

## CHANGES NEEDED IN THE ORGANIZATION OF THE NATION'S FOOD INDUSTRY TO MEET CHALLENGES AHEAD

by

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In order to assess organizational changes in the areas of research, extension and service which support the U.S. food industry, we have to understand what the food system is.

This is not easy as most of the available writings deal only with parts of the system. So, I have attempted to develop a model or flow chart of the U.S. food and fiber system. Because some of the data needed in such an effort is nonexistent or at best weak, I have to point out there are a number of approximations in this chart. I have used the best available data from both government and industry sources and have drawn heavily on the ERS input-output materials. The illustration shows 1975 data in billions of dollars measured in the top to bottom width of the chart (Figure 1). The chart shows \$92 billion of farm sales with farm inputs of \$20 billion, mostly feed, seed and livestock purchased from other farmers. Nonfarm inputs of \$55 billion include fuel, machinery, fertilizer and similar products produced by industry and mining of nonagricultural sources. Value added consists primarily of labor and capital inputs. Other farm income is reflected as well as unknown values of agriculture to the nation such as recreation, water, and esthetics. Outside sources of income for farmers are not reflected.

As we move to the right, across the chart, major processing and marketing

activities such as assembly and storage, processing, wholesale and retail are shown. These stages are not based on groups of individual enterprises since such data is often obscured due to vertical integration but reflect the function regardless of who performs it. Also, assembly, storage, and processing activities occur for some of the \$20 billion of farm inputs. Food exports and imports as well as fiber and industrial uses are reflected in reductions or additions to the system.

Major nonfarm inputs for processing are packaging materials and fuels. Transportation occurs between each segment with the major expense area between processing and wholesaling and is included in the expenses of each segment. The retail and food service segment delivers about \$194 billion of food to the consumer. At this point, I wondered what the value added concept would look like applied to the consumer. So, what we have done is apply the same concepts at reasonable wage rates to food in the home. Since this consumer input is so large, I have adjusted the chart to make the presentation manageable. Nonfarm inputs for the housewife include food preparation and storage equipment, fuel used in food procurement and preparation, waste disposal, etc. The major item, however, is the labor in food procurement, meal planning and preparation; at reasonable wage rates, \$355 billion.<sup>1</sup> Retailers have been trying to shift expenses to the consumers for a number of years by elimination of delivery,



self service, etc. On the other hand, housewives or shoppers have increasing demands on their time for other activities. We think this explains the trade-offs we see with away from home meals and "built-in maid services" in ready prepared foods. The primary point made by this chart is the relative size of the different parts of the system.

At the right-hand side of the chart we started at the bottom to subtract from this total figure of \$560 billion, the component nonfarm or value added costs. After these are removed, we are left with around \$20 million which is remarkably close to original farm input. Farming itself, represents only a very small though vital part of a very large system and farm prices and profitability are obviously very much at the mercy of variations in the other larger parts of the system. Of course labor is the largest segment, but energy, transportation, machinery, packaging, and capital costs obviously have a major input on food prices.

Without the efficient operation of all parts of this total system, no one part can survive by itself. Therefore, research, extension and service activities need to be balanced so we have all parts covered and coordinated.

I also calculated the calories of U.S. farm produced food and the calories actually consumed by U.S. citizens. The average consumption figure for all men, women and children is considerably above recommended diets but we are known to consume more than we need.

This chart does seem to indicate that we are not losing very many calories in our distribution system. However, I was unable to make any estimate of nutrient losses to food that is consumed and this is undoubtedly the more critical area for the U.S. Food losses,

however, are defined many ways and if we take the best available estimate of dollar losses these are considerable. These figures, incidentally, check fairly well with percent data from the U.K. (1) We have not included harvest losses which may be quite significant. The first figure shown is \$2 billion for assembly and storage which is reflected back to the farmer due to the typical commission type sales or quality dockage that occurs. This is a cost typically borne by the farmer. Processing losses are the least preventable of those shown here and probably represent that part of the product which is uneconomical to recover. When products are assembled in large quantities, the maximum utilization is usually achieved by industry, as is reflected in the statement that "every part of a hog is used except the squeal." Considering the extensive form changes taking place in food processing, a less than four percent loss would seem remarkable and may indicate that a viable approach to food loss prevention is the concentration of product.

Losses at wholesale are minimum and these include a substantial part of transport losses. Losses at retail are larger and represent some processing activity. Food service losses are included here but only for the back room and food preparation areas. In these losses the product is seldom recovered for other uses and there is an additional expense for disposal.

The last loss item in the consumer column is for loss in the home and plate discards for both homes and food service. A substantial portion of this loss is the food left on the plate and discarded after the meal.

We have some reasonably good data from the School Lunch Program and from the ARS consumer and food economics research which seems to be well supported by the Arizona garbage studies. To these

food losses there must be added a substantial cost for garbage disposal. All of these losses, which are stated in dollars, include substantial nonfarm inputs and value added as the product moves through the marketing system. Because of that, these dollar losses may not represent as major a reduction in the ability to feed people as would occur in a less developed country where 30 percent or so of the food stored on the farm is lost to insects, rodents, mold, etc. However, it does represent a substantial potential for reducing costs as well as increasing the food supply. It also may indicate that the developed countries have substantial food losses too, but that they occur at a different place in the food system.

Losses at the consumer level could be due to improper buying habits, improper home storage, poor food preparation, over serving, or similar factors. These could be approached by improved consumer food education. However, it is wrong to assume that when the housewife buys a head of lettuce or any other food item at the supermarket and later discards all or a part of it that the fault lies wholly with the consumer.

