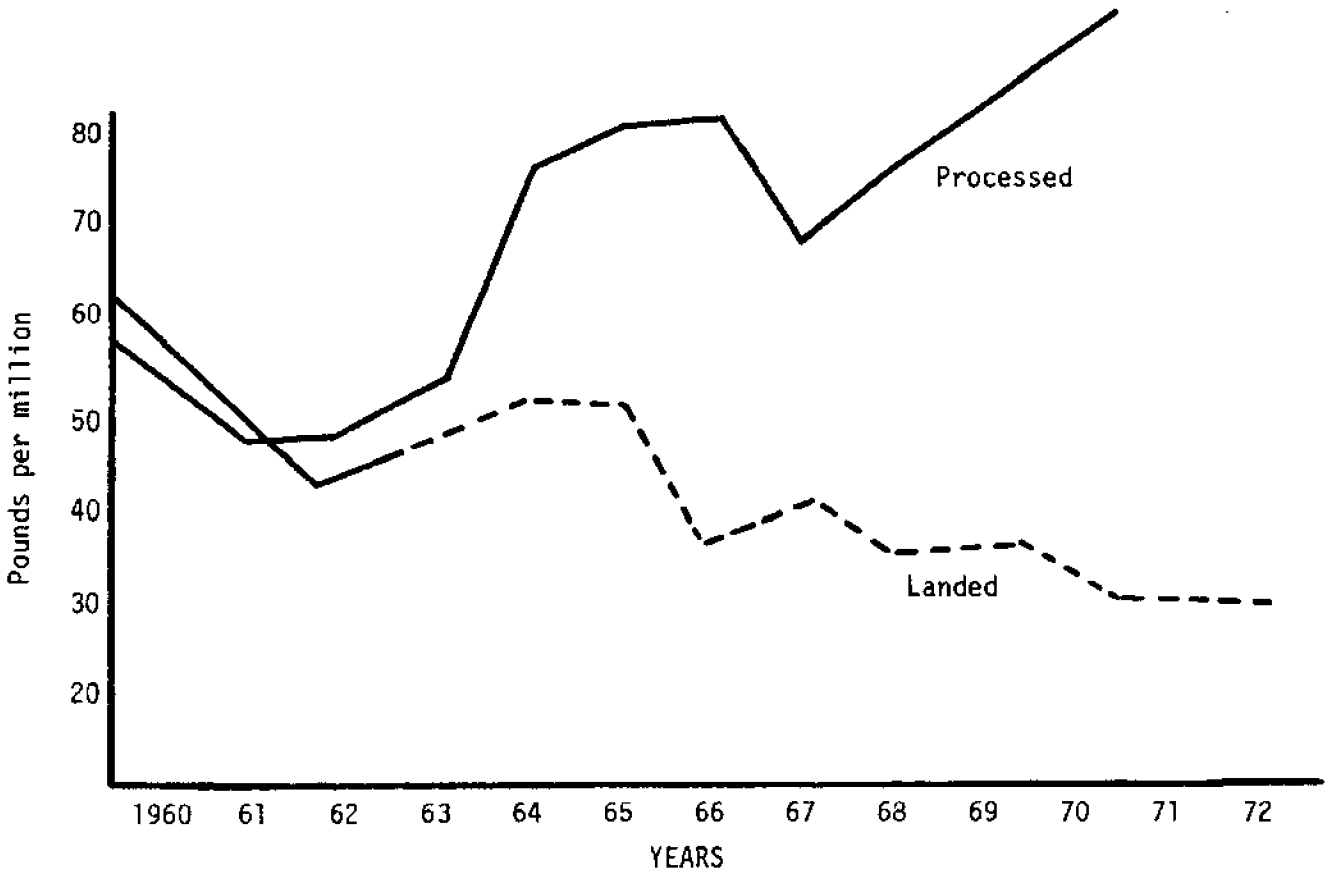

Figure 1.--Florida shrimp landed and processed, 1960-1972

Sources: [8,10].

INDUSTRY CHARACTERISTICS

Description of the Industry

A shrimp processing firm is defined in this study as one engaged in any of the following processing activities: cooking, peeling and deveining, breading, and producing specialty products such as cocktails, shrimpburgers, and stuffed shrimp. A firm may also deal in green headless shrimp or other seafood products. While most Florida shrimp processing firms specialize in one or more shrimp products, most also handle numerous seafood lines. The research reported here does not include production of other seafoods by the firms studied.

There were 16 shrimp processing firms in Florida in 1972. Of four firms not included in the analysis, one had data for less than a year because business was initiated in mid-1972; one very small firm operated only one day per week; and two refused to release any production information. A fifth firm gave general information not requiring numerical data. In addition to the 12 firms (including the one giving general information), three firms dealing exclusively in green headless shrimp were included. This sub-sample was interviewed to obtain knowledge of the green headless shrimp market and to trace Florida shrimp to the ultimate market destination. The three firms sell directly to institutional and retail markets. One firm operates its processing plant outside the U.S. but has warehouses and marketing offices in Florida. Altogether, the 15 firms included in the analysis account for more than 85 percent of total shrimp production.

Location of Plants

Shrimp processing plants are primarily located in two geographical areas of Florida--nine in the Tampa area and five in the Miami area. Of the remaining three, one is in Jacksonville and two are in Apalachicola. The three firms that deal with green headless shrimp exclusively are located in Pensacola, Panama City, and West Palm Beach.

Type of Ownership

All plants surveyed operate as corporations with a majority being family-owned independent or single-unit plants. Some firms are vertically integrated and operate unloading houses, either as owners or under various types of contractual arrangements. A smaller proportion of the firms surveyed function as multi-unit processing plants. Most multi-unit firms have plants located in other states of the U.S. with a majority emphasizing seafood products other than shrimp.

Product Line

Shrimp usually comprise the most important product processed by firms included in this study. Three firms deal exclusively in shrimp products. Shrimp sales constitute more than 85 percent of total dollar sales for a majority of the 15 firms (Table 1). Seven firms produce up to five types of shrimp products while eight firms deal exclusively with one type of product. Shrimp products account for 15 percent or less of total sales in only three firms. The pattern

of processing seafood products other than shrimp is very similar among firms. The most important non-shrimp products are oysters and scallops; less important are spiny lobsters, mullet, and blue crab.

Table 1. Shrimp product lines as a percentage of firm and Florida industry sales, 1972

Firm	Product lines*	Shrimp as a percentage of firm sales	Shrimp as a percentage of industry sales
1	a	60%	
2	a	15	
3	a	75	
4	c	85	
5	c	15	20%
6	c	90	
7	c	100	
8	e	10	
9	a, b	99	7
10	a, c	90	
11	a, b, c	100	16
12	a, b, c	100	
13	a, b, c, d	99	6
14	a, b, c, d, e	90	51
15	a, b, c, d, e	90	
			100

*These are (a) green headless, (b) peeled and deveined, (c) breaded, (d) cooked, and (e) specialties.

The shrimp processing firms included in this study sold 72.7 million pounds of shrimp products for a total value of $122.3 million in 1972. The relative importance of each type of product and a comparison between the survey and data from secondary sources are shown in Table 2. Several factors account for the differences in production figures from each of the two sources. The number of firms interviewed was greater than those listed by the National Marine Fisheries Services because all firms do not report to the NMFS. Consequently, more production is shown in the survey data. Also, cooked, peeled, and deveined shrimp products were included under unclassified items in the NMFS data.

Table 2. Florida shrimp production in 1972: survey data compared with secondary data from The National Marine Fisheries Service

Type of product	1972 Survey Data		1972 Secondary Data	
	Total pounds	Percent of total pounds	Total pounds	Percent of total pounds
Green headless	10,792,968	14.8%	5,925,892	9.6%
Peeled and deveined and cooked	13,818,925	19.1	10,194,554[a]	16.8
Breaded	47,982,813	65.9	44,418,023	73.0
Specialty products	172,500	0.2	443,494	0.6
Total	72,767,206	100.0	60,981,963	100.0

[a]This figure includes raw peeled and deveined shrimp. In secondary data, cooked, peeled and deveined shrimp were included with unclassified items.

Source: 1972 secondary data computed from [8].

Plant Size

The size of Florida shrimp processing plants was measured in terms of plant capacity, employment, and 1972 production. Based on survey response, shrimp processing plants were classified as shown in Table 3. Each firm fell within the same size classification for all measurement criteria.

Table 3. Capacity, employment, and production in three size classifications of Florida shrimp processing plants, 1972

Classification criteria	Plant size		
	Small	Medium	Large
Capacity (thousands of pounds per day)	1.2-7.5	20.0-70.0	Over 100.0
Number of employees	20-50	150-305	Over 500
Millions of pounds produced in 1972	0.5-1.5	3.0-8.0	Over 10.0
Number of firms	5	6	2

Marketing Channels

Marketing channels for the Florida shrimp processing industry were divided into three levels: (1) supply sources for fresh and frozen shrimp, (2) processing plants, and (3) market outlets (Figure 2 and Tables 4 and 5). Forward movements through the marketing channels are identified, representing a progression from the sources of supply through subsequent handlers toward the market outlets. The data represent only the activities related to Florida processors even though some marketing agents bought and sold in other areas.

Table 4. Sources of fresh and frozen raw shrimp for the Florida shrimp processing industry, by type of market agent and percentage of purchases, 1972

Supply source and market agent		Percent of purchase
Florida fresh		
Shoreside plants		73%
Brokers		1
Processors		26
	Total	100
Other U.S. fresh		
Shoreside plants		94
Brokers		2
Wholesalers		4
	Total	100
U.S. frozen		
Shoreside plants		79
Brokers		13
Wholesalers		5
Processors		3
	Total	100
Foreign frozen		
Foreign processors		4
Brokers		85
Wholesalers		2
Processors		9
	Total	100

Table 5. Percentage distribution of Florida shrimp purchases and sales by market agent, supply source, and receiver, 1972

Market agent	Supply source	Percent	Receiver	Percent
Shoreside plants	Florida fresh	26%		
	Other U. S. fresh	56		
	U. S. frozen	18		
	Total	100	Processors	100%
Wholesalers	Other U. S. fresh	46		
	U. S. frozen	20		
	Foreign frozen	34		
	Total	100	Processors	100
Brokers	Florida fresh	0.1		
	Other U. S. fresh	1.8		
	U. S. frozen	4.2		
	Foreign frozen	93.9		
	Total	100.0	Processors	100
Processors	Shoreside plants	51.0		
	Brokers	36.0	Institutional	
	Wholesalers	2.8	West[b] 19	
	Florida fresh (direct)[a]	4.7	N. E. 20	
			S. E. 23	
	U. S. frozen (direct)[a]	0.4		62
	Foreign frozen (direct)[a]	3.5	Retail	
			West 11	
	Foreign processors	1.6	N. E. 17	
			S. E. 10	
	Total	100.0		38
				100

[a]Vessel owners buying directly from their fleets.

[b]See the map in the Appendix.

