ECONOMIC FORCES SHAPING THE FOOD PROCESSING INDUSTRY

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Economic forces shaping the food processing industry come from three main areas: (1) the structure of the demand for food; (2) the costs of production and supply, and (3) the competitive structure of the industry. The paper surveys the trends in these economic forces over the past three decades that are likely to prove useful for managerial decisions in the future.

The Demand for Processed Foods

From 1950 to the present, per capita food consumption in the United States increased .78 percent per year.[1] Demand growth has occurred due to changes in the level, distribution, and sources of income, the demographic composition of the population, preferences, prices, and foreign trade.

Since 1950, real per capita PDI has grown at 2.0 percent per year. Increases in income have little impact on overall food demand. However, as incomes increase, consumers shift to higher quality and more convenient foods. Processed foods with relatively high income elasticities are frozen fruits and vegetables, meat substitutes, cheese, nuts, alcoholic beverages and food-away-from-home (FAFH). Relatively unprocessed foods with similar income elasticities are veal, shellfish, lamb and vitamin C-rich noncitrus fruits. Processed foods with negative income elasticities will experience declining demand; they include processed milk, cooking oil, cereals, lunch meats, canned fruits and vegetables. As incomes rise consumers acquire time saving durables which augment the demand for frozen foods.

The highest income elasticity of all (.81) is for FAFH. USDA defines "convenience foods" as those which are fully or partially prepared and which transfer time and skill from the kitchen to the food processing firm.

One-half of food at home expenditure is for convenience foods. Fresh food which can be eaten raw and FAFH are also convenient.

The most significant factor affecting demand has been the dramatic changes in the demographic composition of the population, especially the decline in household size. This reduction is due to a lower birth rate, increased divorce, longer lifespan, later marriage, and increased affluence which permits younger and older persons to maintain households of their own. Smaller households spend more per capita on food and consume more poultry, fruits and vegetables, bakery products, cheese, fish and soft drinks. In contrast, larger households consume relatively more dairy products, cereals and breads, pork, poultry, eggs, sugars and sweets, coffee, soup and prepared foods. Preferences for different foods are also a function of age. The age distribution of the U.S. population has not been static, the biggest factor contributing to this change was the postwar baby boom.

Another major trend has been changes in labor force participation. Since 1950, the labor force participation rate for women has increased four-fold for those with children under six and doubled for those with children 6-17. The term "dual earner" household refers to the 40 percent of families where the husband and wife work outside the home. Their median income in 1981 was $27,696 compared with $21,702 for single earner families.

The major impact of increased participation by women has been to augment the service component of food demand. Households with employed wives consistently spend larger portions of their food dollar on FAFH. Income earned by part-time working wives increases the household's marginal propensity to consume FAFH more than any other income source. Income earned by full-time working wives decreased the household's marginal propensity to

consume FAFH, because the full-time employed wife does not have time to eat out unless it is in a relatively fast (and hence, inexpensive) restaurant. By acquiring capital equipment, the wife who is employed full-time can prepare food at home faster then she can eat out. The implication is that the consumption of convenience foods and (fast) FAFH foods will increase as more women are employed full-time. This implies that high quality, easily prepared food will increase in demand.

Another significant factor is the vastly improved information about diet and health, especially longevity. USDA summarized this information in their 1980 "Dietary Guidelines for Americans," which call for moderate consumption of foods high in fats, cholesterol, sodium, sugar, and alcohol. Foods high in fiber and diets with adequate starch were recommended. One-fourth of the households surveyed by the Community Nutrition Institute in the late 1970's were classified as "healthy eaters." They consumed more vegetables, fruits, whole grains, lean meats, poultry, and fish than average, and disliked highly processed convenience foods. They achieved convenience by eating foods prepared very simply. Predominately these consumers lived in one or two person households, were over age 45, and had either very low or very high incomes. Processes that prolong the storage and shelf life of fresh foods will take on increased importance as consumers demand more fresh and/or natural foods.