Many times that product which looked good on the supermarket shelf may not be what was represented on the label, be lacking in taste or flavor, have internal damage or have so little remaining shelf life it broke down immediately in the home. In these cases, the accountability for the cause of the loss lies somewhere back up the marketing chain.

It may be we have learned just enough about product preservation to be able to pass our problems on to the consumer. In the United States the major off the farm loss in foods does appear to be at the consumer level and we should make a major effort to examine and correct the various causes of those losses.

I have also tried to assemble the food system into ten component parts with problems and issues for each component (Figure 2). While some of these segments do come close to matching SIC listings, recent information is still hard to come by and this table is still incomplete. Even harder to get, is information on research, extension and regulatory efforts. We do know that the farm sector has about 6,000 federal and state research scientists. We also have a fair number of food scientists that can be identified with food processing and research areas such as nutrition and food safety can probably be assigned to the consumer sector. Industry has R&D efforts in some of these fields. For food processing, we have a fairly definitive number.

However industry contribution to R&D in the food field is lowest of the various industry segments (Figure 3). Most of this data is for food processing and the retail and food service industry has even less R&D as can be seen by the food and lodging category. On regulatory activities, I have been unable to find any useful data as to the personnel or dollars assigned to each industry segment. Such data might help explain some of the productivity figures.

Figure 3. Comparison of Industry R&D<sup>1</sup>

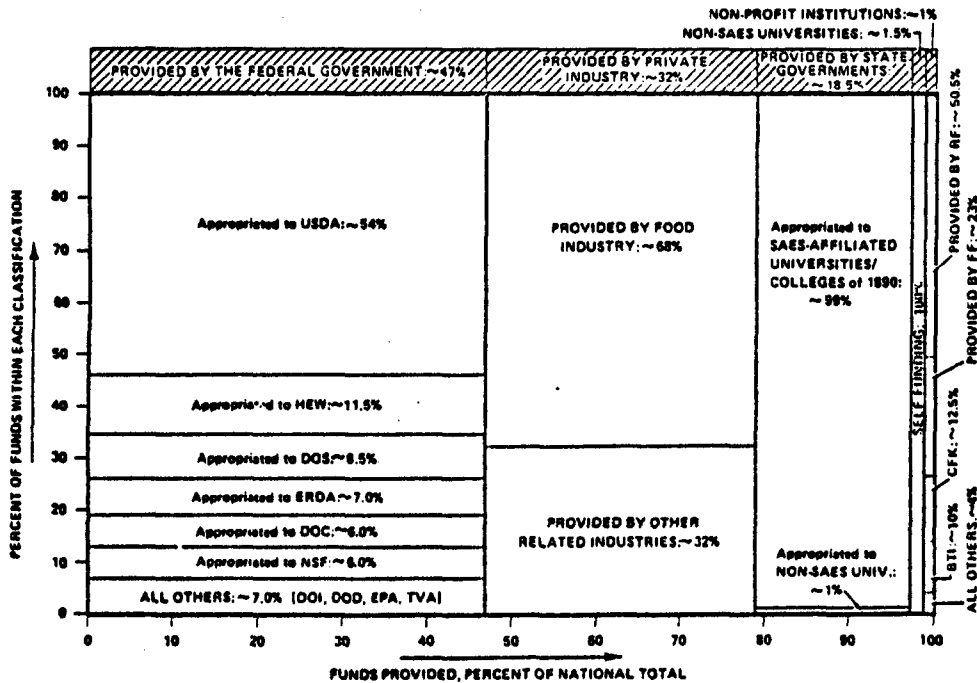
Industry Segment	R&D as % of sales	R&D as % of profit
Aerospace	3.2	136.0
Automotive	2.7	137.9
Electronics	3.0	81.5
Containers	1.1	34.7
Service Industries	.3	12.1
Food	.5	14.3
Beverages	.3	4.0
Food & Lodging	<u>.1</u>	<u>2.0</u>
All Industry Composite	1.8	38.2

<sup>1</sup>Source, Business Week, June 28, 1976



Figure 3:

FUNDING FOR FOOD-RELATED RESEARCH IN THE U.S., FY 76\*1/



	Dollars (Million)					Percent of Total	
	USDA	Other Federal	States	Industry	Total	Research Dollars	Food Sales <sup>4/</sup>
Total Research	314.9 <sup>2/</sup>	269.8	230.2	393.0	1,242. <sup>3/</sup>	100.	.65
Marketing (Economics)	27.3 <sup>5/</sup> (13.6)	.5	18.8 <sup>5/</sup> (12.5)	16.0	62.6	5.0	.032
Food Processing	28.0 <sup>5/</sup>	8.3	14.3 <sup>5/</sup>	106.0	156.6	12.6	.072
Consumption, Nutrition & Food Safety	30.5 <sup>5/</sup>	108.5	21.7 <sup>5/</sup>	16.0	176.7	14.2	.091

Comparison of Industry R&D<sup>6/</sup>

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1. Special Oversight Review of Agricultural R&D, Report No. 2, Committee on Science and Technology, U.S. House of Representatives, 94th Congress, Second Session, Aug. 1976.
2. Federal food related research is 2.6 percent of total federal funded R&D (\$22 bil.) (total private R&D 15.1 bil.). Total US R&D as percent of GNP declined from 3.0% in 1964 to 2.3% in 1974 (the Hudson letter-June/July 1976).
3. Other categories account for \$33.9 mil.
4. Based on \$194 bil.
5. These data from Inventory of Agricultural Research FY 1975.
6. Business Week, June 28, 1976.

