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Synthetics and Substitutes: The Challenge to the Food Industry

A Response by the Food Industry to the Changing Environment

Food 70's

Identifies the broad parameters of the synthetic food situation and enumerates marketing problem confronting manufacturers of synthetic food products.

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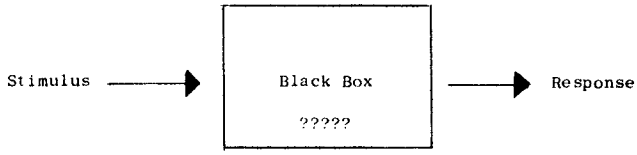
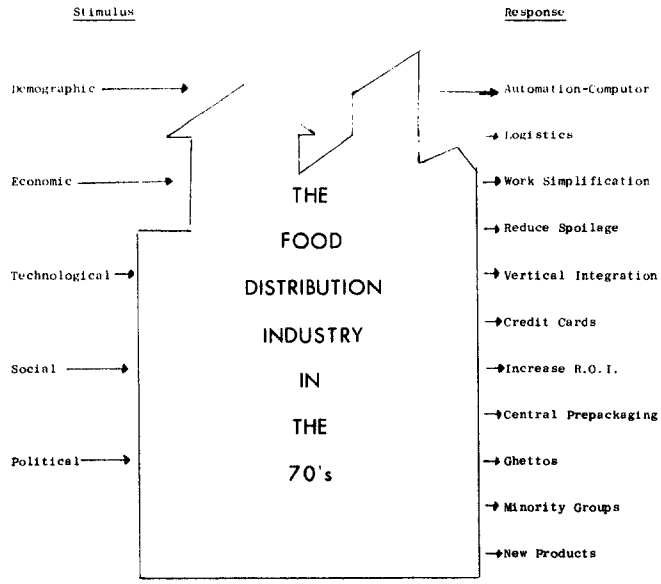
● Man is influenced by many forces. He is constantly exposed to stimuli which he receives through any one of his five senses: taste, touch, smell, sight, and hearing. Something happens in his mental mechanisms or "black box" to give meaning to these stimuli or inputs. This meaning is translated into a response or output. The literature in psychology abounds with theories of what happens within the black box. More recently the marketing man has begun to study the black box as it relates to consumer decision making in the market place.



The Black Box Model provides a way of viewing the food distribution industry and its' response to the constantly changing environment of today. As the following diagram suggests there are certain changes which are taking place within the environment that will function as stimuli to which the food industry will respond in the decade ahead.

It is possible to categorize nearly all of the changes or inputs to change under one of the five stimulus as indicated in the opposite diagram. Time does not permit nor is it the purpose of this paper to develop or explain the characteristics of each of the stimulus. Current publications in our libraries and newstands as well as the mass media do this continuously. The reader should experience little difficulty in identifying each of the stimuli as a changing force in our dynamic society.

The list of responses is certianly not exhaustive. Many of the eleven responses identified in the diagram are frequently cited in the current literature of the food industry. Some, however, have not been widely written about but have been included as a result of observation and study of the industry.



AUTOMATION - COMPUTER - Efficiency in information processing and problem solving has been tremendously enhanced by the development of high-speed electronic computers. Management in the food distribution industry has just begun to recognize the many diverse cases to which the computer can be put. The information requirements of the modern executive have changed radically since the post war period yet many in food distribution management operate under the same basic information arrangements of two decades ago.

LOGISTICS - The term was developed by the military and is concerned with the management of the flow of goods including inventory control, materials handling, processing of orders and transportation. These costs for the food industry have been estimated to be approximately 30 percent of sales which is among the highest for all American industries. Logistics management must and will continue to receive attention by the food industry during the 1970's.

WORK SIMPLIFICATION - Modern, one story warehouses are commonplace in the food industry today just as palletization, ramps and efficient backrooms are in the retail store. Future gains may not be as easy to come by, however, increasing wage costs and greater employment of women will continue to make improvements in productivity and work simplification a fact of life for the food industry.

REDUCE SPOILAGE OR BREAKAGE - This is an area which, in the opinion of the author, has been neglected by many in the food industry. A review of the current food distribution literature reveals that little has been written or said about this problem. A tour of a typical wholesale warehouse, backroom of a retail store, processing plant or fruit and vegetable market suggests the problem may be significant in view of the fact that profit margins are more likely to decrease than increase. Another dimension of the problem that may loom large in the 70's is the possibility of increased Food and Drug regulations on the use of preservations.