One of the major factors affecting the demand for processed food is its price. It is generally agreed that food is price inelastic. Brandow examined retail demand for 24 categories of foods and found an overall price elasticity of -.34. He found elastic demand for veal, lamb, chicken, turkey, and beef. George and King, dealing with 49 commodities, found similar results for meats and an overall food price elasticity of -.23. Price elasticities for fresh

fruits and vegetables appear to be higher than for their processed counterparts. Over the entire postwar period, and extending considerably before, the ratio of food prices to nonfood prices has remained approximately constant. As a result of the constancy of this ratio and the low income elasticity of demand, the proportion of the consumer budget spent on food has fallen. This share has declined from a fourth in 1959 to almost a seventh in 1985.

Prices of most processed foods have increased faster than their fresh or relatively unprocessed counterparts. Prices of food at home, FAFH, and prepared foods grew at about the same rate but the price of bakery goods and cheese increased faster than cereals and whole milk. The price of frozen fruits and vegetables increased faster than the price of fresh or canned fruits and canned vegetables but the price of fresh vegetables rose faster than the price of canned vegetables. Over this time period, the consumption of those foods for which the price rose rapidly increased more than the consumption of their counterparts that were becoming relatively cheaper. Increased incomes, changing tastes, and demographic factors shifted the demand for these items.

The United States has a comparative advantage in <u>exporting</u> primary agricultural commodities. Food commodities are categorized into low and high value products (LVP and HVP) on the basis of value per metric ton. The bulk of U.S. agricultural exports are LVP but the bulk of the traded HVP are processed foods. The demand for HVP from developed and middle income countries will increase because of tourism and imitation of American eating patterns. This will increase the demand for fresh fruits as well as highly processed foods. Developing countries will demand more semi-processed

products for use in local food processing. The most dramatic increase in demand for HVP has been for beef and poultry. Fast growth HVP include canned meats and fruits, sugar and cereal preparations, fruit juices, vegetable oils, oilseed cake and meals.

Imports of food products may be classified as complimentary or supplementary depending or whether or not they are produced domestically. Complimentary items increase the variety of foods available and do not compete directly with U.S. products. These items include coffee, tropical fruits, cocoa and tea. Supplementary imports which are growing rapidly include pork, poultry, dairy, bakery, and confectionary products, fruit juices, frozen and preserved vegetables, wine, and vegetable oils.

Costs of Production and Supply

The processing sector purchases inputs of raw farm products, and with the assistance of labor, capital, and other inputs transforms them into processed foods. For most firms, the biggest expense is for the raw product. The price, quality, and availability of this raw input is of prime concern. While the prices of most farm products have risen with the general price level, individual experience is mixed. Perhaps more important than price increases has been the volatility of prices since the early 1970's. This volatility creates uncertainty with respect to the volume of output to be produced, the level of raw input to purchase, and the degree to which substitution for other inputs should be attempted.

Rapid productivity growth results in low rates of growth of costs, oversupply, and hence low output prices. Such has been the case for agriculture. However, productivity growth for food processing apparently has been much slower. Total factor productivity in the food processing and

distribution industry was found to be zero over the 1950-1980 period. The major drawback with that study was that no allowance was made for quality change. Factors such as increased convenience, better packaging, and more information were excluded. Hence, the rate of productivity growth can be equated to the rate of growth of these factors. These findings were roughly consistent with other productivity studies for all of manufacturing. Research indicates two periods of slowed growth--the late 1960's and the mid-1970's. The causes are often attributed to increased government regulation, higher energy costs, and unskilled labor force entrants.

Looking at partial productivity indexes, output per worker-hour grew at 1.46 percent for the Food and Kindred Products Industry (SIC-20). At the same time, real wages in that industry rose at an annual rate of 1.84, adjusted for the shorter work week. Part of this disparity can be accounted for by increased social security contributions, disability insurance and employee benefit increases. Average hourly earnings ($7.43 in 1981) for workers in SIC-20 has been about 94 percent of the all manufacturing average for the past 30 years. The proportion of production workers to all workers has remained constant in SIC-20. The industry is highly organized with nearly half of the work force in one or the other of the 26 unions operating in the industry. The occupational injury and illness rates are almost twice the national average. These high rates have resulted in increased costs thru disability claims.

