CHEMICAL MARKETING IN THE COMPETITIVE SIXTIES

A collection of papers comprising the Symposium on Chemical Marketing in the Competitive Sixties, presented before the Division of Chemical Marketing and Economics at the 136th National Meeting of the American Chemical Society, Atlantic City, N. J., September 1959

Number 24 of the Advances in Chemistry Series
Edited by the staff of the *ACS Applied Publications*

Published September 1959 by
AMERICAN CHEMICAL SOCIETY
1155 Sixteenth Street, N.W.
Washington, D. C.

INTRODUCTION

The chemical industry in the postwar period has moved with such large strides that many contemporary writers refer to this period as the "chemical age." Its achievements, although little understood, have been recognized in the public and financial press with awe. The industry, based upon technological foundation, will face many challenges in the next decade, the 1960's. These need not be insurmountable if all segments of the industry—research, production, engineering, and marketing—recognize them and plan now to meet them.

The wide diversification of products and the several hundred companies engaged in production and marketing of chemicals, point to increased competition between domestic and foreign producers; between different chemicals for the same end use; and between companies for their share of markets for the same commodity. This increase in competition alone will call for new ideas and new approaches to the marketing of the products of the chemical industry. It is not just a matter of selling the goods but the much larger concept of marketing the industry product to the satisfaction of the ultimate customer. The solution will require over-all coordination of the sales organization with advertising and distribution—and concurrent assistance and guidance from those departments responsible for market research, technical service, and application research. The introduction of new products can be of mutual value to the customer and the supplier alike if the effort is integrated into the over-all marketing concept.

The challenges facing the chemical industry, while different for each segment—organic and inorganic, drugs, and agricultural chemicals—will likely have numerous similarities in their solution. With this in mind, the symposium "Chemical Marketing in the Competitive Sixties" was organized with leading marketing men of the industry presenting the broad challenges expected in the 1960's. Others, chemists who are authorities on the several phases of the marketing function, offer solutions to the many challenges for the future. In presenting this symposium, it is hoped that the authors of these 20 articles, by their individual contributions, will materially aid the entire chemical industry in fulfilling the needs of the general public in the decade ahead through improved products offering greater value to the consumer.

Special acknowledgment is made of the assistance of K. R. Fitzsimmons of Shell Chemical Corp. and S. D. Koonce of American Cyanamid Co. in helping to organize the symposium.

R. L. BATEMAN, *Symposium Chairman*
Union Carbide Chemicals Co.
New York, N. Y.

The Challenge in Marketing for Drug and Agricultural Chemicals

A. B. CLOW

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.

Drug and agricultural chemical producers will have to fight two wars during the next 10 years. One is with domestic competitors; the other lies in the international field. Foreign competition must be met on its own grounds by establishing foreign operations. On the domestic scene, one of the foremost challenges lies in the barrier created by government statutes. Another challenge, obsolescence, is sure to haunt every drug and agricultural chemical marketing man in coming years. Patent expirations pose yet another problem. Finding and training better salesmen will be a serious challenge as marketing assumes an increasingly complex and demanding role. Rising costs, moreover, must be balanced with a realistic price policy. In agricultural chemicals three special problems—dealing with present farm surpluses, future needs of an expanding population, and changing farming methods—will be faced.

During the next 10 years the drug and agricultural chemical manufacturing industries must fight two wars. One is a continuation of the domestic battle with a group of keen competitors who will have but one purpose: to take our entire business away from us—yours and mine—if they can. The second and far more serious war is one that started in earnest some years ago in the international field and has now extended to both political and economic battlegrounds. This is the war which may affect not only our businesses but our entire economy as well as our society.

For several years after the last great war, this country was in a position of leadership in the production and distribution of drug and agricultural specialties, as well as many products that might be classed as commodities in these two fields.

Pharmaceuticals

In recent years, however, for reasons such as the great increase in the manufacturing pace and the technological capacity of such prewar producers as Britain, Germany, Italy, and Japan, we have been losing markets not only in these countries, but also in lesser developed areas, as well as within our own

country. The seriousness of the foreign competitive situation in pharmaceuticals cannot be fully shown by examining total imports and exports. The former is relatively small, having amounted to $15,000,000 in 1958. However, the peculiar market structure of the chemical industry is such that the offering of but a small quantity of a given product quickly tends to drive prices downward. With no past source of supply loyalties, a foreign supplier must rely on a lower price to enter a market. So as not to lose business the domestic producer meets the price. This is followed by still lower offerings and so on downward. I can cite some dramatic examples to illustrate this trend.

In 1949, *p*-aminosalicylic acid sold for $15 a pound. Today the price is $3.40 a pound. *p*-Aminosalicylic acid is used as a drug in the treatment of tuberculous patients.

In 1954, thiamine hydrochloride was sold for $100 per kilogram. It is now available from foreign producers at $21 per kilogram. I do not know what other domestic producers' costs are, but I can say that our company can no longer manufacture this product and sell it with any profit at $21 per kilogram.

In 1957, folic acid was offered at $1.20 per gram. At present it is offered by two American producers at 44¢ per gram in competition with the Japanese product available at a considerably lower price. In Japan, however, the price is from 45 to 50¢ per gram.

Many other examples could be cited. The effect of the pricing policies of Japanese and Danish sulfadiazine producers have caused world prices to decline by nearly 75% in the last few years. Some of these prices are considerably lower than domestic costs. The net effect of this competition will be gradually to dry up domestic sources of supply for products so affected and make us dependent upon foreign sources. Perhaps the difference in our wage scales is the main reason for these price inroads. However, we should look at ourselves. Have we done an outstanding total marketing job? If not, does this not present one of our greatest challenges in the years to come? We have reaped good profits from exports in the past. Have we reinvested a sufficient portion of those profits abroad, so that we could be in a position to fight our foreign competitors on their own grounds, and using their own rates and rules? I seriously doubt whether a sufficient number of companies have done so. I think they must do so in the future.

You might ask why anyone should wish to see greater competition develop in their industry. There are at least two reasons: First, if we do not have operations in the main producing countries we will gradually be forced out of their markets; second, and far more important, will be our displacement in the lesser developed countries. In these areas, we have already begun to battle the new and sinister giant—Russia. Here we have an obligation that goes beyond immediate profit. Agricultural chemicals make for greater availability of food. Drugs make for better health. If we can help alleviate the pains of hunger and disease in the lesser developed countries of the world, do we not make happier people? If we can build operations in those countries, do we not help their economic plight? Will not healthy, occupied people tend to resist the political mirage offered by Russia? Can a single company do this job? Certainly not. But I believe that very many companies expanding in foreign countries may well, within the next decade, provide the catalytic influence to preserve our way of life, our society, and our type of economy, in many sections of the world—not the least of which is right here at home. This is why I believe that

there should be greater international competition, based on native production in the country where the market exists.

The Boggs Bill, currently pending before the House of Representatives, would provide incentive for private American capital to go abroad, and to promote the economic growth of the free nations of the world. It is a tangible recognition of both a great need and a realistic way to serve it.

Establishing foreign operations with standard products is, of course, extremely difficult. Fortunately, in the drug and agricultural fields we have an area where specialties can often provide the open door and the preliminary breathing spell to get started. This is not a marketing challenge, but it definitely is a challenge to our associates in research. The prayer of every peddler is, "Please give me that necessity which nobody else can find or copy." This prayer is especially apropos for the job I have outlined.

So much for foreign challenges. There are also a number of obstacles facing us here at home. One of the foremost lies, I think, in the barriers created by government statutes. None of them will make our domestic, or for that matter, our international job any easier. Some of them may make part of it impossible.

In the drug and agricultural fields we now have very restrictive procedures for federal clearance of a new product. I believe that any concern placing a new product on the market has a definite moral responsibility to investigate thoroughly the safety of that product before introducing it. It is also sound business sense to do so. But the job of meeting some of our government's requirements has become so expensive and time-consuming that research for new products in some fields will no longer be economically justified. If this should be the result, the public will definitely be the loser.

Government Marketing Challenges

In August 1953, after exhaustive study, this company applied to the proper authorities for use of the antibiotic Aureomycin as a preservative in fresh poultry. The data we submitted filled several very large volumes. Accompanying the data were affidavits from many of the leading clinicians in the country that the residue of Aureomycin remaining on poultry, up to 7 p.p.m., would be insignificant from a human toxicity standpoint. An individual would have to eat 314 pounds of chicken to have a drug intake equivalent to $^1/_4$ of a normal daily therapeutic dose. Even with all the data submitted, it took 2 years to obtain clearance on its use on chickens, upon submitting data on many more clinical and laboratory trials. The total cost reached into the six-figure category. With all of this I agree.

But then we asked for clearance on the product's use to preserve fish, where the residue might be 4 to 5 p.p.m. In all cases, little or no residue would remain after proper cooking. This clearance required $3^1/_2$ years more, with countless additional submissions of data. The clearance we now have, however, still does not include processed or filleted fish. The only possible question, as in our poultry application is this, "Will x parts per million of Aureomycin in a portion of your daily diet prove to be toxic?" If it did not at 7 p.p.m. in poultry, how could it at 4 to 5 p.p.m. in fish? Should it take 3 years to obtain such an answer? If all our total costs in obtaining these clearances could be tabulated, I believe they would be greater than our gross sales to date. Can we continue research in fields where barriers of this type are set before us?

In obtaining clearance on a new insecticide no one questions the demands

that its use should not prove toxic at the levels at which it is to be used. But is it necessary to prove this on a radish, then a turnip, next a cabbage, and so on?

In mentioning the above difficulties, I speak strictly as a marketing man. There may be sound scientific reasons why some products should be delayed in reaching the marketplace. Certainly I believe that our government officials are endeavoring to comply with the statutes by which they are controlled. But if we as marketing men are asked to support research in certain fields, and if we are charged with the responsibilities of marketing new products for food and health in the coming 60's, then, the increasing difficulty in obtaining federal clearances presents us with a formidable challenge.

So much for governmental challenges. What other obstacles are there which we must fight against in the coming years?

Obsolescence

Obsolescence will surely haunt every drug and agricultural marketing man in the years to come. Between 1948 and 1958, pharmaceutical manufacturers introduced 4829 new products—3686 new compounds, and 1143 new dosage forms. This is an average of one new pharmaceutical per day, and almost every new one is intended to make an old one obsolete. If this continues—and continue it must—a marketing team must be quick to recognize a product change and be quick to change its marketing strategy.

Patents

In addition to obsolescence, the grim specter of the expiration of patents will be with us. During the 60's, the majority of the important sulfa drug and antibiotic patents will expire. Many of our present important insecticides will also be freely available to all interested manufacturing plants. Certainly much of this protective loss will be tempered by new products superior to those becoming available. I do not know how others plan to meet this, but I suppose we have a challenge to be on the right team with the right products at the right time. At least our lives will be happier if we do so.

Better Salesmen

There is no doubt that, in the years ahead, marketing will assume an increasingly complex and demanding role and that it will need men equal to the job. One of the serious problems will be to find, train, and develop better salesmen.

Together, the pharmaceutical houses today employ 16,000 salesmen—detail men—whose principal job is to call on doctors. It is not unusual for a single doctor to receive visits from as many as six or seven salesmen a week. Office hours are short and doctors are extremely busy men. Much as they may want to, they simply do not have the time to see all salesmen. Those they will see are the ones who can answer their questions, who know their company's products, who can help the doctor by providing the information he wants. In short, good salesmen.

In addition to face-to-face selling, pharmaceutical houses have almost unanimously committed themselves to elaborate direct mail campaigns, to the extent that the average American doctor receives something like 4000 pieces of expensively produced advertising a year. As production costs increase, and

as the net effectiveness of each advertisement is watered down by sheer numbers, a clear challenge seems to present itself: to find a better, more efficient way to advertise. Our industries—and this includes agricultural chemicals as well as drugs—have a highly scientific base. Every advertising man, therefore, has a trust to present his wares to his market in a manner which will do credit to the scientific group who support him. False claims, misleading comparisons, nonsupported data can bring discredit not only on the propagator, but on the entire industry as well. When such practices appear we must do everything within our power to see that they are eradicated. If we do not, the veracity of our own efforts will soon be questioned. Our promotional expenditures will produce negative results. Some buyers may be fooled for a time, but I believe that it is but a short time before the truth is known and a drastic reverse of the temporary upward sales curve greets the tricky one.

Agricultural Chemicals

In the realm of agricultural chemicals, three very special challenges will face the marketing man. One is posed by the present surpluses of agricultural products, and the Administrations' program for eliminating them. The second is the long-term need for expanding agricultural output to feed the growing population. A third is represented by the gradual changes that are taking place in the character of farms and in farming methods.

In recent years, by reason of the agricultural support program enacted by the Congress, the Federal Government has supported the prices of certain basic farm commodities far above the price which could be secured for these products in a free market. At the same time the Government restricted the acreage which might be planted in an effort to avoid overproduction. This program has failed. Under the incentive to produce, farmers have worked their land more intensively through increased application of agricultural chemicals, through the use of improved seeds, and the mechanization of farming methods.

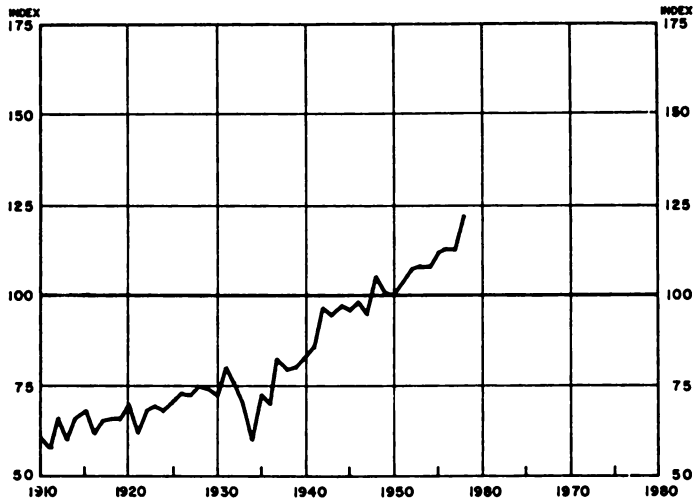


Figure 1. Farm output, past trend, and projected needs in 1975
(1947–49 = 100)
Source. U. S. Department of Agriculture

This has caused the yields per acre to soar and has offset reductions in acreage. One cannot blame the farmer, because naturally one would expect him to make every effort to maintain or increase his income.

The present Administration has recognized this problem and has apparently determined that the only way to eliminate surpluses is to reduce the prices at which farm commodities are supported, at the same time removing some of the restrictions on acreage. Although, it seems unlikely that the Administration's program will be approved by the present Congress, such removal of the incentive to maintain yields on reduced acreage could result in a decreased use of agricultural chemicals. This will call for efforts on our part to continue to advance the education of farmers by informing them of what we know to be true, that, except in rare instances, the use of fertilizers is far below the optimum use to achieve maximum profit. From the standpoint of surpluses, however, we are again presenting the Government with greater outputs. Are there international marketing means by which this problem can be alleviated? To the individual or group who produces the answer should go the "Agricultural Oscar" for the 1960's.

Fortunately, we can look forward to a continued population growth and to further gains in our standard of living in helping to solve this problem. Based on a Department of Agriculture analysis, farm output will have to be expanded by 30 to 35% by 1975 to fulfill the nation's increased requirements. This long range outlook also calls for the continued education of the farmers, so that increased yields may be secured on a total acreage which is to be limited, if not by government regulation, at least by the amount of tillable land available in the country.

The recent trend toward the merger of small farms into larger enterprises, coupled with the increased mechanization of farms, makes imperative major efforts to improve the efficiency of the operations. Wasteful methods cannot be tolerated in a large undertaking without incurring exorbitant costs. Agricultural chemicals constitute a major factor in promoting increased efficiency on the farm. At the same time, the customer for these products is becoming an informed specialist, a technical man, often a business executive with considerable responsibility. To be successful, a salesman will have to speak his language.

Prices

Still another important challenge that will surely be with us has to do with price and pricing. What has happened during the past decade to the selling prices of drugs and agricultural chemicals? They have not tended to increase nearly as much as prices of the goods made in other industries.

In the last decade the over-all index of wholesale prices of industrial goods has risen by 22%—to pick a familiar and specific item, automobile prices were up almost 40%. But over the same period, fertilizer prices gained 7%, pharmaceutical preparations only 3%, and drug and pharmaceutical bulk material prices actually dropped more than 53%. 1958 prices throughout the chemical industry averaged about 6% over 1948, a smaller increase than in all but two of the other 12 industries included in the government price index.

Other costs have also been rising during the past 10 years—wages, research, selling, and transportation. That last item represents two different challenges to businessmen. In contrast to the 6% rise in the selling prices of the chemical industry since 1948, freight rates and transportation equipment

costs have gone up between 38% for air freight and 130% for parcel post rates.

We all can see the need for economies and ingenuity in the face of such cost increases, but I see another more subtle challenge here. While we in the chemi-

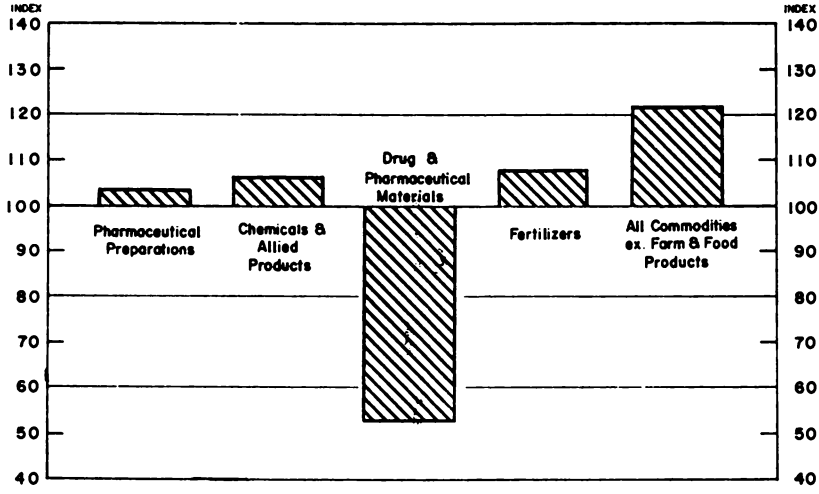


Figure 2. Ten-year price change for wholesale industrial and selected chemical prices, 1948–1958
(Index 1948 = 100)
Source. Bureau of Labor Statistics

cal industry, and some of our colleagues in other sectors of the private enterprise economy have in the past, and again today, been accused of the heinous crime of raising prices to offset higher costs, the services operated, regulated or subsidized by the Federal Government have been able to establish some substantial price boosts in a more or less routine manner.

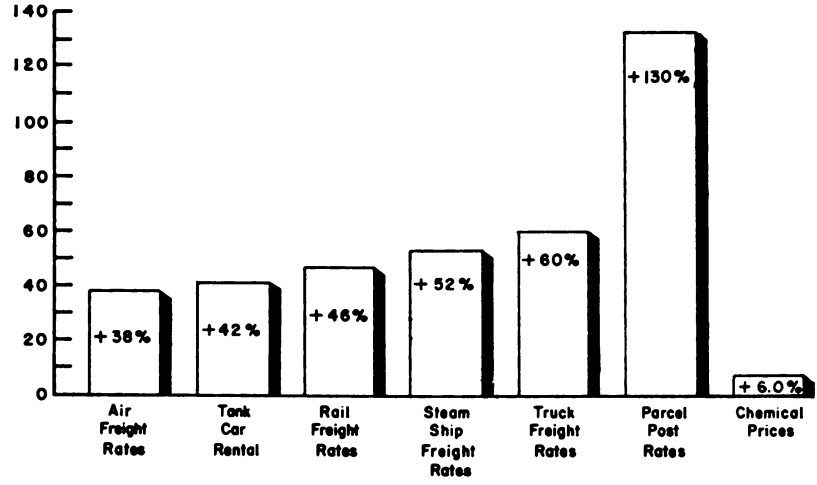


Figure 3. Comparison of increases in freight rates and transportation equipment costs with price increases in the chemical industry
Source. ACCCO Traffic Department and U. S. Bureau of Labor Statistics

These cost and selling price trends raise some danger signals for the years ahead, especially for the coming recessions. We have had three recessions since the war. Some of the economists with whom I have talked believe that we will probably have three similar recessions within the next 10 years. It is during such recession periods that some marketing teams become jittery and press the panic button. It takes a long time to recover from the side effects of such an ailment.

Unquestionably, we have many challenges ahead of us. Not all of them will be solved. I believe that the majority of the prophets, however, will say that enough of them will be solved to give us, in the coming competitive 60's, the greatest markets we have ever enjoyed.

The Three Commandments. A Discussion of the Challenging Sixties in Industrial Organic Chemicals

JOHN A. FIELD

Union Carbide Chemicals Co., New York, N. Y.

If past growth trends are maintained, organic chemicals output will amount to about $11 billion in 1963, about double the 1958 figure. Achieving this growth rate will be possible only through extraordinary effort to expand known markets and to create entirely new markets. The problem of overcapacity and the resulting keen competition underlie the challenges facing organic chemical producers in the sixties. Basically, the industry faces only one challenge: to develop and utilize its total assets for satisfactory growth and adequate profits, so that it can continue to invest in research and development. To do this a series of subordinate challenges must be resolved. New markets must be created to absorb existing overcapacity. The industry must adapt itself to internal competition. Newcomers must accept their responsibility for contributing to growth. Profit margins must be kept high enough to permit continued support of research. Manpower must be obtained, trained, and held. Foreign competition must be put in a proper perspective. Additional investment capital must be attracted.

In looking back over the past four decades, one cannot help but be impressed by the remarkable growth of the chemical industry. From the very start, with the introduction of synthetic dyes and blasting powder, this industry has accomplished its growth by assiduously following three basic rules or commandments:

Create new products to satisfy human needs.
Create synthetic products that out-perform natural products.
Create new processes to make the first two possible.

By adhering to these commandments, it has been able to accomplish unexpected and spectacular advances. These advances have occurred not only in basic chemical raw material production but throughout the complex industrial enterprises, which, from raw materials to consumer products, constitute the chemical industry. One segment of this complex, the synthetic organic

chemical industry, provides an interesting opportunity for study today as this segment is facing a marked change in the patterns of its existence. The forthcoming decade provides many serious challenges to those companies presently engaged in the manufacture of synthetic organic chemicals.

Before the challenges that face the industry can be reasonably discussed, the industry itself must be defined. Specific statistics that give adequate comparisons on sales, pounds, and total value of synthetic organic chemicals sold are not easy to determine, and it becomes necessary to define the industry by a process of elimination. The United States Department of Commerce reports that the aggregate of sales among chemicals and allied products accounted for about $23 billion in 1957. In Table I, it can be seen that almost $18 billion of this aggregate were accounted for by finished product sales: synthetic rubber, paints, soaps, fertilizers, and pharmaceuticals or by inorganic chemicals such as sulfuric acid, ammonia, and chlorine.

By eliminating duplication of tonnage within the petrochemical segment, as in the case of dioctyl phthalate produced from ethyl hexanol where the ethyl hexanol might normally be counted twice, it is possible to arrive at an output figure of slightly under $2 billion for the petrochemical portion of the industry.

Table I. Chemicals and Allied Products Breakdown, 1957

Organic chemical intermediates		$2.1 billion	Synthetic organic chemicals[a]	$5.4 billion
Petrochemical	1.8			
Nonpetrochemical	0.3			
Semifinished products		$3.3 billion		
Plastics	1.2			
Pharmaceutical raw materials	0.6			
Rubber raw materials	0.6			
Agricultural chemicals	0.2			
Plasticizers, Detergents, Dyes	0.7			
Inorganic chemicals		$ 3.3 billion		
Finished products		$14.7 billion		
Pharmaceuticals	2.4			
Paints	2.2			
Vegetable oils	2.4			
Soap and detergents	1.2			
Fertilizers	1.0			
Synthetic fibers	1.5			
Synthetic rubber, etc.	4.0			
		$23.4 billion[b]		

[a] Sold to finished product area (above) or to industry outside chemicals and allied products area.

[b] This figure contains duplication—e.g., some sales of inorganics to organic and finished product areas and of organics to finished product area.

In addition to this $2 billion there is perhaps an additional $500 million of monomer and synthetic rubber raw material included in the semifinished product block, which is really petrochemical production rather than plastic or rubber. An aggregate of $5.4 billion is attained for the whole synthetic organic chemical industry, which including plastics and rubber in bulk is a pretty good figure. The size of this output has captured the imagination of investor and producer alike.

Raw Materials and Derivatives

Natural gas and refinery gases are two main sources for the raw materials used by the organic chemical industry today. An analysis of the derivation of petrochemicals reveals that ethylene has been a more widely used and productive building block than propylene. Tables II and III indicate the more important derivatives of these two raw materials.

Table II. Derivatives of Ethylene

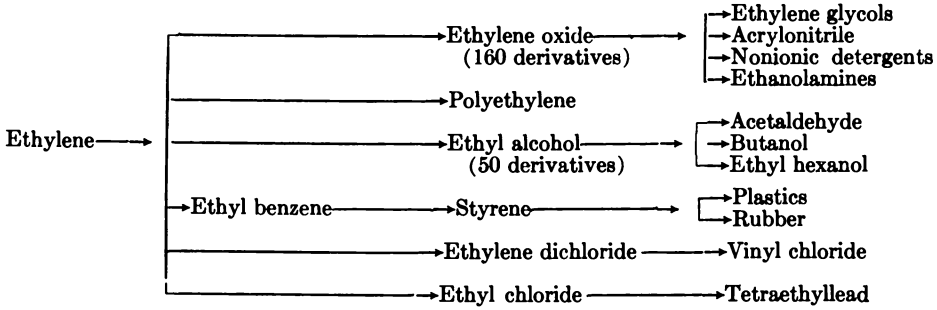
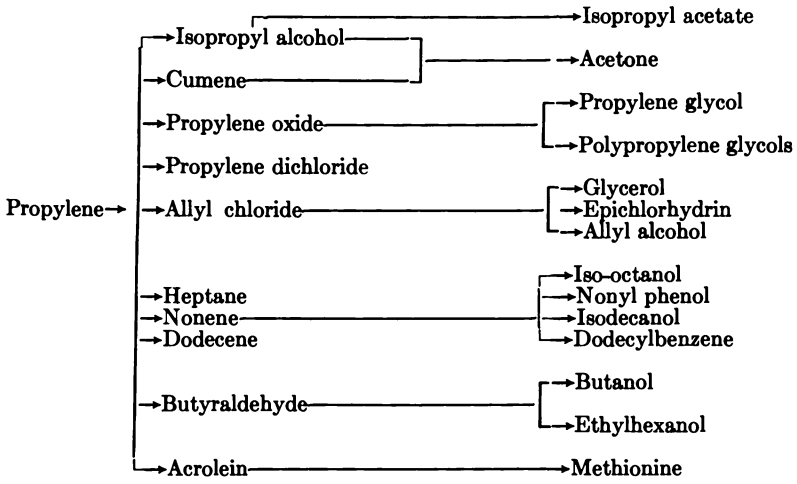


Table III. Derivatives of Propylene



Estimates for organic petrochemical intermediates show that sales have grown from about $800 million in 1950 to over $2 billion in 1958 (Figure 1). If this historical growth rate trend (1950 to 1958) is maintained, the sales for these chemicals will amount to about $4.25 billion in 1963. Since organic chemical intermediates are used in many of the semifinished products and since in reverse the growth of the semifinished products is reflected in the growth of organic chemical intermediates, it is reasonable to assume a comparable growth rate for the composite. This would indicate a probable 1963 figure for synthetic organic chemicals of $11 billion. Achieving this growth over the next four or five years will only be possible if an extraordinary effort is made to expand the known markets for organic chemicals and to create entirely new markets. This presents a tremendous challenge for the organic chemical industry in the sixties. Extrapolation geometrically leads to per-

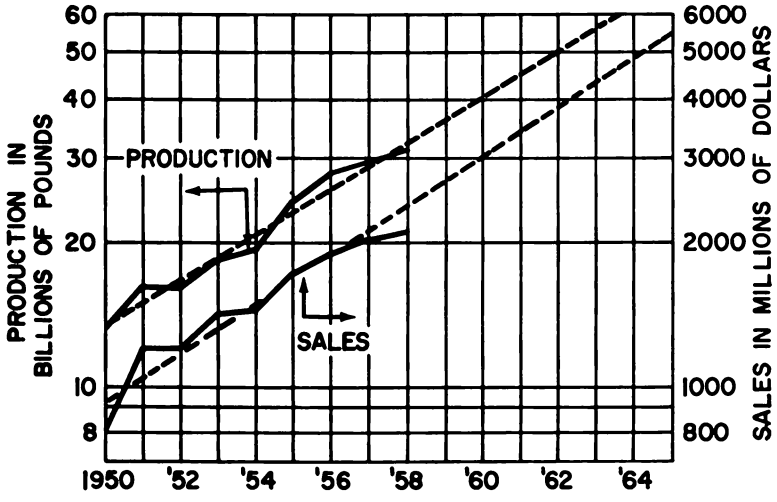


Figure 1. U. S. petrochemical intermediates and polyolefins

centage growth rates which sound reasonable in themselves, but when the absolute magnitude of the indicated growth is considered, the real challenge becomes apparent. Briefly stated, the industry must grow as much in the next five years as it has in its entire life.

A casual consideration of these growth possibilities might and does lead corporations to invest capital in the expectation of assured sales and easy earnings. Perhaps as a result of this, one of the most striking characteristics of the organic chemical industry today is the problem of existing overcapacity. It is a little unsettling to realize that a more rapid increase has already occurred in productive capacity than in the markets consuming organic chemicals. Competition has become much keener, there is an accompanying pressure on prices, and the ability to earn an adequate profit becomes an immediate problem. A producer seeks to expand his sales at the expense of other producers by lowering prices and thereby gaining a larger share of the market. Unfortunately, such activity does not increase the total market. All producers meet the lower prices in a parallel effort to hold their shares of the market and may find themselves selling products at a lower price than good business judgment dictates if they are to achieve an adequate profit.