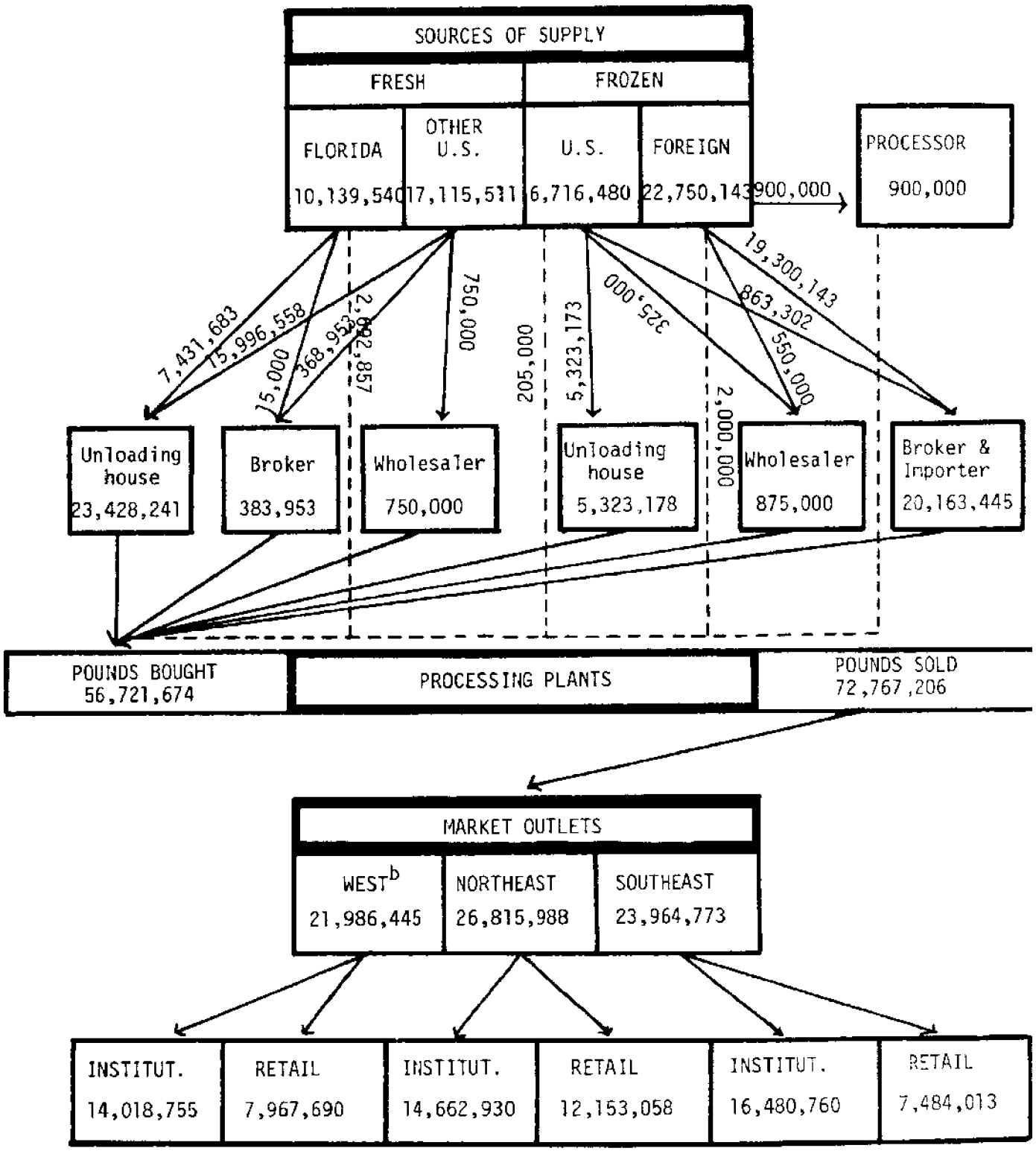

Fig. 2.--Marketing channels for the Florida shrimp processing industry, 1972

[a]Note that total pounds purchased do not equal total pounds sold because products either lose or gain weight in the production process.

[b]See the map in the Appendix.

Raw Product Procurement

Reasons for buying from the three different supply sources (Florida, U.S., and foreign) vary according to processors. Florida shrimp were bought mainly by firms having some control over raw supply. Florida-landed shrimp are purchased because of prices comparable with other sources, and, according to these processors, the quality of Florida pink shrimp is superior for peeled and deveined products. Many firms indicated a desire to fill all raw supply needs with Florida shrimp but are forced to buy elsewhere due to inadequate supplies. In most cases, when Florida shrimp are unavailable, other U.S. shrimp are bought to fill processing needs. Prices of other U.S. shrimp differ very little from Florida prices. Foreign shrimp are bought for several reasons. Some processors requiring butterflied shrimp for specialty products buy foreign shrimp because of high domestic labor costs or a domestic shortage. When select sizes are in short supply in the domestic market, the foreign market is a supply source. There are mixed feelings about quality of foreign shrimp. While some processors believe foreign shrimp are of better quality, others affirm that inspection is not adequate to maintain desired quality.

Though acquiring a secure supply of raw product is the desired goal of most firms, the method of obtaining this assurance has changed during the last few years. Supply control[1] may be exercised either by owning vessels and/or unloading houses or through formal and informal contractual arrangements. At present, firms owning vessels are those dealing exclusively with green headless shrimp and one firm operating in a foreign country. Other firms owned boats in the past but now have special arrangements with unloading houses to maintain a secure supply. These arrangements are generally moral obligations without written contract, a standard practice throughout the industry. A representative of the firm works with vessel owners and packing house managers to maintain adequate supplies. Financial assistance may be granted by processors to the suppliers. This practice also creates informal supply commitments.

The relative importance of each source of supply and the channels used to purchase the shrimp are shown in Tables 4 and 5. Florida is a relatively unimportant supply source accounting for 18 percent of the raw shrimp bought for processing in the state in 1972.[2] Other U.S. and foreign sources accounted for 42 and 40 percent, respectively. These percentages illustrate the extreme dependence of Florida processors on outside sources.

Channels used to buy shrimp vary in importance from source to source. Shoreside plants are the most common source for domestic shrimp. Brokers and wholesalers are relatively unimportant in purchase and sale of domestic shrimp but very important in foreign frozen shrimp purchase. Raw products move from

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[1] Use of the term "supply control" is not meant by the authors to suggest a value judgment concerning good, bad, right, or wrong.

[2] This is less than the amount landed because raw shrimp also move into green headless and other uses.

the source to the processing plants in refrigerated trucks. In a few cases these trucks are either owned by the processing firm or the unloading house, but in most cases commercial carriers are used.

Market Outlets

Sales of the 72.8 million pounds of Florida processed shrimp products were almost evenly distributed among the three main regions of the United States[3] (Fig. 2 and Table 5). Institutional markets accounted for 62 percent of total Florida sales, and retail markets, 38 percent. Institutional sales are greater than retail sales in all three regions. Retail sales, however, more closely approach institutional sales in the Northeast than in the West and Southeast, as evidenced by retail sales representing 45, 36, and 31 percent of each region's sales, respectively. To illustrate raw product distribution among the three regions of the country, finished product weights are expressed in raw product equivalents in Table 6 and Fig. 3. Different amounts of raw shrimp are required to produce different types of products. Of the 72.8 million pounds that Florida shrimp processing firms sold in 1972, conversion to raw weight gives a total of 59.2 million pounds. This is 2.5 million above the 56.7 million pounds bought. The difference results from the fact that previous estimates were based on interviews with individual firms in Florida whereas the conversion factors are averages for the Gulf and South Atlantic regions of the U.S. Weight gains and losses through processing vary by individual firm depending on local and regional consumer demand. The adjusted distribution by regions shows an increase of 2 and 5 percent in the Southeast and Northeast, respectively, and a decrease of 7 percent in the West. Institutional and retail market sales remain almost identical in the Northeast and Southeast while an increase of 4 percent in retail sales is observed in the West.

Channels used to sell the products vary from firm to firm. Large single-unit and multi-unit firms have their own distribution channels, for example, an organization of regional representatives or a subsidiary acting as a seller. Medium- and small-sized firms use brokers to sell their products and, in some cases, the owner himself makes sales directly from the plant to distributors and brokers.

To distribute the finished products, four firms use either their own trucks or trucks under contracts. The remaining firms use common carriers without contracts. Losses seldom occur with responsibility and insurance coverage varying according to truck ownership.

[3]The three regions--West, Northeast, and Southeast--are defined in a map in the Appendix.

Table 6. Percentage distribution of Florida shrimp by region and type of outlet in processed and raw product equivalents, 1972

Region and market	Processed product		Raw product equivalents of processed product	
	Region	Regional distribution	Region	Regional distribution
West	30%		23%	
Institutional		64%		60%
Retail		36		40
		100		100
Northeast	37		42	
Institutional		55		56
Retail		45		44
		100		100
Southeast	33		35	
Institutional		69		69
Retail		31		31
		100		100
	100		100	

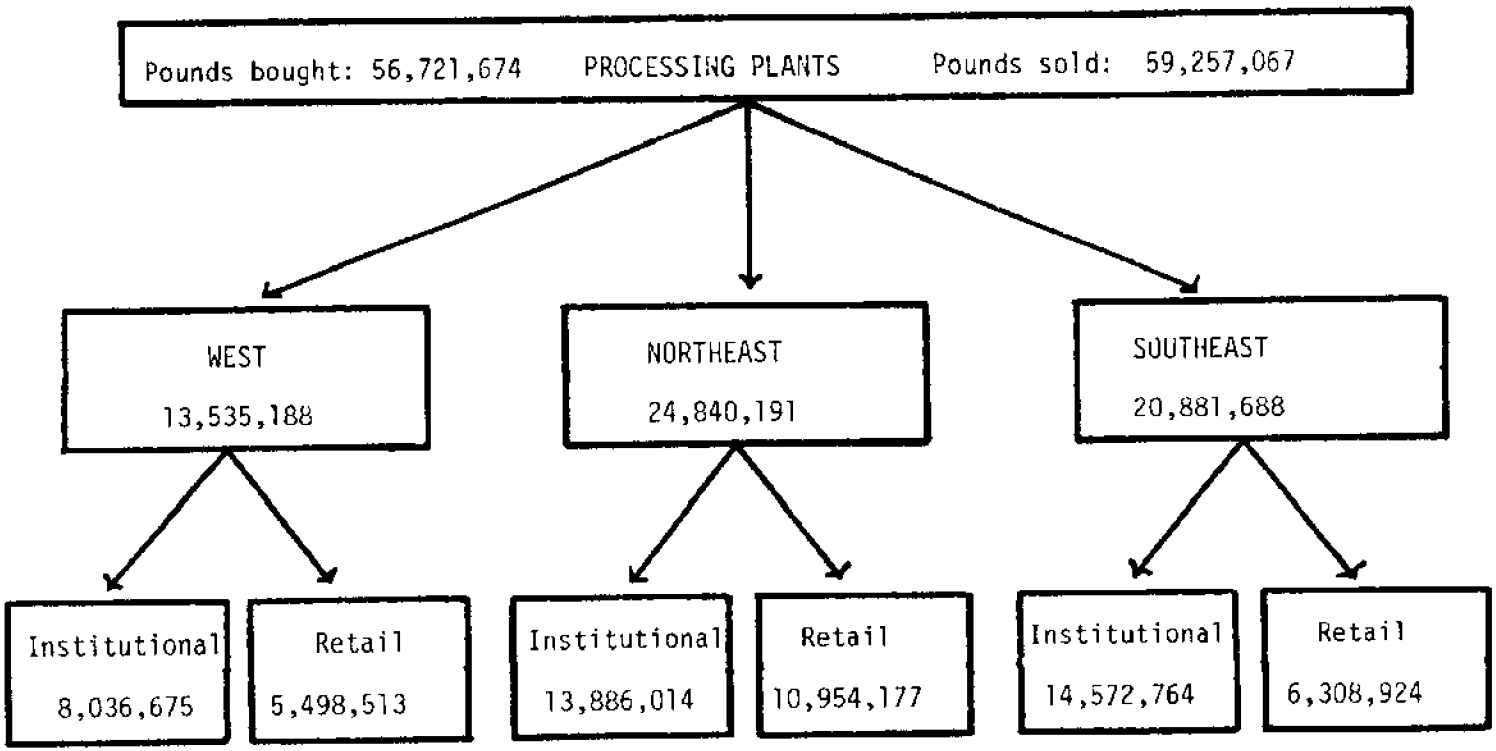

Figure 3.--Florida institutional and retail shrimp market outlets by region expressed in raw product equivalents, 1972[a]

[a] The conversion factors used were: 0.63 breaded raw to headless, 1.97 peeled cooked to headless, and 1.26 peeled raw to headless as indicated by the National Marine Fisheries Service.