Productivity within the food industry is probably one of the most important concerns at this time. Traditionally, food marketing productivity gains have not been as high as in farming, but averaged slightly better than all other industry (Figure 4). From the 1930's till the late 60's, wages per hour rose at a very regular and steady rate. Labor cost per unit of output rose at about an equal rate until the late 1940's and then leveled off until the late 1960's. This was a period of considerable research and extension effort both on the part of public agencies and private industry and also was a period with pretty good consumer food industry relations. This data series stopped in 1967 but when looking at other data we see some startling changes taking place in recent years (Figure 5). Wage rates began to escalate at a more rapid rate in the early 1970's and productivity leveled off and began to decline. In spite of the higher wages paid, employee purchasing power declined at the same point as productivity. This is noticeable in food processing but is even more pronounced in food retailing (Figure 6). This productivity decline was coupled with a rapid increase in costs of other goods and services to marketing firms (Figure 7).

The result has been a rapid rise in the market basket cost for food (Figure 8). The real impact however, has been on the percent of disposable income spent for food (Figure 9). Since the early 1930's, this figure has steadily declined up to 1972. In 1972, the decline bottomed out and then rose for two years. At present, it may be leveling off again but such an increase coupled with tight money and unemployment does not augur well for the food distribution industry. Changes in the amount of disposable income of course can affect this statistical series but we have

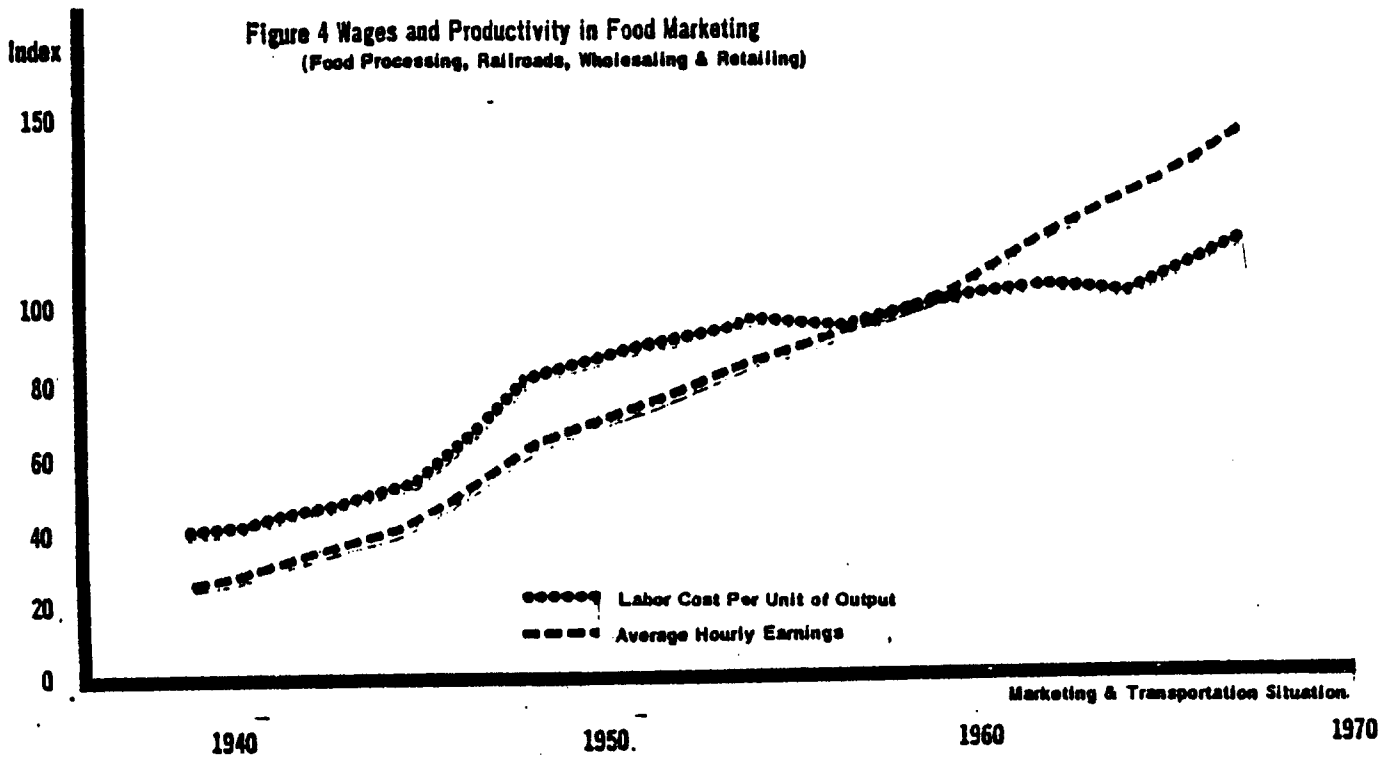
found that consumers often feel the pinch more on food than on other goods and services because of the frequency of purchase and the cash nature of food purchases.

During the so-called "era of good feelings" for food distribution, (1940's to 1960's) we were in an area of growth for supermarkets and consolidation of grocery wholesale operations. Economics of scale were being achieved, nonfarm resources such as fuel, fertilizer, machinery, and packaging supplies were readily available at reasonable prices and an active program of research and extension activities in food marketing was underway. The food industry was building its own R&D programs and many educational activities were undertaken by the food trade associations. The result was a system of food distribution that was emulated around the world by developed and developing countries. "The Supermarket" was America's best success symbol.