A substantial portion of recent entries into the food processing labor force have been Mexican-Americans, particularly in California and Texas. Proposed legislation designed to limit or restrict immigration would have increased costs of food processing as well as farming.

In addition to labor and raw food, the other main inputs are energy and capital services. Costs of both rose significantly beginning in the early 1970's. The industry responded by substituting labor for capital and energy. High interest costs have been partially offset by investment tax credits, accelerated depreciation, and lower tax rates. Government regulation, especially clean air and water standards, have imposed substantial costs on industry and little apparent real benefit.

Estimates of the demand structure for inputs for the industry show that the demand for raw food is highly inelastic, while the demand for other (inputs) is higher and nearly elastic. There is little substitution among raw farm products, or between farm products and other inputs. However, there is substantial substitution among the labor, packaging, transportation and other inputs. Also, the estimates indicate that capital is a substitute for labor, packaging, and transportation but a compliment to other inputs.

Market Structure and Structural Change

In the framework of industrial-organization economics, demand and supply conditions are the two principal determinants of market structure. The paradigm further posits a causal connection between market structure, the business strategies open to firms, and their financial performance. Three aspects of market structure are particularly basic: sales concentration (the number and size distribution of companies in a well defined market), the degree of product differentiation and the ease of entry.

In a perfectly competitive market firms have little latitude in choosing an optimal mix of investment or marketing policies. In other market situations, firms enjoy greater discretion. This conduct includes: new plant location, investing in distribution facilities, introducing new products,

identifying products to be discontinued, selecting the marketing support for the existing product portfolio, and of course choosing the price and output levels. Changes in basic demand or supply conditions often result in structural changes, such as a reduction in the number of rival firms.

A useful distinction is between strategic "investment" and "marketing" decisions.[2] In the context of a diversified firm, investment choices are made in the centralized administrative units and potentially affect all lines of business of the firm. Marketing decisions, on the other hand, are channel-specific and typically are the primary responsibility of division or product-line managers. For the purposes of this disucssion, an otherwise identical product may be sold in four or more distinct domestic distribution channels: industrial products, undifferentiated consumer products, foodservice, and manufacturers' brands. To set a profitable strategy, it is essential for a food manufacturer to assess the structural dimensions of each market channel in which the firm participates.

Market Structure

There are three organizational characteristics that define a particular market's place on the perfect competition/monopoly spectrum. The first is market sales concentration. In a concentrated market the leading firms recognize that their actions impinge on each other's profits. Recognition of mutual interdependence provides an incentive for market rivals to seek to establish a peaceful, stable market environment. Major rivals often do this by developing tacit understandings about the rules of business conduct that can reconcile their conflicting financial goals and maintain an industry structure that provides benefit for all participants. However, even when concentration is high, if the top two or three brands have roughly equal

shares, it is likely that the oligopolistic consensus will, at least sporadically, come unglued.

The second is product differentiation. Advertising is the principal tool used to differentiate a branded food. The intensity and mix of advertising effort made by the leading brands sets a standard that nearly all brands must imitate to some extent. Thus, the average level of advertising (per dollar of sales) is a useful indicator of the extent of product differentiation. Measured mass-media advertising is often only the tip of the selling-effort iceberg. In addition to unmeasured media advertising (e.g., in local newspapers, business and trade publications, and the like), there is a panopoly of other selling methods.

The third dimension of structure is the ease and speed of entry. As a rule it is easier to enter a market that consists of a standardized product than one with differentiated products. When industry grades and quality levels are well recognized and relatively unchanging, physical imitation by a potential entrant is fairly straightforward. When an industry sells differentiated products, mere imitation of existing brands is unlikely to guarantee success. Even if product and packaging design problems can be overcome, a potential entrant will have even more formidable problems in dealing with image differentiation maintained by brand advertising.