There are many areas in the organic chemical industry in which the current productive capacity exceeds the demand by an abnormal amount and interestingly enough most of the overcapacity was built at about the same time. For example, Figures 2 to 7 depict the excess productive capacity for ethylene oxide, vinyl chloride, phthalic anhydride, fluorocarbons, methanol, and acrylonitrile. Note that the demand capacity lines began to diverge in 1957. Admittedly many products have shown a resurgence in demand in the past few months, and in three instances, vinyl chloride, methanol, and acrylonitrile, the resurgence in demand has been indicated by a second dotted line with information based on sales in the first four months of 1959. Present shortages in phthalic anhydride were brought about by a combination of circumstances having no relation to capacity. Among these were forward buying, certain attempts to fill inventories of products using phthalic anhydride, and temporary curtailment of some phthalic anhydride production. This

resurgence is characteristic of emergence from a recession, but there is no certainty that the temporary accelerated rate of growth will serve to close the supply-demand gap more rapidly than could be inferred from the long-term trend. Overcapacities such as these will continue to exist and they are basically responsible for many of the challenges which face us in the next few years.

Challenges of the Sixties

Fundamentally, the challenge facing the organic chemical industry can be simply stated. The industry must develop and utilize its total assets to grow at a satisfactory rate and in doing so realize an adequate profit. To meet this basic challenge, a number of subordinate challenges must be resolved.

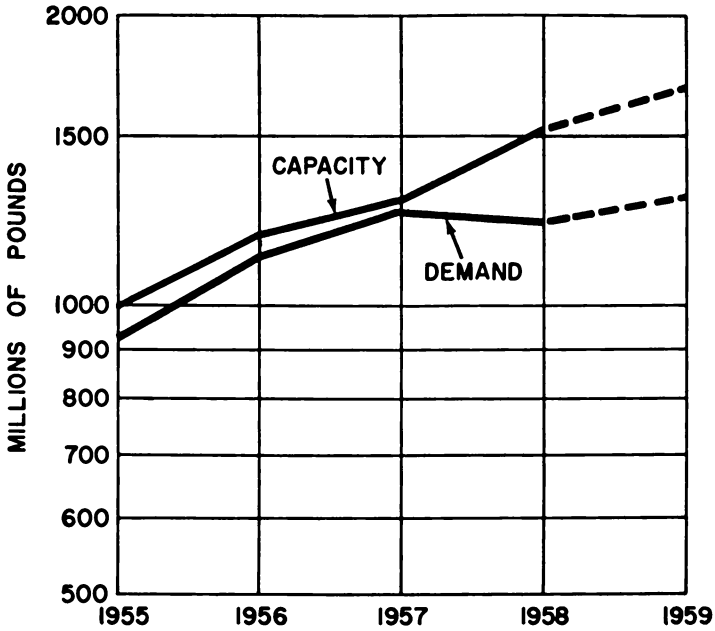


Figure 2. Ethylene oxide

The Challenge of Overcapacity. This becomes apparent when the growth in the number of producers of organic chemicals is examined. In 1940 about 250 companies reported their production figures to the U. S. Tariff Commission in the organic chemicals field. Today more than 660 companies are reporting—almost a threefold growth in 20 years. In 1940 only three companies produced ethylene, a basic building block in petrochemical reactions. By the early 1960's, 16 different companies will be producing this product: Union Carbide, Gulf, Esso, National Distillers, Monsanto, Dow, Jefferson, Phillips Petroleum, Shell, Texas Co., Koppers, Tennessee Eastman, Standard Oil of Indiana, Petroleum Chemicals, Olin-Mathieson, and Socony. Further comparisons between 1940 and today are graphic. In 1940, two companies produced ethylene oxide, today there are eight; vinyl chloride producers have increased from one to 12, acetone from five to eight, methanol three to 11, polyethylene one to 13, and styrene one to eight.

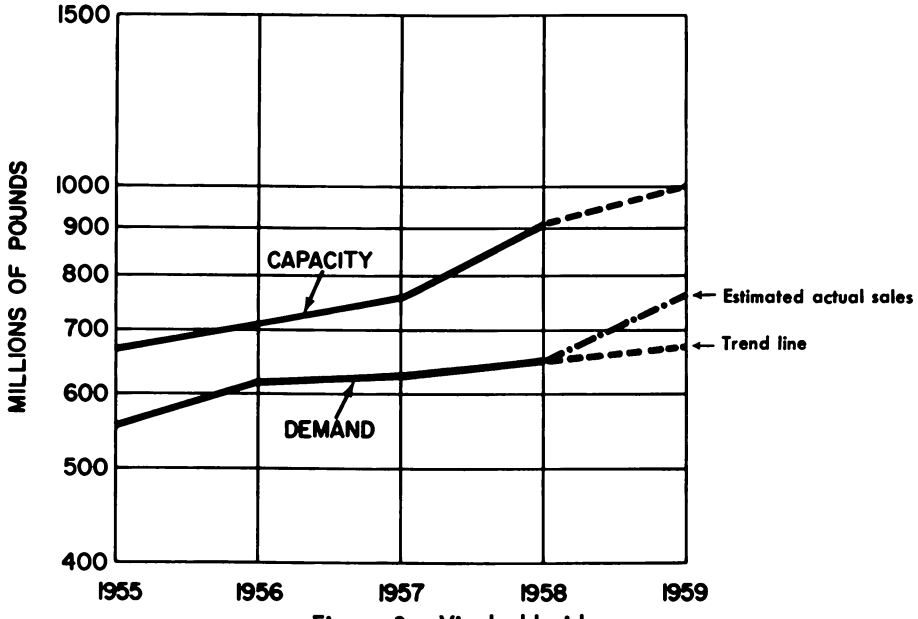


Figure 3. Vinyl chloride

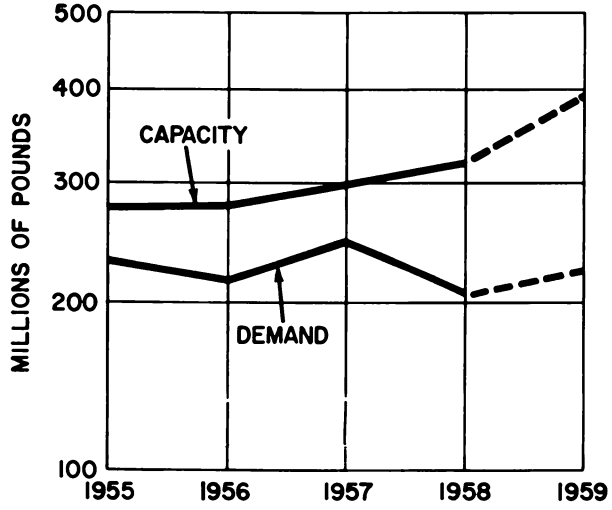


Figure 4. o-Phthalic anhydride

The Pressure of Capital. Today a major challenge is that some provision must be made to absorb the monies which have become available as a result of prosperous years of operation. Most companies find themselves in the position of having money to spend and too few ideas on which to spend it. The supply of money is generated from earnings, depreciation, and amortization. A well-run industrial concern has two choices. It can either pass these monies on to the stockholder as dividends or use them in capital expansion, conserving and multiplying them. To protect and increase the value of stockholder investments the favorability of the second choice is obvious, and the pressure to expand becomes so great that companies may often invest

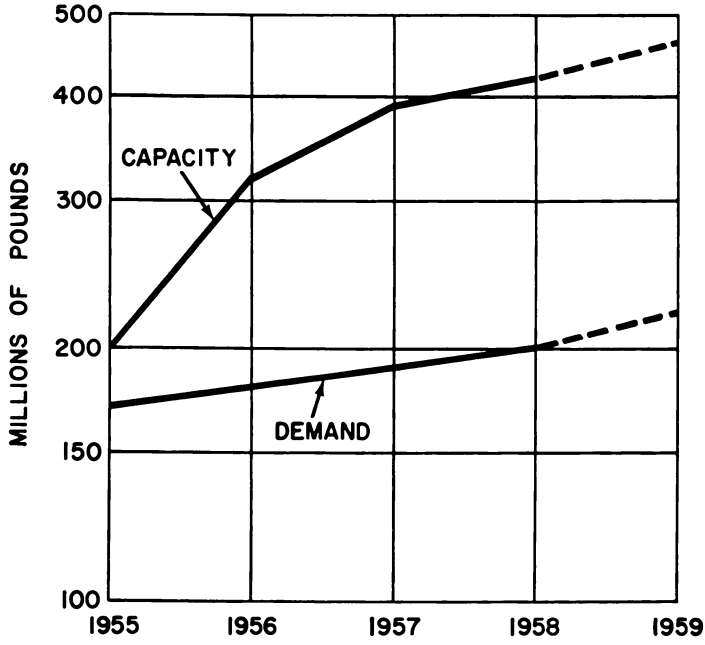


Figure 5. Fluorocarbons

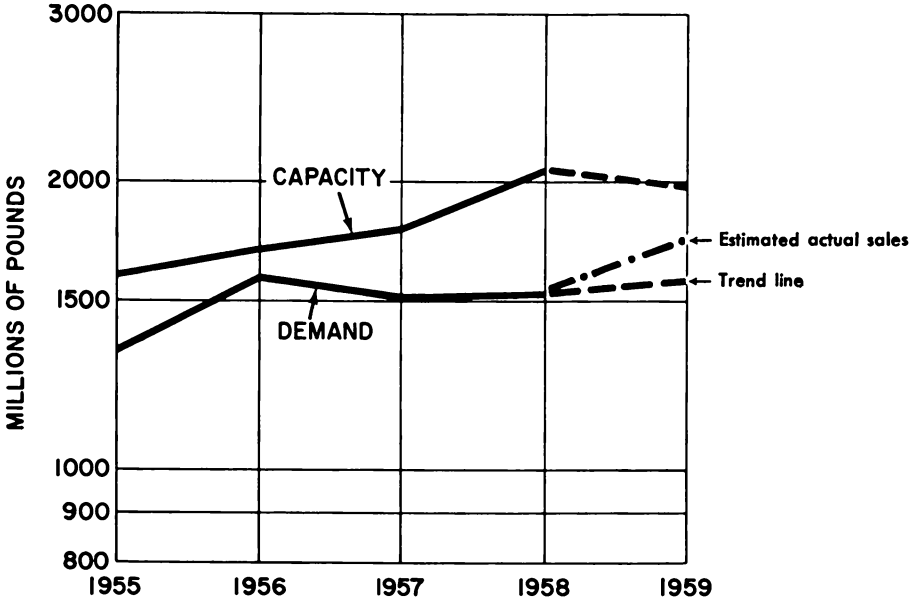


Figure 6. Methanol

in projects which carry a greater risk or a lower return than the company would normally consider. Acquisition of marginal enterprises, new entries into large but already overloaded areas of marketing, and decisions to back integrate for the production of raw materials normally purchased are typical examples.

The Matter of Profit. This is a fundamental concept which cannot be

ignored. The continued expansion resulting from the presence of available money to the chemical industry obviously brings about a marked increase in competition, and, in some cases, may cause a disastrous decrease in selling prices and profits. Competition brings with it the necessity of performing an increasingly greater service to the customer. Better formulations, more accurate data, higher quality of product, more convenient and faster deliveries, and extended credit terms are all demanded. The producer is faced with lower selling prices and increased costs of doing business. Inflation strikes hard at production costs, but often ignores sales prices. The challenge to produce at lower costs and to devise new production processes through technological advances which yield an adequate return in spite of lower sales prices rests heavily on the research, development, and production personnel alike. Historically, the organic chemical industry has introduced products at prices which covered research and development costs and lowered its prices as the markets for its products expanded. For large volume organic chemicals, prices have *decreased* 5% during the seven years which have seen the cost of living *increase* some 11%. Costs of some materials used by the organic chemical industry have *increased* as follows: iron and steel 40%, equipment 33%, and fuels 8%. How can the industry withstand inflation and maintain profits? This is the challenge.

Perhaps it will be useful to illustrate this point by an example, the cost of developing a successful agricultural chemical. To obtain one successful agricultural chemical about 2000 compounds must be synthesized and run through biological screens. Since the cost of failures must be borne by the successful ones, further experimentation and syntheses run the cost up fantastically. Laboratory work, greenhouse testing, field tests, residue analyses, toxicological studies, production, pilot plant construction, patents, and many more

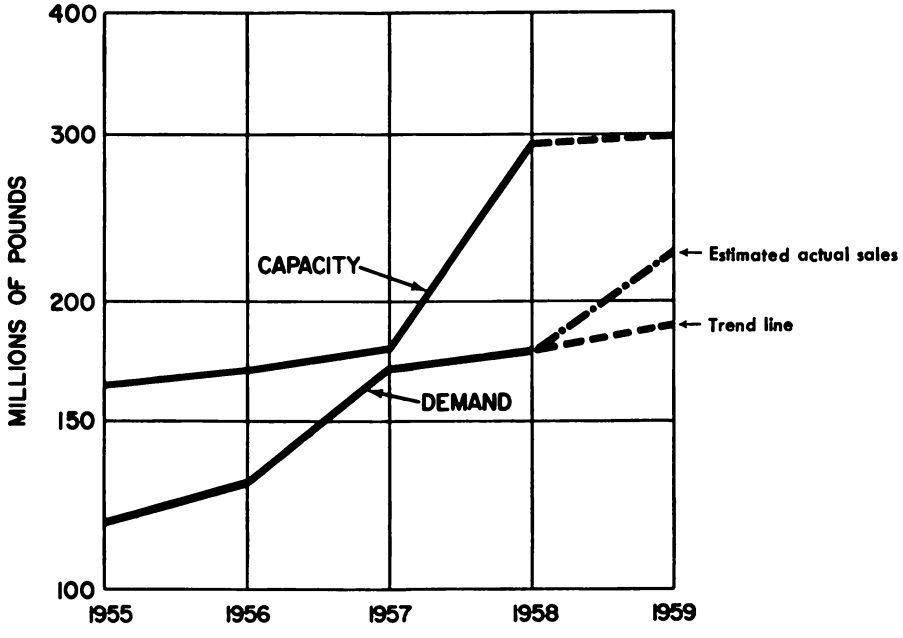


Figure 7. Acrylonitrile

costs mount as fewer and fewer products successfully pass the various tests. Industry statistics show that out of the original 2000 compounds, only one will ever reach the commercial market. In this one commercial product there will be about $1.5 million invested before the manufacturer can start to sell it. This cost must be recaptured and a reasonable return earned or progress will suffer.

Another example lies in a comparison of the manufacturing cost in the synthetic organic chemical industry to that of the pharmaceutical industry as a per cent of sales. These are illustrated in Figure 8. Profit before taxes is about twice that of the organic chemical industry. Here indeed is a challenge to the organic chemical industry—how to increase its profit as a per cent of sales.

Perhaps we have dwelt long enough on the problems of the cost squeeze which are, after all, fairly obvious. Not so obvious is the need for expansion of research and development activities as the industry expands. Research

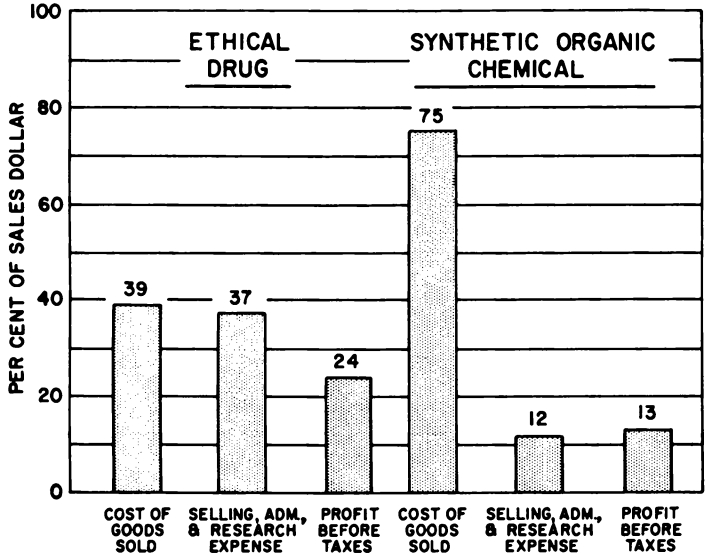


Figure 8. The sales dollar: where it goes

and development must be paid for and the fourth challenge arises out of this concept.

Newcomers to the Market Place. How can the industry impress upon them a sense of responsibility to contribute to the growth of the industry? How can they be made to realize that the industry was not built by companies seeking a quick profit but rather has achieved its growth through the expenditure of the time and effort of many men and of millions of dollars in research? If every newcomer to the market place would accept this responsibility and would bring to the industry a technical expenditure proportionate to his expected share in the market, the prospects for continued rapid expansion of the industry frontiers would brighten perceptibly. Those who come expecting only to sell their product to a single large customer because of price and without the contributions of research and technical service do not contribute to the growth of the industry and may in the long run seriously hinder its growth.

Foreign Competition. A serious challenge is presented as the resurgence of the European economy is dramatically changing the pattern of foreign sales of the U. S. synthetic organic chemical industry. Technological know-how and engineering services are easily obtained by foreign nations and most domestic United States companies are facing a loss of their European markets to European producers. Even more serious than this in the long run is the increasing threat of imports into the United States at lower prices than those prevailing in the domestic market place. This challenge is then really two-fold. First, ways and means to continue to profit from the sales of chemicals in foreign lands must be devised. This can be accomplished in part by participating in productive enterprises in the foreign countries and partly by providing a continuing number of new materials not produced in those countries. Secondly, costs must be reduced and technological advances must be accelerated so that the domestic industry can continue to prosper in the face of foreign imports.

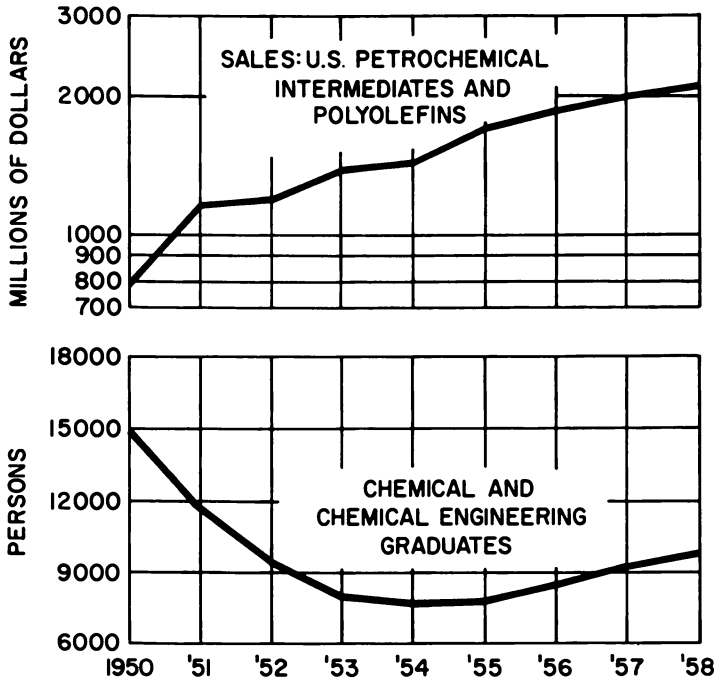


Figure 9. The manpower challenge

The Manpower Challenge. This arises out of the fact that the industry has been increasing at a trend growth rate of 12.5% per year since 1950 while the available number of technical graduates has decreased or at best remained constant (Figure 9).

The synthetic organic chemical industry needs an increasing number of chemists and chemical engineers. Quantity alone will not suffice; the quality of the chemical graduate must be improved as well. It is a clear responsibility of the industry to support programs which will provide the necessary number of good men to fill the managerial posts in the increasingly complex chemical industry that will exist at the end of the 1960's. At least

three times the amount of men that are now being graduated from our colleges and universities will be needed, and the average quality of these graduates must be significantly higher than what has been true in the past few years.

The industry has an obligation to tell the story of its accomplishments to those at the high school level and even earlier if it can be done. By the time a boy reaches his senior year in high school he has made decisions on courses that will admit him to the college or university of his choice. Each student should be approached before these decisions are made, and when made, he should be encouraged with scholarships. Proper follow-up should then be made to make certain that he starts on a career in the chemical industry, after which his employer must take a most active interest in his career via training and retraining programs to keep him abreast of technological developments as well as by periodic evaluations of his progress.

These then are some of the challenges facing the organic chemical industry in the coming decade. The happiest solution to all of our problems is, of course, to open new markets at a rate sufficient to absorb all available capacity and all available capital. Essentially this is what the industry has experienced in the past and it is by no means impossible that the future will witness a continued expansion of this sort. However, the challenge is a great one. There have been major new markets for organic chemicals which have opened as the years have passed such as synthetic detergents, synthetic rubber, and synthetic fertilizers. But what has happened to these markets? Almost all the uses for rubber have been filled by synthetic rubber and even if all remaining natural rubber were replaced by synthetic, the expansion would not approach the growth already achieved. Approximately 75% of all soap uses are now filled by synthetic detergents so there is only 25% to go. Although ammonia is not an organic chemical it is derived from the same basic raw material and its history is typical. Approximately 90% of the nitrogen produced today comes not from natural sources but from synthetic ammonia and this portion of the chemical industry must now grow at the rate dictated by the growth of the economy itself. Further penetration is practically impossible. In other areas the outlook is similar. Where then are we to turn for the new markets which allow us to grow at an increasing rate?

Recent examples indicate the possibilities. A few years ago, E. I. du Pont de Nemours & Co., Inc., began to develop fluorocarbons as propellants in aerosol containers. A whole new industry, which in 1959 will package almost 500 million packages of some 150 different products, has resulted. Even more recently, the advent of polyether urethane foamed plastics bids fair to provide a market for hundreds of millions of pounds of organic chemicals. Others come to mind—agricultural chemicals and pesticides such as DDT and 2,4-D, gasoline additives such as tetraethyllead and so on. Surely these are not the last such great advances which will result from the research and development effort now being put forth.

An examination of some of the major markets yet available to the synthetic organic chemical industry is challenging. Compare the value of the organic chemicals sold to certain industries with the total dollar value of the output of these industries (Table IV).

The organic chemical industry can increase its sales to these markets by developing uses for chemicals that will eliminate costly procedures or products that are too expensive. Consider the plastics industry where the value of organic chemicals represents about 68% of the sales by the plastics industry

Table IV. Synthetic Organic Chemicals' Share of Industry Sales in 1958

Industry	Approximate Sales to Industry ($MM)	Industry Sales at Mfgrs. Level ($MM)	SOC as % of Industry Sales (approx.)
Automotive	406	11,000[a]	4
Plastics	1510	2200	68
Rubber	849	6000	14
Agriculture	188	32,000[b]	0.6
Drugs	200	2300	9
Textile	700[c]	5000	14
Protective coatings[d]	150	1700	9
Detergents	225	1000	22
Chemical intermediates	285	—	—
Miscellaneous[e]	1293	—	—

[a] Excludes spare parts. [b] Includes farm, ranch, and forest products. [c] Includes fiber raw materials. [d] Includes industrial consumption. [e] Includes aircraft, metals, military, petroleum, and adhesive.

to its customers. By comparison the organic chemical industry sells over $180 million worth of chemicals to the agricultural industry, whose sales amount to about $32 billion. This means that the value of organic chemicals represent only about 0.6 of 1% of the total value of all agricultural products sold. About $406 million worth of organic chemicals are sold to automotive manufacturers, only 4% of the total value of all automobiles produced. Even though these industries are now two of the major markets for organic chemicals there is a long way to go.

What a challenge exists here! How can the value of synthetic organic chemicals sold to the automotive industry be brought up from 4% of the industry sales to say 8 or 10%, or in agriculture from 0.6 to 2 or 3% or more?

Like the wise old owl who counseled the centipede about his corns, we have not offered any specific solutions to these challenges that face the synthetic organic chemical industry. These solutions will come only from the ingenuity of the men and women of the industry, from the sums of money and effort expended in research, and from the imagination of the young tempered by the wisdom of the mature.

Conclusion

Regardless of the changes that are taking place and the challenges facing the industry, it will continue to grow at an outstanding rate. Possibly its greatest strength lies in the diversity of end uses into which its products go. This diversity enables organic chemicals to penetrate into existing markets at the same time that those markets are themselves expanding. This penetration is occurring at an increasingly rapid rate and is accomplished in three ways: by replacing natural materials in uses where the synthetic product has superior properties, by replacing natural materials in uses where the synthetic product may not be superior but where it has an economic advantage, and by creating entirely new markets for which no existing material is suitable or available.

Along these three paths lie the keys to our future. If the industry continues to follow its three basic commandments mentioned in the introduction, somewhere the doors will be opened and the new markets made available, but they will not open without the united effort of all those who participate in the industry. To meet these challenges demands our time, our imagination, our devotion, and a lot of hard work.

The Challenge in Marketing for Inorganic and Heavy Chemicals

F. A. GILBERT

Food Machinery & Chemicals Corp., New York, N. Y.

Inorganic chemicals, because they are basic building blocks for the entire chemical industry, show three important characteristics. They are for the most part mature and little subject to obsolescence. Major technological changes affecting marketing or manufacturing are unlikely. Their growth tends to follow general economic patterns. For these and other reasons, the heavy inorganics may be more than normally subject to the challenges of the sixties. Such challenges include overcapacity, and the continuing cost-price squeeze. Closely related to these challenges are changes occurring in the export-import picture. The industry will also face increasing costs and other problems of distribution. And it must meet the need for new and better manpower skills.

The phrases "inorganic chemicals" and "heavy chemicals" are often used interchangeably. Such use is normally correct. However, it may be well to differentiate between the two. Generally, many inorganic chemicals are "heavy"; they are well-established, low cost, high-volume products with mature markets that tend to follow the general economic growth of the country. Yet, do the newer inorganic fluorine chemicals, the silicones, the active oxygen chemicals, fit this definition? Definitely, the answer seems to be "no." The problems connected with the marketing of these products are challenging, intriguing, and manifold, but they tend to parallel those found in other more glamorous sections of the chemical industry—drugs, organics, plastics, etc. Therefore, this paper focuses attention on the more truly heavy part of the inorganic field such areas as alkalies, mineral acids, chlorine, phosphates, and the like.

These have been, and will continue to be, basic building blocks of our whole chemical industry, perhaps even of our whole economy. Practically every drug, organic, plastic, and other end product chemical is produced, in part at least, by using these basic inorganic materials. Note the word "basic"; it is important as a primary specification of this segment of chemistry. By being basic to our whole economy these products tend to show the following characteristics:

The chemical, and often its method of manufacture, are normally mature and little subject to obsolescence.

Conversely, major technological advances, resulting in either very rapid market expansion or substantial manufacturing cost savings, are unlikely.

By being stable, these chemicals tend to parallel such natural economic patterns as population growth, gross national product, construction, etc. These relationships are much more pronounced with the heavy inorganics than with the newer chemical products.

For these and other reasons, the heavy inorganics may thus be more than normally subject to the "Challenges of the Competitive Sixties." To meet these challenges successfully will call for alertness, clear judgment, and top-flight (often new) skills, coupled with a considerable amount of creativity. The challenges themselves might be divided into a number of categories, even though any such list suffers from the dual ills of incompleteness and duplication. The following might be considered:

Overcapacity
Cost-price squeeze
Impact of changes in exports and imports
Increasing costs and problems of distribution
Need for better or different human skills

Overcapacity

Overcapacity is not a new or unusual challenge, but it may become increasingly important in the next decade. As a larger and larger segment of the industry moves away from the rapid period of growth into an era of greater maturity there is a tendency, through sheer inertia, to allow a continuation of the expansion of productive capacity past the point of need. That this is probably true at the present time, at the threshold of the coming decade, can be seen from a survey of 500 of the country's largest industrial concerns made by the National Industrial Conference Board as of June 1959. NICB's survey showed that industry generally was planning to increase its capital spending program for 1959 by 37% over 1958 while the only segment to report a decrease was the chemical industry, "which plans to lower its first quarter spending by 17% because of previous overexpansion."

Adding to this problem is the growing tendency for newcomers to enter the inorganic field. Examples can be found both in the activities of existing chemical companies to broaden their lines and in the entry of many previous non-chemical manufacturers. The appeal of diversification and the desire for identification with one of the glamour industries may be reasons for these moves, but whatever the cause, the results are the same—added capacity.

Some chemical consuming industries, too, are indulging in "backward integration" by manufacturing their own chemical raw materials. A well-known example is the production of caustic and chlorine by paper mills. Here, again, while the specific moves may be well justified, the end result is still more capacity.

For the producers of heavy inorganics, all this adds up to a considerable challenge. The individual chemical company must be particularly astute in forecasting not only the probable future growth in national demand of its products, but also the growth pattern for its specific consuming areas. It must recognize possible inroads that others may make in what in the past, may have been considered its safe sales region and, particularly, it must be able to judge correctly the relative position of the specific chemical on its own demand curve. This has particular significance for the heavy inorganic producers because more

and more of these chemicals may have reached, or be approaching, the end of their rapid growth period. Considerable experience is needed to judge what additional capacity others may be planning and how this will affect the relationship between supply and demand. Figure 1 shows a typical demand curve with a capacity curve superimposed thereon.

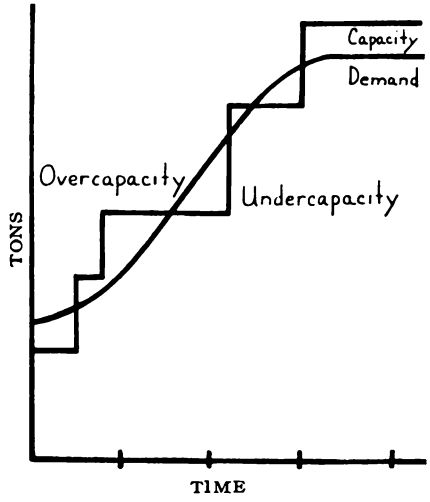


Figure 1. Demand *vs.* production capacity

The problems that are inherent in this situation are self-evident. If a company waits too long to build additional capacity and waits until the demand has become quite firm, others may expand first and reap the harvest. Conversely, in these days of ever-increasing capital costs and resultant high break-even points, serious penalties await him who builds capacity too far in advance of the need.