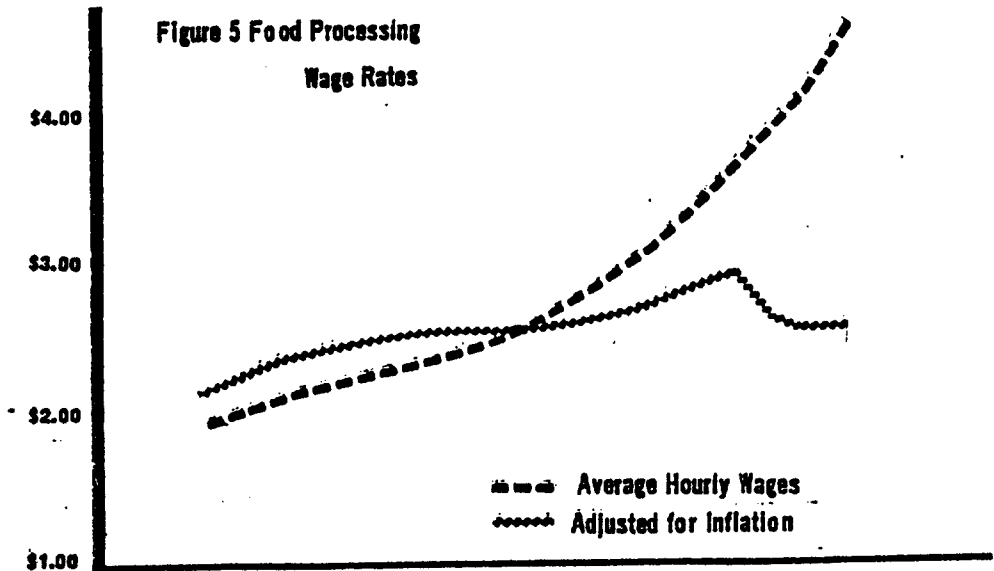
Then things changed. The steam began to run out on economics of scale achieved by even larger outlets, research and extension programs ran into hard times and were cut back, and the ecology and energy crises hit. Industry R&D had to become more defensive and the major effort was shifted to meet ecology, food safety and consumer issues. Ever cheaper foods became less automatic and the consumers' mood changed. The "middleman" suddenly found himself in a role as the enemy of the consumer, probably a much more realistic role historically than the one to which he had become accustomed.

What does the future hold? Probably more problems, more regulation and higher prices. Such a trend will not be turned around overnight, however, we have to make a start. It is inconsistent to believe that we can not again return food distribution to one receiving more favorable consumer response. However, it won't be easy.

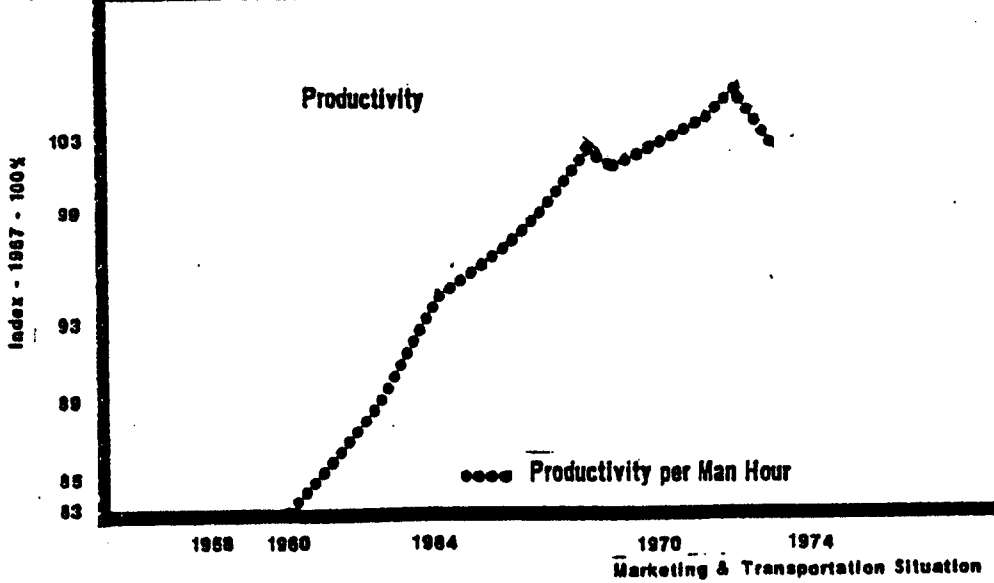
**Figure 4 Wages and Productivity in Food Marketing**  
 (Food Processing, Railroads, Wholesaling & Retailing)