VERTICAL INTEGRATION - Theoretically, cooperative groups and wholesalers sponsoring voluntary groups could achieve the advantages of vertical integration by owning food manufacturing plants. However, this has not occurred to a significant extent. It would seem logical to expect such a movement now that the growth of voluntaries and cooperatives by the method of absorbing previously independent stores cannot be significant in the 70's inasmuch as there are few such stores in existence.

CREDIT CARDS - Many supermarkets executives say that the day is coming when the credit card will be used in the supermarkets. Others feel strongly that the use of the credit card for food purchases is many years away if it ever comes. In those stores which have used the credit card, the average sale is typically higher. In Ohio, a firm reported average sales of $28.00 with card and $11.00 without a card. Another firm reported usage as high as 30 percent. A firm operating convenience stores reported average sales of $5.00 with a card compared to $1.75 without a credit card. The future is uncertain, however, it is highly probable that more companies will experiment with the credit card during the 1970's.

INCREASE RETURN ON INVESTMENT - In the 1950's the food retailing industry netted an average of 14 percent on its net worth. In 1968 it netted only 11.5 percent. This means that they had to take in 32 percent more dollars just to stay level in earnings. The R.O.I. for the food processing segment of the industry has typically been less than for the retail segment. Many of the large chains have relatively little long term debt, however, the smaller chains and voluntary wholesalers must increase their R.O.I. if they are to attract the necessary capital in sufficient quantity for continued growth.

CENTRAL PREPACKAGING - It perhaps is fair to say that interest in centralized prepackaging has been sporadic. To date, many of the well-publicized operations that have been installed might better be called extensions of the supermarket backroom cutting than centralized meat packaging according to some in the industry. The investment of manpower and dollar resources to implement central prepackaging of red meat will probably be made within the next 10 years. Experts agree that we have the technical know how to do the job today.

GHETTOS - Does the food industry have the social responsibility to operate in the ghetto? Some would argue that it is the social responsibility of business to use its resources and engage in activities designed to increase its profits so long as it engages in open and free competition without deception

or fraud. It is probable that we could see food distribution firms and the government join hands to provide food as efficiently and as abundantly in the ghetto as we now experience in the suburbs. It is an established fact that in the 1960's the poor paid more for food. This must change in the 70's.

MINORITY GROUPS - Differences between black and white consumer behavior stems from economics as well as social differences in background. Problems in serving the blacks are numerous. Black owner-operators report that most black shoppers are conditioned and prefer to shop at white outlets which are usually outside of the black community. There is also the problem of hiring the blacks. The status professions can hire the number of blacks needed to fill positions in many of the firms. The food distribution industry will learn to relate to the needs of the black community. Perhaps, we will have national and regional black chains by 1980.

NEW PRODUCTS - In the authors opinion, the most significant response by the food industry to the varied stimulus will be in the form of new products. Many of these new products will consist of synthetics and substitutes. New processing technologies, expanding consumer income and changing consumer preferences and desires all are favorable conditions for expanding number and output of synthetic and substitute food products.

The balance of this paper will be devoted to a discussion of synthetics and substitutes; what they are and some marketing implications.

SYNTHETICS AND SUBSTITUTES

A review of the literature suggests that synthetics are raw or semi-processed materials derived from nonagricultural sources. Substitute products simulate performance of traditional products and include one or more major ingredients derived from unconventional agricultural sources.

In 1966 it was estimated that synthetic substitutes had captured 10 percent of the value of the current market for agricultural products. In the past the food industry has not been seriously threatened by synthetic substitutes, however, the future promises competition from agriculturally derived product substitutes and other new synthetic foods. As the next speaker will show, the use of soybeans in simulating red meats may not at this time be economically significant, however, current experiments have far reaching implications.

DAIRY - The dairy segment of the food industry has become increasingly influenced by the growing significance of synthetics and substitutes. The butter-margarine competition dates back to 1885. More recently dairy substitutes have been developed for coffee creams, whipping creams, evaporated milk and various frozen desserts. Filled milks in which dairy fats are replaced with vegetable fats and imitation milks using no dairy ingredients are competing for a share of the fluid milk market. It has been conservatively estimated that dairy substitutes have reduced the national dairy market by one-fourth.