Cost-Price

One of the results of actual or threatened overcapacity is the cost-price squeeze that the chemical industry is now experiencing. Not that this is the only cause of this ill, but it is certainly one of them. Even in the face of rising costs, the existence of idle capacity seriously deters a corresponding price increase.

That a cost-price squeeze exists, particularly in the heavy inorganic field, is well known. According to the Bureau of Labor Statistics, finished steel prices, one of the bellwethers of our economy and a good measurement of the cost of things we must buy, have risen 80% in the last decade. Over the same years, industrial chemical prices have gone up approximately 23%. For further amplification, Figure 2 shows the price history of industrial chemicals in relation to two of the most important elements of chemical production cost—high fixed capital requirements and cost of labor. Unless some extraordinary change in the economics of the heavy chemical industry occurs—and none is in view—there is no reason to assume that this situation will correct itself in the coming decade.

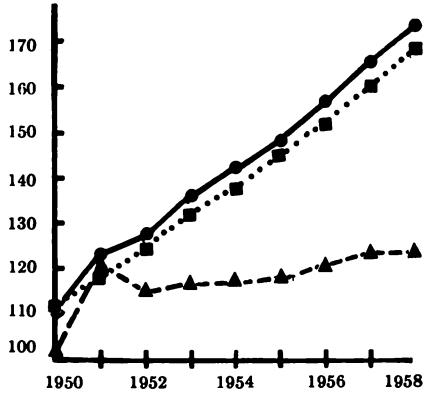


Figure 2. Industrial chemical prices *vs.* construction material prices and weekly earnings of industrial chemical worker

Index 1947–49 = 100
▲ Industrial chemical
■ Construction
● Earnings
Sources. U. S. Department of Labor and *Engineering News Record* "Construction Cost Index"

Besides the pressures from overcapacity there are a number of other factors bearing on this problem. For example, the heavy inorganic field, because of its size and maturity, cannot look to the chemical industry's normal antidote for rising costs—namely, increased efficiency through major volume increases or technological breakthroughs. Unfortunately, these are generally the private domain of the newer growth chemicals.

Break-even costs that are high, and in some instances going higher, intensify this problem. More and more, the profit is concentrated in the narrow top band of sales; and what pressures this brings to sell the full capacity of a plant! A whole host of challenges are to be found as a result. Is it better to increase volume at the risk of price deterioration? Is it wise to use trade relations as a sales tool and, if so, to what degree? Should special credit terms be extended in order to increase sales volume? In selling heavy inorganics, how much can one afford to spend on technical sales-service? These questions and many more must be faced during the coming years. The organization that answers them properly will not operate profitably in the near term, but will be building soundly for the future.

Export-Import

Closely allied with the two challenges previously discussed is that which is connected with the changes that are occurring and will continue to occur in the chemical export-import picture. At the end of World War II the usually strong chemical industries of such countries as Western Germany, the United Kingdom, and Japan were in a very weakened condition. Not only were U. S.

chemical firms experiencing little or no competition in export sales to other areas of the world, but these normally self-sufficient countries were themselves importers of our products. However, in the intervening years their chemical industries have been rebuilt, in some cases with U. S. money and technology. Now, not only can they satisfy their own demand but also they are strong competitors for world markets. Figure 3 indicates recent past experience in this

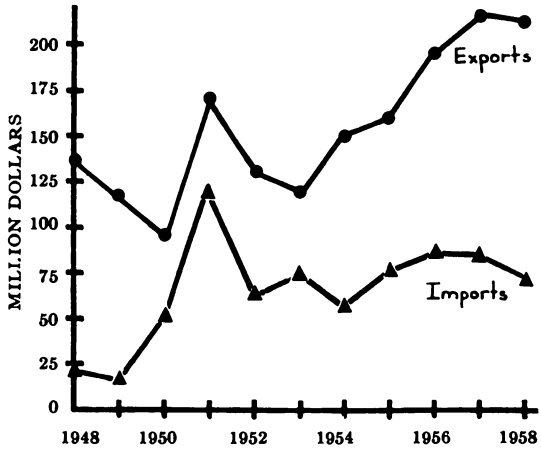


Figure 3. U. S. industrial chemicals exports, imports

Source. U. S. Dept. of Commerce

area. It can be expected that these trends will be markedly reversed in the coming decade, perhaps to the extent that the favorable balance of the early 1950's will all but disappear.

Another development of perhaps equal importance is the formation of the European Common Market, the full impact of which will certainly be felt in the sixties. This new organization can be expected to strengthen the whole Western European economy and thus increase the volume of goods that will be consumed there, including imported products. However, it is probable that to an even greater degree the concentrated strength generated by the Common Market will show itself in an increasing pressure to sell part of their combined output in the world markets, including in the United States.

While the export of heavy inorganics has never taken a major portion of the U. S. production, any loss of sales in this or any other area comes right off the top. A few per cent reduction in sales can have a much larger effect on profits, return on assets, etc.

A dual challenge is presented here. How should the industry as a whole, or an individual company, act to minimize this loss in volume? Should European prices be met in Latin America, for example, even if this means little or no profit to the U. S. producer? Should there be some type of government subsidy for chemical exports, such as very low freight rates similar to those enjoyed by European shippers? What attitudes should be taken towards the possible loss of some domestic business through the increasing pressure of imports into the United States? Industry and Government both will have to make intelligent, far-sighted decisions in these areas.

The other half of the challenge represented by the loss of export markets is the question of how best to continue to make economic use in foreign lands of U. S. chemical technology. An increasing number of American chemical companies are exporting their know-how in place of their products. Returns, through either royalty payments or an equity position in a foreign producing operation, often equal, and sometimes exceed the loss in profits resulting from lost export markets. Whether or not such a program is sound must be decided by each company within the framework of its own situation. However, even with the older heavy inorganics there are production and sometimes end-use technologies which are sufficiently advanced to have real economic value in other lands. The forward-thinking chemical company will find some way of capitalizing on these assets.

Distribution

Another challenge which will become particularly important in the next decade has to do with the physical distribution of heavy chemicals from the producer to the consumer. Ever since the war, transportation and other distribution costs have risen so sharply that they have become a major factor in determining sales policy. In the case of the heavy inorganics this is particularly true, since shipping rates have risen much more rapidly than sales value and are today one of the largest single items of the delivered cost of these products. Whether this item of cost is for the account of the producer or of the buyer is of little consequence. In either case, it must be controlled.

The major method of transportation of heavy chemicals is the railroad. Here, rates have gone up rapidly. Gerrit Van Schaick, General Traffic Manager for American Cyanamid, said at a recent MCA Transportation Symposium in Cleveland (*1*), that since 1947 railroad freight rates have climbed 64% and the cost of freight cars 52%, while in the same period chemical prices have risen less than 10%. It is hard to see that these trends will reverse themselves in the coming decade.

Neither the producers nor the consumers of heavy chemicals, with their low prices and high volumes, can long afford to absorb these rising costs. The challenge must be met and met promptly. Because of the magnitude of the problem, the rewards to those companies that develop some of the right answers can be very large, either in terms of cost savings to themselves or additional business from those grateful customers who gain the benefits of the savings.

How to solve this problem is difficult to state and many approaches can be taken. Alternative forms of transportation such as pipelines for liquids and sometimes solids, water movement, truck-rail (piggy-back), and truck-water (fishy-back) combinations, are all possibilities. Plant relocations to minimize shipping distances to major customers, or to allow direct across-the-fence movements, should be considered. The use of the newer, or the yet-to-be-developed containers, such things as bulk rubber "bags" for liquids, bulk handling of dry solids via air slides, etc., lined fiber drums for liquids, should all be carefully studied. The creation of bulk distribution points may in some instances be of value.

These are but a few of the possibilities. In any case, however, the existence of this large and rapidly growing portion of the total costs of heavy inorganics represents a challenge of the first magnitude.

Personnel

The last of the challenges listed earlier is, perhaps, not a challenge at all but rather a means of solving the problems and moving forward in the next decade. It is the recognition of the changing manpower needs, the necessity to supply new and often better skills to the field of inorganic chemistry. No longer can reliance be placed solely on the more normal experiences of chemical personnel—production, sales, engineering, and research. To meet the existing and future challenges there must be added abilities in such newer fields as logistics, operations research, planning, transportation and distribution, and automation. What is needed is not more manpower but better trained manpower; people who are, perhaps, more sophisticated and thus better able to judge all of the nuances present in the various challenges to be faced.

In the field of marketing the personnel will have to be more highly trained in technical skills and must be able to develop empathy regarding customer's needs, applications, and uses of chemicals. Probably the superior sales people will be those of an optimistic frame of mind, well balanced with realism. Our marketing managers must also be more highly skilled in forecasting, in identifying needs of the process industries, and in technical-economic aspects of the diversified industries served. Decision making by marketing executives and by their team will call for real courage. They must determine what moves to make and, more specifically, they must judge the timing of such moves, such as when to enter a market, when to drop a product, and when to expand. All this must be done with a high degree of accuracy, for the stakes are large.

All of these problems are real, as are the many others that have not been mentioned here. However, this does not mean that the next decade should be approached with pessimism. These problems and challenges should be recognized for what they truly are, valuable opportunities for those alert enough to identify and solve them. Barring a major military, political, or economic upheaval, the next decade should be one of continued growth for the heavy inorganic chemical field. Some individual chemicals may move faster than others but, over-all, this segment of the industry should approximate its growth of the last ten years. It is at the level of the individual producers that the challenges will be most keenly felt. The companies that know their facts (even more so than at present), that realistically and courageously face these facts, that recognize and use properly the opportunities that will be presented, and that above all remember that they are but instruments through which the interests of many are served—owners, employees, customers, suppliers, the communities in which they live, even society as a whole—these are the companies which will benefit most from the "Challenges of the Competitive Sixties."

Literature Cited

(1) *Chem. Eng. News*, **37**, 27 (May 11, 1959).

The Challenge in Marketing for Plastics

PAUL MAYFIELD

Hercules Powder Co., Wilmington, Del.

The plastics industry is one of the most exciting, fertile, and expanding industries in this country. Consumption is expected to increase 100% to 9½ billion pounds over the next 10-year period. The challenge for marketing plastics in the 60's is this: to direct the right team which has selected the right products, and to sell at the right price in the right market. This challenge will be influenced by many factors. Four important ones are: forecasting, growth and cost patterns, corporate changes, educational programs.

The 60's have been referred to as "The Golden Decade." With the combination of technological progress, burgeoning population, and unprecedented buying power fusing together, the 60's should turn into a truly dynamic decade.

The plastics industry, a comparatively minor factor before World War II,

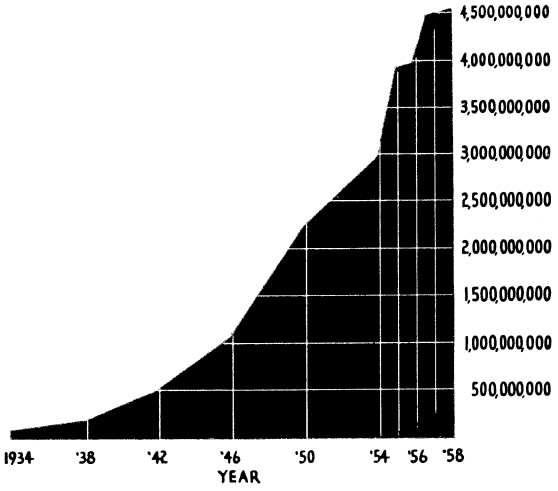


Figure 1. Total production in pounds of synthetic resins and cellulosics, 1934 to 1958
(Including those used for coating)
Source, U. S. Tariff Commission and *Modern Plastics* estimates

is today one of the most exciting, fertile, and expanding industries in this country. It has now grown into a billion-dollar industry, joining automobiles, aircraft, steel, petroleum. In 1957 plastics became for the first time a $2 billion industry. Production has increased over 300% in the past 10 years to over 4.5 billion pounds. At Western Electric, for example, over 60,000,000 pounds of plastics per year are used. Plastics have displaced steel as the second ranking raw material purchased by Western Electric (first is copper).

Figure 1 illustrates the tremendous growth of an industry that will continue to expand with new products and new markets. We have projected the future through 1970, when annual consumption will be $9^1/_2$ billion pounds, a 100% increase over the next 10-year period (Figure 2).

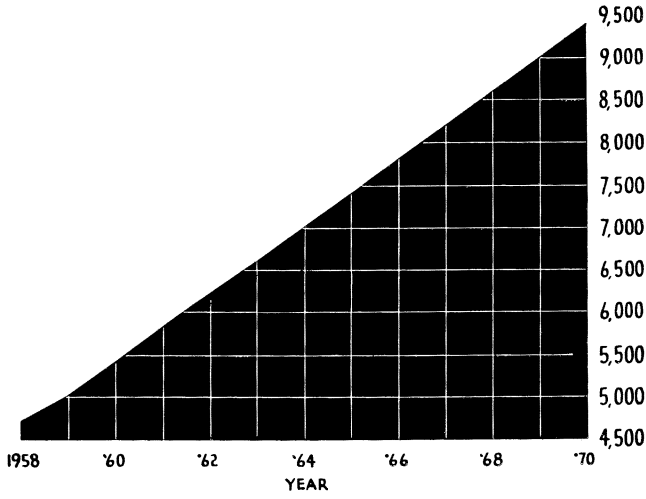


Figure 2. Forecast production of cellulosic and synthetic plastics and resin material, 1958 to 1970
(Millions of pounds, dry basis)
Estimated by SPI, based on U. S. Tariff Commission

From 1957 to 1965 the annual average percentage rate of increase is 6.5%. Table I illustrates another way to see this growth.

Table I. Per Capita Consumption of Plastics

Year	Pounds/Person Consumed
1934	$^3/_4$
1950	19
1955	$23^1/_2$
1957	26
1960	30
1965	38
1970	45

Population Forecast (Millions)

1958	175
1960	180
1965	195
1970	211

U. S. Tariff Commission preliminary figures for 1958 list the breakdown of

production for the plastics industry in 1958. They demonstrate the diversification of resins and of the markets served by the plastics industry (Figure 3).

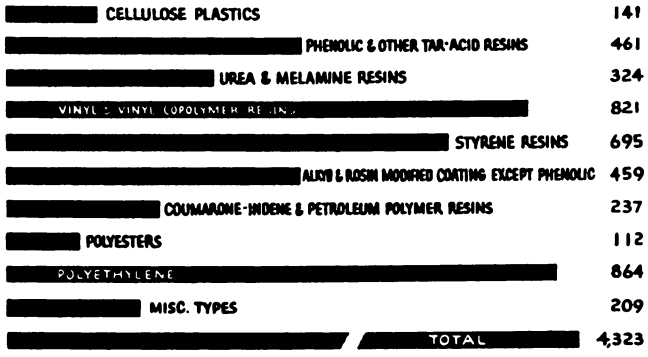


Figure 3. Production of synthetic resins and cellulosics
(Including surface coatings in 1958)
(Millions of pounds, dry basis)
U. S. Tariff Commission, preliminary figures released March 20, 1959

Polyethylene production, at over 800,000,000 pounds in 1958, moved into first place. It is expected to be the first billion-pound plastic. In the late 60's it should reach 2 billion pounds.

What do these figures mean in the challenge for marketing plastics in the sixties? What is "the challenge?" As we see it, the challenge is to:

Have the right team, which has selected the right product, to sell at the right price, in the right market, to show the right profit margin.

The challenge in marketing for plastics in the 60's will be influenced by many factors, four of which are extremely important: forecasting, growth and cost patterns, corporate changes, and educational programs.

Forecasting

The first important challenge in marketing for plastics is forecasting the business climate of the 60's, the relative changes in costs of some raw materials, the rate of acceptance of new polymers, and the availability or rate of development of equipment required to do more plastics jobs.

Many important changes in business activity have been largely governed by three things: defense spending, population, and money.

Defense spending has already provided the plastics industry with a demand for both new and better materials to meet the new challenge of rockets and missiles, and the broad range of plastics materials used by all the services in various equipment.

Census Bureau data suggest an increase from 175,000,000 people to 211,000,000 by 1970. Marketing will be affected by the change in the number of people in the age group from 19 to 25, which will increase 45% in the 60's. This means new families, and new families mean new homes and all that goes to equip those homes—housewares, toys, containers, and new types of packaging for all types of goods. This means an increased demand for plastics, because of their sales appeal, utility, and low cost.

Another important challenge, which we share with the whole economy, is to protect the integrity of the dollar. Inflation probably will not leave us

now or in the 60's. The market for plastics products will grow with the apparent continued trend of lower plastics costs.

Growth Patterns

The surge ahead for plastics in the 60's will embrace many new developments. Most of the new markets will be new applications. There is a vast quantity of nonplastic materials today that have not yet faced true competition from the plastics industry. For instance, on a yearly basis we use:

222 billion pounds of steel
800 million pounds of brass and bronze
2.6 billion pounds of aluminum
13 billion pounds of glass

Inroads are already under way in most of these industries. The top growth industries in the 60's, not necessarily in order, are forecast to be:

Plastics
Residential construction
Guided missiles
Office equipment
Electro energy sales
Air transportation
Electronics
Aluminum

A good example of the continued growth of plastics is in the automotive industry, which in 1958 used 18 pounds of plastics per car, for a total consumption of 100,000,000 pounds, according to *Automotive Industries*. In 1965 the composite car will use an estimated 32 to 35 pounds of plastics for an estimated total consumption of 200,000,000 pounds. This estimate is based on the production of from 7,500,000 to 8,000,000 cars.

The packaging industry has been responsible for rapid growth in all types of plastics packages. Plastic films and containers have established new concepts in packaging and developed new markets not previously open to plastic. This growth trend will continue in the 60's at an even faster rate.

All of us are aware of the tremendous potential for plastics in home construction. This is an area in which plastics are ready to go to work, even though building codes and union restrictions are slow to give way. There are many other growth areas which, taken individually, may not excite too much enthusiasm but when grouped together as consumers of plastics can represent large-volume use. The shoe industry is one example of this miscellaneous group. Others are radio and television, kitchen appliances, and marine products.

Growth patterns will expand with continued market development for existing and new plastics materials. The trend now is toward more application development, and actual product development with customers, to assure these growth patterns. Naturally, the dominating factors in the acceptance of plastics in replacing primary raw materials are cost, durability, quality, time, and manpower.

Cost Patterns

A spokesman for one of the largest appliance manufacturers said recently: "The price of steel has been increasing, while material costs of plastics have

decreased. Material costs are not the really significant figures; rather it is the combination of product plus fabrication costs. This total figure has been increasing for steel at a steady 5 to 7% per year while plastics have been decreasing at 4% per year."

Figure 4 demonstrates that the point where the lines intersect is where the economics start becoming favorable for plastics.

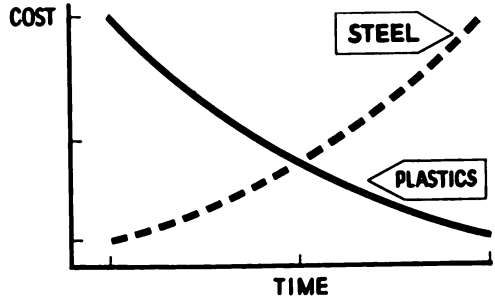


Figure 4. Comparison of steel and plastics in relation to cost and time

For intricately designed pieces the total cost of plastics materials and labor competed successfully with fabricated metals about 1946. For medium-sized pieces plastics were able to compete about 1953. Plastics are expected to invade large-unit fabrication anywhere from 1961 to 1965. For example, all materials needed for an all-plastic refrigerator unit are known; it is simply a matter of economics.

The advantages of using plastic are many. Tooling becomes less of a problem, and restyling can be done much more easily. In styling itself you will be able to shape and form articles in ways that are completely foreign to current use.

To maintain reasonable price stability, even with a continued downward drift of plastics prices, new markets must be developed to consume new plastics, as well as absorb the overcapacity for some, which has been a challenge to us in recent years.

Not only will plastics quality improve in the 60's, as in the past, but the dynamic 60's will see a continued growth in the happy marriage of plastics with plastics, and plastics with nonplastics materials. Products have evolved that were never possible with either material, to open new avenues of product development.

Such combinations include:

Plastics with paper, glass, metal, and fibers
Mylar with polyethylene
Acrylics with styrene

Most of the major metal, glass, wood, and paper industries have made moves to join with plastics in producing combinations.

New possibilities will grow with a generation of new polymers still in research and development.

Corporate Changes

One of the major factors that will influence the marketing of plastics in the 60's will be the continued industry movement toward joint ventures, mergers, acquisitions, long-term contracts, and large-scale diversification into previously unexploited markets.

The trend toward integration of plastic raw material suppliers into the manufacture and sale of film indicates the feeling there is not enough room for adequate profit from the raw material and the finished product. The plastics industry has seen many such moves in the past 5 years. It will undoubtedly see more in the fabulous 60's. A typical trend already started relates to the export-import market.

The marketing challenge for plastics will be influenced by export and import regulations. In addition, new plants are being built overseas to adjust to the European Common Market, and many companies are expanding their foreign interests.

Educational Programs

With the continued growth of the plastics industry, the industry must sponsor an educational program to the public, consumer, designer, and engineer. Many misapplications of plastics over the years have hurt the growth of some resins and limited industry growth. That old adage still holds true: "You can't send a boy to do a man's job." Some plastics, unfortunately, have been boys. The industry must select the best resins for the application, and the consumer must be educated through proper labeling and instructions that plastics are not one material, but a group of resins that can be engineered to meet a product requirement.

With many new products on the horizon, the plastics industry must take time to spell out the limitations as well as the advantages of these new materials. A good example of this is the recent move by Underwriters' Laboratories to limit the use of all plastics in room air conditioners.

The Manufacturing Chemists' Association, the Society of the Plastics Industry, and the Society of Plastics Engineers have accepted a share of the industry's public relations responsibility. They, as well as others, will have to continue to spread the word on plastics through schools, colleges, industry, and to the consumer by the means of press, radio, and TV.

We need to do more education in other areas. The continued development of new equipment for new polymers is a must, if the industry is to continue to expand. Closer liaison between raw material suppliers and equipment manufacturers would speed up new developments.

The development of blow-molding techniques, for example, has been delayed by the lack of equipment development.

Aggressive action is required now to cope with these important influences.

Conclusions

Our primary challenge still is to direct the efforts of the right team, which has selected the right product, to sell at the right price, in the right market.

Our degree of success in marketing plastics in the 60's will be determined by how well and how efficiently we meet this challenge.

The Role of Advertising by the Chemical Industry

F. A. C. WARDENBURG

E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.

The intense competition that is expected to characterize the 1960's can only mean that we will have to step up sales activities. Advertising will be no exception. The chemical industry probably now spends at least $300,000,000 a year to advertise its products. By 1970 it will be spending $750,000,000. Increased size is not the only change expected. Advertising will be aimed at a bigger audience, and to a greater extent at the consuming public. Services available to the customer will be played up more, and institutional advertising will be more important. Companies must make a determined effort to develop the art of advertising research. We need to know how and why advertising works and what effect it has on sales, so that decisions on how much to spend will be more soundly based.

There seems to be a universal fascination in speculating about the future, and the more distant the period, the greater the fascination. In business, a one-year forecast is prosaic, but a ten-year forecast is almost romantic. This is in part, at least, due to the fact that the short-term forecaster will be brought to account for the success or failure of the decisions based on his predictions. The long-range forecast, however, will almost certainly have been forgotten by everybody —including the prophet himself—long before it has run its course.

The role of advertising at any time is simply to assist sales. Advertising has no other justification. If it does not promote present or future sales, it should be discontinued. A very real problem, of course, is determining whether a particular advertising program has or has not helped sales.

The nature of the sales problems which will face chemical manufacturers in the next decade will determine the nature of the tasks that advertising will be called upon to perform.

Economic conditions in the 1960's will depend upon many things: the rate at which the population grows, both in total and by specific age groups; the rate of technological advance; the growth of productivity of employees and of investment; the course of labor-management relations; and the wisdom of government monetary and fiscal policy. These factors are interrelated, each depending to some degree on the others, and each influencing the others.

Any long-range analysis of economic conditions must be based on specific assumptions regarding each of these. For our purpose, however, we should look briefly at only two—population growth and productivity.

Population Growth

We can be more certain about population growth than about the other factors, because the people that are going to be important to business in the 1960's are already born. There will be no dramatic growth in the total population. It is expected to continue to increase about 1.5% a year, rising from its present level of 178,000,000 to 208,000,000 in 1970.

It is in the composition of the population, however, that dramatic changes will take place. Between 1960 and 1970 the numbers of young people between the ages of 18 and 24 will increase 52%, compared with only 2% from 1950 to 1960. The next higher age group, however, those from 25 to 39, will increase by only 3%. Those under 18 and over 40 will grow at about the average rate, or some 15% during the decade.

The great increase in the 18 to 24 age group is spectacular in itself, but its impact will be magnified because most of the growth will occur in the last half of the decade. This has important implications for business. During the early 1960's there will be a continued shortage of skilled labor and college graduates. The rate of family formation will be relatively constant. During the last half of the decade, however, these conditions will change sharply as these young people come on to the labor markets in increasing numbers. They will be marrying, and buying small homes, low priced cars, and household appliances—mostly on credit. These things will not happen, of course, unless there are jobs enough to go around, but we believe that this will be the case.

The 25 to 39 age group will increase very little. This is not without its implications for business. The market for higher priced cars, homes, appliances, and so on will necessarily grow less rapidly. The importance of price is expected to be even greater than it is today.

To predict that technological advances in the ten years ahead will continue at about today's pace seems a very conservative assumption indeed. If we do no better than we are now doing, the productivity of labor and capital combined should continue to rise at an average rate of 2% per year. These gains in productivity cannot be taken for granted. They must be created by individuals and business corporations—there must be adequate incentive for savings and investment, and profits must be large enough to encourage risk taking. Any restrictions on capital formation will limit productivity gains. I am assuming, therefore, that these necessary conditions will be present.

If we add to the 2% gain in productivity an average increase in population of 1.5% per year, we must conclude that gross national product should increase at an average rate of 3.5% throughout the 1960's. By 1970 the gross national product will be approximately $700 billion at present prices as compared with an estimated $475 billion in 1959.

These projections assume that there will be no serious depression similar to that of the 1930's but that we shall have an occasional mild recession. Business fluctuations are inevitable in a society where economic decisions are decentralized. These estimates also assume no substantial change in the war situation in the decade of the 1960's, but continuation of the "cold war."

Productivity

The index of industrial production prepared by the Federal Reserve Board is now about 155, representing a rise in the output of factories and mines in physical terms of about 55% since the 1947–1949 period. It will rise to a peak of 160 to 165 late next year. The index of production of chemicals and allied products is now about 210. It will rise to a peak of 225 in 1960.

There may be some decline in production during 1961 or 1962 because of excesses which usually develop during periods of prosperity, but the trend of production in this country is upward.

Industrial production is expected to continue rising in the second half of the 1960's, when family formation, residential construction, automobile production, and industrial expansion will be significantly higher than they are today. We expect the index of industrial production in 1970 to be about 225, representing an annual growth rate of about 4% over the next 11 years. Output of the chemical industry may reach an index of 400 by 1970, representing an annual growth rate of about 6%.

Attainment of these growth rates over the next decade will require expansion of our present research programs, with consequent development and introduction of many new products, a very large volume of new investment, restraint of price increases, restraint on the expansion of nondefense activities of the Federal Government, and a substantial rise in employment.

The 1960's will be characterized in most lines of business by intense competition; this will certainly be true of the chemical industry. War-induced shortages, so prevalent after World War II, which continued until well after the Korean War, are things of the past. Many important chemical products are in oversupply today, and I doubt if this situation will change much before 1965. Even with the accelerated rate of business expansion in the last half of the next decade, shortages of production capacity in our industry should be infrequent and of short duration. This can only mean that we will have to step up our sales activities, and advertising will be no exception.

Few people realize that advertising is a $10 billion industry. Total national advertising expenditures may, in fact, reach $11 billion this year. Advertising has in the past decade grown much more rapidly than industrial production, gross national product, or almost any other index of economic activity. The explanation is to be found, in the fact that competition has become more intense directly in proportion to the increase in the available supply of all goods and services.

There are no reliable estimates of total advertising expenditures of the chemical industry. For one thing, the chemical industry does not have very well marked boundaries. However, we spend at least $300,000,000 a year to advertise our products. By 1970 the chemical industry will be spending $750,000,000 for advertising, or about 1.75% of every sales dollar.

We cannot assume that advertising by the chemical industry ten years from now will be about the same as it is now, only much bigger. We have seen changes in the past, and we shall see more in the future. There may well be shifts in the audience we seek to reach, in the products and services we tell them about, and in the media we use to do the job. Some trends are already apparent.

Advertising Trends

One change we can predict with some degree of assurance is that we shall be talking to larger and larger audiences.

Most chemical products do not reach the ultimate consumer in their original form, but are used as ingredients in the products of other industries—textile, automotive, electrical, paper, and a host of others. Most chemical advertising has in the past been directed to rather narrow industry audiences, and these are, of course, the cheapest to reach.

Competition is, however, forcing us more and more to advertise over the heads of our direct customers to create preferences by the consuming public for goods in which our own products are important ingredients. It costs a great deal more to reach a mass audience with advertising than, for example, the managements of companies manufacturing air-conditioning equipment. I would expect the trend toward more consumer advertising by the chemical industry to continue in the years ahead.

Many other industries will be faced with similar conditions, and they will be raising their advertising voices. The sheer volume of advertising will make it more and more difficult for the voice of a single company to be heard. Each of us will have to speak more clearly and more to the point.

There is another trend which is already evident and which will become more and more important as we move into the 1960's. Price and quality differentials are becoming less important competitive weapons. No single manufacturer has a monopoly on modern technology. Selling is more and more based on a wide range of technical services that can be offered to our customers. We are advertising not only our products, but also the services that are available to the customer to make it as simple as possible for him to use them.

At the same time corporate reputation is becoming more and more important to chemical manufacturers, as they become more dependent on the choice of individual consumers. All of us have confidence in those products which we know through personal experience or by reputation, and we hesitate to take a chance on those which are unknown to us. The less the public knows about you through actual use of your products, the more you have to tell them about yourself, if you wish them to prefer an article containing something you produce.