Product differentiation is the most forbidding barrier to entry but other barriers may be operative as well. Production and distribution economies of scale are substantial in some food industries. The size of an optimal plant must be measured against the size of the output market and, for some major inputs, a localized procurement zone. Moreover, in some food industries additional technical and pecuniary advantages of size may result from

multiplant ownership. Finally, the presence of conglomerate firms in leading positions may forestall entry by more specialized firms. Diversification across product lines or across geographic market areas opens new retaliatory options for incumbent firms to use against would-be entrants.

Structural Change

As a rule, market concentration, product differentiation, and barriers to entry may be regarded as essentially fixed over the five- to ten-year planning horizon that is for manufacturers. However, market structure does evolve over longer periods. While the large scale entry of a new conglomerate firm may trigger a sharp increase for a few years, the evidence from the post-World War II period shows that advertising-to-sales ratios in most food industries are remarkably stable. Similarly, though somewhat less well documented, optimal plant scales have kept pace with shipments in about half of the food processing industries and have risen only slightly in the rest.

The most persistent trend in market structure is the rise in sales concentration. With the exception of a few fast growing industries, the number of food processing firms has declined at an average rate of almost 3 percent per year. Average four-firm concentration increased among the national food product classes. Empirical analyses have determined that advertising-created barriers to entry are the primary cause.

Investment Strategies

In this section we focus on the strategic decisions made by the central administrative units of firms that aim at the maximization of long-run profits. We argue that the profit histories and market structures of lines of business are useful guides to a number of important nonmarketing management

decisions: selecting new lines of business, introducing new products or processes, and other cost reducing capital expenditure.

The numerous market structure-profit studies of the food manufacturing industries all paint a similar picture. High rates of returns are generated in markets with high concentration, strong product differentiation, and other barriers to entry; firms in such markets with high market shares and a diversified portfolio of businesses display even higher profitability. Profits in food processing tend to be more stable over time than the rest of manufacturing, and supranormal profits also tend to persist for decades. However, profits are often high because entry barriers are difficult to surmount. Multiproduct diversified firms with experience in marketing grocery products have the best chances of overcoming such barriers. Even when retaliation takes place by the leading-firm group, such an entrant can gain a significant market share at the expense of the nonleading incumbents, especially when initial entry occurs by merger. Successful entry is also enhanced when the production techniques and marketing characteristics of the target industry closely match the expertise of the entering firm.

Entry into most industrial or private-label food products manufacturing is generally easier because of the absence of product differentiation barriers. In the case of private label products, however, high concentration and advertising place upper limits on the shares that can be garnered by all sellers. The basic strategy in these markets involves lower cost production methods. Investment in more efficient plant and equipment is more likely to be successful when there is evidence of X-inefficiency in an industry; this could be signalled by an oligopolistic market structure that yields lower-than-expected profits. If the X-inefficiency takes the form of excess capacity by incumbents, a prospective entrant should be wary of dogged

resistance to incursion. Investment in computer-assisted production, inventory, and distribution systems will provide many cost-reducing opportunities for food processors and the suppliers of food processing equipment. In-house research and development expenditures by food processors is rather low, but R&D expertise facilitates interindustry transfers of technology as well as the development of product variants with potentially high consumer acceptability.

Marketing Strategies

Having decided upon a portfolio of industries, the food manufacturer still faces decisions on basic selling strategies. These are typically initiated by division or product-line managers. The structural characteristics of the marketing channels to be served, as well as the marketing strategies of major rival firms, play major roles in forming these strategies. For a given well defined product, different pricing and product design policies will be needed for each marketing channel because the demand segments, set of rival sellers, and marketing institutions vary systematically across channels. For example, packaging sizes, pricing methods, and delivery terms for tomato catsup will be different for fast-food places as compared to more traditional restaurants.