MEATS - Emulation of chicken, ham, and beef using soy protein has achieved some success in consumer tests. Recently a bacon analog - a fabricated strip of vegetable proteins that simulates the look, taste, form, and texture of real bacon was test marketed in Fort Wayne, Indiana. The substitute product has 14 ingredients including generous measures of wheat and soy proteins and corn oil. The bacon analog was sold as a frozen food and achieved 4 percent share of the bacon market during the first 3 months with intensive sales promotion and dropped to 1.3 percent during the second 3 months with no special efforts to push sales. It is highly unlikely that a bacon analog will replace real bacon, however, a small share of the 1-1/2 billion pounds of bacon consumed annually would prove to be quite a slice. Some have estimated that the meatless meat market in the U.S. may approach 50 million people.

The advantages of meatless meats might be considered threefold:

1. Totally free from cholesterol or animal fat.
2. Free of diseases that animals may carry.
3. No waste, won't shrink when cooked.

CITRUS - The introduction of non-citrus juices and the development of substitute and synthetic citrus drinks have been correlated with the random winter freezes in Florida. Tang was introduced following December 1957 freeze and Awake developed following the December 1962 freeze. Assuming that no new

markets were created by the synthetic substitutes it is estimated that the 52 million gallons of synthetic drinks sold in 1967 represented a $45 million loss to the citrus industry.

SWEETNERS - Synthetic sweetness production has increased dramatically in recent years. In 1965 saccharin and cyclamates had approximately 6.2 percent of the sweetness market. Prior to the cyclamate ban, diet beverages held 13 percent of the soft drink market. Now they are reported to hold 8 to 9 percent of the market. The cyclamate ban of October, 1969 was partially lifted; however, since August, 1970 the ban has been total. The U.S.D.A. is conducting research with other sweetners; however, it may take in excess of two years to complete all tests. Current market reports suggest that heavy users of diet foods have not been lost while light users (estimated to be 50 percent of the consumers) have been lost at least temporarily because of the cyclamate scare. Approximately 70 percent of the total diet market has been regained according to the most recent figures available.

FISH PROTEIN - The fish protein plan for feeding the world's hungry has received wide publicity during recent years. Fish protein concentrate (FPC) is the end product of a process by which hake or hake-like species are ground whole; water and liquids are removed by a multi-stage extraction process; the residue is then dried and ground into a free flowing grayish powder which has no fishy flavor or ordor. The composition of FPC is approximately 81 percent crude protein and is primarily used as a diet protein supplement.

Fish protein concentrate has gained acceptance as supplements to high-starch and carbohydrate diets in protein deficient nations. Chile has a deep interest in FPC because of its commitment to feeding infants and preschool children. FPC can be added at 5 to 10 percent level in basic foods. Reports suggest that 20 million pounds could feed approximately two million people for a year. Taste panels indicate that the taste of fish flour was acceptable when people did not know what they were eating.

Prior to 1967, the Food and Drug Administration did not consider fish protein concentrate a food because of the "filth" or inclusion of the whole fish. The regulations circumscribe the type of solvent extraction process, maximum odor level, minimum protein content, maximum fat content, and package size of one pound only for household use. The significant change is that now, whole fish of hake or hake-like species may be processed into the protein contrate.

It is logical to expect more changes regarding fish protein concentrate by the Food and Drug Administration once more research data is available. It is an established fact that low cost fish flour has significant implications for future competition in the human protein market.

PETROLEUM PROTEIN - The original source of protein was found in the residue at the bottom of oil tanks. British Petroleum Company built the first plant to produce protein from oil. According to a late 1967 Wall Street Journal article, for every 100 tons of oil processed through the plant, 10 tons will be for protein and 90 will be for high-grade heating oil. SCP (single cell protein) is produced by British Petroleum by allowing yeast organisms to feed from waxy paraffins in aerated tanks of crude oil. The yeast cells are then centrifuged out and dried so that they form a white powder. SCP is a high concentration (60 percent protein) animal food that is marketed in Europe.

Shell Oil in England bubbles methane and air into a salt solution containing bacteria. As the bacteria feed on the methane they reproduce quickly and then are separated from the solution. The protein-rich material is heated to kill the micro-organisms and is then freeze dried. Some believe that this has more flavor than protein extracted from crude oil. The Monsanto Company has been able to synthesize protein like materials by purely chemical means.

Russia, in 1967, was fattening cattle and poultry on foodstuffs processed from petroleum. Mexico is trying to conserve its oil resources because of the potential food value.

It will take years of testing before petroleum-based proteins can pass stiff standards in the United States; however, the time will surely come.

SEA PROTEIN - The sea has great potential as a source of food. We have just began to realize the importance of ocean research. Truly, we are at the threshold of ocean farming. Algae are 20-40 times more efficient in converting solar energy into food than

are field crops. It is estimated that the per ton cost of algae protein would be comparable to soybean protein but could become cheaper with advanced production techniques.