This means institutional advertising, which has as its purpose expanding the public's knowledge of just who you are, what you do, and what you stand for—and institutional advertising is also rather expensive.

Preparing Markets for New Products

There is another area in which we can make far more effective use of advertising than we have in the past, and that is in preparing markets for new products.

A very considerable percentage of the 1970 sales of the chemical industry will be of products which are not now on the market—still in the laboratory, or in the early stages of development. Shortening the time between invention and marketing can mean a great deal in terms of increased profits. I see no reason why many products of the chemical industry cannot be intensively advertised before they are available for purchase. Launching a new chemical product requires telling all the prospective users of its properties and its potential applications. The greater the interest, the greater the tendency for potential users to speculate about possible applications in their own operations.

Advertising can spread this information and create this sort of interest more cheaply than can direct contacts. Advertising cannot replace such direct contacts, but it can usefully supplement them, if used more extensively and much earlier in the life cycle of a product.

Problems

Advertising represents for all of us a very substantial and growing item of expense, yet our decisions as to how much we will spend for advertising are necessarily based on rather meager data. The size of advertising budgets is often determined by how much was spent last year, or by next year's sales forecast, or by a guess as to what a competitor is spending. None of these has any direct relationship to what an advertising program can reasonably be expected to contribute to future profits. Our best guide is usually experience and judgment. But this is really not good enough, and advertising management has a responsibility to find something better if it can be found. It can, if we make a determined effort to develop the art of advertising research.

I call advertising research an art rather than a science. In its present state this is a more accurate designation. Someone has said that the purpose of a large part of what is termed advertising research is simply to advertise advertising. Another part simply seeks to measure the success of an individual ad or a campaign in capturing the attention of readers. Measurements are necessary to research, but they are not of themselves research, which should seek and find new knowledge. We need to know how and why advertising works, and to do this we must make greater use of men trained in the social sciences. Above all we need to discover just what effect past advertising has had on sales, so that we can more intelligently estimate the benefits to be obtained from future advertising. If we can do this, our decisions on how much to spend will be more soundly based.

Because of the large number of variables operating in any marketing situation, isolating the effect of a single variable, such as advertising, has until recently seemed a hopeless task. But now, with the availability of electronic computers and with the growth since the war of operations research, there seems to be a real possibility that the problem can be solved.

It may seem rather visionary to attempt to describe anything as complex as the market place by a mathematical model, but the evidence suggests that it can be done. Much time and money and—above all—patience are necessary, but the possible rewards are very great.

All advertisers should as a matter of policy devote some minimum percentage of their advertising budgets to advertising research. This figure might lie between 1 and 2%.

Some substantial part of this research appropriation should be devoted to determining the effect of advertising on sales. I can think of no industry better qualified to increase the scientific content of advertising research than the chemical industry. If advertising is to play effectively the role assigned to it in the competitive 60's, advertisers must do everything in their power to make it a sharp and efficient tool.

Reaching the Organic Chemical Customer via the Sales Organization

LAURENCE E. RUSSELL

Chemicals Division, Olin Mathieson Chemical Corp., 745 Fifth Ave., New York 22, N. Y.

The organization of an organic chemicals sales force is discussed; several problems and responsibilities faced by such an organization are examined. The sales force must provide management with maximum sales volume at suitable profitability levels and lowest possible cost. It must have ability and flexibility to capitalize on growth potentials. To fulfill these responsibilities, it will be necessary to recruit and develop competent, technically trained sales representatives. These men must continually increase their knowledge of products, markets, and customers, as well as of their competition. Finally, it is essential to recognize that the only thing constant in organic chemicals sales is change.

How should we effectively organize, administer, recruit, train, and develop an organic chemicals sales force that can meet the challenges of today for the business of tomorrow? Such a sales force must provide its management with the maximum in sales volume at suitable profitability levels at the lowest cost commensurate with the job to be done. In addition, it must have the ability and the flexibility to capitalize, in its field, on the growth potential that has been projected.

There are many types of organizational structures (nearly as many as the people with experience in the field) that can be effective in the sale of organic chemicals. In fact, because organizations are people, structures of organization cannot be completely inflexible. Otherwise, some individual abilities will be lost as square pegs in round holes. However, no matter what the salesmen are called or to whom they report, an effective sales group must have certain functional responsibilities with their respective levels of authority. By considering some of these functions, we can establish the organizational pattern that will effectively answer the challenges during the next decade to organic chemical sales. First, in the broadest terms, what functions must be fulfilled?

The Customer

Let's start with the originator of the order, the customer. In the organic chemical field, the customer, in the majority of cases, is a company using

organic chemicals as solvents, intermediates, dyestuffs, detergents, or other processing chemicals to manufacture commodities for sale to the ultimate consumer. Very few organic chemicals (and none we will discuss) are sold as consumer goods as such. Therefore, the first stage of our organization requires well-trained chemical sales representatives capable of presenting both the technical and business phases of their products adequately to their customers, The customer represents, from a decision-making standpoint, a complex of individuals that includes technically trained purchasing agents, research chemists and engineers, manufacturing personnel, general management, and, in many instances, both sales and sales development personnel. By analogy, the organic chemical sales organization cannot answer the problems of the next decade by operating as though it were involved in the stock or commodity exchange. The products cannot be properly marketed by calling a broker to advise that you have a drum or a tank car of an organic chemical and to sell it at the going market.

Sales Specialists

At the same level within this organization must be specialists in the end uses of the products. Sometimes these specialists are referred to as technical sales service representatives; at other times they may be called product development or market development representatives. In a number of specialty organic chemical sales groups, they may be the well-trained sales representatives. Again, regardless of what they are called or to whom they report, specialists with a high degree of end use know-how are needed to introduce, promote, and market organic chemicals.

The activities of these sales representatives require competent field sales supervision. This may be at the district office, regional, or national level, depending upon the size of the operation.

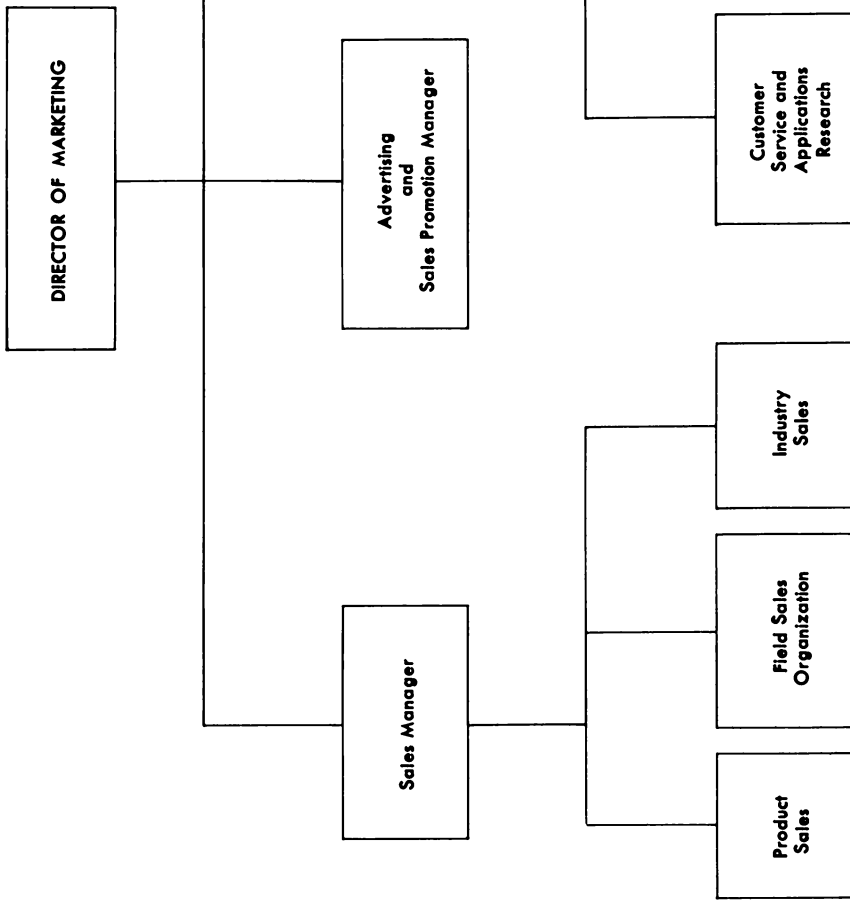
The primary function of the sales representatives and the supervisors is to obtain the order directly and increase the business within the territory. The next requirement, therefore, is a staff responsible for processing the order. This involves pricing, scheduling, planning, promoting, and in general following through with all the services required to look after the customer's interests properly. In many organizations, this is called product sales management. Within such an organization, we must provide personnel experienced in the marketing of specialized products on a national basis. In the organic chemical field, product sales areas are in many instances broken down into classes, such as solvents, plasticizers, intermediates, surfactants, chlorinated solvents, and functional fluids.

Many organic chemical manufacturers use specialists in industries in addition to the specialists on products.

During the next decade, we should expect more competition for each end use requirement plus a continuing demand for better quality and superior performance products, both new and old. All this will require a better industrial and product knowledge, to have an effective organic chemical sales organization. As a result, more specialization will be required by both products and industries.

One cannot introduce new products, establish new outlets for existing products, or plan the changes required by constantly and rapidly changing processing technology during the next decade without personnel active in sales

Sales Organization Chart



development, market development, and market research in the organic chemical field. Such functions vary tremendously within the organic chemical industry with respect to their place in the organizational pattern. I believe this effort is primarily a marketing function; the closer it operates to the other line and staff marketing personnel, the more effectively it will function.

One or more individuals must manage the organization and supervise the entire sales program. From the above, we can draw up an effective organization chart. Then we can study in detail functions and responsibilities needed to sell organic chemicals in the markets of the future.

"Commercial development," including sales development, sales research, technical sales service, customer service, and application research, is considered in detail by other authors. This discussion is concentrated entirely on the responsibility of the sales manager's organization within the marketing group. A strong and closely coordinated commercial development activity is particularly needed in the sale of organic chemicals—not only to promote growth by developing new end uses, but to provide the springboard for the sales organization in selling new products and estabilshing new markets for old products.

Because a myriad of trace impurities affect yield, quality, and performance of a product, the technical sales service organization must be constantly alert to product quality. It must also develop new specifications related to specific end uses, improved packaging, more informative labeling, more and better literature, new end use technology. And it must assist the customer in the most efficient utilization of the products.

The sales research organization must collect, collate, analyze, and disseminate commercial field intelligence, with respect to both existing products and new products.

Selection of Personnel

The first problem faced by the sales manager is recruiting suitable personnel. This manpower problem is not likely to get simpler in the near future. To represent an organic chemical manufacturer adequately, the salesman should have at least a chemical or a chemical engineering degree. Following initial screening by the personnel department, candidates must be interviewed by the supervisory staff from sales, sales development, and technical service, because each marketing function reflects somewhat varied personnel requirements. Unfortunately, an applicant fresh out of college has very little business knowledge to permit him to determine his specific areas of interest. In addition, the interviewer can only make an educated guess regarding the specific abilities of the individual in various types of sales work.

The best approach is to consider that the potential applicant is making only one decision at the time—namely, making a choice between the "business end" and the "technical operating" or "research end." To their credit, a number of applicants coming directly from school are able to make this major separation. The particular area of maximum value to the employer and employee can then be established more definitely during the first two or three years.

The training of a man for sales can be accomplished in many different ways. Some in-service experience should be provided in operations, research, and the staff area of the sales organization as a minimum. This in-service training where the individual has some responsibilities, no matter how minor

they may be, is better than a lecture or "looking on" approach.

"In-service" training in the product sales organization provides an excellent background for selling. Since this area is concerned with the products, programs, and plans on a national basis, the trainee obtains a most valuable insight into the sales organization policies, plans, products, and problems.

The sales representative must have excellent emotional stability in addition to other personality characteristics and intelligence. Therefore, some form of psychological testing should be utilized to be certain that the individual will measure up to the investment (on the order of $500,000) that will be made in him over the next few years. By taking this viewpoint, one can readily recognize the necessity for proper selection procedures for new personnel.

A check list of steps for employee selection is shown in Table I. This chart, prepared by the Industrial Relations Center, University of Chicago, is very helpful to guide the procedure that should be followed with each candidate. Manpower requirements suitable for the job to be done during the next decade will be increasingly difficult to fill. However, no part of a selection program as outlined in Table I should be relaxed. The personnel requirements for the organic chemical marketing profession should be just as high as any other segment of chemical operations.

By the time of the salesman's initial assignment, the sales manager should be able to reply affirmatively to such questions as:

1. Does the man know the company's objectives, policies, and procedures?
2. Does the man know his product line, properties, end uses, product handling, prices, and sales policies?
3. Does the man's wife react favorably toward his new job?
4. Is the man accepted by other members of the organization with whom he has worked?

Let us now take this salesman and study what he will have to do to be part of an effective organic chemical sales organization. First and foremost, he must have an intimate knowledge of the potential customers in his territory. By this, we mean:

1. The people in the organization who influence purchasing decisions, such as purchasing, research, operations, management, sales development, and sales.
2. The processing technology used by the customer.
3. The customer's market.

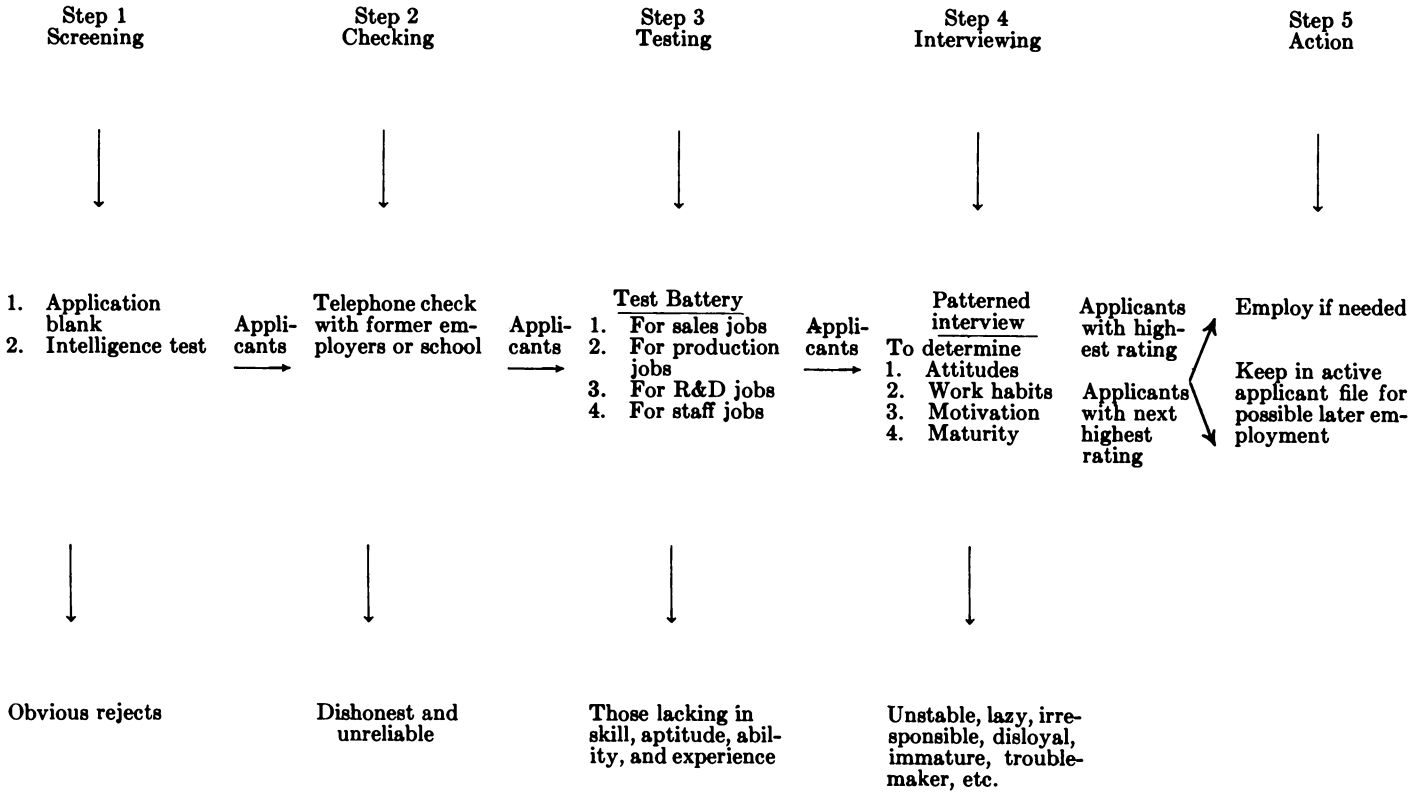
The need for this detail in the organic chemical field will be greater than in some others because changes in consumption due to process changes, product changes, and demands for improved quality are more frequent. There will be more new products being introduced from research or new product development. The sales representative should know his territory well enough to guide sales development personnel, thereby providing a short-cut from test tube to tank car time. He must also be in a position to assume responsibility for each new product at the earliest possible date.

Market Intelligence

The functions of market intelligence relative to customers and competition will play a very important role in assisting the management in making the correct decisions relative to pricing policies, expansion plans, research programs, application research activities, and new product development. A sales executive of one of the largest organic chemical manufacturers said last year that his

Published on June 17, 1959 on http://pubs.acs.org | doi: 10.1021/ba-1959-0024.ch006

Table I. Steps in Employee Selection



salesmen averaged about 65% of their time with customers' research organizations. This situation must continue if the growth is also to continue.

A checklist of one sales manager represents the extent of knowledge that the sales organization must develop to market their chemicals properly over the years ahead.

The Company

Know the customer's total dollar sales.
Know how strong it is financially, whether it is growing, standing still, or fading.
Know its competitive position.
Read its annual report, if available, and study it organization chart.

Its Management

If possible, know the president.
Know the president's background; whether it is in law, finance, production, etc.
Know the sales vice president.
Know who the "comers" are in the company. Make friends with them now.
Know which men in the management group take a direct interest in purchasing.
Know whether the company's management is stable.

Products, Marketing

Know whether your customer has a marketing concept and, if so, what it is.
Know the range of his products and services.
Study his catalogs and bulletins.
Compare your prospect's products with those of his competition.
Know whether he is developing any new products.
Know how his products or services are sold and to whom.
Know and evaluate his method of distribution.
Evaluate the caliber of the customer's sales force compared with his competitors'.

Promotion

Find out top management's attitude toward promotion.
Know the size of its advertising budget.
Know whether your customer's ratio of advertising to sales compares favorably with that of other progressive companies.

Organic Chemical Product Sales Management

This staff function will be increasingly important to the profitability and growth of the organic chemical business. Let us look at its major responsibilities and duties:

1. Sales Planning and Policy
   a. Maintains continuous knowledge of customer's reactions to marketing policies and programs as executed by the field sales force.
   b. Suggests improvements and develops new policies and programs.
   c. Recommends additions or changes in pricing policies relative to product prices, terms, and discounts.
   d. Keeps the sales manager informed regarding competitive pricing policies as reported by the salesmen.
2. Sales Forecast, Budgets, and Controls
   a. Reviews, with the sales manager, sales estimates submitted by selling organization and develops sales forecasts for approval by the sales manager.
   b. Coordinates, with the operating department, the scheduling of production to ensure that sales requirements are met.
   c. Develops forms and procedures for approval by the sales manager to provide smooth and effective two-way flow of information between staff and line groups within the sales organization.
3. Customer Relations
   a. Makes personal calls with the line sales organization on customers to keep abreast of their needs, and of their reactions to the company policies, methods, and products and helps to maintain good customer relations.

4. Product Development
   a. Continually seeks opportunities to broaden present and potential markets and develop new sales ideas and outlets.
   b. Evaluates competitive products, methods, and activities.
   c. Stays abreast of trends and developments in consuming industries which may affect products and markets.
   d. Reviews and submits to the sales manager for approval all bulletins and sales promotional material for release to the sales representatives.
5. Product Distribution
   a. Supervises the proper handling of all orders, schedules, credits, warehouse facilities, contracts, and complaints.

Why have we taken the time to detail the major responsibilities and duties of the product sales organization? Because in the organic chemical field in particular, the coordinating staff handles many of the challenges that cannot be handled by the individual salesman, district manager, or field sales manager.

This is a relatively young and immature marketing area. It faces problems of rapid growth, product and process obsolescence, oversupply, changes in quality, new distribution techniques. The product sales organization is the focal point of over-all service to the sales manager, the management as a whole, and the industry.

Summary

In summary, we list ten important points to assist the organic chemical sales manager to meet the challenges of the future:

1. Recruit competent, technically educated sales representatives.
2. Adequately educate and develop these men.
3. Continually increase the product knowledge of the entire organization.
4. Know the market.
5. Know the customers in depth.
6. Utilize sales development, technical sales service, and market research groups effectively.
7. Organize and administer market intelligence effectively.
8. Strengthen and properly utilize product sales management.
9. Know the competition.
10. Recognize that the only thing constant in organic chemicals sales is change.

Reaching the Plastics Customer via the Sales Organization

G. J. WILLIAMS

Plastics Department, The Dow Chemical Co., Midland, Mich.

Sales organization is defined as that part of the marketing group concerned with direct contact with customers. Its immediate objective is to place well-trained salesmen, armed with the right product, service, and information, across the desk from the influence factors in the customer's organization. The complexities of marketing plastics in the 1960's will place a great premium on intelligence, information, and skill. The number of products to be sold will be greatly expanded. Specialization in sales is likely to increase greatly. Customers will be created by providing a plastic that will do a better job than existing materials. The job will not be so much competing with other plastic materials as the creation, development, and satisfaction of entirely new markets for plastic materials. "Depth selling"—recognition that the total organization of the customer contributes to purchasing decision and needs—is the real way to reach a customer. The purchasing agent is the communicating link. Selling is really geared to the needs of research, production, or sales. These make their needs known to the purchasing agent who communicates them to the seller. For the 1960's, markets and objectives must be carefully analyzed with these points in mind.

The words "sales organization" mean that part of the marketing group primarily concerned with the direct contact of customers. Necessarily included are sales people in the home office who direct the programs and activities of the salesman. You cannot really reach a plastics customer with just the sales organization. I know of no other industry in which the teamwork of research, development, production, and the other parts of the marketing group such as market research, technical service, advertising, and promotion is so important.

The immediate objective of any sales organization is to place a well-trained salesman, armed with the right product, service, and information, across the desk from the influence factors in the customer's organization. This involves two basic problems: the selecting, training, and locating of the salesman, and the selling to the customer.

The Salesman

You cannot take just any man, put a price book in his hand, and say "you are now a plastics salesman." The man you choose must be carefully selected, thoroughly trained in the plastics industry, salesmanship, the products of your company, the services of your company, and the philosophies of your company. Only then should you put him in a field office to face his and your customers. While this may seem elementary, the complexities of marketing plastics in the 1960's will place such a premium on intelligence, information, and skill that we could all do well to review our selection and training programs.

One of the marketing complexities that we now face, and will continue to face to an increasing degree in the years ahead, is the ever-expanding group of products that a sales organization must handle. Ten years ago the typical plastics sales group had one or two basic products to sell. Today this list has grown to six, eight, or ten and, with this expansion in the product line, there has come a corresponding increase in the markets being sold. A salesman can learn and apply only so much and it would seem that specialization, with all its drawbacks, will be a necessity in the 60's. We could spend hours, and even days, debating the relative merits of market specialization *vs.* product specialization *vs.* some other kind of specialization. Keep your customers' problems in mind when you arrange your sales organization. Ideally, the customer would like to deal with one man in an organization who could handle all of his problems. While this may not be possible, do not confuse and irritate your customer with too many people.

The salesman needs help and direction in the organization of his work and account coverage. Depending upon the geographical area and the importance of accounts to be contacted, a salesman will probably average two to three calls per day. With vacations, sickness, sales meetings, etc., the average salesman has about 180 days to spend with his customers. This limited time must be used effectively. In most chemical companies, a majority of the dollar volume is done with a minority of the accounts. This is also generally true in the plastics industry. The major portion of the time of a sales organization has to be spent with important accounts, either actual or potential. But, a salesman must be given time to work with new or marginal accounts, and selling in the 1960's will necessitate an increasing amount of time spent on secondary selling. Perhaps a division into 50% major accounts, 25% new accounts, and 25% secondary selling would be appropriate. Each of us must analyze his own business, in order to make the proper allocation.

Customers

Now to the important business of selling the account.

Generally speaking, plastics customers fall into one of three categories:

A customer who buys the product to make it into a component used by another manufacturer.

A customer who buys the product and makes it into a finished product ready for the market.

A customer who does not buy from your company at all, but buys components made from your products.

You may quarrel with the inclusion of the third category in the definition of a customer, but he can and does select your product and he does furnish the

money that pays your invoice. As such, he is entitled to be called a customer and to be treated as one.

Each of these customer categories has separate and distinct problems, and it cannot be reached by any one marketing formula. We should also remember that each customer within a category is an individual having peculiar and distinct problems. All customers have one thing in common—a love of profits. The supplier who keeps this in mind and directs his selling efforts toward profit for his customer will generally be a very successful businessman.

Economists may think of many more approaches, but it seems to me that there are three ways to increase profits—lower costs, higher prices, greater volume. Each and every one of our customers is interested in one or more of these profit-making routes. How can a salesman sell "profit" to the three categories of customers we have defined?

The customer who makes components for another manufacturer is primarily interested in lowering his costs and in securing new business. A salesman who has nothing in his head, but only a price book in his pocket, has little to offer this customer. He can help lower costs if he knows enough about his products, handling, and material processing to get raw materials into the customer's plant, through the machines, packaged, and delivered to the carrier at the lowest possible unit cost. This can and may involve a change in raw materials, a change in processing techniques, or a change in materials handling. The salesman will use other services of his company to solve these problems; but he must know his customer's business and be well trained to recognize problem areas and to offer possible solutions.

The alert, well-trained salesman supported by an organization with good communications can do much to secure new business for the custom manufacturer. We all have contacts with companies that need plastic parts. Our customers make plastic parts. It is an important part of our job, as a sales organization, to bring these two interests together.

The second and third categories of customers, those who make or buy a plastic part for their own sale or use, have much the same interest in lower costs as the custom molder. They also have a broader interest—the search for new, better, different, or more economical articles to use or sell. It is this broader interest that creates the greater challenge for today's plastic sales organization. The proprietary molder, making a line of housewares, is intensely interested in finding new items to add to his line or a change in his current line that will increase its salability. He is constantly searching for new marketing concepts and new sales tools. To sell to this customer, a sales organization must provide at least some special services, besides the usual ones of a good product, good supply, and technical help.

Perhaps the greatest challenge is offered by those customers who are now using or can use a plastic in the manufacture of an article that they sell. This is the real area of developmental selling. The sales organization must be alert to the problems and needs of these industries, develop a product to fill the need, prove out its utility and—last but not least—sell the customer.

Appliances used to be essentially 100% metal and the appliance industry was faced with such problems as corrosion, heat or electrical conductivity, and limitation of design flexibility. Fortunately, our industry recognized these problems and developed plastics that helped make better appliances at lower costs. In many industries the solvents used in protective coatings created

problems of flammability or toxicity. Today, many of these problems are solved by the use of water-base paint systems. The pharmaceutical and cosmetic industry was and is faced with a serious packaging problem. Metal rusts and glass breaks. Plastic packages, particularly those of polyethylene, have solved these problems in many applications. Here we are not just reaching a customer. We are actually creating a customer by providing a plastic that will do a job better than an existing material or will do a job that just could not be done before. This is the way our industry has grown and to continue this growth is the real challenge of the 60's. Our job is not so much competing with other plastic materials as it is the creation, development, and satisfaction of entirely new markets for plastic materials.

Selling in Depth

I have spent some time defining the types of sales situations confronting our plastics industry, because I think that it is necessary to an understanding of "depth selling," which is the real way to reach a customer. What do we mean by this term? It is a recognition, on the part of the seller, that the total organization of the customer contributes to the needs and purchasing decisions. This being true, it is necessary that the sales organization be intimately familiar with all phases and functions of the customer's organization and business. Only through such familiarity can we do the best job for our customer and for ourselves.

Most companies can divide their business into the functions of purchasing, research and development, engineering, production, marketing, and management. In larger companies, these may be separate and distinct departments with many employees. In a smaller company, the "boss" may perform one, two, or all of these functions. Regardless of the organizational pattern, each of these functions must be performed in the operation of any manufacturing and selling business. The important thing for us to remember is that every one of these functions can influence the decision to use or buy your plastic.

When a customer has a product in research or preliminary engineering, many fundamental decisions are being made such as to size, shape, and materials of construction. The sales organization can be of real service to the customer, to you, and to our industry at this stage. If plastics can be used in the customer's product, now is the time to make the decision. If the application is critical and special plastics should be used, now is the time to get them specified. It is so much easier to start with the right plastic than to correct mistakes or convert to plastics after the product is in production.

If we have done the correct job of helping the customer with the design and selection of materials, we should not have many production problems. Unfortunately, we do not always get the chance to do this and, even when we do, we sometimes make mistakes. Then too, our industry is characterized by constant change and improvement. All of this means that our sales organization must follow our customer's product into production. Here we can again assist the customer by helping him operate at maximum efficiency and lowest costs. This may involve modifications of either the material used or processing techniques. One thing is sure—your sales organization cannot help if it does not know your customer's production processes.