MARKET STRUCTURE

Market structure of the Florida shrimp processing industry was analyzed by examining major characteristics that exert an influence on the nature of competition within the industry. These characteristics are the conditions of entry into the market, market concentration, product differentiation, and market coordination.

Entry and Exit Analysis

For analytical purposes two types of firms in the shrimp industry were defined: processors and handlers. Shrimp processors perform one or more of the following activities: cook, peel and devein, bread, or produce specialty products. Handlers exclusively freeze and package green headless shrimp.

Entry and exit patterns from 1961 to 1971 show an increase in processor firms and a considerable reduction in handlers. In 1961, 15 processors and 38 handlers in Florida accounted for 28 and 72 percent respectively of the 53 shrimp industry firms (Table 7). In 1971 only 41 firms remained in the industry. Seventeen, or 41 percent, were processors and 24, or 59 percent, were handlers. Over the ten year period a net decrease of 12 plants occurred; 43 left the industry and 31 entered. The number of processors increased by 2 with 13 exits and 15 entries. The number of handlers decreased by 14 with 16 entries and 30 exits. Nine processors and 18 handlers were operating in both 1961 and 1971. Processing plants experienced a higher percentage turnover rate than handlers over the 1961-71 period. In summary, this analysis of total firm numbers in the industry indicates that handler exits from the industry exceeded entries for the 1961-71 period. Processing firm entries, however, slightly exceeded exits. Exits from handling were significantly greater than entries.

Table 7. Entry and exit of shrimp processing and handling firms in Florida, 1961-71

Type of plant	Plants operating in 1961		Plant exits 1961-71	Plant entries 1961-71	Plants operating in both 1961 and 1971	Plants operating in 1971	
	Number	Percent				Number	Percent
Processor	15	28%	13	15	9	17	41%
Handler	38	72	30	16	18	24	59
All plants	53	100	43	31	27	41	100

Source: Calculated from [3].

Entry and exit patterns, classified by plant size in terms of total employment, suggest a tendency toward increased concentration for handlers but an irregular change for processors over the 1961-71 period (Table 8). For processing plants, there was no change in firms employing from 2 to 10 employees, a decrease in the number of firms with 31 to 100 and 101 to 300 employees, and an increase in firms employing from 11 to 30 and from 300 or more. For handlers, only the largest plants employing from 31 to 100 employees increased in number, while plants with 2 to 10 and 11 to 30 employees decreased.

Entry Related to Age of Firms

Analysis was made of the relationship between total sales of each firm and the number of years the firm was in the industry to determine if several years in the industry were necessary to secure a solid position. This relationship between total sales and the age of firms was weak when total revenue was used to indicate sales. When pounds sold were related to the number of years in the industry, no significant relationship was found.

Thus, results suggest that presently established firms did not have to devote many years to securing a solid position in the Florida shrimp processing industry. Potential entrants experience less difficulty in developing knowledge of the market and in developing a market for their product than in developing sources of supply.

Conditions of Entry and Exit

All firms interviewed indicated that no serious restrictions prevailed at the moment of entry. No firm acknowledged that established firms had control of superior production techniques at the time of entry.

According to processors, entry has become more difficult in the past few years. Present conditions of entry were analyzed through processor responses about current barriers to entry. These relate to advertising requirements, distribution networks, resource costs including the raw product and labor, and the existence of excess capacity.

Advertising requirements. Advertising expenditures are not a limit to entry of new firms. Processors do not consider advertising to be an extremely important part of their business. Though many firms advertise their products, advertising does not appear to play a major role in product identity at the processing level.

Distribution networks. Distribution networks do not appear to impede entry of new firms. Almost all firms assemble the raw products and distribute their output in common carriers which are generally available at prices acceptable to the industry. Recent fuel and transportation problems may begin to create transportation difficulties and/or increase transport costs.

Key resource inputs. Availability of the key resource inputs, raw shrimp and labor, were reported to be a substantial barrier to entry into the shrimp processing industry in Florida. The majority of processors believe that competition for scarce raw products, the associated rising prices, and the scarcity of labor discourage businessmen from entering shrimp processing.

Table 8. Entry and exit of shrimp processing and handling firms in Florida, classified by firm size (employment), 1961-71

Type and size of plant (employment)	Plants operating in 1961		Plants operating in 1971		Change in percentage share of the industry 1961-1971
	Number	Percent	Number	Percent	
Processor					
No employment data[a]	1	7	3	18	+11
2-10	2	14	2	14	0
11-30	4	29	6	43	+14
31-100	3	21	2	14	- 7
101-300	4	29	1	7	-22
301 or more	1	7	3	22	+15
All plants	14	100	14	100	
Handler					
No employment data[a]	11	29	5	21	- 8
2-10	14	52	8	42	-10
11-30	10	37	6	32	- 5
31-100	3	11	5	26	+15
All plants	27	100	19	100	

[a]Because no employment data were available for these plants, they were not included in the plant total.

Source: Calculated from [3].

Excess capacity. Excess capacity of processing firms presently in the industry also discourages entry by new firms. Only three of the processing firms interviewed acknowledged that they operate at or near full capacity. Other firms, however, seem to be well below full capacity reportedly due to the lack of labor and raw shrimp for processing.

Market Concentration

Market concentration, or more precisely, the share of a market held by firms within an industry relative to size of firm was analyzed.[4] Degree of concentration is used here primarily to describe the shrimp processing industry and not to indicate industry and firm well-being. Too many additional factors must be considered besides concentration if judgments are to be made about the relative qualitative aspects associated with market concentration ratios.

The Degree of Concentration

Concentration ratios for the industry and for each type of product processed were calculated (Table 9).[5] From the data provided by 15 firms in the industry, the results relative to total dollar sales of the Florida industry showed the largest two, four, and eight firms controlling 51, 74, and 95 percent of total dollar sales, respectively. Relative to the U.S. shrimp processing industry, the largest four and eight Florida firms controlled 22 and 28 percent respectively, of total dollar sales in 1972.

Concentration ratios by type of product differ. Ratios for green headless shrimp included the three handlers surveyed since they sell their products directly to institutional and retail markets. Though it is difficult to estimate the percentage of total Florida industry sales to retail and institu-

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[4] Concentration in shrimp processing in Florida was measured by means of concentration ratios, expressed numerically by a Gini coefficient and graphically with a Lorenz curve (see Fig. 4). Gini coefficients were computed using the formula

$$R = 1/2(P_{k-1} \cdot Q_k - P_k \cdot Q_{k-1}) \cdot \frac{1}{5,000},$$

where P_k represents the percent of firms accounting for a given proportion of total sales and Q_k represents the percent of total sales accounted for by a given percent of firms and k designates the cumulative percent and position of firms and sales. A zero coefficient would be perfect equality of firm shares while a coefficient of one would be a pure monopoly. This measure illustrates relative concentration at one point in time. Comparisons of Gini coefficients over time show changes in concentration. The Lorenz curve shows as a continuous function the percentage of total industry sales accounted for by any given fraction of the total industry population.

[5] The three firms not included in this research would not have made a major change in the concentration ratios as two are very small and one appears to be of medium size.

Table 9. Cumulative concentration ratios for the Florida shrimp processing industry by industry and type of product, 1972

Largest firms[a]	Industry	Green headless	Peeled and deveined and cooked	Breaded
2	51.09	61.95	62.62	54.48
4	73.77	83.67	93.80	84.30
6	86.63	92.61	100.00	93.97
8	94.94	98.00		98.15
10	97.70	100.00		100.00
12	99.31			
14	99.92			
15	100.00			

[a]Each group of firms may not contain the same firms in all four categories due to differences in product lines.

tional markets represented by these three handlers, responses from processors and handlers in the different locations indicate that the three constitute a high percentage of sales by handlers. Concentration ratios for the 10 firms dealing with green headless shrimp show the largest two, four, and six firms controlling 62, 84, and 93 percent of total dollar sales, respectively.

Concentration ratios based upon total dollar sales for the six firms dealing with peeled and deveined shrimp and cooked shrimp indicate that the largest two firms control 63 percent and the largest four firms control 94 percent of total dollar sales.

The 10 firms involved in breading shrimp present the following concentration ratios relative to total dollar sales: the largest two, four, and six firms account for 54, 84, and 94 percent of total dollar sales respectively.

Gini coefficients computed for the industry and for each type of product processed are as follows:

Industry	.62
Green headless	.56
Peeled and deveined; and cooked	.40
Breaded	.55

Concentration ratios plotted in the form of Lorenz curves are shown in

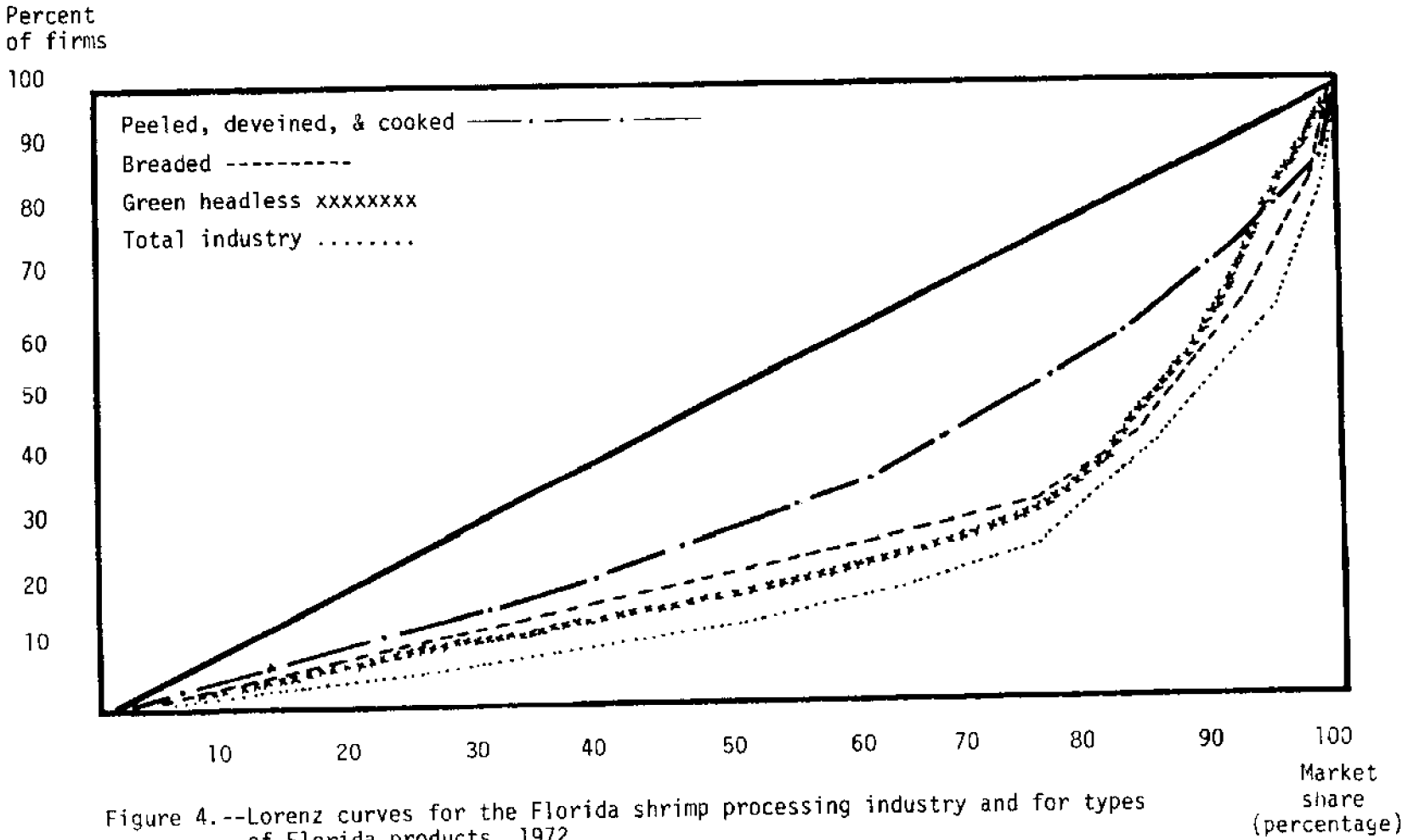

Figure 4.--Lorenz curves for the Florida shrimp processing industry and for types of Florida products, 1972

Source: [1].