**Figure 5 Food Processing Wage Rates**



**Productivity**





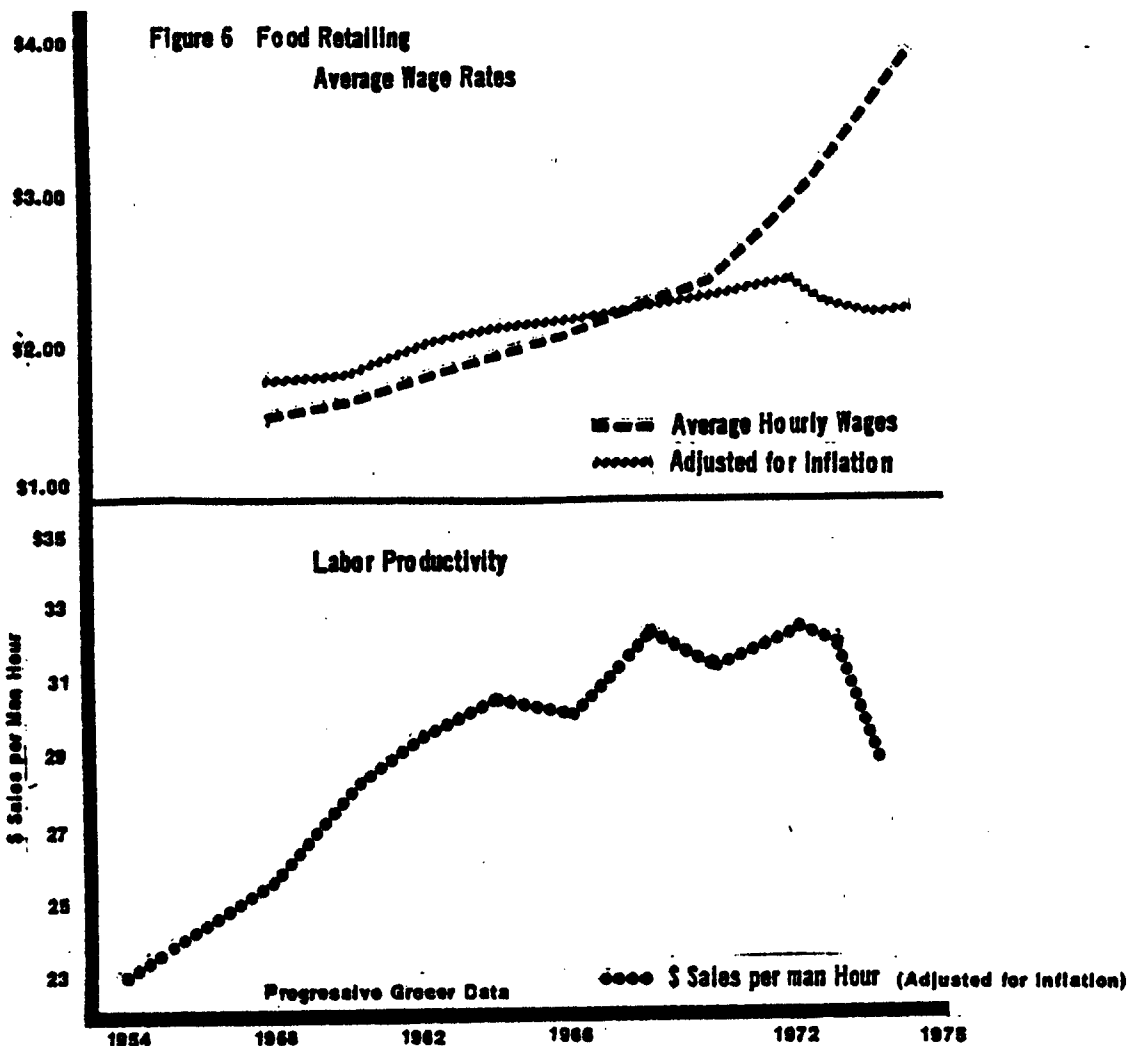
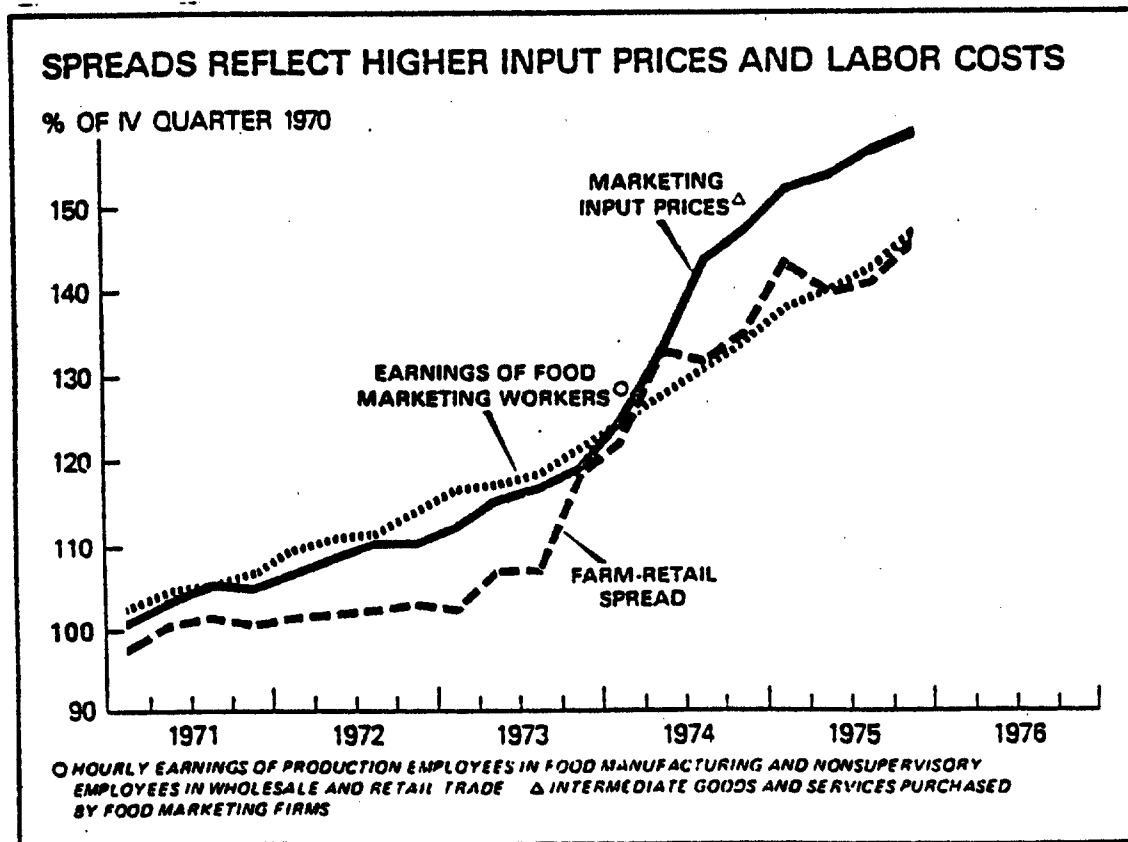
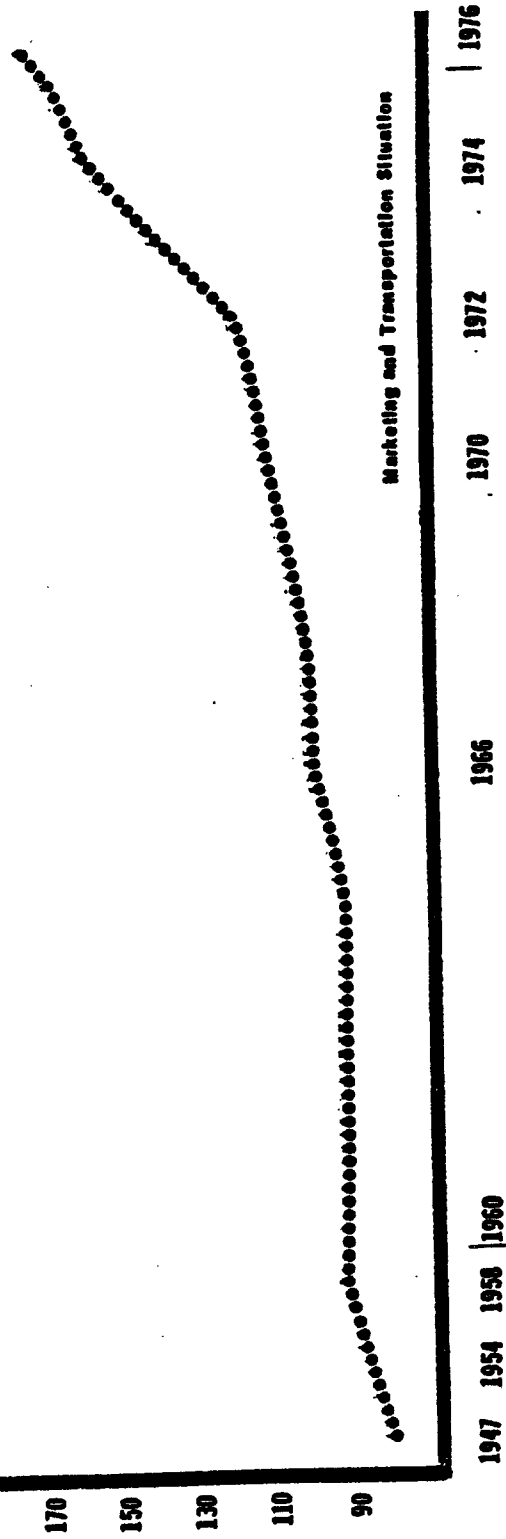