In the discussion of selling profit to your customers, increased volume was specified as one profit route. All parts of a customer's organization are interested in volume, but you must admit that nothing is nearer and dearer

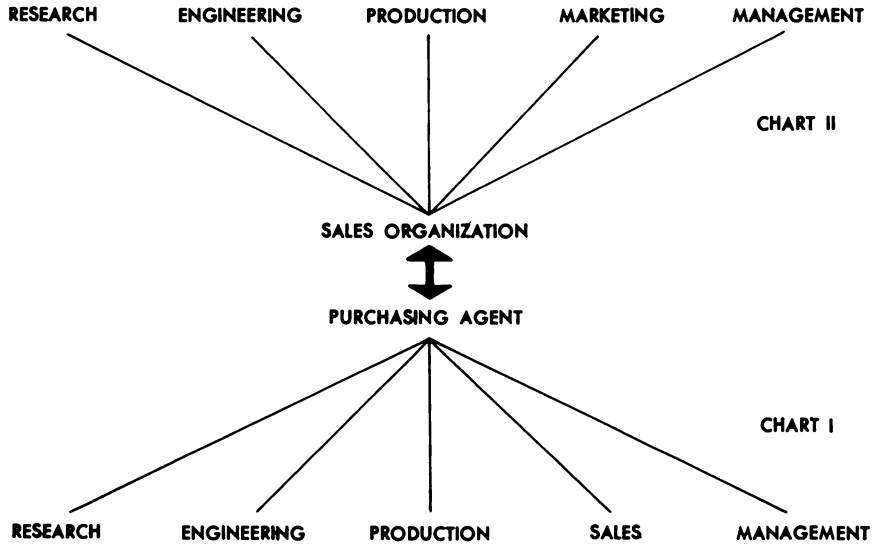
to a salesman's heart than volume. And, more than any other group in a company, a sales organization is measured by the volume it can generate. Plastics are very versatile materials, available in a wide color range and capable of being formed into the most intricate shapes. Their correct use can do much to increase the salability of a customer's product. The use of plastic packages for screws, food, and clothing; plastic toys and housewares, plastic garden hose, latex paint are but a few examples. Your customer's sales organization is vitally interested in these new product ideas. Our customer also has sales problems. We should know these problems and use our sales organization to help solve them.

Only in certain situations does management itself directly make a purchasing decision, but its presence is felt in all the parts of a customer's organization. If we are to sell in depth, we must have the permission and cooperative support of the customer's management. This can best be achieved by good performance as a supplier, but it may also be necessary to explain and sell your company's philosophy and its advantages.

At this point the question arises: Where does the purchasing agent fit into this sales program? Well, he is the answer to our question: How do we reach the customer via the sales organization?

As your sales organization is the communicating link to and from the customer, the purchasing agent is the communicating link to and from you. When we speak of selling to research, production, or sales, we really mean that we sell to their needs. Their needs and problems are made known to their purchasing agent and he in turn communicates with us. Likewise, it is to the purchasing agent that we transmit solutions for these needs and problems. Many times the purchasing agent will advise us to talk directly with research, production, or sales. Such direct discussions are very beneficial, but this decision must and should be made by the purchasing agent.

A simple chart shows this purchasing agent–total company relationship very effectively (Chart I). Now when we place on this chart of the customer's organization a similar chart of the seller's organization, we have the complete buyer-seller relationship (Chart II).



All parts of the seller's organization can, should, and do contribute to any successful sale. All parts of the customer's organization can, should, and do contribute to a successful purchase.

Selling and buying are truly cooperative team efforts and, as with any team, you must have a leader—the man who calls the signals and directs the team effort. With the buyer this is the purchasing agent and with the seller it is the sales organization.

Conclusions

Directing the seller's team effort in the 1960's will be no easy job. The pace will be fast, with change the rule, rather than the exception. A few things—perhaps fundamentals—will always be with us.

The 1960's will be a time of good business with intense competition.

Our real job is to create new markets for plastics, not just to sell against each other.

We will need a sales organization equipped with men who are well trained, creative, and industrious.

Markets and marketing objectives must be carefully analyzed and specified. Much time and effort can be wasted riding the wrong horse.

Know your customer. A customer is a complex business organization having many and varied problems, needs, and desires. Analyze, define, and fill these needs.

Work through the purchasing agent.

Always remember to sell profit for your customer. It will make you a rich man.

Reaching the Customer by the Sales Organization

Inorganic and Heavy Chemicals

W. F. NEWTON

Columbia-Southern Chemical Corp., One Gateway Center, Pittsburgh 22, Pa.

The market for inorganic and heavy chemicals will be competitive during the sixties because of continuing overcapacity for many products. If inflation continues, moreover, the cost-price squeeze will continue to exert extreme pressure. In meeting those challenges, the best sales job will be done by organizations that have set realistic goals and have closely examined their personnel needs. Sales organizations may need to be changed to make selling efforts most effective. Technical services must be analyzed. Multiple contacts will increase further. Selling and freight costs will receive much attention. Salesmen must increase their knowledge of customers' products, problems, and needs.

What is there of importance to be said about reaching the customer of inorganic and heavy chemicals through the sales organization in the competitive sixties? Why should we concern ourselves with this problem?

Familiarity is often said to breed contempt and there are times when inorganic and heavy chemicals, while not held in contempt, are perhaps treated with less concern than they deserve. Technical people, not closely associated with the industry, are apt to think improvements in products and processes have been pretty completely covered. Many users are apt to take it for granted that supplies will always be readily available. Financial analysts are, at times, inclined to underrate the value of activities in this field.

A healthy, progressive, and profitable inorganic and heavy chemical industry is vital to this country. This industry produces the major tools, or building blocks, of virtually the whole chemical and processing industry. It is, therefore, of prime importance that the challenge of the sixties be met, not only for the financial success of companies engaged in this field, but for the consumers of these basic products. It is also of more than academic interest that sales organizations properly perform their whole function in reaching the customer in the competitive sixties.

The customer can be reached in several ways other than through the sales

organization. Successful marketing has been described as the creation and satisfaction of a demand at a fair profit. In its broad sense, marketing is the concern of all the departments of the company. Any company that does not accept this premise and conduct itself accordingly, is risking its success. To fulfill its function properly, the sales organization should be the integrating force that brings all the ways of reaching a customer to bear on a favorable sales-purchase relationship. All the departments of a company have an important place in a successful program.

Inorganic and Heavy Chemicals

Some of the major products that come to mind most naturally in this category are: sulfuric acid, caustic soda, soda ash, chlorine, salt cake, phosphates, and silicates.

Most of the products considered in this field have had a long period of high tonnage commercial use. The manufacturing processes are fairly well stabilized. Product quality is usually high, although minor differences in quality can often be of extreme importance to some consumers. Competition is keen, since there are several producers in most of the products. Capital investments per unit of sales are high. Prices are low per unit as compared with many organic and specialty materials. Consumption of many of the products in this field is less subject to wide fluctuations than some of the other chemicals being considered in this series of papers. End-use distribution is usually broad. Freight costs represent a high percentage of the delivered cost to the customer. Bulk delivery in tank cars, box cars, hopper cars, and trucks makes up a large portion of the deliveries, although packaged goods are important.

Characteristics of the Market in the Sixties

The market will be competitive, not because of a low level of business activity, but rather because a large number of vigorous producers will enter the sixties with considerable overcapacity in many products.

Many economists in this field predict a rise of 75% in the output of industrial chemicals during the next decade. Thus, while we will enter the sixties with overcapacity in many chemicals, the expected rise in consumption during the period will require further expansions. Because those in the business will seek to maintain or improve their position, and undoubtedly there will be some newcomers in many fields, the new expansions will probably precede actual demand and again give overcapacity. Because of the time required for construction of facilities, usually 12 to 24 months, and the necessity for building large economic-sized plants, successful companies must commit themselves to expansion before the actual new demand is realized. Many factors in our economy point to continued inflation. Cost of raw materials, labor, and services will rise. Most of the chemicals in this field are now produced on such a tonnage scale and have had so many years of intensive technical work on the processes that further cost reductions will be hard to realize. If inflation does then continue, the cost-price squeeze will continue to exert extreme pressure.

Sales Organization and Methods of Selling

There are many variations in actual practice. Organizations selling inorganic and heavy chemicals might have sales volumes of from $10,000,000

to $200,000,000 per year. District sales offices may number from three to 20, with a district office manager, in some cases an assistant district office manager, and from one to 10 salesmen in each office. District sales managers will report to an executive sales management, consisting of from one to four executives. Sometimes there will be regional managers between the district office managers and the headquarters executive group. Supporting staff groups will consist of such departments as Order and Service, Credit, Traffic, Sales Research, Market Development, Technical Service, and Advertising. All of these groups will not necessarily report directly to the executive sales group, but in an effective company they will be set up so that a close-working relationship is maintained.

A high percentage, possibly 50 to 80%, of a company's products, will be sold to a relatively small number of customers, say 10 to 100. The balance of a company's sales will be to a large number of companies, perhaps 200 to 3000 or more. Probably 80 to 95% of the company's products will be sold directly to the consumer, with the balance being sold through, or to, distributors.

Very little spot selling will be done. Most of the business will be conducted on a yearly contract basis, with some substantial business done on longer terms. Customers do not readily change suppliers, having built up loyalties, normally over a long period of time. Selling to this field is, therefore, a long-term relationship, requiring patience, persistence, and intelligent use of all the company's skills.

Most of the men selling chemicals in this field will be technically trained, with a preponderance of chemists and chemical engineers. Many will have had some years of laboratory or plant work. The choice of technical men for selling is the subject of considerable discussion. During periods of acute technical manpower shortage, the claim is made that the use of technical men in selling is not the most efficient use of skills. Others claim that technical men do not basically have sales' aptitudes. Some feel that nontechnical salesmen should be chosen and then trained in the "vocabulary" of the field, sufficiently to discuss the products and their application. It is a conviction shared by many, however, that the strongest sales organizations in this field will have a majority of technically skilled man who also have a high aptitude for sales.

In an article titled "The Changing Language of the Sales Call" [*Sales Management* (May 1, 1959)], Jack Bernstein quotes John L. Gillis, vice president, Marketing, Monsanto Chemical Co., with respect to the qualifications of salesmen in this highly technical and competitive field. The point is made that today's salesmen must be qualified to talk in terms of technology, management, marketing, and profit. This has been made necessary in a large part because buying is being done by personnel more versed in the technical aspects of the industry and because the purchasing function is becoming a more important function of management.

Meeting the Challenge

Goals. One of the first steps by which the successful sales organization will meet the challenge of the sixties will be in a setting of realistic goals for accomplishment. Estimates of an increase of 75% in industrial chemicals during the next decade have been mentioned. Initial overcapacity brought about eagerness on the part of most producers to expand, and accentuated by imports, will make the task of setting feasible goals difficult. Successful com-

munication of the goals to the whole sales organization with adequate division of responsibility, coupled with proper follow-up, will be most important.

Personnel. To meet the goals established, there must be a careful analysis of manpower needs. Good men do not come into an organization by accident. Adequate recruitment and the sales training programs must be established, implemented, and followed. All of the best tools available must be used in screening and selecting men. Training programs will have to be more effective than they have in the past, if younger men in the organization are to take their place quickly in the ranks of those who can produce. In many cases, at the present time, it is the general practice for new men selling in the field to be given a period of indoctrination in the plants and various inside departments that relate to sales, followed by on-the-job sales training in the field. The next several years will see an increasing number of companies engaged in more formalized sales training programs for new men and the retraining of experienced salesmen in certain areas of their work.

Organizational Changes. It has been common for sales organizations in the field of inorganic and heavy chemicals to handle the complete line of the company's products. The larger and the more diversified the companies become, the more critical is the question of whether organizational changes are required for more efficient handling. One route that is taken by some companies is rather complete divisionalization of products, so that a company may have two or more separate sales organizations covering the same geographical fields. Another method of meeting this problem is through the use of product managers working in a staff relationship to the direct line sales group. Still another method involves the assignment of specialty salesmen to the jurisdiction of the district office managers. There is no single correct solution to this type of problem. Many companies will use combinations of the above-mentioned methods. There are probably two extremes that should be avoided: the tendency to stay too long with a simple straight-line organization, which often results in a lag in progress in new fields; and the tendency to divisionalize too soon and too completely, which may result in top-heavy staffs and divisional conflicts.

Technical Services. Recent years have seen an increasing amount of manpower and facilities devoted to rendering technical service to the consumers of basic chemical commodities. This service is not necessarily limited to actual problems involved in the handling of chemicals being sold. However, it is the obligation of the sales organization to decide how much service should be rendered, consistent with the amount of business at stake, and to see that the service program is merchandized in a way to justify the expense.

Multiple Contacts. Under the impetus of more competitive selling conditions and the increasing complexity of the chemical field, a greater amount of sales effort is being expended by top sales and other executives. The establishment of multiple contacts with customers and potential customers is definitely on the increase. Properly handled, these can be extremely beneficial for both the seller and buyer. Without proper communications and considerations, these contacts can result in a loss of sustained effort and can undo much good ground work that has been laid. Every multiple contact should have as its purpose the strengthening of the relationship between the man primarily responsible for the sales and the man primarily responsible for the purchasing decision. Buyers and sellers alike will seek to open up additional opportu-

nities for constructive contacts of this type, to make their work more effective.

Selling Costs. Selling costs, including salesmen's compensation, traveling expenses, and entertainment expenses, will receive close attention in the years ahead, to be sure that money is being spent effectively. There is no mathematical guide as to what constitutes a correct selling expense ratio. This will vary from territory to territory, customer to customer, and product to product. In some cases, sales organizations are spending too little. Additional expenditures in certain areas might appreciably increase profits. An organization may have a low expense-to-sales ratio, but be spending the money poorly. Careful analysis of the goals and the expenses involved in reaching these goals will consume an increasing part of sales management time. Activities that provide an opportunity for a sound and closer working relationship between buyer and seller will increase. Entertainment primarily for the purpose of "buying" business is of no significance in this industry, and will not become so.

Freight Costs. The costs of delivering are generally a substantial percentage of the total cost the customer pays for the product at his plant. More efficient ways of handling products will be continually sought. More efficient ways of scheduling will help cut delivery costs. Working against the reduction of delivery costs will be the competitive situation involved in delivery times. Many producers will find they need warehousing or stock points to render certain customers competitive service. Carrying this type of service to an extreme will increase costs, which ultimately will be borne by the customer. Considerable judgment must be exercised in this area. One of the ways in which delivery costs will be reduced will be the attracting of some consumers to neighboring plant sites, so that over-the-fence or pipeline deliveries may be effected. This requires close coordination with the customers' plans. The most important consideration in this area is to be sure that plants are not poorly located with respect to the long-term cost of producing merely for a temporary advantage in delivery costs.

Field Sales Responsibilities. To play their proper part in meeting the challenge, the salesmen in the field must increase their knowledge of their customers' products, problems, and needs. This will be done not alone by purchasing contacts, but through all of the many sources of information, such as companies' literature and trade journals. The salesman must become increasingly familiar with his company's products, services, and plans for the future. He must know the company's goal as it affects his particular area, and he must have a plan for meeting the goal.

District managers are faced with the ever-mounting problem of competition for the time of their salesmen on the part of product managers, technical service, market research, sales development, and other staff men. This points to the need for managers more than ever familiar with the company's total program, so that they can make wise decisions in the allocation of manpower in the field.

Summary

The best sales job in the competitive sixties will be done by organizations that have set their goals, analyzed their personnel needs, and are now embarked on a program which will use all of the skills of the company to help keep pace in a dynamic and challenging industry. Right leadership will create the proper atmosphere for team play that will be beneficial to all concerned.

Reaching the Consumer via the Sales Organization

Agricultural Chemicals

D. J. KEATING and W. B. SHAFER

Agricultural Chemicals Division, Stauffer Chemical Co., 380 Madison Ave., New York, N. Y.

There is no question but that the agricultural chemicals industry is going to grow. However, it is vitally important that we all recognize that it must be built. It must be built upon research and technical service. The industry's growth pattern may well parallel the pharmaceutical industry, the growth of which has been predicated upon substantial investments in research and major expenditures in technical service. Only with the further development of productive research and the organization of efficient technical service, can the agricultural chemicals business be built to the stature which it merits in the competitive decade ahead.

All of us are intrigued by the future. And, as responsible businessmen, we must be. For all of us recognize that no organization, no industry, can progress and prosper unless it constantly appraises the future and plans its own development in harmony with the new needs and competitive forces which are arising. But one impressive fact is that often many of us tend to regard the future as being veiled and mysterious; the future, we are often persuaded, is bound to be different from either the past or the present. That, in degree, of course, is true. However, what we do not always appreciate is that the future does not necessarily have to be so different, so indeterminate. For, after all, the future is merely an extension of the present. The present grew out of the past and the future has its makings in the present. Consequently, if we analyze current circumstances thoughtfully, we can determine the shape of the future with reasonable clarity and certainty.

We propose, therefore, to assess some of the major trends which are taking place today. We shall evaluate some of the important economic and technical developments and assess their impact on both the course and stature of the agricultural chemicals industry. Then we must determine how our sales organizations must be structured if they are to function most effectively in the decade to come. For that is of pervading importance. Over the past few years I have heard and read much about how the agricultural chemicals industry is going to

grow. The casual use of that word "grow" annoys; it implies a certainty which is sure to evolve, regardless of how leisurely or bumbling we may be. Our industry will, to be sure, grow. But, in essence, it must be built. We must build it—through investments in research, study of economic needs, intelligent planning, and by selling. And sound selling can be accomplished only if we have sales organizations which are geared to the circumstances that will prevail in the now-close sixties.

What Is Happening Today

New Products. It is somewhat trite, but literally true, to say that both agriculture and the agricultural chemicals industry have undergone a revolution in recent years. Many factors have contributed to this revolution, but among the most noteworthy has been the development of a myriad of new products. All of us in the industry are aware of the stream of new pesticides which is pouring out of research laboratories. However, immersed as we are in the day-to-day affairs of our business, we may not be fully conscious of the degree to which research has recast our entire industry.

Table I merits consideration, because it profiles what is happening and provides a significant perspective.

Table I. U. S. Production of Some Major Pesticidal Chemicals

(1000 pounds)

Chemical	1956	1957	1958[a]
Aldrin, chlordan, dieldrin, endrin, heptachlor, and toxaphene (combined production)	86,659	75,424	98,280
Benzene hexachloride (gross)[b]	84,599	39,559[c]	31,000
Benzene hexachloride (gamma equivalent)[b]	14,700	7,300[c]	6,200
Calcium arsenate	27,106	19,478[c]	9,000
Copper naphthenate	2,012	2,130	[f]
Copper sulfate	133,616	141,360	97,192
2,4-D acid	28,835	34,251[c]	28,500
2,4-D acid esters	19,476	24,137	22,827
2,4-D acid salts[d]	1,766	3,182	
DDT	137,659	124,545[c]	143,216
Disodium methylarsonate	[e]	618	[f]
Lead arsenate	11,756	11,920[c]	[f]
Methyl bromide	10,204	9,653	[f]
Methyl parathion	[e]	1,925	[f]
Nabam	5,486	4,961	[f]
Parathion (ethyl parathion)	6,529	5,962	[f]
Pentachlorophenol	31,385	28,346	[f]
Phenyl mercuric acetate	693	570	[f]
Sodium chlorate	110,136	118,284	134,498
2,4,5-T acid	5,169	5,334[c]	3,500
2,4,5-T acid esters	7,045	6,831	[f]
Ziram	1,436	1,277	[f]

[a] Preliminary.
[b] 1958 includes lindane; 1956 and 1957 without lindane.
[c] Revised figure.
[d] Sodium and amine salts.
[e] Figure not publishable because it would disclose individual operations.
[f] Figure not yet available.

Sources. U. S. Tariff Commission, U. S. Bureau of the Census, U. S. Bureau of Mines, chemical industry.

In the decade of the fifties impressive advances have been made by "new" pesticides. The chlorinated hydrocarbons (aldrin, chlordan, dieldrin, endrin, heptachlor, and toxaphene) have moved from a very meager output in 1950

to 98,280,000 pounds last year; 2,4-D and 2,4,5-T from practically nothing to 73,725,000 pounds in 1957; DDT from limited production to 143,216,000 pounds. On the other hand, some of the old staples—for example, calcium arsenate—have faltered.

What is mirrored here, too, is a striking parallel between our own industry and the pharmaceutical industry. The trend in recent years in pharmaceutical chemicals has been to develop, through research, more effective and in many cases more specific medicinals. For instance, about ten years ago approximately 90% of the prescriptions which were dispensed were prepared by the druggist. He mixed and blended various ingredients, many of them crude drugs, of some medicinal merit—a sirup, an analgesic. Then pharmaceutical research yielded the specifics—the antibiotics, antihistamines, sulfas—each of which had a particular therapeutic worth. Consequently, some 90% of today's prescriptions are prepackaged specifics.

In agricultural chemicals we are destined to follow a similar path. Many of the newer pesticides are specifics; many of the products we now market are prepackaged specialties, formulated to do particular pest control jobs.

When the pharmaceutical industry was in the throes of transition, it became evident that the structure of its marketing organization had to be modified. The pharmaceutical makers had to educate the medical profession, had to inform doctors of the characteristics and uses of their new products. So the "detail man" became the important element in pharmaceutical marketing, the foundation on which much of the industry's growth was built. We, too, must recognize the new informational needs which are arising in our industry. The circumstances of the future are going to dictate that we have large staffs of "detail men"—agricultural specialists who can inform and advise farmers of the products and procedures which should be used to prevent or remedy agricultural problems.

That is going to be one of the keystones of any successful sales organization in the competitive sixties.

There is another similarity between the pharmaceutical industry and ours, and it is also reflected in the statistics tabulated. A dozen or so pharmaceutical companies have grown lustily in the past decade. Hundreds have slipped into obscurity. Those which have grown, without exception, have invested heavily in research. Those which have failed have, in the main, done little or no research. They were content to compound and mix and to sell what they could. Thev contributed little to the growth of the market—often, indeed, they relied on the quick sale at a cut price as their sole business asset. The survival rate of these noncontributing pharmaceutical firms has been low, very low. We can, with a considerable degree of assurance, predict that the future of any firms of this type in the agricultural chemicals industry is dismal. Our industry has matured. It is a specialized business. Investments in research, in the development of new products, in the expansion of technical services, are now fundamental necessities. Any company which ignores those truths has no prospect of staying in business in the competitive decade which now confronts us.

Change in Farming

Profound changes have been effected in the nature of our product line. But just as importantly changes have taken place, and are taking place, in the nature of the market for our products.

There are today far fewer farms than there were a decade or two ago. But the average farm is now much larger. In 1940, for example, there were 6,500,000 farms in the U. S. Average acreage per farm was 174 acres. Now there are 4,700,000 farms; average acreage has risen to more than 240 acres (242 acres in 1955).

What these figures depict is obvious. There is a movement away from the family farm and farming as a way of life. (About 21,000,000 people live on farms in this country now compared with 31,000,000 in 1940.) Today's farms are larger units. They are run in the same manner as modern businesses. In some respects the farm has become a factory—a factory which produces crops of foods or fibers. And larger modern farms, just like factories, now have management teams to ensure efficient and profitable operation.

This trend toward the concentration of farm acreage and the utilization of the methods of business management will be a major characteristic of the sixties.

If we are to capitalize on this trend, we must realign our sales organizations. In business, as we all know, few orders for industrial chemicals are received by having salesmen call only on purchasing agents. Production men, too, are purchasing influences; so are other staff people in management, research, and so forth. With a similar diversity of purchasing influences developing in agriculture, we will have to build depth into our sales organizations. Particularly to introduce new products, we must have squads of "detail men" or agricultural specialists. We shall have to have too, other specialists, those who can talk dollars and cents with purchasing agents, those who can discuss application methods with production managers, those who can appraise pesticidal conditions with entomologists. I can envision a stratum of specialists—by crop and by product—who will be responsible for "marketing in depth." And, incidentally, this will put new demands upon sales management, for its responsibility will be to coordinate these many talents.

Continued Inflation

We must anticipate too, in planning our marketing programs, that we are going to continue to be subject to the penalties of inflation. All of us hear many public pronouncements on the evils of inflation. Most of these are uttered with the same nobility of spirit as are the pronouncements which condemn sin. But, in actuality, just as there are those who privately relish sin, so there really are no potent forces which are ruggedly against inflation. Indeed, if you analyze the comments which most people indulge in when they discuss inflation you will notice that the real, and the only, fear is that runaway inflation may engulf our economy. In light of that circumstance we must conclude that our general economic course is going to be an inflationary one. Controlled inflation, we trust, but inflation nevertheless.

That means that, without doubt, our own costs will continue to rise—our research and manufacturing costs, travel and selling expenses, and so on. But of equal importance, agricultural costs are going to move up steadily too. In all probability the impact of inflation will be greater on the farm than on industry. Farm labor cost are already proving to be burdensome; labor costs are now a matter of consequence to all farmers. They are going to become even more so within the next few years.

Thus we are confronted with a challenge and accorded an opportunity. The challenge will be to control our own costs; the opportunity that is ours is

to develop labor-saving chemicals—particularly herbicides—which can be used in raising high-labor cost crops and lower the farmer's costs.

The pressure is going to be on our industry to develop these compounds. The task of our sales forces is going to be greater in order to reach the consuming farmer.

Mechanization of Farms

With labor costs mounting, and we are convinced that they are going to continue to mount, and with the trend toward larger unit acreages, the farm of the future might well be regarded as an agricultural factory. And just as the inevitable trend in industry is to the installation of more mechanized equipment, so we may expect a parallel development in agriculture. A glance at Figure 1 will reveal what is already taking place in terms of farm mechanization. And mechanization of agriculture is as yet only in an early phase. We can anticipate that the sheer pressure of economics will broaden and accelerate the trend toward greater mechanization.

As another facet of mechanization, and one which is destined to expand, consider the rapid growth of aerial application practices. The acreage of crops and forests—and forests are now being properly categorized as timber cropland —treated with pesticides from the air in 1957 was 18.4% over 1956 and 24.9% over 1955.

Table II. Aerial Application of Pesticides and Defoliants in the United States in 1957

Activity	Area Treated, 1000 Acres	Materials Dispersed	
		Dry, 1000 lb.	Liquid, 1000 gal.
Insect control, total	46,157	215,269	64,618
Crops, orchards, etc.	30,472	213,902	51,946
Forests	10,338	151	7,698
Towns	2,695	517	2,251
Soils	2,652	699	2,723
Plant disease control	1,048	13,725	3,103
Weed control	6,904	12	12,112
Brush control	585	172	2,294
Defoliation	2,094	12,968	11,415
Total	56,788	242,146	93,542

Source. CAA Statistical Handbook of Civil Aviation, 1958 edition.

Impact on These Trends

It is apparent to even the most casual observer, that powerful forces—research, labor costs, mechanization, and the business orientation of agriculture—are singly, and in combination, driving the agricultural chemical business into a new period of expansion. There are today some areas of research which have been explored only in a peripheral sense. There is, for instance, much that we do not know about soil-borne plant diseases, much that we have yet to do in the development of soil fumigants, which would include soil insecticides, soil fungicides, and nematocides. Since the advent of 2,4-D—and that was only a few years ago—our industry has focused a considerable amount of research on herbicides. But, there again, much remains to be done if we are to control the vast array of weeds which plague agriculture.

We have begun, but only begun, to study the infestations of forests. This

area will become a more important and active one and scores of compounds will be originated to cope with the multitude of pests to which our forest lands are subject.

There is promise too—early promise, to be sure—in systemic insecticides and in microbial pesticidal agents. We are, it is certain, on the threshold of significant discoveries in those areas.

All these developments, and all these economic circumstances are surging trends, are going to thrust new responsibilities on our marketing organizations.

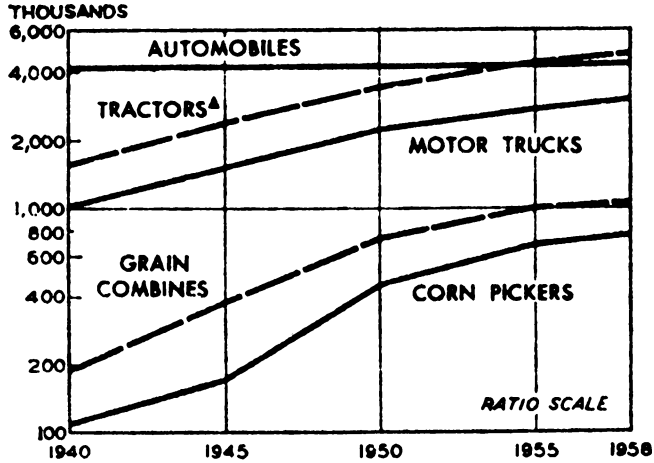


Figure 1. Increase in number of machines on farms

Data as of January 1
▲ Exclusive of steam and garden types
Source. Department of Agriculture

Impact on Marketing

The roster of new products will be accompanied, of course, by many technical data. Our sales organizations will have to be made up of technically knowledgeable specialists. Their function may well be to act more as agricultural consultants than as "salesmen." As a consequence we can anticipate that technical service will be one of our major sales costs in the next decade. Moreover, as our own manpower costs increase, not only in terms of cost per man but also in light of the broadened technical services we shall be called upon to render, we shall have to capitalize upon the most economical communications techniques we can devise.

There is, of course, no substitute for the man in the field—for personal selling. But we shall, we suspect, pay more heed to buttressing his efforts by the use of more sales aids. Our industry invests substantially in advertising. Some of these funds are well invested in factual, informative, fruitful advertising. Much advertising, however, is pretty, colorful, and burdened with glittering claims which fringe, to say the least, on fiction. The decade of flossy advertising is going; the time is coming when the advertising of all agricultural chemicals will be factual and functional, when fitting respect will be paid to the intelligence of the farm audience.

It is probable, too, that we shall utilize the facilities of closed circuit TV,

so that agricultural seminars may be conducted conveniently on a coast-to-coast basis.

However, the basis for the growth of our industry, and certainly the basis for the survival of any company, is going to lie in the productiveness of its research and the character of the technical services which are rendered by staff specialists. Let us not forget that one fifth of the food crops planted by mankind each year never reach the dinner table. They are destroyed or damaged by insect pests, fungus, or disease. And, in some countries, an additional 10% of the harvests is destroyed in storage or in transit, by rodents, fungi, or other pests.

This represents a staggering economic waste. And where such waste exists, there is a clear-cut opportunity for the development of means to curb such losses. That is the purpose of our industry. That is the opportunity which is ours.

Our industry will, to be sure, continue to grow. But we should never forget that it is our responsibility to ensure not just that it grows, but more importantly, that the agricultural chemicals industry is built.

For that is our charge.