Fig. 4 with those curves deviating most from the diagonal indicating highest concentration. The total industry market share presents the highest degree of market concentration, followed by green headless, breaded, peeled and deveined, and cooked shrimp products. Green headless shrimp show less concentration than breaded shrimp as a result of decreasing inequality of market shares among the firms with the least output.[6]

Characteristics of Concentration in Shrimp Processing

Industry concentration. Most firms within this highly concentrated industry include several products. Of the seven largest firms accounting for 92 percent of total industry sales, six produce several types of shrimp products while only one produces just one type. Of the nine smallest firms, only one produces two different products while the other eight firms have one product. These facts suggest that overall industry concentration may be directly related to the number of products processed by each firm. Six of the seven largest firms accounting for 92 percent of total industry sales are backwardly integrated into ownership or control or raw supply. Diversification and backward integration thus account for the high degree of industry concentration.

Green headless shrimp. Backward integration into the ownership or control of raw shrimp may explain some of the concentration found in green headless shrimp sales. Of the five largest firms accounting for 88 percent of total industry sales of green headless shrimp, two own vessels and two have unloading facilities and strong commitments with vessel owners. The fifth largest firm displays neither form of integration. The sixth leading firm is a strong buyer of Florida fresh shrimp but acknowledges no such agreements or ownership. The seventh and eighth either have vessels or agreements, and the last two selling green headless shrimp have neither. The remaining five firms in the industry do not sell green headless and report no control over raw supply. This also supports the explanation relating concentration in sales of green headless shrimp to backward integration into the ownership or control of raw shrimp. The six firms accounting for 89 percent of green headless shrimp sales have vessels or some type of control over raw shrimp supplies.

Peeled and deveined products. Control over Florida pink shrimp, acknowledged by many processors as the most acceptable for peeled and deveined products, may account for the concentration found in peeled and deveined products. The four leading firms, which account for 94 percent of peeled and deveined shrimp and cooked shrimp products, purchased over 86 percent of Florida's 1972 production of raw shrimp included in the survey (Table 10). The remaining two firms selling this product bought no Florida-landed shrimp. If the amount of Florida shrimp produced and marketed directly through institutional or retail outlets by vessel owners and not processed in Florida plants is omitted, the control over Florida's raw supply by the firms producing peeled and deveined products would be even higher. This seems to corroborate the assertion that concentration in peeled and deveined production may be associated with supply control of Florida's raw pink shrimp. There is a high dependence upon Florida raw pink shrimp for the state's production of peeled and deveined shrimp.

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[6]This could be the result of not including all of the green headless firms in the industry. As indicated earlier, though, it is believed that a high percentage of those selling to institutional and retail markets were included.

Table 10. Concentration ratios for peeled and deveined shrimp and cooked Florida shrimp products related to Florida shrimp landings, 1972

Largest firms	Percentage of total industry sales	Percentage of Florida landings in survey
2	62.62	67.18
4	93.80	86.91
6	100.00	86.91

Breaded shrimp. The degree of concentration in breaded shrimp products is related to but not the direct result of product differentiation activities. Of the five largest producers of breaded shrimp accounting for 90 percent of total breaded shrimp product sales, four are involved in some product differentiation activities. Three have more than one label, three advertise their products, and four have their own recipe for breading. One is not involved in any of these activities. Another possible explanation for the degree of concentration found in breaded shrimp products may be the processing for other private labels. The same four of the five leading firms process for 5, 15, 20, and 79 other labels, respectively, while the remaining firm processes only under its own label. Of the five remaining firms producing breaded shrimp products, one processes for five other labels, one for two other labels, and three do not process for other firms. If concentration in breaded shrimp products is compared with overall industry concentration, it appears that four of the leading five firms in breaded products also appear among the five leading firms in the industry. In summary, the degree of concentration in breaded shrimp products appears to be highly associated with product differentiation activities, the processing for other private labels, and overall industry concentration.

Product Differentiation

One potential effect of product differentiation in an industry is price differentials among sellers, with those differentiating their products receiving higher prices. Though available data made it difficult to arrive at a definite conclusion, an analysis of the relationship between product differentiation and price was performed. The existence of a location advantage, the existence of a superior product, ownership of an exclusive recipe, the number of labels, innovation activities, and advertising activities were used as indicators of product differentiation.

Location Advantage

There seems to be no location advantage in shrimp purchases and/or sales. Of the 16 firms responding, 12 indicated that adequate transportation negated any location advantage. The development of modern refrigerated trucks, according to processors, negates differences in plant location because the raw and finished products can move fast and the freight differentials increase prices only moderately. Because of this, the advantage of being located in Florida has been eliminated. Only one processor believes he has an advantage since he buys and

sells shrimp only in Florida, which does make his firm unique. Two feel that they have no location advantage in sales but do have a supply location advantage because they have access to Florida shrimp. One firm dealing exclusively with green headless shrimp and buying from their own unloading house acknowledged a disadvantage because boats must go further to find shrimp.

In general there is no special reason for being located in Florida. Some plants were located in Tampa, for example, because the major share of the raw shrimp supply was landed there at one time, but processors now realize that with increased dependence on foreign imports and the development of modern refrigerated transportation, most original location advantages have disappeared in Florida.

Superior Product and Exclusive Recipes

Not all firms have the same opinion concerning the possibility of producing a better quality product. Ten of the 16 firms interviewed believe that their product is not superior to that of their competitors. Those firms dealing exclusively with green headless shrimp affirm that their product is basically standardized within the industry. In addition, some processors say that there are no major quality differences among breaded shrimp products.

Six processors, four of whom produce breaded shrimp products and account for 42 percent of total sales in breaded products, believe they have a better product than their competitors. The reasons are use of the "best" ingredients, ownership of recipes prepared under private specifications, and meticulous care in processing. The belief of having a better product probably results from product differentiation efforts. Ownership of exclusive recipes signals a tendency to differentiate products. Only two of the 12 plants breading shrimp do not have their own recipes. One produces the breading in the plant while the remaining firms buy the breading according to specifications.

The hypothesis that product differentiation in breaded products leads to higher prices was tested. Nine of the firms involved in the production of breaded products were classified according to the presence or absence of product differentiation and whether the price of the product was above or below $1.58 (the average price). It was concluded that product differentiation is not likely to lead to higher prices in breaded shrimp products. This measure of product differentiation, however, was not entirely appropriate and definitive. A more appropriate technique, but impossible due to the data available, would have been to test for significance between prices to determine if differentiation exists.

Also tested was the hypothesis that product differentiation is associated with a larger market share. Theory suggests that the firm with product differentiation can obtain a larger share of the market. However, this allows the firm to differentiate its product even further. Causality thus becomes difficult to establish. For this analysis processing firms involved in both innovation and advertising activities were classified as firms differentiating their products. Each group was also classified according to the percentage share of the market controlled in 1972. Processing firms with differentiated products accounted for 87 percent of 1972 total sales. As anticipated, results indicate that product differentiation activities are associated with a larger share of

the market.[7]

Number of Labels

The number of private processor labels used per firm, i.e., labels belonging to the processing firm, ranged from one to five. In the industry 67 percent of the firms used only one label. This group, mainly smaller firms, accounted for 36 percent of total dollar sales. Using two labels were 13 percent of the firms, representing 36 percent of total sales. Another 13 percent had three labels and accounted for 20 percent of industry sales. The remaining 7 percent--one firm--represented 9 percent of total sales; this firm used five labels. Two labels were used when two distributors were selling the same firm's product in the same market area.

The number of labels carried by a firm is influenced by the distribution of that firm's shrimp output to its own labels and to processing for other firm labels. Seventy-five percent of the firms had 85 percent or more of their shrimp output under their own labels while 25 percent of the firms had 75 percent or less of their shrimp output under their own labels. Processing for other firms is almost evenly distributed with 56 percent of the firms in the industry processing for other labels.

Innovation Activities

Introducing new products and new packages can achieve additional product differentiation. During the last five years, 60 percent of the firms introduced new types of breading, new packages, and new specialty products. Thirty-three percent of the firms do not intend to do so in the future. Fifty-three percent of the firms have a person or department responsible for research and development activities.

Advertising Activities

Advertising activities are important in creating a product image. Forty percent of the firms have a person or department responsible for these activities. Sixty-two percent of the firms are involved in product promotion through advertising (institutional magazines, newspapers shared with chain grocery outlets, radio and t.v. spots, and discount policies).

To summarize product differentiation, no major Florida location advantage affects either purchases or sales for the Florida shrimp processing industry. A tendency toward product differentiation for those firms engaged in the production of breaded shrimp and specialty shrimp products is evidenced by the control or ownership of exclusive recipes, the use of top quality ingredients and meticulous care in processing these products. Generally firms use only one or two labels. A form of product differentiation occurs where two distributors in the same area use distinct labels because they both sell only one processing firm's product. Introduction of new products or packages as a means of product differentiation has been minimal in the past few years though many of the firms

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[7] For firms with product differentiation accounting for 87 percent of the market and firms without product differentiation accounting for 13 percent, $X^2 = 54.76$ and $X^2_{.10} = 2.70$.

acknowledged that work is underway to develop new products. Advertising seems to play a role in product differentiation as evidenced by 62 percent of the firms doing some advertising. Finally, product differentiation activities by firms are associated with larger market shares for those firms.

Market Coordination

Vertical and horizontal coordination were studies; such coordination involves how the functions of supply, brokerage, wholesaling, and processing in the shrimp processing and marketing system are organized and interrelated, both formally and informally (Table 11). All markets experience vertical and horizontal coordination; the ways vary from lack of formal arrangements where buyers and sellers in the market have little contact except at the time of exchange, to systems formally integrated either through contracts or ownership. Of particular importance in this study was dominance by firms at any level in the system through either ownership or control of the production and supply of raw shrimp.

Vertical Coordination

Firms in this industry are vertically integrated to some extent. This involves a formal agreement where one firm performs two or more vertically integrated activities in the system either through contracts or ownership. Fifty-six percent of the firms are involved in one or more forms of vertical integration. Four firms are involved in one activity; two firms, in three; and three firms, in two, four, and six activities of vertical integration respectively. Seven firms have no vertical integration involvement.

Six firms, or 37 percent of the industry, are integrated into the ownership or control of raw supply. Two of these firms are green headless handlers and market their products directly to institutional and retail markets. The remaining four firms have a secure supply from different sources. In 1972, these four firms bought 11, 43, 87, and 90 percent of the total number of raw shrimp they processed, under some type of control or agreement. These four firms are included within the seven largest firms that controlled 92 percent of total industry sales in 1972. One firm in this group of the seven largest bought a substantial amount of Florida shrimp in 1972 but did not acknowledge or recognize any control over raw supply. The presence of a relationship between concentration and backward integration into the ownership or control of raw shrimp is suggested.