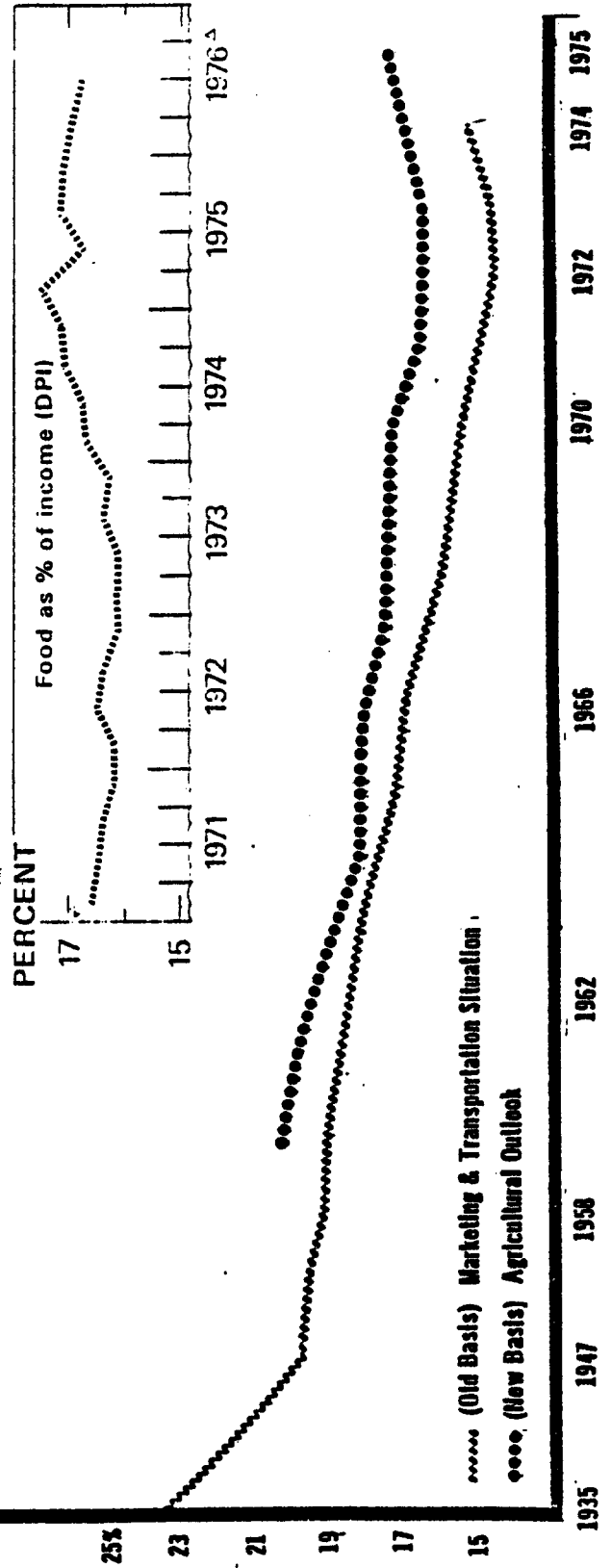
Figure 7



**Figure 8 Market Basket For Food  
(Index of Retail Prices Paid)**



**Figure 9 Percent of Disposable Income Spent for Food**



The very nature of food processing and distribution has become more complex and with more restraints on independent action. The beginning has to be in research, development and education, both public and private. More facts are needed, more disciplines have to be consulted, more parts of the system have to be involved in changes.