A key decision for producers is whether or not to differentiate their product. This decision depends on the nature of the product and the communications expertise of the producer. If a company can produce a brand that meets consumer needs better than other producers' brands and/or if the company can communicate the superiority of its brand well and cheaply to customers, it should choose a differentiated marketing channel. Firms

choosing not to differentiate with these firms will emphasize distribution and production cost efficiency, rather than marketing and product design.

The least differentiated channel in food manufacturing is shipments to other manufacturers. In 1977, 26 percent of the value of shipments of food manufacturing industries went to other food manufacturers for further processing. For example, the wet corn milling, animal feeds, oilseed crushing, rendering, and malt industries ship nearly all their output to other processors, including processors abroad. With the exception of a few flavorings, sweeteners, and preservatives, intermediate foodstuffs are virtually homogeneous commodities sold in bulk. Semi-processed commodities are typically sold in large lots on the basis of continually negotiated prices or prices contractually related to open cash or futures markets. Except where the number of companies selling a product is low, the producer goods channel is characterized by vigorous price competition and cost-cutting investments.

Sales of manufacturers' brand foods through grocery stores offer the greatest challenges and opportunities to food processors. In 1977, branded, packaged goods sold through food stores accounted for 39 percent of food manufacturing value of shipments. Branded-food manufacturers use a variety of persuasive techniques aimed at both consumers and foodstore managers to promote their brands. To be successful a manufacturer must convince retailers to allocate desirable shelf space to the manufacturers' brands. It does this by offering deals to retailers and building strong consumer demand through advertising. The stronger the consumer franchise, the more difficult it is for a retailer to avoid carrying a brand.

Manufacturers that are unable to make use of the advertising strategy may be forced to sell to retailers at lower prices. In some cases the lower prices take the form of trade "deals" or allowances. More often, however,

trade deals are used to eliminate temporal or geographic imbalances between supply and demand. Manufacturers can offer incentives to retailers based on retailer pricing or promotional cooperation. Essentially these price reductions are payments for particular shelf locations that generate greater brand sales.

Small manufacturers may be able to prosper by appealing to small segments of consumers that are not worth the attention of the larger producers. Some of the largest food manufacturers set minimum sales targets of $50 or $100 million per brand. Nearly all food products markets have fringe segments demanding unusual container sizes, meeting dietary restrictions (Kosher foods, MSG-free oriental foods, "organic" and "health" foods), or offering unusual taste combinations (apple-peach juice).

Product and packaging innovations often are complementary to brand promotion. If a manufacturer offers a product that consumers perceive to be better and if it can make consumers aware of the improvement, it can gain market share rapidly. Recent examples of innovations supported by substantial marketing muscle include cookies, spaghetti sauce, and disposable diapers.

Product proliferation, introduction by a few companies of many varieties of a product, has been suggested as a strategy for protecting market position. Product proliferation fills up market niches that other firms could use to gain a toehold and experience in the market from which they could later expand. It also can make more effective use of a powerful brand name and advertising campaign. Economic models have been developed that demonstrate that increasing the number of varieties of a product can be a more profitable way of deterring entry than lowering prices. Product varieties can also be used to price discriminate between groups of consumers with different tastes.

The breakfast cereal industry has been frequently cited as an example of product proliferation to deter entry and discriminate among consumers.

FOOTNOTES

†John Connor, Dale Heien, and Jean Kinsey are associate professors of agricultural economics at Purdue University, University of California-Davis, and University of Minnesota, respectively. Robert Wills is research associate, University of Wisconsin at Madison.

[1]This paper borrows heavily on material presented in Connor and Wills and Kinsey and Heien [2]. Due to space limitations no references are cited here. The interested reader can find documentation for facts and finding in the two works mentioned above.

[2]The focus of this section is on selling strategies. A third set of strategies important for food processors, but omitted here, concerns procurement practices in input markets.

REFERENCES

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