Horizontal Coordination

Two activities are related to horizontal integration. These are the ownership of other processing facilities and the production of non-shrimp products. The latter activity is common. Three firms have other processing facilities; two of them are part of multi-plant operations. Fourteen firms, or 88 percent of the industry, are involved in the production of non-shrimp products. For a majority of the firms, this diversification is influenced by a lack of raw shrimp for processing in the face of a goal to increase total sales. Vertical and horizontal integration activities, related to size of firms based on 1972 production, revealed a positive relationship between firm size and degree of integration.

Table 11. Vertical and horizontal coordination activities, by size of Florida shrimp processing firms, 1972[a]

Size and number of firms	Raw supply control	Make or print boxes	Transportation		Retail outlet	Facilities outside Florida		Other products
			Raw	Finished		Pre-processed	Processed	
Small (four)	0%	0%	0%	0%	25%	0%	25%	100%
Medium (six)	33	0	0	0	0	0	33	50
Large (two)	100	50	50	100	0	100	0	100

[a]Percentage of firms having these characteristics.

MARKET CONDUCT AND PERFORMANCE

Market conduct was studied; this consists of each firm's behavior in pricing raw and finished products, in specifying product policy, in research and innovation activities, and in advertising. Market performance was studied through non-normative evaluations of marketing margins, plant productivity, and emerging changes in the industry. No assumptions or judgments were made about the quality of performance relative to either theoretical or institutional criteria. Problems that are affecting or may affect industry performance in the future were identified and anticipated.

Margins and Pricing Behavior

Raw Product Pricing

Information used in raw product price determination varies by source of supply. Instead of using the "yellow sheet,"[8] most firms in the industry find it more useful to trust the pricing decisions of the leading firms knowledgeable about local daily market conditions for Florida-landed shrimp. Most processors acknowledged that price leadership for Florida's raw shrimp persists though to a lesser extent than in the past.

The "green sheet"[9] is followed more closely by Florida processors when determining prices for other U.S. raw shrimp. This may be because Florida processors have fewer daily contacts in other regions of the country than in Florida. Yet the "green sheet" can be used only as a general barometer because, like most price information sources, it often arrives after the market situation has changed. Prices for other U.S. shrimp are determined by daily market conditions in which Japanese buyers exert an influence.[10]

A general consensus prevails among processors that prices of foreign frozen shrimp are greatly influenced by the Japanese presence in the world markets. The increasing quantity of shrimp bought by Japan makes this country a leader in the world market. The Commercial Fisheries Review [5, p. 49] stated that "Japanese trade sources say that by 1980 total shrimp consumption may reach 150,000 tons, with imports supplying most of this demand." The Japanese influence is such that the Quantity of shrimp imported into the U.S. "will largely depend on the amount purchased by the Japanese on the world markets" [8, p. 10].

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[8] The "yellow sheet" is a Gulf Coast Regional market news report published by the National Marine Fisheries Service in New Orleans, Louisiana.

[9] The "green sheet" is similar to the "yellow sheet" but contains information on the Atlantic Coast and the Fulton Fish Market, which is the major wholesale fish market in the U.S.

[10] Commercial Fisheries Review [5, p. 49] stated that "...the Japanese public will continue to demand shrimp and pay higher prices...." As a result of the activities of Japanese buyers, the Japanese share of the U.S. shrimp exports rose from 9 percent in the first half of 1972 to 35 percent during 1973 [9, p. 10].

Foreign shrimp prices, however, were not significantly higher than domestic prices in 1972. When average prices paid for raw products in 1972 from the three different sources (Florida, other U.S., and foreign) were compared, no substantial difference was found. Processors acknowledged that world trade may have had an influence in raising domestic shrimp prices. Average price paid for Florida shrimp was $1.51, while $1.38 and $1.56 were paid for other U.S. shrimp and foreign shrimp, respectively (Table 12). The relatively low price paid for other U.S. shrimp is due to the smaller sizes of shrimp bought in other Gulf Coast states.

Table 12. Supply sources for the Florida shrimp processing industry--total pounds of raw shrimp bought, total dollars paid, and average price paid, 1972

Supply source	Total pounds bought	Total dollars paid	Average price paid
Florida	10,139,540	$15,278,474	$1.51
Other U. S.	23,831,991	33,017,376	1.38
Foreign	22,750,143	35,462,174	1.56
Total	56,721,674	$83,758,024	$1.47

The average purchase function, intersecting the actual purchase function at 8 million pounds, indicates pecuniary economies of scale for large firms (Fig. 5). Average price paid per pound of raw shrimp for the industry in 1972 was $1.47. The average industry price, multiplied by different quantities of shrimp bought by each firm, gives the average industry purchase function. This average purchase function, given by $Y = 1.47, X$ (where Y = total purchases in million of dollars and X = total purchases in millions of pounds), when compared with the actual purchase function, given by $Y = 1.59X - .015X^2$ (with Y and X as defined above) shows smaller firms paying above and larger firms paying below the average price for the industry.

Finished Product Pricing

Prices and inventories. As shown in Fig. 6, the average sales function crosses the actual sales function at 6 million pounds. Firms larger than this size are predicted to receive below average price. Average price received per pound of processed shrimp for the industry in 1972 was $1.68. This price was multiplied by different quantities of shrimp sold by individual firms to obtain the average sales function for the industry (see Fig. 6). The average sales function given by $Y_1 = 1.68X$ (where Y = total sales in million of dollars and X = total pounds sold in millions), when compared with the actual sales

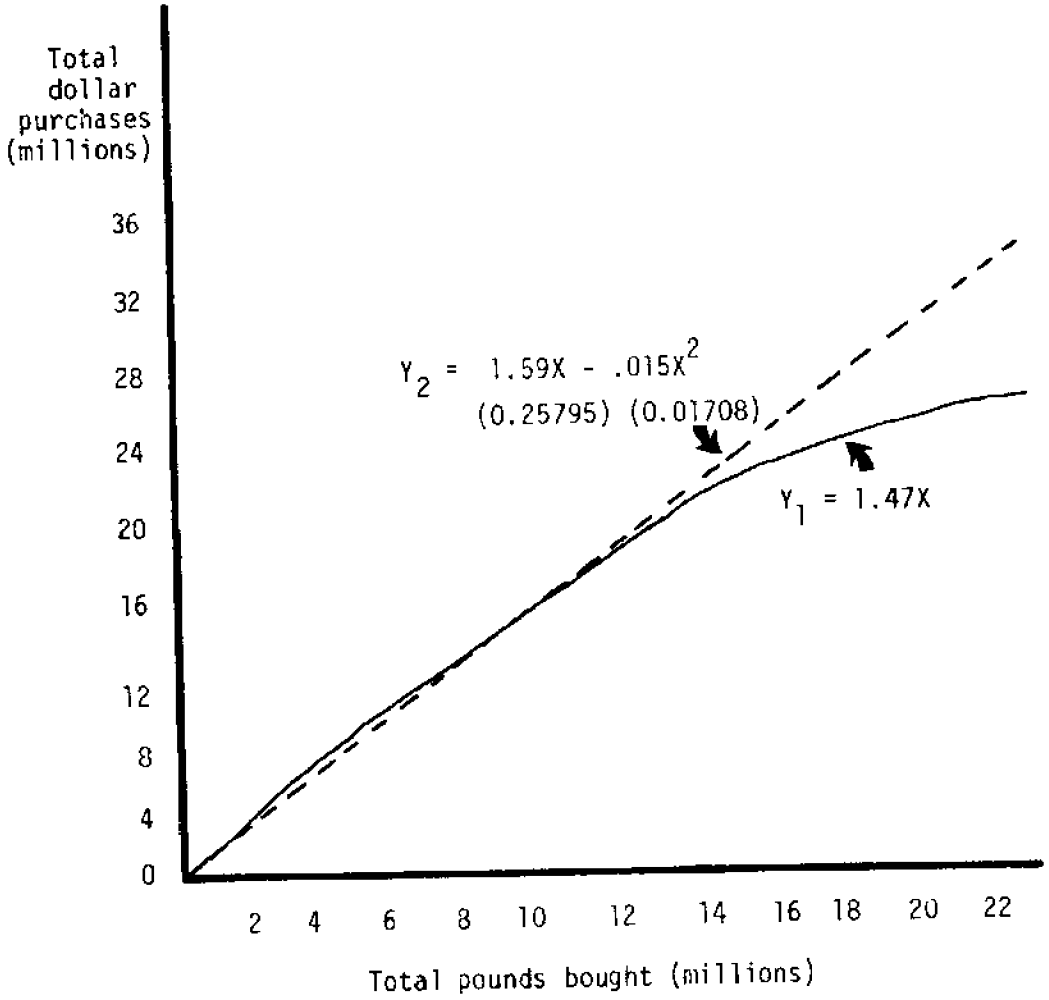

Figure 5.--Actual purchase function (Y_1) compared with average purchase function (Y_2) for the Florida shrimp processing industry, 1972

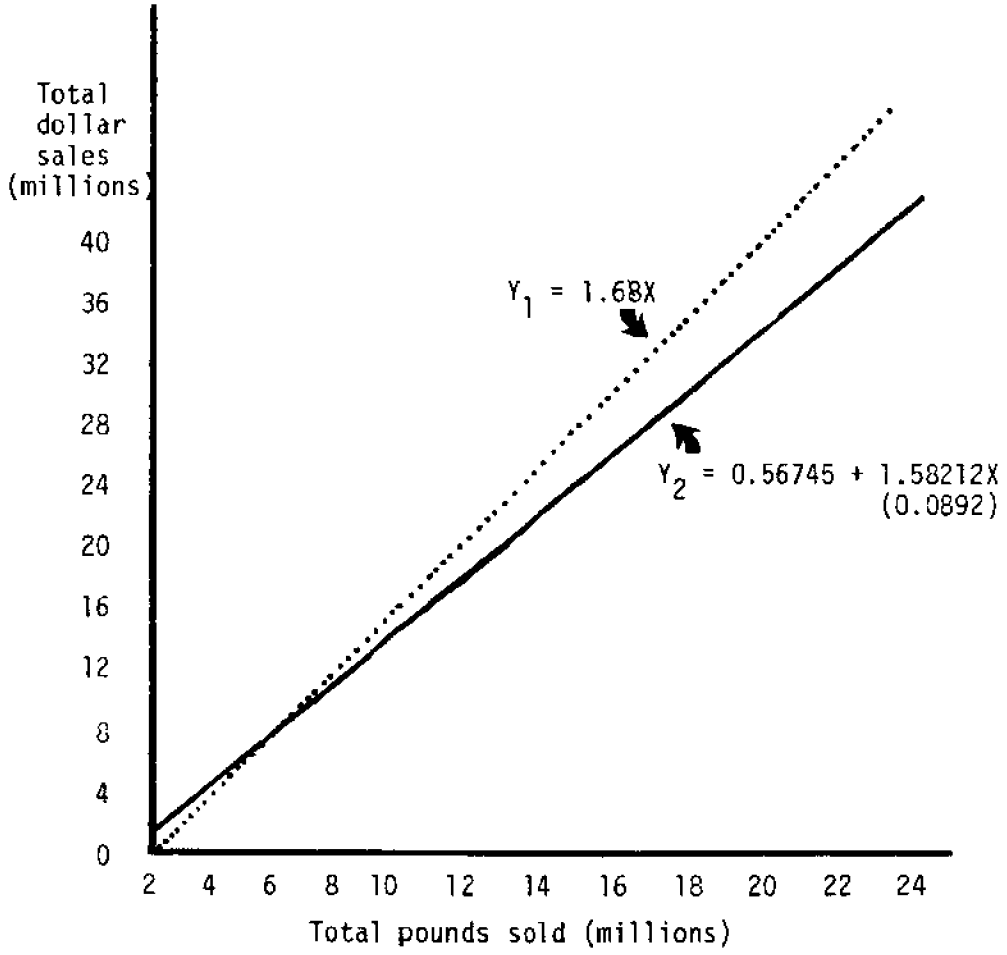

Figure 6.--Actual sales function (Y_1) compared with average sales function (Y_2), 1972

function given by $Y_2 = .56 + 1.58X$ (with Y and X defined as above), reveals that small firms received above average price and larger firms received below average price. The net effect of this is discussed in the section on gross margins.