I believe the success in food marketing's early years was partially brought about by 1) the earmarking of a certain part of federal funds for marketing, 2) the enticing away of many scientists, engineers and economists from production-oriented research to marketing problems, 3) unusually good research and industry relations and cooperation (partially due to freedom of actions legislated in the Marketing Act of 1946), and 4) the effective use of industry advisory committees to assure the usefulness of the research done.

The Agricultural Marketing Act of 1946 established a peculiar working relationship between industry, public agencies and universities. From it developed programs that had many positive and favorable results. The Act declared it to be "The policy of Congress to promote through research, study, experimentation, and through cooperation among Federal and State agencies, farm organizations and private industry a scientific approach to the problems of marketing, transportation and distribution of agricultural products similar to the scientific methods which have been utilized so successfully during the past 84 years in connection with the production of agricultural products..." For a period of time that began to happen but somewhere along the way marketing efforts began to falter in both the public and private sectors.

For example, in the Federal-State sector funds for food research on product

quality, processing and marketing declined 14.8 percent in real dollars (adjusted for inflation) between 1966 and 1974 (2). During that period, crops and livestock protection funds remained constant and farm production, conservation and food and nutrition research areas increased about 20 percent. Even worse the number of scientists in processing and marketing declined by 244 over that period.

Why has marketing never been able to achieve equal status in the research and extension community? Historically, marketing was suspect in the agricultural establishment. Some people treated marketing like a cancer on the body of agricultural research and extension, a small lump that if allowed to grow might take over and change the functions and thrust of the whole system. I suspect some felt marketing research and extension was in direct competition with the production area.

One fear may have been that this marketing group might begin to determine consumer wants and dictate to agricultural production what to produce to fill that need. The best examples of the marketing orientation in agriculture have been agribusiness firms that, through vertical integration, have developed branded poultry and vegetable marketing systems. These marketing systems that dictate all aspects of farm production are considered by many elements of the agricultural community to be the worst thing that has happened to agriculture.

The food technologists also may have a problem with basic agricultural production. There are some very real possibilities that processes will be developed that will shut out some of agriculture's traditional production practices. For instance, making use of crop materials to produce a substitute for animal proteins. We saw what happened with butter and margarine. Some inroads are being made in egg products and milk and meat products may be subjected to similar competition.

The final report of the White House Conference on Food Nutrition and Health stated "We do not believe that the production of synthetic and substitute food products should be subsidized or promoted by Government agencies,"(3) This task force was made up of many prominent farm leaders.

This distrust of marketing should not be condemned out of hand. Lack of understanding of marketing is endemic in our society. I only need refer you to Steiner's article in the July Journal of Marketing (4). In fact, those of us who know "marketing" may not be too eager to release this "monster." We have seen that the unrestrained marketing philosophy can generate some undesirable results. Properly used, however, the marketing "tool" can be of great benefit to agriculture.

I believe the largest problem food marketing has faced is one of lack of familiarity, of uncertainty, of lack of understanding of what marketing research and development is and what it can do. Most of the people in charge in universities and public agencies were from basic science fields. The food industry leadership, on the other hand, were nonscientific, they were "doers" and were not sure what R&D could do for them.

But more than anything else, an understanding of bureaucracy, both public and private, is needed to explain why marketing never fully succeeded. One of the best explanations of how a bureaucracy works in research is in an Arthur D. Little report to the National Bureau of Standards (5).

In this report, there is a case study on edible soybean protein which includes a section on economic, political and regulatory influences. The Report states the conduct of Governmental R&D is subject to four major influences:

- The pressure at the laboratory level to perpetuate existing lines of research.

- The pressure at agency level to preserve the balance of allocations among commodities competing for funds.

- The pressure at the Executive level to preserve the balance of allocations among the various agencies.

- The pressure at the Congressional level to preserve the balance of allocations among competing constituencies interest.

All of these pressures add to the inertia of the status quo, which makes it difficult to respond to new needs as they arise or to disengage from lines of research that are patently of less value. My contention is that marketing, in spite of the Agricultural Marketing Act of 1946, has never been able to break this barrier either in the Federal agencies or in the Land Grant System.

The net result has been that now many substantial problems of marketing have been recognized by non-Land Grant Universities, governmental agencies other than Agriculture, nongovernmental research organizations and the consulting trade, as prime opportunity areas.

I have heard a statement that 28 Federal Governmental agencies are now involved in the food field, most of them in regulatory activities.

The NSF has recognized this research gap in marketing systems and in its budget submission has requested funds to conduct this research.

Even in the face of the so-called world food shortage and the resulting flurry for agricultural production to feed a hungry world, marketing problems have not been forgotten.

It has been pointed out that in the LDC's the problem is often more one of distribution than of production. Adequate food existed in one location while a neighboring area starves due to the inability to move the food to the point of need. It has also been suggested that if the substantial losses in handling and storage were halved, almost every country in the world would have an adequate food supply.

Even the Kansas City Conference of July 1975, which was heavily weighted toward production in membership and interests and was held during the height of the "world hunger" public concern, has managed to give marketing research and extension some high marks in needed research.

In the report of a follow-up meeting of work group chairmen and ARPAC, July 1976, increased emphasis was recommended for low-energy food processing and food wastes and quality losses.