Delivering the Goods to the Customer

J. G. ROBISON

Pennsalt Chemicals Corp., 3 Penn Center, Philadelphia, Pa.

The traffic department's over-all responsibility is to procure the most economical transportation available for both manufactured goods and inbound purchased materials. The heaviest amount of the traffic department's work is with the sales department. But it must also work closely with the corporation's executive, production, purchasing, and research and development departments, as well as with accounting, treasury, advertising, and publicity. Many important changes in transportation have occurred in recent years. These have affected railroad shipments, the trucking industry, inland waterways, and ocean freight.

Delivering the goods to the customers in the competitive sixties brings to mind, along with a lot of other things, the old saying: "Go like sixty." It had, I suppose, behind it the idea of an automobile going 60 miles an hour. Delivering the goods to the customers in the competitive sixties, believe me, will not be one of those horse and buggy 60-mile-an-hour things. Some goods will move at 460 miles an hour and the tempo of almost all movements will be stepped up substantially.

Not only will we have faster transportation, but it will be better and cheaper transportation, and there will be more of it. There will be a myriad of new packages, new cars, new trucks, new water, air, and pipeline routes, and, more importantly, there will be coordination among these forms of transport—interchangeable facilities, through rates, and through routes.

Transportation in the 1960's will be integrated so that the several separate transportation steps between raw material and finished product will be combined into one transaction. This will eliminate delays, annoyances, transfers, and paper work inherent in the previous system.

Visualize an initial movement of a raw material by water, an interplant product movement by rail, a final movement to the customer by truck or air—covered by one through transportation charge, one bill of lading, one responsible transportation company. This is in the cards for the sixties.

Just how your companies will use such services depends on specific marketing problems, what new things you come up with in products, how your distribution pattern changes, and most important of all, how these changes can lower costs, improve service, and enhance your over-all marketing position.

I may be accused of overdramatizing the transportation possibilities of the next decade to the point of not being practical. If some of my statements border on the incredulous, look back ten years and think what has transpired. For example, who would have dreamed it possible to attend a ball game in New York in the afternoon, fly to Los Angeles after the game, and see the Dodgers play at the Coliseum that same night!

Much progress has been made in all forms of transportation in recent years. Those who look on railroad management as a bunch of dead "dodos" basking in the reflected glories of the gay nineties, should take a look at our modern locomotives. In 1936 almost every locomotive in America was steam-powered. Now, some two decades later, almost all rail traffic is handled by modern diesels.

Railroads

The ever-changing transportation picture has drastically affected the tonnage handled by the railroads. Since 1946, the total intercity freight traffic ton-miles in the U. S. has increased 49.4%. In spite of this remarkable growth, the railroads now carry only 46.3% of the intercity freight traffic compared to 66.6% in 1946, or a change of 20 percentage points in relative position. Obviously the rails have lost position to the motor carriers, pipelines, and water carriers, in that order. Leaders in the railroad industry are well aware of this serious problem and have revitalized their organization to cope with it. Loss in revenue from passenger traffic has long been a headache and a political football, particularly commuter service. As a traffic man, I am of the opinion that railroad freight rates should not be increased to take care of deficits in passenger service. The railroads in recent years have done a statesman-like job in presenting their passenger problems to the public and law makers alike.

The trend toward consolidation among the railroads will continue. There will be many mergers, with resultant economies and abandonment of unprofitable segments of the present rail system. For example, the Seaboard Airline and the Atlantic Coast Line would like to marry; so would the Erie and Lackawanna. Several New England railroads are studying a regional get-together. All of this is in the best interests of the carriers and shipping public, and will be the forerunner of a healthier transportation system. In the age of speed which lies ahead, there may well be only a dozen large railroad systems instead of the 661 operating railroads in existence today. (This figure includes switching and terminal companies. In 1911 there were 1312 operating railroads!)

Railroads have made great progress in locomotives, from the high-stacked wood-burners of the 1850's to steam locomotives, electric locomotives, and finally the diesels of today. Railroad planners are now studying the possibilities of a locomotive powered by atomic energy.

To a shipper one of the most pleasing aspects of railroad progress has been the manner in which the railroads have improved their facilities through the use of centralized traffic controls, new yards, new shops, improved signal and communication systems, and many other modern devices. The new railroad freight yards with their vast array of electronic devices and "push-button" controls of whole freight trains makes us wonder how the freight of the future will be handled. The immortal Casey Jones would turn in his grave at the very

thought of a train operated without engineers or firemen, but it is not beyond the realm of possibility.

In the "sizzling sixties" which lie ahead, we will see a vast improvement in the type of railroad cars. Tremendous progress has been made in the past decade, and railroads will keep pace with the equipment needs of our dynamic, ever-expanding chemical industry. In recent years we have seen improved covered hopper cars, Damage-Free cars, Tote Bin cars, Truck-Trailer cars, and many others.

Piggy-Back Service. One of the most revolutionary and controversial changes in transportation in recent years is the rail piggy-back service. This service has many names, such as Flexi-Van and Truc-Train, to say nothing of the many less complimentary names it has been called by the opposition.

Plan I. Rail transportation of trailers owned by motor common carriers. Truckers solicit and bill freight at truck rates. The shipper has no direct contact with the railroad. The trucker pays the railroad—either a "division" or a flat charge per trailer. This plan seems to be in a relative decline, perhaps due to reluctance on the part of the truckers to avail themselves of rail service in competition with straight over-the-road delivery, handled exclusively by the trucks.

Plan II. Railroad trailers moved in rail service. The railroad deals directly with the shipper, soliciting business under railroad-truck competitive tariffs. This plan is rapidly growing in usage and has not been subjected to Interstate Commerce Commission Investigation and Suspension proceedings. The railroads have provided a new efficient service, which in many cases is equal to truck service and at competitive rates.

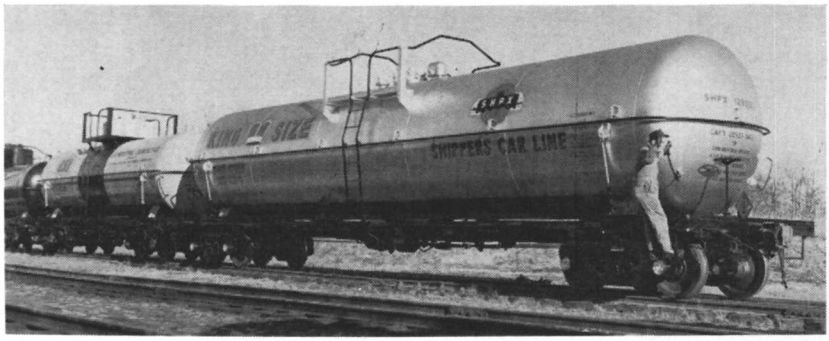
Plan III. Trailers provided by the shippers, owned or leased as he wishes. The shipper delivers loaded trailers to railhead; the railroad puts them aboard flat cars, ties them down, moves them to destination, and grounds them; and the shipper handles delivery. Rates are based on commodity and quantity moved, or on flat basis. The rates under this plan are obviously much lower than on Plans I and II, because the shipper supplies the trailers and bears the expense of pickup and delivery. Many chemical companies have found that fantastic savings are possible under Plan III. Unfortunately, these rates are being investigated by the Interstate Commerce Commission and are subject to cancellation. Some chemical companies, as well as trade associations in the industry, have appeared at ICC hearings in support of Plan III. We feel that it is an economical and sound proposition, in the best interests of the shipping public, and therefore should be established on a permanent basis.

Plan IV. Rail movement of shipper trailers on shipper flat cars. The shipper takes trailers to and from railroad, and loads and unloads cars. The railroad performs origin to destination movement only. Rates are based on flat charge per car, whether trailers are loaded or empty. This plan is being used largely by freight-forwarding companies and is also involved in ICC Investigation and Suspension proceedings.

Piggy-back development is no "operation hula hoop," here today and gone tomorrow. Each traffic man must carefully study his particular movements to ascertain which plan will meet his needs and reduce transportation costs. All four plans have the immediate advantage of very little loss and damaged freight as compared to the usual box car shipment. In fact, in the not too distant future the box car may be relegated to shipments of a few low-rated bulk commodities.

Recently the railroads have proposed so-called "Guaranteed Rates." In principle these rates are similar to the "agreed rates" in effect in Canada, whereby the shipper guarantees the carrier a volume of freight at an agreed charge. Hearings before the Interstate Commerce Commission on the legality of these rates are now being held in Washington, D. C. Shippers, in general, believe that the guaranteed rate principle is sound and in the long run will be an established procedure.

There have been many more progressive ideas for rail freight recently. Many of these involve incentive rates—that is, lower rates for larger amounts shipped in one rail car. The jumbo tank car is in this category, and the eastern railroads have approved a rate scale for cars of over 10,000-gallon capacity. Many shippers do not approve of the formula proposed for rates in these giant cars, but, at least in principle, it is a step in the right direction.



King-size tank cars, with a capacity of 20,000 gallons, allow shippers of chemical, petroleum, and food products to take advantage of lower freight rates for volume shipments

During the 1960's there will be much legislation affecting the railroads. The amendment known as the 1958 Transportation Act gave the rail carriers some relief. I predict, however, in the years to come the rails will be given much more leeway in fixing their rates and charges, and far greater latitude in augmenting their present service with truck, pipeline, and water operations—even air operations—under one management.

The chemical industry is a valued customer of the railroads. Nine per cent of the gross revenue of the U. S. railroads is derived from the transportation of chemicals. The transportation of chemicals and raw materials which enter into their manufacture runs into millions of carloads annually. Tank cars used in rail transportation are furnished by the shippers and there are over 45,000 of these cars in use today. Most of these cars are expensive, highly specialized equipment, developed over the years for our peculiar needs.

As Confucius said, "He who scratches my back shall likewise get his scratched!" In other words, the railroads are one of the largest customers of the chemical industry, buying wood preservatives, fire retardants, refrigerants, wood killers, insecticides, and a host of other chemicals. The Association of American Railroads advises that railroad purchases from the Chemical Industry amount to several hundred million dollars annually.

Trucks

The comparatively young and vigorous trucking industry is absolutely essential to the growth of the chemical industry. We can appreciate its rapid growth when we stop to consider that federal regulation of interstate trucking was not enacted into law by Congress until 1935. General types of trucks are:

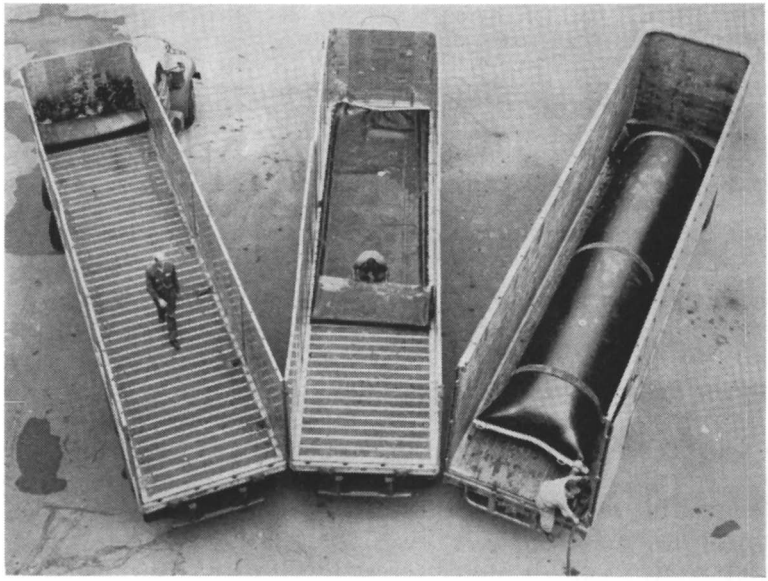
1. Private trucks, operated by an industry or individual as an adjunct to and in furtherance of the primary business of the company.
2. Contract carriers. These trucks engage in for-hire transportation under individual contracts or agreements with their shippers. They are not required to file specific rate schedules with the ICC, but must file copies of their contracts and minimum rates.
3. Common carriers. These truck lines must publish all their rates, rules, charges, etc., in tariffs which must be filed and accepted by the ICC.
4. Exempt motor carriers including those transporting agricultural commodities, fish, and newspapers, or performing a service wholly within a municipal zone.

Trucks will play a major role in our marketing plans in the competitive decade which faces us. The type of truck transportation you will use depends entirely on the service required and your own peculiar marketing needs. Depend on your Traffic Department to develop these vital data. Soaring common carrier truck rates have forced many companies to enlarge their own private fleets of trucks. On the other hand, the manufacture of chemicals is our primary business, and all aspects of private carriage should be carefully analyzed before committing our companies too far. There are many pitfalls, such as labor costs, union problems, ICC regulations, state and municipal laws, maintenance of equipment, and a host of other problems in the trucking industry. One factor which deters many companies from expanding their truck fleets is difficulty in developing a return pay load—a balanced move to and from the plant.

One unethical and illegal practice is all too common in these competitive days, when it seems "the customer is always right." It works like this: Sam Jones, a valued jobber account, places his order, under a "delivered price" schedule, for pickup in "his truck." Sam is allowed the full common carrier freight charges on his invoice, but when the truck shows up at the plant, it turns out to be the Hot Rod Express from South Bycycle, a so-called gypsy without the necessary ICC operating authority. Sam gets his order delivered cheap if the trucker isn't caught, and everybody is happy. Seriously, this practice is all too common, and most chemical companies are taking active steps to eliminate the offenders. The shipper is as liable as the carrier for this malpractice.

The fastest growing segment of the transportation industry has been the for-hire tank truck industry. Thirty years ago practically no chemicals were being handled by tank trucks, but during and since World War II the growth of this vigorous industry has been phenomenal. Today all types of tank trucks transport our chemicals to markets—aluminum, stainless steel, pressure, glass-lined, rubber-lined, and a host of other trucks especially designed for particular chemicals and approved by ICC specifications. In general, the trucking companies supply the tank trailers, and these shipments have the obvious advantage of speedier delivery, smaller minimum requirements than a tank car, and more flexibility of service. The next ten years will see more and more tank trucks carrying chemicals to market over a huge new network of highways. Whether or not the sixties will see a large diversion of chemicals from the common carrier tank trucks to private fleets depends a great deal on whether these carriers can economically serve us at reasonable rates. I believe they can and they will expand and prosper with our chemical industry.

The 1960's will then see a tremendous growth of the trucking industry. State and federal highway expansion programs will further add to the healthy



Collapsible rubber containers can be used to transport bulk liquids in conventional flat bed truck trailers. Sealdtank, produced by U. S. Rubber, rolls up like a rug when not in use, permitting the same truck to be used for both liquids and dry cargo

By hooking up two regular trailers to one tractor, motor carriers can now move loads up to 127,000 pounds over the New York Thruway and Massachusetts Turnpike. When this double unit returns to the regular highways, it is broken up into two single-trailer units

growth of this important segment of transportation. New and more efficient equipment will be forthcoming. The so-called "double-bottom" trailer trucks are now seeing service on some of our thruways and turnpikes. More and more supertruck highways will be built. Delivery schedules will be maintained

at speeds far beyond our present setup. This will enable trucks to compete in many markets where they are not now competitive.

Water Transportation

Many chemical plants are located on our great inland waterways to take advantage of low river transportation costs. Specially designed tank barges ply these rivers with bulk chemicals such as acids, ammonia, chlorine, caustic soda, carbon tetrachloride, acrylonitrile, cyclohexane, urea, turpentine, salt cake, methanol, phenol, styrene, benzene, propane, alcohol, glycol, and many others.

The following figures will give an idea of the growth of barge transportation in the ten years from 1947 to 1957. All these products represent vital raw materials for many chemical companies.

Commodity	Gross Tons	
	1957	1947
Sulfur	2,711,903	885,853
Salt	—	66,979
Coal-tar products	1,658,495	—
Sulfuric acid	1,680,653	1,291,059
Industrial chemicals	3,203,914	10,956
Fertilizer and fertilizer materials	883,855	605,974
Chemical products, misc.	36,704	34,014
	10,175,524	2,894,835

The future will see many more plants built on our great inland waterways. 1958 was a recession year, which somewhat slowed down expansion, but in spite of this, 488 waterside industrial plants were built or expanded.

New barges have already been placed in service for molten sulfur. Barges will ply the waters from Pittsburgh to the Gulf. Improved tank barges will be built for practically every chemical moving in volume lots.

Many chemical companies are located on deep water and can take full advantage of economical ocean freight, not only for export shipments but coastwise and intercoastal traffic as well. The future will see our industry develop many more ocean vessels for the transportation of chemicals in bulk—both liquid and dry. This type of transportation will prove especially advantageous for interplant moves—for example, from Gulf ports to the East Coast.

The so-called Fishy-back service, whereby ocean vessels transport truck trailers, will vastly increase in the next ten years. Transportation of rail cars via ship is already a proved success and will enjoy still further growth.

The opening of the St. Lawrence Seaway has added a fourth coast to the United States. It opens the door of the whole Midwest to seaborne commerce. One third of the population of the United States lives in the 14 states that have ports on the Great Lakes or nearby. This region produces about 40% of the total U. S. manufactures, and many chemical plants are located there. This new waterway, with its 27-foot channel, will bring water transportation to many chemical plants that were formerly land-locked. In the cards for the 1960's is low-cost water transportation for chemical raw materials and for chemical exports. Coordination between the new waterway routes and inland routes, including pipeline, railroad, and highway, will result in lower transportation charges for many chemical materials and products.

The trend is toward integration. Seamobile containers, for example, permit use of the same container to ship by both sea and highway. Containers adaptable to truck hauling are carried on ships designed for handling railroad freight cars

Pipeline Transportation

Far under the ground and unseen and even unknown to most people is a vast network (over 200,000 miles) of pipelines which are principally used to transport petroleum and petroleum products. The flow of this traffic is usually in one direction, although in some instances the direction of flow has been reversed. Most of the existing pipelines are operated by oil companies as private facilities; however, the Interstate Commerce Commission regards the pipeline as a common carrier transportation agency. Those engaged in pipeline transportation on a "for-hire basis" are required by the Interstate Commerce Commission to file tariffs covering their operations.

The chemical industry utilizes pipeline transportation for raw materials and some products, but the distances traversed by chemical pipelines are much shorter than those of the petroleum pipelines. Pipeline transportation, when it can be utilized, represents the lowest-cost form of transportation. Its use depends upon large and continuous volume, one way.

The 1960's will see a greater use of pipeline transportation for chemicals. Increased storage and distribution facilities along the pipeline routes will overcome the volume problems. New detergents, which quickly and efficiently clear the lines, will enable a large variety of products to be handled through a single line.

Air Freight

The volume of chemical freight moving via air today is comparatively small compared to other modes of transportation. The sixties will see a tremendous

increase in the use of air freight. Giant cargo jet planes will fill the skies and render a new type of service at undreamed-of speed. Chemical distribution and marketing patterns will change greatly to take advantage of improvements in air transport.

Yet to be fully developed is what has been quaintly called Birdieback—the transportation of either containers or motor vehicles by helicopters or aircraft, effectuated by the Armed Forces during World War II. There is also commercial use of vanlike containers for air cargo.

Highly imaginative is another variation, so-called "speed packs." A speed pack is a canoe-shaped detachable part which is secured to the underside of a passenger plane by means of cables and hooks. It will carry up to 8000 pounds and is equipped with four wheels which make towing and preloading possible. The unit can be attached for release very quickly and its carriage does not affect the over-all efficiency of the plane.

Conclusion

Even had I the imagination of a Jules Verne, I could not predict all the dramatic changes that will occur in transportation. If we are to remain competitive in the hectic sixties, we must take full advantage of every type of transportation.

Its importance to a chemical company should not be underestimated. Without adequate transportation, there would be no chemical industry.

Your Traffic Department will be very much a part of the team effort if you are to remain a "first division" outfit. Every department in the company—Executives, Sales, Production, Purchasing, Research and Development, Accounting, Advertising—is involved in some phase of the transportation of manufactured products or purchased materials. The over-all transportation bill for the chemical industry is the third largest item of expense, exceeded only by cost of goods purchased and payrolls. Chemical marketing in the competitive sixties will require the ingenuity and skill of keen traffic men to keep pace with this "jet propelled" nuclear age in transportation.

Acknowledgment

The following were of assistance in preparing this paper:

Chas. H. Wagner, General Traffic Manager, Shell Chemical Corp.
Chas. H. Beard, General Traffic Manager, Union Carbide Corp.
Frank C. Tighe, Senior Traffic Manager, Union Carbide Corp.
Carl P. Greenley, V. P. Traffic, National Distillers & Chemical Corp.
Association of American Railroads
American Trucking Association, Inc.
National Tank Truck Carriers, Inc.
The American Waterways Operators, Inc.

Market Research to Provide Guidance for Marketing in the Competitive Sixties

W. G. KINSINGER

Hercules Powder Co., Wilmington, Del.

Only recently has chemical market research been recognized and organized as a corporate function that differs from sales, and is worthy of full-time concern of separate individuals. The tools of market researchers—statistical information from published literature and from field interviews—will have to be sharpened to meet the challenge of the competitive sixties. Market research people must assume the initiative in improving published sources of information. They must also improve their skills in forecasting, but perhaps most important, they must sell and interpret their results to management. Market research is considered from the standpoint of marketing three types of products: long-established products, products new to the company but old to industry, and totally new products created by research.

Nearly all authors who write about some aspect of chemical market research begin with a definition of these terms. Unfortunately, these definitions vary not only in the particular words which are used, but they are frequently found on close examination to be basically different in meaning. It is not my purpose here to add another set of words or to sit in judgment on previous definitions. I am more concerned today with what market research can be in the future than what it has been in the past. The inability of professional experts to agree on the limits and purposes of the function is to me but a reflection of its newness in the corporate organization.

If by market research we mean simply a directed search for markets of products or services, such effort is as old as history and Eve and her apple represent the first, and perhaps simplest, case history. In this same sense, chemical market research has been going on as long as chemical products have been sold. Certainly no one would dare to claim that the early pioneers of the American chemical industry were unconcerned with the markets for their products, were not eager in their search for those markets, and were not, therefore, doing market research in this sense.

What, then, is new about chemical market research? The newness lies in the fact that it has only recently been recognized and organized as a corporate function different from sales, and worthy of the full-time concern of separate individuals or even separate departments. The detailed and objective studies of markets made by these groups can now more truly be termed market research instead of market search.

Organized market research groups in the chemical industry are probably less than 25 years old. It is difficult to set an exact date when the first separate market research division was formed, but the Chemical Market Research Association, probably the first organization of professional market researchers in the chemical industry, held its first meeting as recently as June 8, 1945. The initial membership was 78 people. From this, we may infer that few people in the chemical industry concerned themselves exclusively with chemical market research in the 1930's.

Assuming, then, a 25-year history of organized chemical market research, we may ask, "Where are we now? What tools and skills have we acquired to carry into the competitive 1960's? What challenges exist to improve these skills to assist in guiding the marketing effort of the future?"

Improving the Skills of Market Research

The market research profession, and it is now a profession, has grown rapidly since World War II. For example, the Chemical Market Research Association has increased from an initial membership of 78 people to a current membership of nearly 600, which come from 225 American and Canadian corporations. The formation of the Chemical Marketing and Economics Division of the American Chemical Society and its growth in membership are further evidence of a mounting interest. Courses in chemical market research are now included in the curricula of several major universities. Symposia on some aspect of market research are held frequently by most of the professional and technical societies associated with the chemical industry. All the major consulting houses to the chemical industry offer excellent market research services and the number of individual consulting companies engaged primarily in market research at times seems countless.

During the last decade, the art of market research has been greatly advanced. Today's chemical market researchers are highly skilled in painting the market picture. Their tools, which consist of statistical information from published literature and from field interviews, have been adequate, but these tools must be sharpened to meet the challenge of the competitive sixties. In this coming decade we shall need more than a painted picture of the market; we shall need no less than a three-dimensional photograph and that probably in color! In addition, we must learn to interpret this picture to those who assemble the whole jigsaw plans of corporate action. Let us consider where improvements may be made.

Published Market Information. Chemical market research people must assume the initiative in improving our published sources of market information. We should, for example, cooperate with those departments of the Federal Government on whose published statistics we lean so heavily. The task forces under the sponsorship of the Advisory Council on Federal Reports are now cooperating with the U. S. Tariff Commission to analyze and

recommend improvements in the Tariff Commission reports on organic chemicals. In doing so, they demonstrate such cooperation. The chemical market researcher in industry should begin this cooperation by taking it upon himself to determine that his own company's reports to Tariff are promptly and adequately made. He, of all people in the company, best realizes the industrial value of Tariff statistics, and therefore, should be certain that his own company's reports are correct. The same, of course, applies to all reports to the government, which eventually appear in published form and are used by market research people.

Statistical Information. Our technical journals and trade papers are publishing an increasingly large amount of statistical information on chemical markets. In this area, it seems to me that the responsibility of the industrial market research man is twofold. First, whenever the limitations of company policy or confidence permit, the market researcher should publish the results of his studies. He should do so for exactly the same reasons that our technical brothers publish the results of laboratory studies—to add to the fund of human knowledge and to provide a basis for later workers in the same subject.

His second responsibility is to correct errors which occasionally appear in our usually accurate chemical press. Cooperation with reporters and letters to the editor can do much to prevent or correct those errors. The press, in turn, should make every effort to document the sources of statistics which they publish on chemical markets. How unfortunate it is that many times these numbers, lifted from context, assume an authority far beyond their true value.

Forecasting. Another area for improving the skills in market research lies in the realm of forecasting. One may safely say that the modern chemical market researcher has become expert in describing the market in the past and at the present, but his tools for projecting into the future are woefully weak. And yet it is the future picture which is most needed by those who use market research results. The title of "crystal ball gazer" is not without significance.

This is a major opportunity for research in market research techniques. We must watch closely the forecasting methods even now being developed by economists, by mathematicians, and by students of the human society. We must be quick to adopt these new methods whenever possible.

Handling Results. Finally, and perhaps most importantly, the market researcher must still sell and interpret his results to management. Much could be written on this, but I would offer only this one thought which may be new to some. Generally, the market research man provides information on markets to someone else in the company who, in turn, uses that information to make a decision. The market researcher may or may not be part of the decision-making group. Regardless of his eventual role in that process, I believe that every market researcher has not only the right but the responsibility of arriving at the decision which his own results indicate. Only by going through such a decision-making process can he be sure that his results are adequate, yet not superfluous, to the specific decision involved. Other factors may cause the company decision to be contrary to his, but he will come to accept that possibility. However, if the market research man cannot use his own results to arrive at a decision concerning the market, how then can someone else?

Market Research as an Aid to Marketing

All that has been written thus far applies to the challenge for improving market research as it may be used in all company decisions—by management, research, sales, or production. Now we will deal with the more specific case of its aid to the marketing function and what improvements may be needed for that purpose in the future.

Established Products. The use of market research as a tool for monitoring sales by sales analyses or by determinations of market potential or market penetration has long been recognized.

Setting Prices. In the competitive sixties, marketing men will depend more on market research in determining pricing policies. Prices are properly set by sales management, taking into consideration production costs and an adequate return on stockholders' investment. But two important features of the chemical industry make it vital that objective and thorough market research be employed in setting prices. The first is the well-known fact that chemical production costs decrease rapidly with increased volume. The second is that nearly every chemical product has a wide variety of uses or possible uses at the right price. Thorough market studies will be required to relate these two factors, cost-volume and price-volume, so that a maximum return on investment can be realized.

Market research to prepare a price-volume curve on an established product calls for the highest degree of detailed study. Not only must the relationship of end use to price be studied for the particular product involved, but also consideration must be given to the probable action of producers of competitive products—both those which our product may replace if its price is lower and those which may replace our product if its price is higher. Perhaps the sheer magnitude of efforts involved in a thorough study of this type explains why it is not carried out more often.

Product Planning. Market research can be an excellent sales tool and will be used more for this purpose in the 1960's. Modern purchasing agents and chemical buyers base their purchasing policies, in part, on the long-term trends of the products they buy. Many purchasing departments even have staff men assigned specifically to the study of such trends. An objective and well-presented market research report, including unprejudiced forecasts, is well received by such buyers who consider this another service provided by the seller to the buying company. Certainly, the company which thus demonstrates that it uses such organized market studies in its product planning should be considered a more dependable source of future supply than one which jumps from crisis to crisis.

Customer Market Research. Producers of basic chemicals and plastics have come to learn that the marketing of their products can be greatly helped through market research on the markets for the products their customers make. Such studies require the agreement and cooperation of all the customers who sell to this market. Essentially, it is saying to such a group of customers, "Let us study with you the markets for the products you make from our chemicals. Let us then sit down together and determine how we may mutually increase or expand your markets—through promotion, through research, through improved methods of manufacture, or through any other process by which we all benefit."

Several such market studies have already been made by the Hercules

Powder Co. In every case, we have been able to benefit Hercules customers and Hercules together. This type of market research, on customers' products, will become more and more common in the 1960's.

Consumer Research Groups. As the chemical market researcher begins to make his studies nearer and nearer to the ultimate consumer, either through work on his customers' products or through the integration of his company toward consumer products, he will find that he must learn to understand the methods and language of consumer research groups. He will be called upon to appreciate the accuracies and inaccuracies of their methods, to translate to chemical sales management the real meaning of their statistical approach, and to understand the psychology in motivation research. He may even be called upon to conduct or direct such surveys himself. Technical men in the chemical industry, accustomed to industrial markets where the number of customers is limited and where the reasons for product use are usually technically logical, have difficulty in understanding the broad statistical approach of consumer research groups and the psychological aspects of motivation research. The chemical market researcher, more than any other individual in his company, bears the responsibility of interpreting to his marketing management the significance of consumer research studies of the buying public.

Finding New Uses. My final challenge to the chemical market researcher of the 1960's in assisting the marketing of established products lies in market studies of totally new uses for these products. Much has been written about the current overcapacity of the chemical industry and many predict this will carry over into the early 1960's. Finding new uses for the products we are already making is perhaps the biggest single challenge to the industry as we enter the next decade Although this has always been an outstanding ability of the chemical industry, marketing men and applications research men whose products are in oversupply must increase their efforts to develop new uses. Here, creative market research can be at its best.