Lack of sufficient data impeded a test of the relationship between inventories and price variations. Analysis of questionnaire responses suggests that the Florida shrimp processing industry behaves according to the economic principle of an inverse relationship between inventory level and price level. Inventories experience seasonal variation, with some firms holding none or very low inventories during certain times of the year. No relationship was found between inventory level and size of firms, and inventories as a percentage of total sales showed no definite pattern.

Revenue and quantity sold. An important consideration in analysis of pricing behavior was to determine the nature of the relationship between total revenue and the number of units of the specific type of product sold in the market. This analysis establishes whether revenue differentials prevail within the industry.[11] It must be reemphasized that the products included in each total revenue estimate are not necessarily homogeneous. Thus, any price differential received by larger firms represents varied attributes of the product in addition to volume. A complete explanation of price differentials between firms would require an analysis of the entire U.S. shrimp market since Florida alone does not determine U.S. prices.

The analysis suggests that total revenue per unit tends to remain constant at all levels of quantity sold. The small number of observations for each equation permits only tentative acceptance of these results. However, a total revenue equation for all products, involving all firms in the industry presented in the following section, yields slightly different results.

Gross Margins

Total revenue and total purchase functions for the industry were developed. Both functions were specified on raw product equivalents so that direct gross margins calculations could be made. The estimated equations provide a linear total purchase function and curvilinear total revenue function (Fig. 7). From these two equations, gross margins were calculated at different quantity levels of shrimp purchased for processing. Margins were computed by subtracting total dollars paid for raw shrimp from total dollars received for finished products divided by total pounds of raw product purchased.

Based on these computations, gross margins decrease as firms become larger (Fig. 8). Several factors contribute to lower gross margins for large firms relative to small firms. Larger firms experience pecuniary economies of scale in purchasing (see Fig. 5); buying below the average price paid by the industry

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[11] Linear and quadratic equations for total revenue received from each type of product were estimated [1]. The empirical evidence suggests that the quadratic model is not suitable for the total revenue equations for all three types of products. When the quadratic component is introduced, the coefficient of the quadratic term is not statistically significant. Results of the linear equations, however, are significantly different from zero at the .01 level in all three equations.

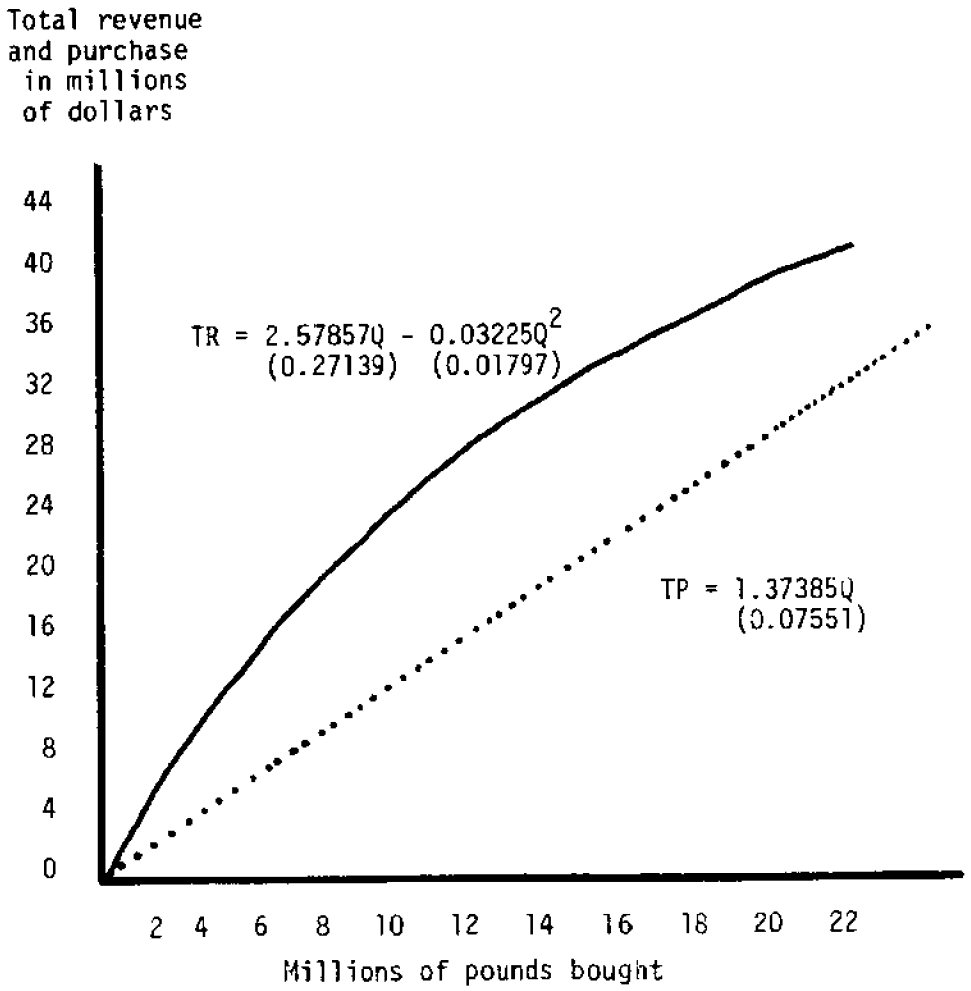

Figure 7.--Total revenue (TR) and total purchase (TP) functions for shrimp processors in Florida, 1972

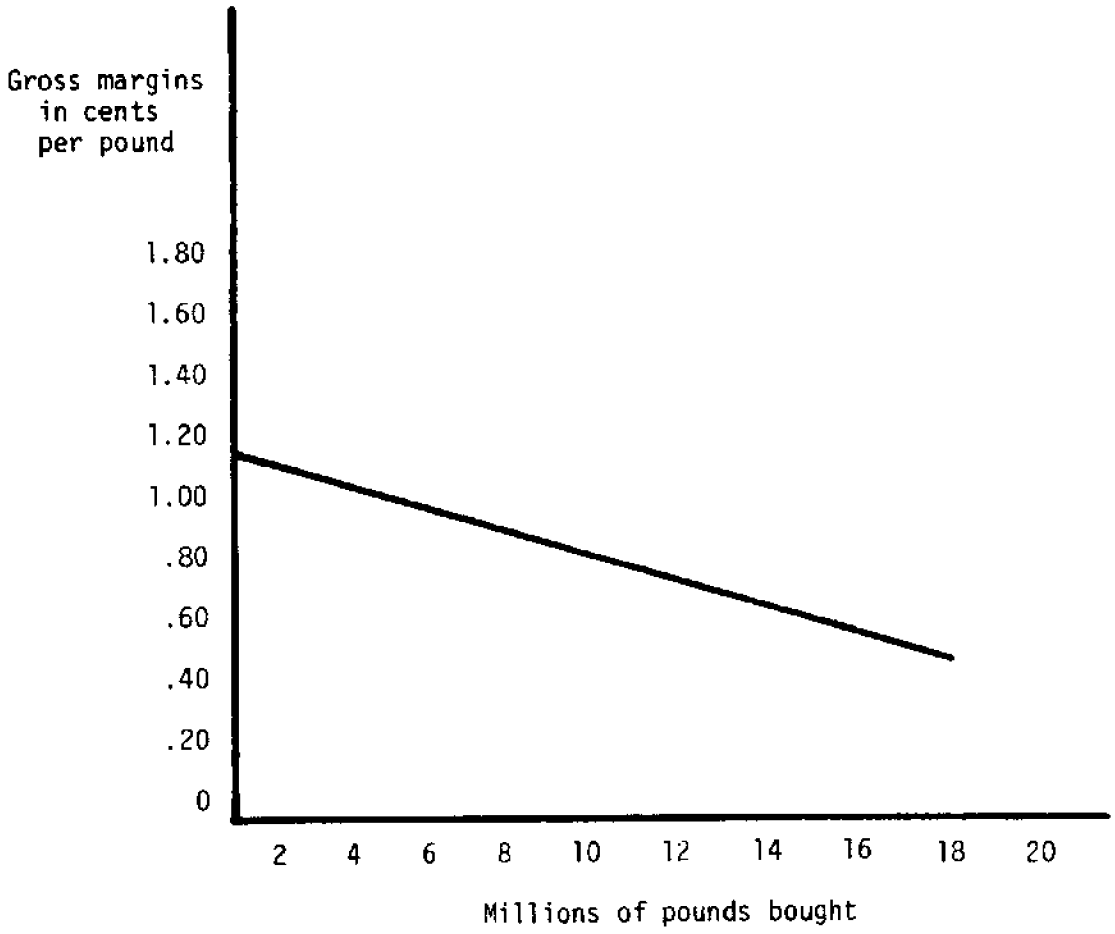

Figure 8.--Gross margins for processed shrimp in Florida estimated from the total revenue and total purchase function, 1972

offsets the lower margin to some extent. Productivity measures, discussed below, suggest that annual average productivity per worker tends to increase as the size of the firm increases. Consequently, large firms with technical and pecuniary economies of scale may not receive a lower net margin than small firms.

Individual firm margins were not plotted in Fig. 8 because of the confidential nature of the data. Actual margins of most firms fell near the estimated gross margin function with the exception of a few small firms. Several of these small firms fell considerably below the estimated margin due to special characteristics of their operations. These include a large volume of green headless shrimp and limited processing practices.

Product and Sales Strategies

Product Strategy

Product variation over time was analyzed by considering changes in quality or design that have occurred in recent years. Future plans for product variation were also considered.

Changes in quality or design have not occurred frequently in the past, but they may increase in the near future. Two firms (one large and one medium) have introduced new packages in the past few years. Four firms (one large, one small, and two medium) have changed shrimp product quality, mainly by the use of "better" ingredients. Two firms (one large and one small) have changed packages or quality in products other than shrimp. Eight firms, however, intend to pursue some of these activities in the near future.

Product variation is related to the number of products processed by firms. The wider the product line the more involved the firm tends to become in quality and design changes. Firms dealing with green headless shrimp are not likely to introduce new types of products or new packages. The same holds true for those dealing with two products (green headless and breaded, and green headless and peeled and deveined) and to some extent for those producing only breaded shrimp products. Firms producing several types of products are most involved in product variation, which suggests that product strategy is more important to multi-product firms than to single- or two-product firms.

Research and Innovation

Industrial organization theory suggests that large firms compared with small firms are generally more effective in making technological inventions and adopting innovations. This hypothesis was tested for the shrimp industry by classifying firms according to the existence (yes) or absence (no) of a research and development department, and according to size of firms. Firms were separated into two groups: those selling less than $2,500,000 in 1972 (small firms) and those selling $4,000,000 or more (medium and large firms). Test results indicate that research and innovation activities do not depend on size of firms;[12] large firms in this industry do not invent and innovate more than small firms.

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[12] For $n = 11$, $X^2 = 1.621$ and $X^2_{.10} = 2.70$

No relationship was found between research and innovation activities and type of firms. Five of the seven multi-product firms and three of the four single-product firms invent and innovate (Table 13).