As a side note, there is also new interest in catfish farming. Improved technology in raising fingerlings, in achieving excellent growth rate, and in simplifying harvesting have been developed. Catfish have been found to be very efficient nutrient converters with the capability of producing about a pound of growth of each pound of feed.

(Soybeans, an excellent protein source which has contributed substantially to agricultural substitutes, will be discussed by the next speaker, Dr. M. D. Wilding of Swift & Company.)

MARKETING PROBLEMS

Technology will permit the development of nutritionally adequate high protein foods and synthetic substitutes in sufficient quantity to feed the world for years to come. The dilemma is with respect to the marketing know-how. The problems facing the food industry range from the ability of the market potential to pay for the product to legal questions.

Perhaps the most significant problem facing the marketer at this time is the legal question. Can the Food and Drug Administration arrive at satisfactory generic names and standards for the various new products which have and will emerge? The problem is compounded because there is a sharp difference of opinion between the processors of textured soy flour and the processors of spun protein fibers. General Mills petitioned the Food and Drug Administration to establish a new class of foods which would have the end result of permitting only those companies using the spun-fiber process to manufacture a product such as synthetic fried crumbled bacon that need not be labeled "Imitation Bacon." Obviously, this would put those companies using the textured soy flour process at a distinct disadvantage. Few can seriously believe that such names as "soy", "meatless meat", "vegetable meats", etc., would gain product acceptance in the marketplace. The outcome will likely be a standard of identity for what might be called textured oil seed proteins, the building blocks of meat analogs.

The agricultural lobby represents a challenge to the food marketer. As one might expect, the agricultural interests, specifically, the dairy and livestock associations are trying to legislate many of the new foods out of existence. Increase in synthetic food production would adversely affect the farm supply markets, at least until adjustments or reallocation of resources could be made. Simply stated, meeting human diet and living needs with synthetic products that substitute for natural agricultural products is a "threat" to traditional farming. Solutions to these problems will not be painless.

There is also the problem of pricing the product. For example, 3.25 ounces of an imitation bacon marketed in Buffalo by General Mills retailed for 69 cents compared to approximately 80 cents per pound for real bacon. However, the comparison must be made on the cost of cooked lean meat. One cup of imitation bacon bits is equivalent to three cups of fried crumbled bacon or 4-5 pounds of raw bacon. Few consumers are fully aware of the actual cost of cooked meats because they buy it raw. Unit pricing only compounds the problem for the consumer.

Another dimension of the pricing problem is the probability that the new nutritionally adequate foods will not immediately reach the lowest economic stratum of a given population whether it be the domestic market or in an underdeveloped nation because of the prices that must be charged. Compounding this problem for the marketer is the lack of an adequate distribution system to reach the lower economic stratum in any underdeveloped nation and even domestically to an extent.

The questions regarding food additives are yet another problem that the food industry will encounter during the next few years. There is evidence to suggest that the consumerism movement will focus on food additives as a health "myth". There are those that say that the myth of enriched white bread is an atrocity of the food industry and that any unnatural additive affects the health of the consuming public. As this movement spreads it will be more difficult to obtain market acceptance of synthetics or substitutes.

Many would agree that the food industry has not given sufficient attention to researching the dynamics of consumer behavior. With the development of synthetics and substitutes the industry must pay more attention to the consumer in the future. Diet foods only gained

acceptance by the consumer after better marketing approaches were developed. Private enterprise has succeeded where the government has not. The most successful marketing venture abroad has been the success of vitasoy, which is sold by Monsanto. Vitasoy, a soft drink based on soy milk, is the largest single seller in Hong King. Coca-Cola Company is now test marketing a protein chocolate flavored beverage made from soybeans called Saci in Rio de Janerio. As other new synthetic substitutes move out of the laboratories onto the food shelves, the idealism of the developers will quickly be tempered by consumer conservatism unless there is an increase in the use of good consumer research prior to the introduction.

CONCLUSION

As suggested earlier, we have the processing technology for expanding the number and output of synthetic and substitute food products. Other stimulus such as expanding consumer income and changing consumer preferences are for the development of synthetic and substitute food products. There are several marketing problems which the food distribution industry must resolve to insure continued growth and improved standards of living for the world. The food industry will respond to the various stimulus in the coming decade to meet the challenge of synthetics and substitutes in spite of these marketing problems. If the Food Distribution Research Society is to be a viable, meaningful organization it must keep abreast and exert some leadership. ●

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