The recent Baker/Ramo White House advisory groups studies for the Office of Science and Technology Policy have developed eight policy issues as being particularly urgent. First is food, with emphasis on losses that occur in transportation, storage and processing. (6) Second was nutritional research. Energy and industrial productivity were among the eight.

In order to be fair, we must admit that the research administrators, ARPAC (USDA and Land Grant Colleges), have recognized the need for marketing research in their long-range projections. The research program, "Marketing and Competition" had 3.5 percent of the research resources in FY 1973.

Of the various crop and resource research items rated in ARPAC administrators in their 1973 and 1978 projection "Marketing and Competition" was

singled out for the greatest increase of resources of any item, (38 scientific man years or 10 percent) provided there are no increases in the total budget. (7) However, practically all of this came through shifts within the subject area "competition and trade" which covers the bulk of our marketing and economic research.

When assessing a potential 10 percent overall budget increase, "Marketing and Competition" was rated in fourth place in SMY increases and the whole subsector "Competition and Trade" would receive less than a 10 percent increase.

It is rather obvious that such a pace will not achieve anything like a balance between production and marketing research in the near future.

We, as a nation, have been through some recent critical periods with minorities and may be beginning to recognize that good intentions and professed freedom from prejudices by individuals will not change a situation.

Let's face it, we're a minority and are being treated like one. We could kick and scream and picket the establishment, form pressure groups and file legal briefs. But we are scientists or are supposed to be even if our scientific "tools" are strange to the established scientists and our "journals" are a bit less prestigious, at least to some viewpoints. I believe the Food Distribution Research Society is an exception among scientific organizations due to the exceptionally wide diversity of backgrounds of its members and the breadth of past programs.

Those of us with social science backgrounds should be able to bring these sciences to bear on the problem. We know something about the process of innovation and that is not purely a technical process. Traditional basic agricultural science approaches, however, may not be adequate.

Scientists generally are reacting to the "accountability complex" that says all science is not responsive to urgent needs and therefore must be subjected to uniformity, rigidity and centralized control. The general attitude of organized science is stated in 1975 report of the Australian Government Science Task Force. "Uncertainty and changes of plan are the essence in the research process and narrowly rigid administration and financial procedures are clearly incompatible with it. The desirable research environment is thus the antithesis of a closely administered centralized structure." (8)

The real problem with the freedom of scientists, however, may be in their priorities which tend "more of the same". Many of the most pressing problems of the day lie in what Ravetz calls the "immature and ineffective fields of inquiry." (9) It is here that traditional "science" is under attack by the sociologists and the new scientific community.

Arthur D. Little found that Federally funded civilian R&D is not sufficient to bring about technological change in the private sector to any significant extent - technological innovation is most often pulled into the market place through appropriate incentives rather than pushed by federally funded R&D. Therefore, policies for federal funding of civilian R&D should be formulated in the large context of the complex process of innovation".(10) This conclusion was based on defense-type research and possibly some by the ARS utilization laboratories. My contention is this does not have to be so. "Marketing" as a science does not have the aforementioned "scientific hangup." This research is by nature disciplined as task oriented and the problems we face require that kind of an approach.

The FDRS represents a corp group that was responsible for an outstanding example of how public and private resources can have a desirable effect on a segment of private industry through an innovative and cooperative program between public agencies and industry and with appropriate benefits to consumers, industry, farmers and even labor. We should use our marketing knowledge to avoid some of the pitfalls Arthur D. Little seems to assume are endemic to all bureaucratic organizations.

There are some encouraging signs for marketing research. The House Agricultural Appropriations Committee has been stressing for several years the importance to the USDA of research that benefits the Urban Consumer since farm-oriented Congressmen are getting to be few in number. Food marketing research and extension represents one of the major areas where USDA and state programs interface with and benefit consumers. Attention to this area appears more likely in the next administration.

An Experiment Station Committee on Planning has been established to develop a workshop to improve coordination of marketing research for the land grant colleges and the USDA. This workshop is tentatively scheduled for next May and would involve many of the top administrators in agriculture. Roy Beasley, the new director of distribution of the National Center for Productivity showed some significant incite in his recent statement that productivity research should get "back to basics" of day-to-day store operation. He then goes on in this "Supermarket News" article to cite labor scheduling, energy, checkout stand design and sanitation; areas that have been the mainstay of FDRS research.

The regrouping of the food industry and formation of the Food Marketing Institute may also help.

I would recommend to this Society that it does its part by utilizing its most viable resource, it's brainpower, to assess the problem of attaining and coordinating the needed resources for research and education in food distribution from whatever source and under whatever administrative setup, public or private. I would further recommend that marketing programs not be limited to out-moded "farm gate" thinking, but should assess and attack the problems of the total food and fiber production and marketing system.

A year ago I suggested to this Society that an advisory board of retired senior food distribution executives might find a useful role in helping the food distribution industries out of some of their current problems.

I would envision experienced and savvy people who no longer have the obligations or the commitment to specific industries or universities and could "blue sky" some innovation approaches to problem areas.

They probably should not be only concerned with the internal problems of the FDRS, but merely use its umbrella as hopefully an unbiased organization not competitive with the various trade groups. Such a broad committee could draw on the FDRS brain power and research and extension capabilities as well as any others.

This is only one possible avenue and I am sure other ideas could be generated, but I think we do need some innovative and dramatic actions if we can revive the Golden Years of the 1950's when food distribution and its visual symbol "The Supermarket" was highly rated by the American public and emulated worldwide.

It was probably the best period in recorded history for the middle man and

and there is no reason it can't happen again.

#### Footnote

<sup>1</sup>Data prepared by Frances M. Magrabi, Group Leader, Family Economics Research, Consumer and Food Economics Institute, ARS, Hyattsville, Md.

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