Table 13. Research innovation and advertising activities by Florida shrimp processing firms, by firm size and type, 1972

Type of Firm	Size of firm	Research and development department	Innovations		Advertising	
			Past	Future	Department	Activities
Multi-product	Large	Yes	Yes	Yes	Yes	Yes
Multi-product	Large	Yes	Yes	Yes	No	Yes
Multi-product	Medium	Yes	Yes	Yes	Yes	Yes
Multi-product	Medium	Yes	Yes	Yes	Yes	Yes
Multi-product	Medium	No	No	No	Yes	Yes
Multi-product	Medium	Yes	No	Yes	No	Yes
Multi-product	Small	No	No	No	No	No
Single-product	Medium	Yes	Yes	Yes	No	No
Single-product	Small	Yes	Yes	Yes	Yes	Yes
Single-product	Small	Yes	No	Yes	Yes	Yes
Single-product	Small	No	No	No	No	No

Sales Promotion

According to processor responses, the hypothesis that fewness of sellers stimulates more incentives to advertise than a large number of sellers is only partially true in the Florida shrimp processing industry. Thrity-eight percent of the firms do not advertise at all.

A comparison of advertising activities to firm type reveals that multi-product firms are more likely to advertise their products than are single-product firms. Six of the seven multi-product firms and two of the four single-product firms do some type of advertising (Table 13).

Upon testing, no significant relationship between advertising activities and size of firms was revealed.[13] Large firms usually do not advertise more than small firms in this industry.

Finally, the research shows that firms tend to be engaged in research, innovation, and advertising activities simultaneously. This result could be

[13] For n - 11, $X^2 = 1.621$ and $X^2_{.10} = 2.70$

expected since firms engaged in research and innovation activities would need to promote new products by advertising.

Productivity

Productivity was measured by using the percentage of plant capacity utilized and employment in 1972 to determine worker productivity for each firm. This analysis was also extended to each type of product processed and to each group of firms with the same product lines.

Based upon a comparison of 1972 production with plant capacity, all firms are substantially under utilizing their plants and the industry is utilizing only 55 percent of total plant capacity (Table 14). According to processors, lack of raw shrimp for processing is the main obstacle to higher plant utilization.

Table 14. Plant capacity and production in the Florida shrimp processing industry, by firm size, 1972[a]

Size of firms	Total 1972 production in pounds	Annual plant capacity in pounds[b]	Plant capacity utilization
	---------- 1,000 ----------		--- Percent ---
Small	2,541	3,400	75%
Medium[c]	12,736	21,000	60
Large	39,400	75,000	53
All firms	54,677	99,400	55

[a]This includes only firms answering the questions.

[b]When plant capacity was given per day, it was multiplied by 300 days.

[c]Does not include one firm moving to a new plant.

Contrary to possible hypotheses, an inverse relationship seems to exist between plant capacity utilization and size of firm and secure supply. Some small firms utilize more of their plant capacity than large firms. No small firms had a secure supply while all large firms did. Some medium size firms did and some did not have a secure supply. Some firms with a secure supply utilize less plant capacity than some firms without a secure supply (Table 15).

Worker productivity varies greatly by product lines, which makes analysis among all firms within the industry less meaningful (Table 16). When subgrouped

Table 15. Plant capacity utilization related to firm size and secure source of supply in the Florida shrimp processing industry, 1972

Size of firm	Secure supply	Capacity utilized
		Percent
Small	No	75%
Medium	Yes	70
Medium	No	55
Large	Yes	53

Table 16. Annual average worker productivity by product type in the Florida shrimp processing industry, 1972

Type of product	Pounds processed	Total number of workers	Worker productivity
			Pounds
Peeled, deveined, and cooked	13,819,000	1,685	8,201
Breaded	47,983,000	2,268	21,156
Industry	74,767,206	2,360	31,681

by product lines (Table 17), firms show a direct relationship between product line and productivity. Productivity increases as the number of products processed increases. This also suggests the possibility of a relationship between productivity and size of firms with labor productivity increasing as the firms become larger.

Table 17. Annual average worker productivity by product line and firm size in the Florida shrimp processing industry, 1972

Size of firm	Product line*	Worker productivity
		Pounds per worker
Small	c	17,352
Medium	c	19,428
Medium	a, b, c	30,625
Medium	a, b, c, d	33,035
Large	a, b, c, d, e	35,008

*These are (a) green headless, (b) peeled and deveined, (c) breaded, (d) cooked, and (e) specialty products, respectively.

Trends and Emerging Changes

Several changes and problems are related to the present and future performance of the Florida shrimp processing industry. Changes and problems in sources of supply of raw products, labor, transportation, location and composition of customers, and the establishment of preprocessing or processing facilities outside of Florida or the U.S. were analyzed.

Source of Supply

Sources of supply of raw products are by far the most important limiting factor facing this industry. In addition, this is expected to be a greater problem in the near future. To the question "Are your sources of supply now different than before?" seven processors answered "no." Six processors answered "yes" and indicated that they were unable to purchase a sufficient quantity of Florida shrimp and consequently had to seek other sources. This shortage accompanied by low cost foreign labor and a shortage of even relatively high cost local labor, has perpetuated increased importation of partially processed (peeled and deveined) frozen shrimp. Only one processor has changed his source of supply from foreign to more local.

With the exception of four firms, one buying from Florida and three from foreign sources, processors foresee major changes in their sources of raw shrimp supply. Eleven processors believe that raw product procurement is becoming critical and that future supplies will have to be purchased from foreign sources. It is difficult to predict how much shrimp will be available in the future because of the Japanese and other countries are intensifying their purchases of shrimp worldwide and are thus affecting U.S. buyers in every market. Increased consumption in foreign countries has driven prices up considerably and changed the availability of raw shrimp from these markets. These conditions will affect the Florida shrimp processing industry as prices continue to rise due to

insufficient raw product supplies and an intensified need to import. Higher and rising prices make it extremely difficult to arrive at supply agreements of any kind, even informal, with the result that no security is available for most shrimp processors buying in world markets.

Labor

Though in most cases the supply of labor does not limit firm growth, it causes processors difficulties and may become critical in the future if more raw shrimp for processing become available. Eleven processors did not recognize the supply of labor as a major problem at present though they have difficulties hiring people to fill positions on production lines. This problem will increase if more shrimp from foreign sources become available for processing in the future. One large firm, for example, hired 250 employees out of 750 applicants when they began operations several years ago but now must hire nearly every applicant because of turnover and fewer applicants. This same firm experienced a 900 percent turnover in 1972 for 40 percent of its total employment, e.g., 40 percent of the positions were filled an average of nine times each. These labor problems are forcing the firm to become more mechanized. Three firms believe that the supply of labor is extremely scarce at present and impedes their business growth. For some firms the labor problem may constitute an inducement to import and to become engaged in processing activities in foreign countries.

Transportation

Transportation problems or changes are few and not foreseen in the future by the majority of the processors either in bringing the raw product to the plants or in delivering finished products. Raw product transportation methods have not changed over the past few years. However, the fuel shortage is considered to be a major issue that may affect transportation availability in the future. No other changes are foreseen, implying that firms will continue to utilize carriers or their own trucks for bringing raw shrimp to their plants.

For delivery of finished products, 12 processors have not experienced changes in recent years while three processors have. One of the four shifted from railroad transportation to a contract with a trucking company. Another firm is experiencing problems in finding trucks and cannot obtain good service. The third firm, dealing with green headless shrimp, once owned trucks but is now using common carriers. More changes in the future, however, were not foreseen when the interviews were taken. This was before the fuel crisis.

Customers

Changes in customer location and/or composition (institutional or retail) are not foreseen by the great majority of Florida shrimp processors. Ten firms confirm this position while two believe that they may change to more institutional or retail outlets, depending on the price of shrimp. One processor foresees an increase in sales of processed shrimp to institutional markets now buying mainly fresh and unprocessed frozen shrimp.

Facilities Outside Florida

The establishment of pre-processing or processing facilities outside

Florida is closely related to the scarcity of labor and raw shrimp for processing and is a potential concern for the industry. A few large firms with control over raw supply established facilities outside Florida during the 1950s. The purpose was to achieve improved access to raw supply where the growing scarcity of Florida's raw supply and the existence of lower cost foreign labor were motivating factors. One Florida firm went to Trinidad during the 1950s to locate more shrimp and is presently in partnership with a Trinidad plant that freezes green headless shrimp and produces peeled and deveined shrimp products. Another firm established a plant in Ecuador during 1962-63 in cooperation with the Ecuadorian government but could not obtain adequate raw product supplies, which caused discontinuance of the business. Two firms are part of multi-plant operations having many seafood and other processing plants throughout the U.S., but only one processes shrimp and was established long before their Florida business began. Repetitions may occur in the case of a relatively small firm that went bankrupt because it lacked capital for its new Florida plant under construction. This firm did not try to stay in Florida and preferred to transfer its business to Honduras where raw supply and labor are more readily available than in Florida.

Priority Problems

Similar responses were obtained to the question about what processors consider to be the most important problem of the Florida shrimp processing industry at present. These were scarcity and high prices of raw shrimp and the labor shortage. Lack of raw products as well as increasing prices are recognized as major problems for this industry presently. One concern is the worldwide Japanese competition; dollar devaluations have given the Japanese an extra edge against U.S. buyers of raw shrimp. The labor shortage at all levels is also a major problem that may become critical, particularly if all plants were able to expand raw supply for processing to full capacity levels. Other problems mentioned were government intervention (all processors are against price controls), interest costs for borrowed money, and pollution regulations that are not standard between ports.

Conclusions and Implications

Several important conclusions can be drawn concerning the evolving market structure and performance of the shrimp processing industry in Florida. A highly concentrated market is evidenced by the largest two and largest eight firms controlling 51 and 95 percent, respectively, of total industry sales in 1972. Entry and exit patterns during the 1961-71 period reveal a trend toward increased concentration in both processing and handling of shrimp.

Contributing to the impact of market concentration are the market coordination conditions of the shrimp processing industry. About half of the firms are involved in one or more forms of vertical integration with six of the seven largest firms integrated into ownership or control of raw supplies. Horizontal integration is less common.

Productivity, as an important measure of performance, reveals that most firms substantially underutilize plant capacity. The industry utilizes only 55 percent of plant capacity with lack of raw shrimp being the main obstacle. Plant capacity utilization was found to be inversely related to size of firms and the inability to obtain a secure supply.

Gross margins tend to be smaller for larger firms than smaller firms. These are probably offset by pecuniary and technical economies of scale experienced by large firms, which may suggest that net margins differ little between large and small firms.

Source of supply of raw products is by far the most limiting factor faced by the industry. Further pressure on available supplies is expected in the near future. Raw product procurement from domestic sources is becoming critical, and purchasing in the highly competitive foreign market is increasingly necessary. This may affect the industry drastically by forcing some firms out of business while increasing prices of finished products substantially.

Labor supply, though not limiting present growth, causes processors some concern. It may become critical in the future if more raw shrimp for processing become available. For some firms, the labor problem may constitute an inducement to import and to become engaged in processing activities in foreign countries. Though not true at present, labor supply may become a major competitive problem in the future.

Some general implications can be drawn from this study concerning future investments in the shrimp processing industry. An important consideration is the procurement of raw supplies. Since the future depends on non-Florida supplies, small firms may be more likely to succeed if they produce specialty products, sell in isolated markets or develop forward integration from shrimp fishing operations. This research has shown that successful small firms in the industry display one or more of these characteristics. Those not following this behavior have left the industry or may be forced to do so in the future. Large shrimp processing firms selling general lines were shown to operate on narrower gross margins than smaller firms. To be competitive, firms desiring to sell a general line of shrimp products must be sufficiently large to achieve the economies of scale in purchasing and processing presently experienced by large firms. However, availability of raw supplies may limit entrance of very large firms.