Sales people frequently have a perfectly natural but unfortunate mental block concerning their products. Because their daily tasks involve current customers, they tend to think of their products strictly in terms of their known uses or at best in very closely similar uses. A paint resin is thought of strictly in terms of its use in paint or in lacquer; a solvent is strictly a solvent; a plasticizer is used only with plastics. While this is not universally true and sales development people especially have learned to overcome such blocks, there is still a tendency to explore uses analogous to a known use.

On the other hand, the chemical market researcher is frequently, by the very nature of his job, exploring industries and technologies new and unfamiliar to his company. Furthermore, not being specifically concerned with one company product or product type he is more able to think of all company products in terms of their unique physical properties and performance. As he talks with technical people in the new industry or technology, he has the opportunity of creatively matching these product properties against the problems of the industry. Such pioneering or opportunity research can be a major contribution in finding new uses for chemical products in the 1960's. It calls for the highest caliber of market research man—one who can think creatively on industrial problems, one who can quickly grasp a new technology, and finally one who is sufficiently informed on all his company's products that he can use them as tools to solve these needs.

Products New to Company, Old to Industry. Market research on commercial chemicals already established by other companies but new to your company is a well-developed art. The rapid growth of the chemical industry during the last 15 years, both in new products and in new production processes, has created a great demand for this type of "me too" market research.

PRELIMINARY MARKET RESEARCH. The preliminary market research on a "me too" product can be of great help to marketing if and when the company decides to manufacture it. I personally have had the somewhat unique experience of having been appointed sales manager of a product for which I had previously done the market research. This was an opportunity to learn firsthand where my own market research results could have been more useful as a guide to my sales management efforts.

This market research job was by usual standards entirely adequate for Hercules' decision to enter this field. Statistics on production, capacities of competitors, consumption, end-use distribution, and customer potentials were all complete and accurate and even the forecasts of future consumption have since proved reliable. This report was of invaluable help in delineating areas for concentrating our sales effort and in teaching our salesmen how customers used this product. Some eight years later, it is still a handbook to my successor in the sales manager job.

But as sales manager for the product, I found I needed many details not contained in my market research report. Customer buying habits, contract preferences, unloading facilities, shipping containers, and many more data were required to set in motion a hard-hitting sales program. All this information could have been obtained during the market research interview, and today, when market surveys are carried out at Hercules, we try to envision the problems that will face our salesmen if we make the product. Ever since then I have been highly in favor of having every market researcher receive some experience in direct sales.

THE MARKET RESEARCHER. The market researcher is, whether he likes it or not, the pioneer salesman for the product. The impression he makes on prospective customers can be good or bad and can, thereby, make later calls by salesmen easier or more difficult. At the same time, he has an excellent opportunity to size up the purchasing agent or buyer and later to alert the sales force as to what approach to make to this particular individual. To do all this properly, he must have all the attributes of a good chemical salesman in the highest sense—personality, appearance, an ability to think in terms of customer benefits, and a thorough knowledge of the product both technically and commercially.

While all these things are not usually considered as part of the market researcher's job, I feel sure that in the highly competitive 1960's, this type of information and these impressions left in field interviews will be increasingly needed if market research is to be of the greatest assistance to sales.

Completely New Products. Market research on completely new products is properly carried out in coordination with the progress of the product through the various degrees of laboratory and applications research. The intensity and degree of detail in the market research study should increase with the approach of the product to commercialization until a thorough job is carried out just prior to the request for capital funds for a plant. Such thorough market research before capital approval is not always done and many a sad tale could be told where

market estimates were made by guess and by hunch of necessarily enthusiastic development men, rather than by experienced and objective market researchers. Market research on new products while the plant is being built has very little meaning as the job by then is one of market and sales development.

In carrying out market research on a new product in its early stages, the market research man is generally dealing more with the laboratory chemists than with marketing men. However, as part of the development team, he represents the thinking of the marketing departments and in many cases is the most sales-minded individual involved. He must constantly be posing to the laboratory people questions such as "Where will we sell this product? At what price? In what volume?," and, at the same time, be trying to answer these very questions through his own work. While it is necessary to be objectively critical the market research man must never be guilty of pessimism. He should be part of the creative team giving birth to the new product, suggesting uses or markets and working with the applications research people in proving in those uses. In addition, through quantitative appraisal of market potentials it is essential that he act as a checkrein on unwarranted enthusiasm for the new baby, and above all bear in mind that the product can succeed, that it can reach the marketing stage, and that he has the opportunity through his market research of easing the initial sales job and shortening the introductory period after commercialization.

Conclusion

I hope I have been able to change the picture of the modern market researcher as simply a collector of statistics. Perhaps in my enthusiasm for the role he can play in the future I have gone too far; perhaps I have charged him with responsibilities and attitudes toward his job which today we would not include as market research. Perhaps he cannot be both creative and objective in his field activities, but if he is truly to assist marketing in the next decade he must do more than provide numbers, however accurate those numbers may be. He must come to be a part of the marketing team, to think like marketing men, and to appreciate the challenge facing them in the competitive sixties. He must seize on every opportunity to improve the marketing of chemical products whether or not it properly falls within any definition of market research.

Monitoring Sales Performance

HERBERT DEMMEL and JAMES E. SAYRE

Plastics & Coal Chemicals Division, Allied Chemical Corp., New York, N. Y.

The role of the market research department in enhancing sales efforts is discussed. One method of achieving greater sales productivity is by use of control devices to check movements and selling expenses. Such controls are necessary, but by themselves do not give the salesman means of effecting deeper market penetration. A well-prepared sales budget also provides a yardstick for measuring performance. Perhaps the commonest method of monitoring sales is with market share or participation information. The sales budget lends itself readily to this type of analysis. In addition to market share analysis, correlation techniques can be helpful. A number of hurdles must be met in establishing a monitoring program, which is costly to set up, and adequate industry statistics may be hard to obtain.

During the competitive sixties the chemical industry will be characterized by mounting costs, recurring periods of excess capacity, and a great compulsion to sacrifice price for volume. Such pressures, coupled with high taxes and inflation, will inhibit the formation of venture capital and expansion into new product areas. They will also blight opportunities for producers of chemicals to more aggressively develop and retain allied projects which cross industry lines.

Then, too, as chemical industries develop in our present foreign markets, exports will shrink, while imports will rise. As a result, domestic markets will be spaded more intensely and the reduction of excess capacity can be expected to become still more difficult. Furthermore, with accelerated technological progress, the rate of obsolescence of present facilities will quicken.

Additional trouble is foreseen, due to our coming out-of-phase manpower pool. The younger sales personnel during the competitive sixties will have been born during the thirties and early forties when the birth rate was low. Fewer will be available, thus creating a shortage of skilled people at a time when over-all population and markets will be expanding. Salaries can be expected to rise.

Such patterns are believed to be truly representative of the industry, certainly they are a great contribution to low-cost, mass-produced goods for the ultimate consumer. Such foundations underpinning the competitive sixties will demand greater efficiency in all areas. Therefore, it becomes mandatory for each individual firm to improve its marketing effort so that sales can be made

more efficiently in order to maximize earning power and utilize more fully the company's investment in manufacturing facilities.

Such a drive calls for more selling effort. The problem is complicated by the vending of products ranging from test tube to tank car, compounds whose markets are either mature or in the early stages of growth, and lines distributed by marketing groups of all types. Several methods, usually in combination, can be employed to increase selling activity. These include the addition of more personnel to the sales force, increasing advertising and promotional expenditures, and liberalizing discounts and credit. Such devices are costly, so that each increment in effort requires a corresponding, if not greater, rise in profits from additional sales volume. Otherwise, more effort is not justified. Furthermore, management is reluctant to increase its sales costs at a time when profits, either present or prospective, are at low levels. In fact, the opposite is likely to occur as management slashes costs in an effort to improve current performance at the expense of the future.

How then can the marketing effort be enhanced? One of the more prosaic methods of achieving greater sales productivity is by the use of various controls as a check on selling expenses. Such measuring devices as number of calls per day, cost per call, time spent per call, and ratio of sales to salary and expenses, have been developed to utilize the salemen's time more effectively. Such measures are implemented by a Sales Control group which handles all of the related detail for the Sales Department. Although the cost of the group is usually charged to the Sales Department, its supervision, choice of personnel, and design of forms should be the function of Market Research.

Sales Control

The Plastics and Coal Chemicals Division of the Allied Chemical Corp. uses a bread and butter method for sales control. Generally speaking, it has two facets: the system for monitoring the calls of the salesmen and a card system for ready reference of sales as made to customers.

In the former the company's customers are rated according to magnitude and other characteristics—A, B, C, and D. Each type of account is then assigned a certain number of calls by a salesman within a given period. Good industry procedures often designate an A account as one whose sales top $20,000 per year and instruct the salesman to make one call per month. Sales governing B, C, and D accounts could range from $5000 to 20,000; $1000 to 5000 and under $1000 per annum with calls assigned bimonthly, quarterly, and once yearly. Sales Control receives the field reports and enters on each

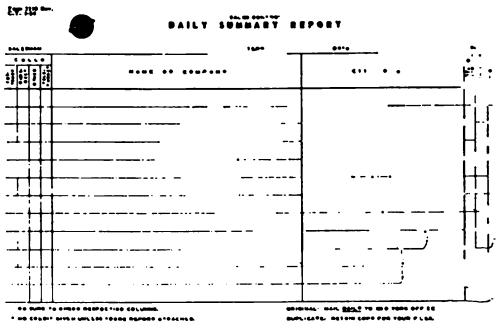


Figure 1

account record the frequency of calls made. Periodic reviews show whether each type of account is getting its proper field coverage. Sales Control also analyses the raw data according to pertinent requirements.

In its other major activity the Sales Control group transfers sales records from IBM tabulations or invoices to a card for each customer by major product, by month, and holds such card records in tub desks for ready reference by departmental and Market Research personnel. Sales and Market Research also compile various analyses from such figures. Main forms utilized are Daily Summary Report of Calls; Territory Potential Record; Purchases by Plants, Requirements by Product and Salesman's Coverage; Analysis of Sales-

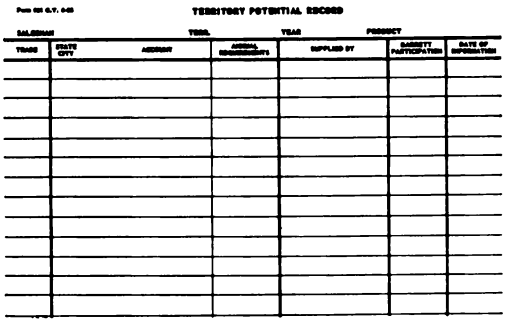


Figure 2

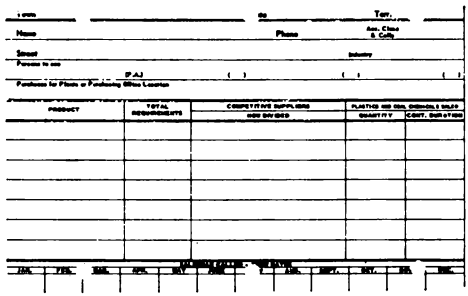


Figure 3

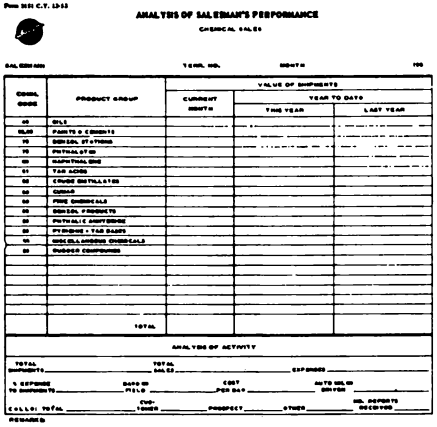


Figure 4

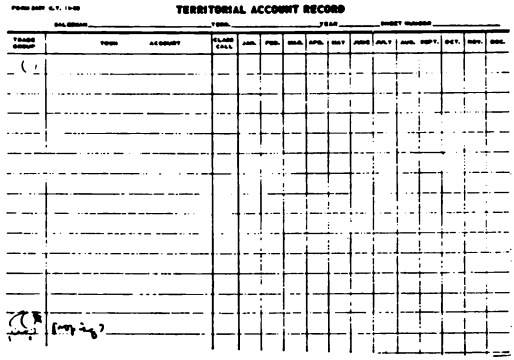


Figure 5

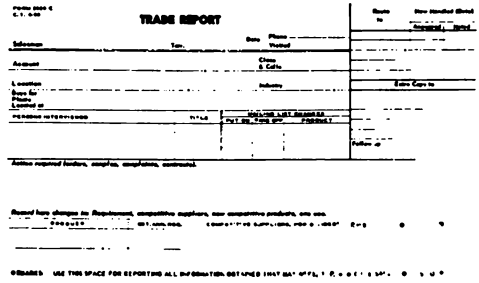


Figure 6

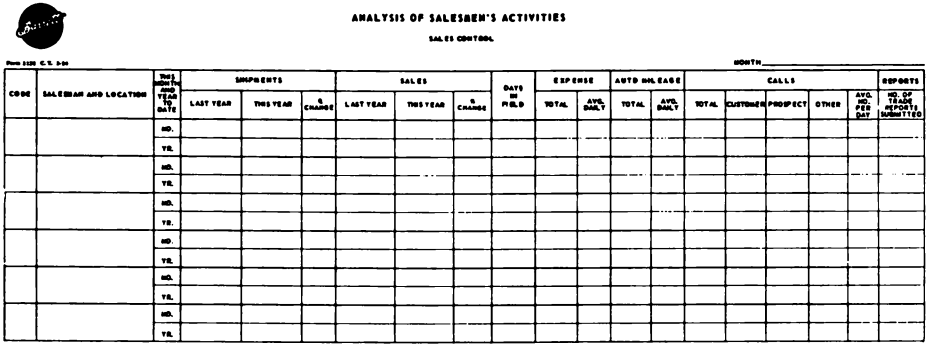


Figure 7

man's Performance; Territorial Account Record; Trade Report; and Analysis of Salesman's Activities (Figures 1 to 7, respectively).

IBM cards may be used to automate the chore of recording the physical movements or call patterns of salesmen. Under the system used by our General Chemical Division, salesmen are required to fill out a mark-sensed IBM card for each sales call. In addition to the card that the salesman fills out covering his movements, he also marks a different card to account for his nonselling activities, including in this category time spent in the office for various reasons, attendance at conventions, etc. (Figures 8 and 9).

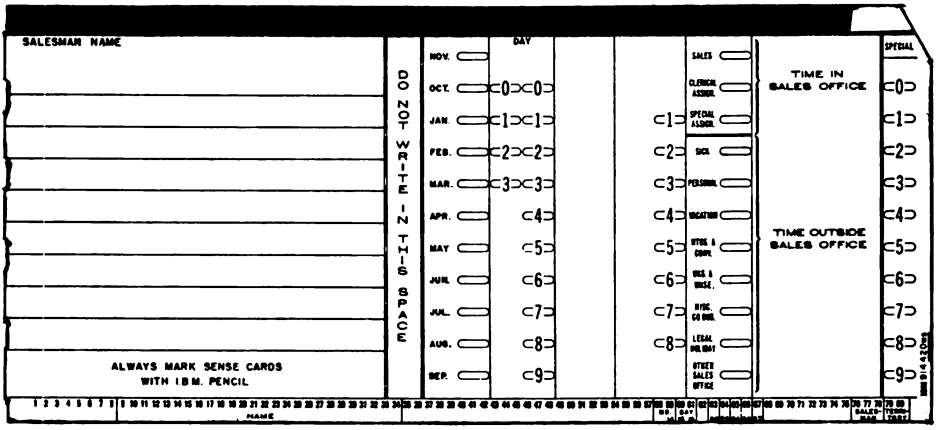


Figure 8

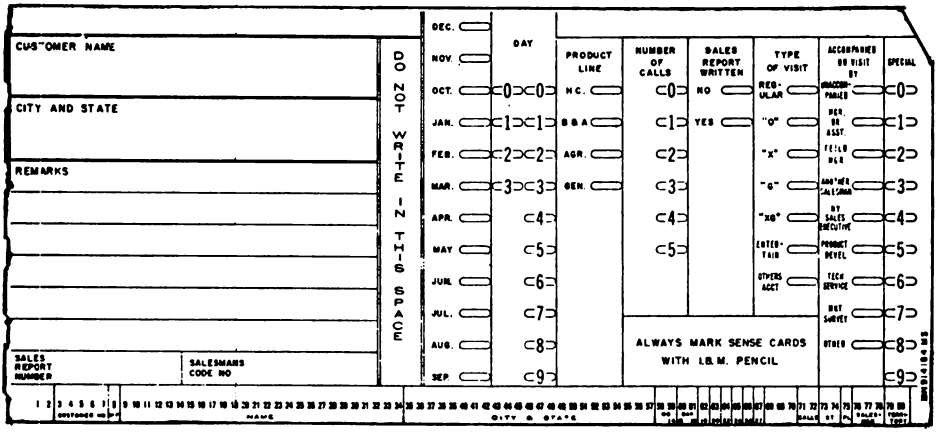


Figure 9

After being noted by the salesman's local manager, the cards are submitted to the Market Surveys Department, where the mark sensing is converted to punches and the customer's name and address are punched in the card from a

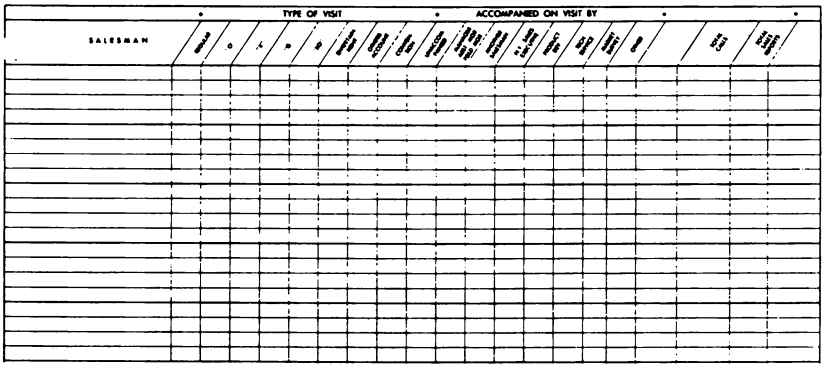


Figure 10

master which has already been prepared. Thereafter the cards, completely punched, may be used to prepare a variety of reports and summations (Figures 10 to 12).

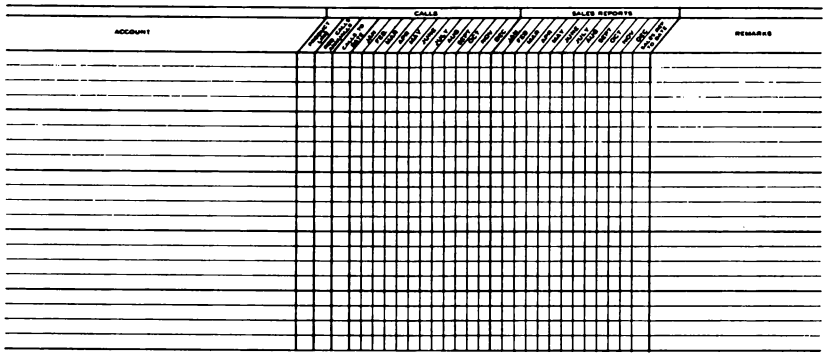


Figure 11

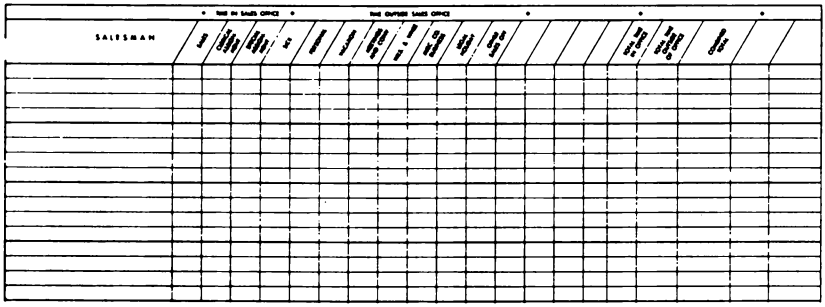


Figure 12

At present the General Chemical Division makes two separate reports on a routine basis. First is a monthly report which is sent to branch managers shortly after the end of each month. This enumerates the total number of each type of sales call made by each salesman and the distribution of the salesman's nonselling activity for the month, according to the classifications outlined on the cards. With this report the branch manager is able to keep a fairly close watch on each salesman's effort, although from this alone he may not deduce the direction of the salesman's efforts.

The second report is issued every six months. It, too, is prepared from the punched cards on IBM equipment. This report tabulates for each salesman all the known accounts in his territory, together with an optimum number of calls per year which should be made on each account. This optimum number of calls has been previously determined by a conference between the branch manager and the salesman. Actual calls are then indicated by month and comparisons may be made with the goal previously set. In this way the manager can evaluate the salesman's efforts against his performance quotas. The system is flexible and automated. It has been working satisfactorily for several years.

Although such controls are necessary, the information developed does not

generally provide the salesman with the means of effecting a deeper market penetration of a particular product than had been previously obtained. In a more sophisticated role, Market Research can aid in monitoring sales performance and in maximizing sales and profits. As a convenient form of reference, performance must first be measured and then appraised through the use of both internal and external criteria. From an internal standpoint, performance may be determined by the use of the sales budget and profitability analyses. The emphasis of the former lies in the comparison of actual with budgeted sales; the latter allows the value of a particular product of the firm to be judged relative to all products manufactured. External criteria are developed through the use of either market share analysis whereby one's own penetration of the market is compared with that of competitors, or correlation techniques to compare sales with trends of a major segment of the economy. These techniques are not mutually exclusive of each other nor is each technique, or combination, a panacea that guarantees higher sales. Their usefulness lies in spotlighting deviations from expected performance and in giving management the necessary information to carry out either remedial or improvement programs.

Sales Budget

The sales budget is generally prepared by the Sales Department. It is developed by estimating the purchases of customers for a year ahead and is then broken down into quarters. Often projections for each account are merely based upon past sales, informed guesses supplied by the customer, or intuitive reasoning. The projection may or may not include a quota for the salesman as an incentive to surpass his past level of sales. A budget of this type usually ignores the general economic environment in which the product must compete. Consequently, when budgeted sales meet actual sales it is the exception rather than the rule. The salesman has long recognized that such casual budgets suffer from "10%-itis" and he soon treats them with contempt or ignores them completely. Because the sales forecast is the foundation of other budgets within the organization, a poor estimate will of course erode sales, impair production schedules, cause inventory problems, and hamper capital planning. A budget without integrity is useless; it must be buttressed with enough skill and care to lift it beyond suspicion.

Market Research can assist the Sales Department in developing a more realistic budget for monitoring the performance of products and individuals in three ways. It can provide the budget assumption, appraise and assist in the revision of initial and interim budget estimates, and review actual performance in the light of economic forces that have prevailed.

In the "grass roots" approach to developing the sales budget, each salesman should be advised of the prospective outlook for his customer industries. It is superfluous to present salesmen with data of future economic conditions couched in broad general terms, such as that the gross national product will increase by 2%, consumer income will rise by 1%, etc. Such information is difficult for the salesman to relate to his sales. For instance, the man who is selling alkyd resins is interested in the outlook of the paint industry, so that revelant information should be supplied as follows: Industrial paint sales are expected to rise by 10%, trade paints by 2%, etc. With such data supplied by Market Research, for each important customer industry, the salesman is able to in-

corporate the assumption of future economic conditions into his estimate for each account where necessary. These economic data become the basis for the budget assumption.

As the initial estimates come in from the field, they are carefully reviewed in terms of aggregates by breaking them down into an end-use or industry pattern. From these are determined the percentage increases and decreases from the previous year's sales. These percentage increases and decreases are then compared with the anticipated levels of the budget assumption. Wide deviations become readily apparent and need to be resolved by Market Research and the Sales Department before the final annual budget is prepared in corresponding time elements.

The sales budget should be in line with industry end-use projections of the budget assumption. Such projections may be developed through the use of correlation techniques with projections of broad but related economic indicators. As a result, the projections of basic economic indicators become the basis for the budget assumption. As the year unfolds, changing economic conditions may well render the budget assumption obsolete. Therefore, Market Research needs to advise the Sales Department of changes in the assumption so that the budget can be revised. It may also be necessary to contact key accounts during the course of the year. A quarterly review is generally the most appropriate.

With all these data available Market Research is now in a position to measure performance. Actual sales can be compared with the flow of events that have occurred in the passing economic scene and the budget assumption revised with the actual data. Performance can be measured by relating the sales of the product to the results achieved by consuming industries. The performance of territories and individuals can also be determined. The value of such a comparison lies in showing where the strengths and weaknesses of the organization lie. It provides the data necessary to determine if Market Research surveys should be initiated for either correcting or improving the performance of a product or territory.

Cash Flow

The sales budget, to be of value to the organization as a whole, must be related to future profits or rather to anticipated cash flow discounted to the present. The concept of cash flow can be described briefly as the difference between revenues and direct costs, not to include depreciation. It represents the amount of cash thrown off from the sales and production of a product regardless of the investment. Consequently, for each product in the sales budget, the anticipated cash flow for the coming year can be determined.

The problem now becomes one of shifting sales effort, as described in the sales budget, to those products which will contribute most to increasing the future cash flow with the least expenditure of the organization's resources. To redirect emphasis, the sales budget so laboriously developed will be changed through management action to achieve a better result. Consequently, the sales budget must not only be periodically revised because of deviations from the budget assumption, due to changing economic conditions, but also because of management decisions to shift resources into areas of the greatest contributions to increased cash flow.

Admittedly, determination of the cash flow is a financial function, yet it is an extremely valuable tool for Market Research. Cash flow in large

measure is determined by the demand for the company's products. Consequently, for Market Research to monitor performance through cash flow analysis in determining whether or not sales emphasis has been placed on the proper products, it must be accomplished within the framework of total profitability. Furthermore, Market Research requires this criterion as a check on the future cash flow consequences in formulating alternative courses of action in the marketing area. It is also important for the development of hypotheses that will be tested during the course of a Market Research survey, particularly those concerned with pricing. In measuring performance through profitability comparisons, Market Research bridges the gap between a Sales Department that is working for volume and a financial group whose function is to maintain a favorable short- and long-term capital position and control funds to maximize net profit for the corporation.

Market Share Analysis

Perhaps the commonest method of monitoring sales is through the use of market share or participation. Simply stated, the firm's sales of a particular product are compared with industry production or sales as obtained either from the Tariff Commission or through periodic reports compiled by a common statistics gathering group as well as from other reliable sources. A percentage share of the market can be determined which may offer a very precise measurement of the performance trend. Such a simplified type of market share analysis has limited value, because the sales executives who are being monitored by this technique may not have a clear picture of why the market share for their product is changing. A blurred picture may not be adequate for decision making. By employing Market Research Techniques, market share analysis can be a valuable tool for monitoring performance.

The data developed in a realistic sales budget can be readily used for market share analysis by measuring the product's sales as a per cent of the industry. An indication of market penetration by customer industries and territories becomes possible. Strengths and weaknesses relative to the industry become readily apparent and may lead to an investigation of the causes.

Market share analysis, wherever possible, should be carried to the point of estimating the competitor's shares by end uses and small integral territories. The sales performance of competitors can then be evaluated. To do this requires the cooperation of the sales force. A form similar to that used by the Plastics and Coal Chemicals Division is sometimes used by salesmen. In this "Annual Customer Report" each individual salesman must be able to ascertain the total consumption of a product by each account and the manner in which purchases are apportioned among the various suppliers. At times, a salesman will not be able to obtain precise information concerning the account in question. However, if he is experienced, he will know approximately how much the account uses and should be able to make an estimate. Such information can be placed on IBM cards and compiled into aggregates by end uses and territories. However, the field force cannot be expected to supply this information on a continuing basis unless they fully realize that it is being put to use. The salesman is without peer in disregarding anything he considers not helping him to make a sale. His interest can be aroused in such a program by having Market Research present the analysis of compiled data at annual meetings. Perhaps the only way of

demonstrating to the salesman the value of this information in guiding top management decisions is by allowing him to spend some time in the Market Research Department. The most propitious time for this would appear to be during the sales training period when he first comes with the company.

Once the sales force can report the consumption of a product by account, performance may be monitored on the basis of knowing the extent of the market. The reported consumption of all accounts, as obtained from the field, is totaled by end use and is compared with industry statistics. It may be found that the sales force does not know where an important proportion of the product is being consumed. This indicates that the sales force is not familiar with the total market. The analysis can even be carried down to the territory and individual level. If the uses of the product have been categorized by "Standard Industry Classification," it may be possible to break down industry statistics on the basis of the number of productive employees by regions or states as reported in the Census of Manufacturers. From this may be determined the level of market penetration in a particular territory.

Correlation Techniques

Besides the application of market share analysis to monitor sales relative to external criteria, correlation techniques can also be helpful to Market Research. To develop suitable factors of correlation, the basic demand for a product must be investigated. The demand for a chemical firm's product may be thought of as being due to four elements: the state of the general economy, competitive activity, the price and physical property relationships of substitute materials produced either by the chemical or other industries, and consumer income and tastes. The first three elements are generally of immediate concern to the typical Chemical Market Research Department. The importance of the last element, consumer income and tastes in our industry, is generally of secondary importance, because chemical firms are usually removed by several stages of production from the economy.

The first element of demand, sales as related to the general economy, is suitable for correlation analysis. Essentially, it is a technique of trying to establish a relationship between the sales of one's product with a broad economic indicator. The relationship should span several years of sales to be meaningful. Once a good correlation has been established on such a basis, it can be used to monitor sales by following yearly corrections in the relationship. Moreover, future forecasts for such series often represent the work of either a large group of personnel or of extended field surveys, especially by various government agencies. In this way, sophisticated data for coming periods may be utilized to foretell demand for one's own correlated product.

The second element of demand, competitor's activities, has already been touched upon in market share analysis; here the usefulness of correlation techniques has limited application.

The third element of demand, the evaluation of substitutes, can be analyzed comparatively by developing information as to use cost and physical property interchangeability. Development of suitable schedules can aid Market Research in monitoring a product's price and its changing relationship to the prices of substitute materials.