Appendix

SURVEY OF SHRIMP PROCESSING INDUSTRY IN FLORIDA
(abbreviated form)

I. SUPPLY SOURCES

A. Facilities

1. Do you own your own boats: If yes, how many? _____
2. Do you have an agreement with boat owners for exclusive access to their catch? Explain.
3. Do you own any unloading facilities? Please describe them.

B. Shrimp landed in Florida ports by U.S. fishing boats:

Annual Pounds and Dollars for:
a. Fresh, heads off
b. Fresh, heads on
c. Frozen (Florida landings)
d. Frozen (not specific)
e. _____

C. Other U.S. landings by U.S. fishing boats:
Raw Product Form, State Landed, Size, Annual Pounds, and Annual Dollars.

D. Foreign imports: Raw Product Form, Annual Pounds, and Annual Dollars.

E. Reasons for buying from these different sources:

Why do you buy (cost, quality, availability, size, etc.):
1. Florida shrimp?
2. Other U.S. shrimp?
3. Foreign shrimp?

F. Buying mechanism:
How do you buy (telephone, own agents: employees or contractural arrangement, etc.):
1. Florida shrimp?
2. Other U.S. shrimp?
3. Foreign shrimp?

G. Channels:
Channels when buying Florida, other U.S. and foreign shrimp:

Do you buy directly from:
a. Fishing fleet _____% or lbs.
b. Unloading house _____% or lbs.
c. Wholesaler _____% or lbs.
d. Broker _____% or lbs.
e. Other _____% or lbs.

H. Reasons for buying through these channels:

Why do you prefer the channels you employ when buying:
1. Florida shrimp?
2. Other U.S. shrimp?
3. Foreign shrimp?

I. Price determination:

How are prices determined when buying:
1. Florida shrimp?
2. Other U.S. shrimp?
3. Foreign shrimp?

J. Type and ownership of transportation:

1. Indicate type and ownership of transportation when bringing Florida, other U.S. and foreign shrimp to your plant.

2. (a) Is it different now than before?
   (b) Do you foresee any changes?

K. Price paid:

When you buy Florida, other U.S. and foreign shrimp do you pay a price equal to:
a. FOB original location
b. FOB your plant
c. Other

L. Landings of shrimp by firm's boats:

1. If you have your own boats, do you land shrimp in Florida? If yes, indicate:
   a. Annual pounds _____
   b. Annual dollars _____

2. If you have your own boats, do you land shrimp in U.S. ports other than Florida's? If your answer is Yes, indicate:
   a. State
   b. Annual pounds
   c. Annual dollars

3. If you have your own boats, do you land shrimp in foreign ports? If your answer is Yes, indicate:
   a. Country
   b. Annual pounds
   c. Annual dollars

M. Reasons for those landings:
1. Why do you land in other U.S. ports?
2. Do you ship these shrimp to Florida for processing by your firm? If Yes, explain. If No, where do you sell it?
3. Why do you land shrimp in foreign ports?
4. Are your sources of supply of raw products different now than before?

II. PROCESSING

1. What percentage of your business, in dollars, deals with shrimp?
   _____% of total sales.
2. If you handle other products, indicate: Product and % of total dollar sales.
3. Product line: Type of product, annual pounds, and annual dollars:
   a. Raw, headless
   b. Peeled and deveined
   c. Breaded
4. a. Indicate what percentage of your shrimp output is labeled under your own label? _____percent
   b. How many labels do you have: _____. If more than one, explain reasons:
   c. Do you process for "other" private labels? _____ Explain.
5. Do you have your own recipe?
6. What is your total employment? _____average/year
   What percentage of these employees work with shrimp? _____percent
7. Do you produce your own breading material? Explain
8. Do you produce your own boxes? Explain
9. What do you do with your waste product?
   a. Throw it away
   b. Sell it as is
   c. Process it
   What product is processed from the waste material?
   Do you process it because it is profitable or because you have to comply with pollution regulations or other types of regulations?
   Do you have any problem selling it?
10. Does your firm have any pre-processing or processing facilities outside of Florida or the U.S.?
    a. If within the U.S., indicate: Location, date established, annual pounds, annual dollars, type of processing, and customers.
       Why did you establish such facilities?
    b. If outside the U.S., do you bring these shrimp to this plant for further processing? If not, what do you do with it? Why did you establish such facilities?
    c. If your answer is No, do you intend to establish such facilities either in other states or outside the U.S.? Explain where and why.
11. What is your average inventory?
    a. Finished products _____
    b. Raw products _____

III. SALES

1. What percentage of your products enter institutional and retail markets, and what percentage goes to various regions of the U.S.?
2. Do you sell the same type of product in the same proportions in all your major markets?
   If No, what is the distribution of your products by region?
3. Through what channels do you sell your products?
   (Own agents, wholesalers, etc.).
4. Do you own any retail outlets?
5. When delivering your products, your firm:
   a. Uses its own trucks
   b. Contracts to haul all its products

c. Uses other trucks without contract
d. The buyer transports it
Is it different now than before?
Do you foresee any changes?

6. If the product deteriorates, do you stand the loss?
If Yes, do you have any insurance? Explain.
7. How are prices determined for your products?

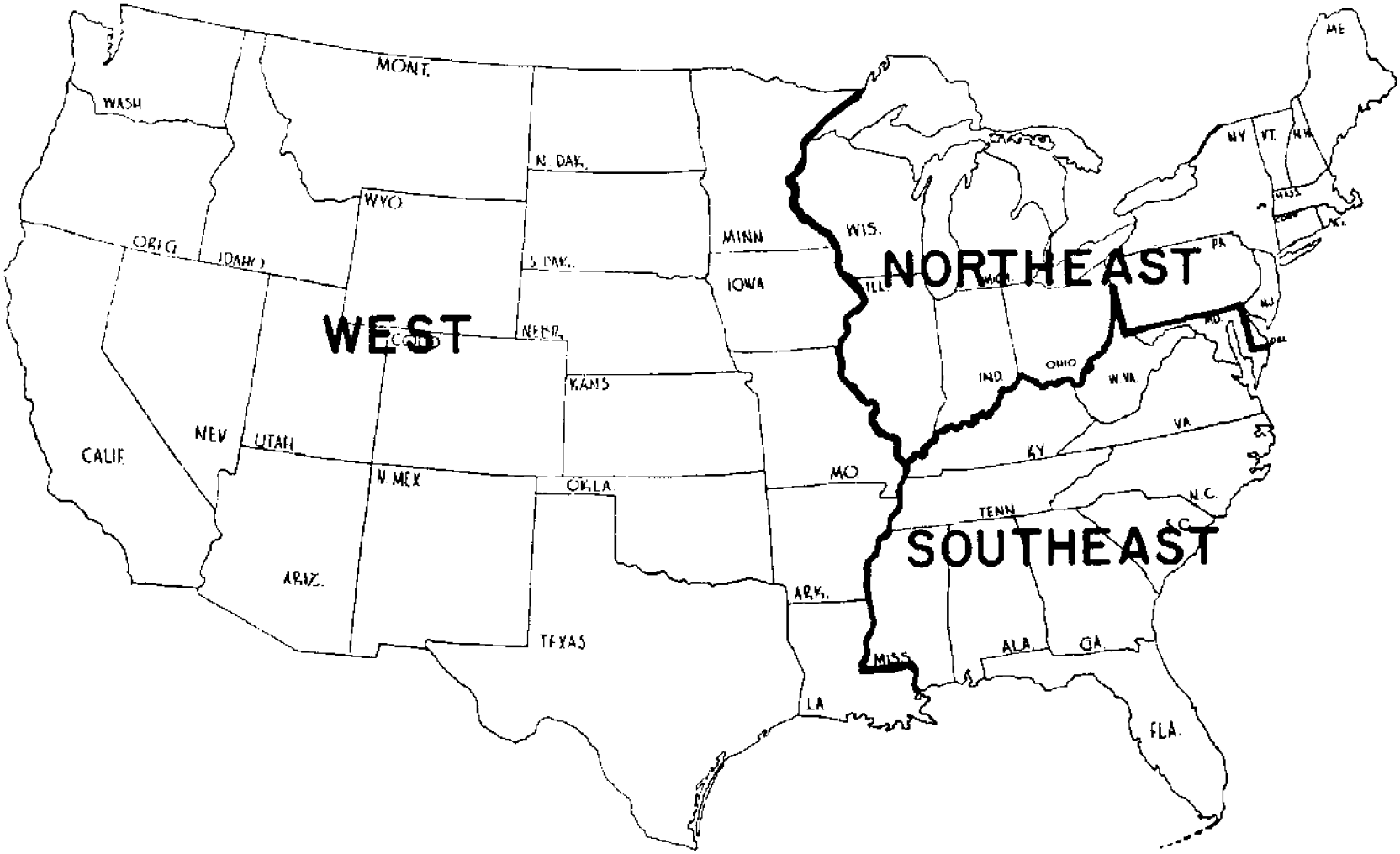
IV. PRODUCT DIFFERENTIATION

1. Does you firm have a department or person responsible for product differentiation activities?
2. Is your firm engaged in any type of advertising?
Please explain.
3. Has your firm introduced a new product or a different quality of product or a new package within:
a. The last year Specify: _____
b. The last 5 years Specify: _____
c. The last 10 years Specify: _____

V. GROWTH

1. Date firm was established.
2. Had established firms any control of superior production techniques (i.e., patents) at that time?
3. How much overall capital did you invest at that time?
4. How much capital have you invested since that time?
5. Do you intend to invest in new facilities or equipment in the near future? Explain.
6. How does the scarcity of sources of supply or the supply of labor affect potential entrants?
7. Are labor costs or the supply of labor limiting growth of your business?
8. What is the plant capacity of your firm?
Are you able to utilize all your plant capacity?
If your answer is No, what are the limiting factors that impede your plant from running at full capacity?
9. Do you foresee any changes and problems in your sources of supply?
10. Do you foresee any changes in the location and/or type of your customers?
11. If your answers to 9 and/or 10 are Yes, how is it going to affect your business?
12. What do you consider to be the most serious problem for Florida's shrimp processing industry at present?
13. Do you have any suggestion for governmental action that could improve your ability to compete with processors in other states or countries?

THREE MAIN U.S. MARKETING REGIONS FOR PROCESSED FLORIDA SHRIMP



References

1. Alvarez, Jose. "The Florida Shrimp Processing Industry: Economic Structure and Marketing Channels." Unpublished MS thesis, University of Florida, 1974.

2. Bain, Joe S. Industrial Organization. New York: John Wiley and Sons, Inc., 1959.

3. Florida State Chamber of Commerce. Directory of Florida Industries. Florida State Chamber of Commerce, Jacksonville, Florida, Biannual Issues.

4. Hamilton, Steve F. "The Shrimp Industry of Florida." Unpublished MS thesis, University of Florida, Gainesville, Florida, 1951.

5. National Marine Fisheries Service. Commercial Fisheries Review. Washington, D. C.: U. S. Department of Commerce, 1973.

6. _____. Fisheries of the United States. Washington, D. C.: U.S. Department of Commerce (formerly under U.S. Bureau of Commercial Fisheries, U.S. Department of Interior), Annual Issues.

7. _____. Fishery Statistics of the United States. Washington, D. C.: U.S. Department of Commerce (formerly under U.S. Bureau of Commercial Fisheries, U.S. Department of Interior), Annual Issues.

8. _____. Processed Fishery Products. Washington, D. C.: U.S. Department of Commerce, Annual Issues.

9. _____. Shellfish Market Review and Outlook. Washington, D.C.: U.S. Department of Commerce, 1973.

10. _____. Summary of Florida Commercial Marine Landings. Washington, D.C.: U.S. Department of Commerce, Annual Issues.

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This public document was printed at a cost of $1,420.44 or 71¢ per copy to present the results of an economic study of the Florida shrimp processing industry. This information is important in assessing the competitive position of the industry.

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