The fourth element of demand, consumer income and tastes, does not lend itself to mathematical correlation with the sales of a chemical product.

Yet, the relationship that could exist might be the critical factor in determining marketability. As the growth of the chemical industry depends more and more upon consumer acceptance of the products of polymer chemistry, such as plastics and synthetic fibers, it becomes increasingly necessary to analyze consumer markets in detail. Many chemical Market Research Departments might have some difficulty in making a consumer survey because the techniques employed are different from those of the more familiar industrial market research. Furthermore, a chemical Market Research Department would not be called upon very frequently to make a consumer survey. For a chemical company with a large portion of its sales dependent upon plastics consumption, the use of an outside agency's experience in sampling and a trained staff of interviewers is vital to conduct a consumer survey properly, which measures preferences and attitudes. The Chemical Market Research Department's role is to make sure such surveys are conducted to provide suitable and usable information that will indicate the performance of the firm's product to its management. Such results might indicate the desirability of improving a chemical or plastic resin either to increase sales or to prevent competitive encroachment. These surveys are also helpful to customers, who ofttimes cannot afford consumer surveys. Such results may indicate whether or not an improvement should be made in the customer's product rather than in the basic resin.

Difficulty of Monitoring

The application of these techniques to monitoring sales performance should increase the productivity of sales by producing more sales per dollar spent. Obviously, if the use of these techniques is only an academic exercise for Market Research, it is very expensive. Consequently, it is necessary not only that top management support these programs, but that it also act upon the information received. The initial cost of setting up a monitoring program is high and several years of operation are necessary before satisfactory information can be developed. However, once established, the compilation, correlation, and analysis of data become routine. In fact, much of the work may be done with the aid of data processing equipment.

In order to avoid the costs that are associated with the use of these techniques by a multiproduct firm, monitoring should be limited to only those products which make the major contributions to profit. In the chemical industry, a handful of products may often contribute 75% of the profits. The sales of these products are candidates for monitoring by Market Research. The other products, of which there might be many, are sold either for the sake of customer convenience, by-product utilization, or new product development. Only in special cases would Market Research monitor the sales of such products. Use of these techniques for any product must be guided by the results one is trying to achieve in terms of the added expense.

Cost is only one of several restrictions on the use of these techniques. The problem of obtaining satisfactory industry statistics can be a major hurdle in monitoring sales through market share analysis or the sales budget. A resin manufacturer who sells most of his product to custom molders may find an end-use pattern that shifts markedly from year to year. In such a case, projections based on end use patterns can become meaningless. Even obtaining usable data from within the organization is beset with difficulties.

In developing profitability comparisons, the method of allocating costs to products that are made in the same equipment or location poses problems.

Another stumbling block encountered in monitoring performance, particularly in the chemical industry, is the distribution of a product's sales. Often only a few customers account for a major portion of a chemical's sales, which may become known as house accounts and are generally handled on the executive level. Consequently, the average salesman is left with a large number of accounts whose combined annual purchases may represent only a small portion of that product's sales—the "crumbs" so to speak. However, it is these sales which may well determine whether or not the plant operates above the "break even" point. Loss of a house account may well cause unprofitable operations, but it is the accuracy with which the sales to small accounts can be measured that will indicate the level of profitability or unprofitability. It is in the sales to small accounts that the product is tested by competition in the market place. House accounts may be relatively invulnerable to competition over long periods of time. It is this factor of house accounts—determining such a large share of a product's sales—that will be used, most often, as the chief argument advanced by the Sales Department that it can handle the sales budget without the aid of Market Research. Hence, the house account increment may cause an attitude that will deprive a concern of the vitality of a progressive monitoring program.

During the competitive sixties, many of the products which are now beginning to come out of the laboratories will make today's products obsolete. While much chemical Market Research activity appears to be devoted to the analysis of potential markets for new products, little effort seems directed towards the study of the obsolescence of one's own products. Much is heard of the many wonderful products that will become part of the American way of life in the sixties, but little is heard of the products which will be relegated to the junk heap as a consequence and whose present profitability is contributing to their own obsolescence by underwriting research. This is a sort of success story suicide situation for the soaring sixties.

As the chemical industry races ahead, it becomes increasingly important to continue the assault on high distribution expenses which are so characteristic of all industrial fields. In view of the fact that each customer call runs from $10 to $20, this area is of paramount importance. The more than one half billion dollars per year, as now expended for sales costs by the chemical industry, represents an enormous goal for the application of more precise sales monitoring.

Maintaining Capacity to Compete

J. L. CRAIG

Spencer Chemical Co., Kansas City, Mo.

Broadening of the chemical industry's markets by product diversification and integration toward the consumer will continue into the 1960's. To be ready for further extension toward the consumer, the chemical industry should improve its knowledge of the needs and desires of final consumers. Marketing abroad is expected to increase, calling for more knowledge of international market situations. Another area of extension is interindustry competition: Markets now served by other industries may be captured by the chemical industry. To meet these situations of the near future, companies in the chemical industry could profitably expand their use of formal market investigations as guides to their technical activity. The real value of use of market research depends to a very large extent upon the insight and sensitivity with which management interprets and uses the information.

When we set before ourselves the goal of maintaining the capacity to compete, we have, in a sense, committed ourselves to do some very serious planning of the long-term position of our company in the market place and of the many factors which must contribute to our reaching that position. Market research can be a very useful tool for the planning and achievement of these long-term goals.

We have attempted to pick out several areas in which an expanded use of market research should show an unusually high profit contribution under the projected competitive conditions of the 1960's. The first of these might be described as concerning the horizontal and vertical growth of our industry's markets.

Our Widening Markets

It seems apparent that the various forces which today are acting to widen the chemical industry's markets by product diversification and integration toward the consumer will continue unabated into the 1960's. The rapid addition of new products to the output of the chemical industry has made it almost a cliche for companies to state publicly how large a percentage of sales is accounted for by products which did not exist 5 or 10 years ago. Added to the growing complexity of the product mix of the industry is the industry's

quickening pace of integration toward the consumer, to gain better control over end products and thus protect profit margins.

It would be far too time-consuming to cite even the better known instances of vertical integration moves which have occurred in this industry in recent years. Consider, though, the number of chemical processing companies which just a few years ago were perhaps three or four steps away from the consumer and today have either reached all the way to the consumer or are just a step or two away. Those companies which were nearer to the consumer some years ago have generally broadened their activities at the consumer level and are bringing other basic products down the stairsteps of integration toward their end-use markets.

Market research is a valuable and necessary service in the horizontal expansion of product lines and in the vertical movement of products from the basic and intermediate categories toward consumer markets. Further broadening of the chemical industry's markets in the 1960's should find market research being used at an increasing rate as a management tool. To the average executive who has risen through the ranks of a basic chemical producer, market research can be of substantial assistance in putting together a concise, understandable picture of some particular consumer market which may otherwise present itself as a disorderly array of opinions and misinformation. When integration moves are being considered, market research studies can be a big help to the sales executive who may be used to thinking in terms of sales volumes measured in numbers of tank cars or thousands of tons, but who may be faced with the need for understanding the problems of distributors of consumer products in Rochester, Des Moines, Salt Lake City, or a hundred other points. Market studies can also help the executive who is experienced in dealing with the relatively high paid and skilled work force of the chemical industry to understand some of the potential problems in competing with the manufacturer or fabricator of end products who utilizes a relatively large, but low-paid labor group.

As an industry, we are more directly dependent on the consumer market than many of us may realize. The bulk of U. S. chemical production is utilized ultimately in consumer products. In fact, the major portion of our production eventually finds its way into consumer nondurable products. Although consumer nondurables is one of the slower growing sectors of our economy, the chemical industry has prospered and shown a growth rate seldom achieved by other industries.

The questions might well be asked by many of us in the industry, as to whether we really know much about the ultimate markets for many of our products and what might happen to some of these markets in the distant haze of the sixties. In many instances our answers to these questions should point to the need for giving more attention to the eventual destination and use of our products, if we are to continue to realize a major part of our growth from the ultimate sale of our products to the individual consumer. To plan successfully for this growth, we need to know more about the specific functions which products perform in their end use areas, and we should improve and extend our knowledge of the make-up of the needs and desires of our final consumers. Market research groups of the chemical industry should find major responsibilities in this area in the 1960's—in effect to assist management by supplying the concise, organized information so necessary to taking action in our rapidly widening and complex markets.

International Market Research

In the 1960's, the market research arm of our industry should reach abroad with increasing frequency, if present visible signs are any indication. Formal studies of any part of the foreign market by chemical producers or by industrial market research firms have been very few in number as compared to the scope of efforts in this country. Until fairly recently, international market research was regarded as an area to be entered into only by major corporations with far-flung overseas operations and its use was usually confined to manufacturers of consumer products. Today, with the rapid growth of exports along with the trend toward the construction of plants in the center of foreign markets, the need for some form of international market research is becoming apparent to more and more companies. The need is being felt most acutely by companies which have large sales in the export market today and are seeking both to protect their present interests as well as to serve their ambitions for expanded foreign operations.

The chemical industry is one which has a particularly large stake in the foreign market. Roughly a fifth of the total U. S. chemical production is ultimately delivered to foreign customers, either in the form of chemical products or as finished goods which utilize large quantities of chemicals in their manufacture. One segment of the industry in which our own company has a vital interest and which has shown a very heavy dependence on the export market is that of the polyethylene producers. In the more than three years in which the Government has maintained specific export figures on polyethylene, the portion of this product which has gone into the export market has ranged from 25 to 30% of total sales by U. S. producers (including exports).

Several factors have emerged in recent times which have made many of us in the chemical industry more keenly aware of our dependence on the foreign market. For one thing, the European Common Market is surprisingly no longer just a paper plan. It has begun operations, and the recognition that the whole idea may succeed after all has sent a record number of chemical industry representatives to Europe to appraise market situations and to do some preliminary shopping for plant sites and raw material sources. While many of the foreign expansion programs being so considered are defensive in nature, a by-product of the situation has been to make American management more aware of opportunities which exist abroad for new and profitable operations.

Another reason for looking abroad with new concern is the mounting pressure to meet the challenge of Soviet invasion of world markets. The countermeasures to be used to meet this threat should offer some positive opportunities for participation by our industry, because our Government will surely use every means at its disposal to impel U. S. business investments abroad.

It is becoming increasingly apparent that to cope with the rising problems of competing in the world's markets we must gain more through, first-hand knowledge of these markets. This need, we believe, will result in the management of the chemical industry directing a greater portion of the efforts of the market research function into exploring the foreign markets in the years ahead.

Much can be done with foreign market data already available in the United States—from the various departments of our Government, the United Nations, embassies of foreign countries, publications, and various world trade associations. For help involving field work in foreign countries, a chemical company might turn to some of the industrial marketing research firms of the

United States which are expanding their operations into foreign markets. Also, all of the major industrial countries of the world outside of the Soviet bloc have well-staffed marketing research organizations. Although most of these organizations maintain a major portion of their business in consumer market research, they will usually undertake industrial market research projects and this segment of their business will probably increase rapidly within the next few years.

Interindustry Competition

As an industry, we cannot hope to continue growing at an above-average rate if we are to become our own strongest competitor. The vitality and growth of the chemical industry must depend to a very large extent upon the displacement of products of competitive industries. Our rapid development of new products has enabled us to make deep inroads into some older industries which have had to be satisfied with a much smaller share of the growth of our national economy. Evidence of this trend may be seen in comparing the growth rates of some major product groups during the past decade.

In the 10-year period ending with 1958, the average rate of growth of all industrial production combined was 3% per year. Chemicals, as a group, showed an average increase of 6% per year. A few representative segments of the chemical processing industries showed the following average increases per year: plastics, 12%; synthetic detergents, 19%; synthetic fibers, 23%; anhydrous ammonia, 11%; and synthetic rubber, 8%. Some of the older product groups showed declines such as these over the 10-year period: wool, down an average of 7% per year; cotton, 1%; soap, 9%; and lead and zinc, both 1% per year. Steel production stayed virtually level; production of paper increased an average of about 3% per year.

Looking back even further, our gross national output of goods and services has shown an average rate of growth of about 3% per year over the last 25 years when the output is measured in constant dollars. Going back 50 years to 1909, virtually the same annual average increase of 3% in our gross national product holds true for the entire period.

It becomes apparent, we believe, that to maintain a good growth rate the chemical industry must search for new markets now being served by competitive industries. Adding to our task is the fact that each additional area of encroachment upon other industries becomes more difficult to capture, as we have stimulated other industry groups to increase their product improvement efforts and to diversify their product lines to mitigate the effects of product obsolescence. In fact, we have stimulated many of them to enter into some rather sizable chemical operations on their own. This latter factor is becoming a problem of serious proportions to the member firms of the chemical industry as we might define it today.

The problem, then, of competing with other industrial groups, both offensively and defensively so to speak, should be of major concern to any individual who has responsibilities in the forward planning activities of a chemical company. The market research function in particular, though, is well-equipped to seek out the opportunities in the marketplace for the competitive displacement of older product groups by the chemical industry's existing products, as well as to determine needs which might be exploited by the development of new chemical products. Increasing the emphasis placed on this type of market

research activity could prove to be of significant help in holding our growth rate to a high level in the 1960's.

Guidance of Technical Activities

The research budget in the average chemical company of today constitutes the most significant optional capital expenditure item on the company's financial statement. Very often, the operating departments of the company are not taking the active part which they should in guiding research goals, perhaps because of their preoccupation with the press of day-to-day business affairs or to the lack of a close relationship with the research function. As a result, the amount of planning and attention which operating departments give to the generation of a dollar of profit may be exceedingly disproportionate to the amount of constructive thought which they give to the expenditure of that dollar in a research program. Somewhere beyond this imbalance which exists in many companies today, is the point of optimum participation of the operating departments in helping to plan the research program and evaluate its progress in order to realize the maximum long-range profit growth of the company.

Market research has found increasing use in recent years as one of the aids to chemical industry management in giving some direction to the research and technical development activities of their companies. We believe that of necessity the competitive sixties will demand even closer relationships between the market research groups and the technical activities of our industry members. This is not to suggest that the marketing function or any other operating group should or ever will hold strong reins on the research function. However, the marketing function and, more specifically, market research can be of substantial help to the technical function of the company in determining the potential markets for products at a very early stage in their development and in pointing out the most promising of these markets which should receive an extra amount of effort in the research and development program.

By an early appraisal of the potentialities for a new product in the market place some very basic questions may usually be answered, such as these: What are the hopes that the product will be competitive in price? Does the apparent marketing pattern fit in with the long-range goals of the company? Would the product satisfy a widespread need or would it serve just a very specialized area of the total market involved? In the latter case, as we have seen too often, a new product may be the perfect answer for one small segment of the market which has problems peculiar to itself; however, the inclination of the developer of the product is to inflate the potential sales to a volume sufficient to cover the entire industry concerned.

With probably only few exceptions, companies in our industry could expand very profitably their use of formal market investigations as a guide to their technical activities. Research and development costs like almost everything else are headed skyward. If, for example, a relatively small amount spent on market research can head off an expenditure of many thousands of dollars of research funds to run down an unmarketable idea, the assistance offered should be accepted as a means of ultimately guiding the research effort into a better and more profitable showing. On the more positive side, if market studies may be used to point out the most profitable markets and shorten the development time and expense required to reach them commercially, it should be realized that the research function, over the longer term, has been given an opportunity for substantially expanding its over-all contribution to the company's efforts.

The exploitation of technology stored up during the years of World War II has been given as one reason for the rapid pace of new product development during the 1950's. Assuming this is true, and coupling it with the fact that probably more companies—nonchemical as well as chemical—have more people looking for opportunities today than ever before, it would appear that the price tag on a profitable new development in the 1960's is going to read considerably higher than the average for the 1950's. The increased use of market research in the 1960's is one way, we believe, for the industry to make its development dollars go farther and realize more profit from them.

Appraisal of Competition

On first consideration, it may seem redundant to say that the competitive sixties surely will focus greater attention on the elaboration and refinement of methods for scrutinizing more closely the activities of our competition. This is an area in which market research is currently playing a part in many companies, and we believe it is to be expected that the role of market research in appraising what competition is doing will increase significantly in the next decade.

In some instances the results of market studies have suffered because of inadequate attention to what competitors are doing or may be planning. Ignoring or not fully investigating the possibilities for changes in the competitive conditions in a market has resulted in more than a few companies being caught by surprise at the loss of business to their competitors. Some producers have found that suddenly they must reassess their position in the market, perhaps because of the introduction of a new competitive product, the acquisition of customers by the integration moves of their competitors, the adoption of an aggressive pricing policy by a competitor, or for a number of other reasons. Naturally, your competitor isn't going to send you an announcement of his plans; however, if you have a good market intelligence system developed, it is unlikely that very many of his actions in the market place will come as a complete surprise to you.

In the area of product improvement and the development of new grades of products, invaluable help may be given by the application of market intelligence information to guide product development work profitably. Answers to questions such as these might be used to good advantage:

What is your share of the market? Is it declining, holding its own, or rising?

How is the market broken down among your competitors? Who are the real comers, and who are those who are just managing to hold their own because of their accumulated momentum?

What is the relative profitability of your share of the market and of your leading product grades?

How many grades of a product are required to satisfy a specific end-use market?

Do you hold an unusually large share of any market which may be particularly vulnerable to the sales or development efforts of your competitors?

Much of the information for appraising your position in relation to your competitors may be found in your own organization, a large part of it being obtainable from among those people engaged in any kind of field work, such as salesmen, market development representatives, and technical service personnel. The market research department can be of material assistance in this area by acting as the focal point for the compilation and correlation of information obtainable from within the company as well as from outside sources.

Certainly the practice of trying to find out what your competitor is doing is nothing new. It is as old as the industry itself. We believe, though, that the next decade will see some great strides in the chemical industry in the techniques employed to assess the competitive position and course of our respective companies. In visiting with industry members over the past two to three years we have seen a definite trend developing toward the establishment of what we shall define as comprehensive, centralized marketing intelligence systems. These are systems which attempt, in effect, to seek out and record virtually every worthwhile fact about a company's customers, the customer's customers, and the share of the customer's business held by competitors in the field.

Some producers with which we are familiar have had marketing intelligence systems of this general type in operation for several years. Others have started in the past year or two. Generally, this centralized automatic or semiautomatic collection and correlation of detailed market information are relatively new practices in the chemical industry. Their use in the decade ahead should become much more widespread as the increasing size and complexity of the industry demand a more useful and reliable source of marketing information.

In our own company we have found a centralized marketing intelligence system to be of particular help to us in operating as a part of the fast-moving plastics industry. After a three-year trial-and-error period, we have now developed a system of a semiannual compilation of a rather complete assortment of market information derived from reports prepared on approximately 1500 plastics processors and end users.

As the familiarity with the system has increased, so has the number of uses which we have found for the information it has yielded. These uses now include: sales analysis, and the determination of sales territories; warehousing and distribution studies; advertising and promotional programs; end-use market studies; the surveying of competitive products. Information obtained on end uses and competitive products is, in turn, applied in our product development programs which constitute a highly important and costly part of competing in the plastics industry.

To illustrate, in slightly more than four years in the polyethylene business, we have produced more than 1000 different grades of polyethylene resins in our commercial plant. A total of 90 of these resins has entered into our line as standard products. However, today we carry only 27 different grades of polyethylene on our price schedule as standard products, which points out the very high rate of product improvement and product obsolescence in this industry. You may see from this example that complete and well organized information on end-use markets, competitive products, and developing trends is very meaningful to us in terms of spending our product development dollars most wisely and expanding our future business.

The real value to be derived from the use of market research depends to a very large extent upon the insight and sensitivity with which management interprets and utilizes our market research information. The mere creation of a market research function within a company gives no assurance of its effective utilization. In the final sense, probably our most important job is to demonstrate and sell our principal product, market information, into all areas of our company where it can be shown to be an effective and profit-making tool.

Technical Service and Application Research in the Competitive Sixties

F. J. MacRAE and N. R. PETERSON

The Dow Chemical Co., Midland, Mich.

Company efficiency in the sixties will require even more than the present organization in depth. The several billion pounds a year of plastic products of that period will feel more the effects of imports and exports, as well as advances in plastics technology. Within companies, technical service groups will be uniquely able to provide liaison on technical matters among management, research, production, marketing, and sales. Such liaison is synonymous with technical progress. Technical service to the customer must: provide technical data, hold training and educational seminars, undertake specific laboratory projects, assist in a customer's plant to find remedies for problems, and evaluate products. This will be very important. Competition will be harder, less technical information will be generally distributed free, and more service will be demanded by customers. Technical service facilities for the future need to be planned now. Costs will be higher. Technical service people will need more training and more people will be needed. Education and communication will be the key words in technical service in the competitive sixties.

In the agenda of this symposium, technical service is listed as one of "management's tools to do the job." The job, presumably, is profitable existence as a plastics producer. We submit that technical service and application research are among the more important of management's "tools" in plastics producing companies.

Company efficiency in the sixties, even more than now, will require organization in depth—from research to production to technical service and product development to sales to marketing—if the company is to have a healthy existence in the plastics area. The plastics industry is growing up. The several billion pound a year plastic products which the early sixties will see, the effect of imports and exports as plastics usage becomes significant in Europe, Asia, Africa, and South America, and the accelerating increase in plastics technology: these things are bringing us to rapid maturity. The plastics industry conceived in the forties and which experienced growing pains in the fifties has matured and is getting down to highly effective work.

In the past decade, many companies were lured into the plastic area by the promise of large profits from a small investment. They entered their chosen segment of the market by matching or nearly matching large volume products of established producers. If they could not match quality or service, they were willing to compensate for their deficiency by reducing prices. Some of these companies have prospered.

However, in the course of doing business, their customers continually pressured them to raise product quality, to develop new and better products, and to provide technical information concerning their products and end uses. Most of these companies are now spending sufficient research money and technical service money to make them reluctant to cut prices to obtain more business. Their organization is becoming more and more like that of the major plastics producers.

From 1948 through 1951, the plastics industry did not merely grow—it exploded. At Dow we had anticipated such growth and accordingly had established our Plastics Technical Service in 1946, and our Coatings Technical Service (the first of its kind in industry) in 1947.

From 1948 through 1951 we played host to almost every major plastics producer—they asked the benefit of our experience in setting up plastics technical service and product development organizations of their own. Technical service and product development as tools were found necessary by general plastics management, if their companies were to experience growth in keeping with that of the whole industry.

In-Company Functions

The very nature of the technical service and product development group causes it, more than any other company group, to have intimate familiarity with product properties, application mechanics and techniques, and customer requirements. For this reason, it is the group that is uniquely able to provide liaison *on technical matters* among management, research, production, marketing, and sales within the company, and between the company and its customers. Such liaison is synonymous with technical progress in the plastics-producing industry.

Maintenance of a desirable balance between basic research activity and the design of new products assures continued company strength in the plastics area.

Technical service—let us conveniently drop the *and product development* —helps relate research know-how to practical ends. This is a major role of Technical Service now, and will continue to be so in the sixties.

Production groups need specifications for plastics materials which fall within allowable practical property deviations. This saves production time and production money. Practical property ranges are best obtained from technical service groups, because of their constant technical contact with end-use industries.

Sales and marketing groups have sufficient responsibilities of their own to preclude their being "expert" across the board in plastics technology. However, they require a constant flow of technical information to help keep them up to date. Technical service organizations constitute an unexcelled technical information center for sales, merchandising, and other in-company groups.

It is management, of course, that uses the technical service tool to accom-

plish these and other ends. The paths of communication just discussed run both ways, and the channeling of information from other in-company groups through management helps determine precisely on what and where the technical service organization will place major emphasis.

The Organization

In The Dow Chemical Co.'s Plastics Department, we have a Plastics Technical Service (PTS) and a Coatings Technical Service (CTS). One is concerned with those plastics which are readily identified as such, because they are films, sheets, foams, fabricated products, or materials to be molded or extruded. The other deals with monomers and polymers or copolymers which, in resin and latex form, ordinarily lose their identity. Typical applications are in paints, paper coatings, and textile coatings.

CTS and PTS screen experimental products, test and evaluate them for end-use significance, and conduct field development and technical service for those products which promise success.

Within the last 10 years PTS has grown from 4 to 12 sections; CTS has grown from 3 to 12 sections. These divisions have assured us that each important area of end-use industries and each important type of fabrication or application gets its necessary attention. Figure 1 shows a section breakdown of PTS. Figure 2 shows a section breakdown of CTS.

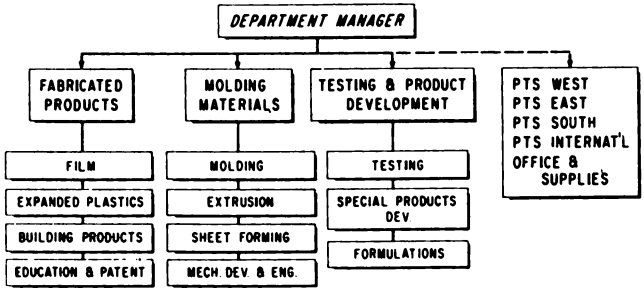


Figure 1. Plastics technical service

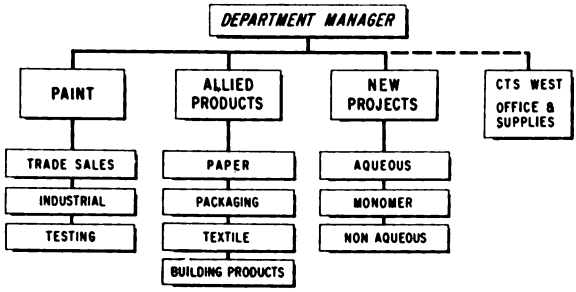


Figure 2. Coatings technical service

By observation of Figures 1 and 2 you perhaps note that there is intentional overlapping between PTS and CTS. Both groups, for example, have a Building Products section so that every type of plastic can be considered for these applications. Conversely, only CTS has a Paper Section, and only PTS has an Expanded Plastics Section.

There is a continuous exchange of information and ideas between the two groups, which is facilitated by having the two laboratories in close physical proximity, within the same building. Products such as polyethylene are evaluated and utilized by both groups. PTS has polyethylene molding powders, films, and foams; CTS has polyethylene coating grade resins. However, latex-type products are the particular province of CTS, while Styron molding and extrusion materials are the exclusive interest of PTS. As new types of products and as new end-use industries come into being, the shape and form of the technical organizations will change to accommodate the new interests.

Development

Development work for plastic products includes working with research and production groups on the design of new products and in the modification of old ones. It includes field development activity to formulate or fabricate plastic products for old and for new uses, development work done at the request of customers, as well as self-initiated development work. At the present time, between 60 and 70% of the total activity of our PTS and CTS is spent on developmental projects. We believe that other plastics producers have or strive to have similar emphasis.

There are many sound reasons for such emphasis on development. Among them are the facts that company growth in plastics and continued expansion of plastics applications are more and more dependent on supplying many special grades of plastics. Product diversification is dependent on product development. The products that will be enjoying the most exciting growth curves in the competitive 1960's are even now in the development stage in the plastics producer's laboratories.

The development accomplishments of our technical service groups are indicated in Figure 3, which shows the number of new products turned over to

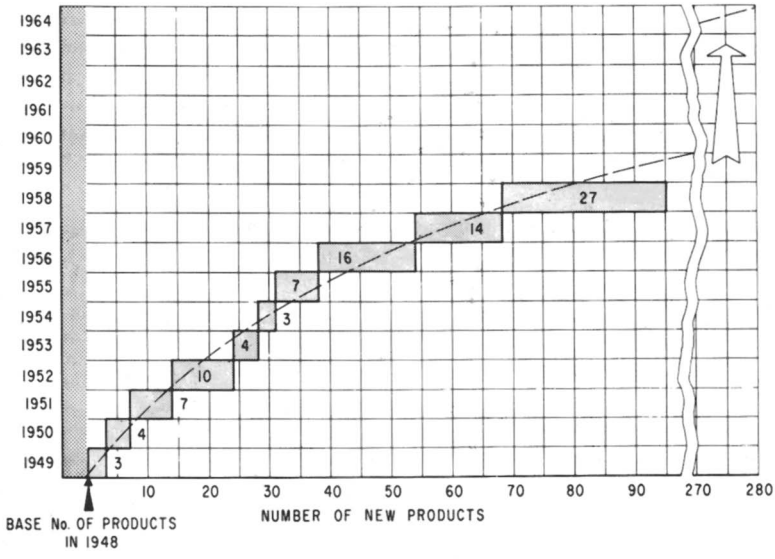


Figure 3. New products released to sales from plastics technical service

sales from PTS in the ten years from 1949 to 1958. To gather the full import of Figure 3, it must be recognized that few "old" products die off—too few—and that new plastics products are not ordinarily completely released to sales in our company until they have healthy sales in the many thousands of dollars. New product turnover from CTS is similar to that of PTS. The same pattern of accelerated development is observable in all major plastics producing companies. And because the number of development projects in the plastics laboratories is now greater than ever, they will have tremendous impact as sales products in the competitive 60's and in the years to follow. This demands planning and programming now.

This impact may well be greater in the sixties than it has been in the past, because certain products may be held longer in developmental stages. The planned release of complementary products for a given end-use industry is a goal toward which all major plastics producers are working. Obviously, it is not possible with every product, because the pace of development work varies with each product.

Technical Service

The need for technical service activity in plastics may be understood by considering the number of products which are released to coatings and plastics customers.

If you multiply the complexity of products suggested in Figure 3 by the many different plastics producers, the result is near-astronomical. It generates real sympathy for the customer.

He needs technical service. He has to have it. And he will favor that company which does the most adequate job of providing it. Because the competitive sixties will see a continuing stream of plastic products approaching the customer's door, technical service is a very important criterion which he can use to help him choose between companies and products that may often appear to him to be identical.

Some of the broad technical services that may be provided to the customer include:

Providing data on physical properties, handling characteristics
Holding training and educational seminars in either company or the customer's laboratories
Undertaking specific laboratory projects to suit products to a customer's needs or equipment
Answering customer requests for specific information
Working in a customer's plant either to assist him in making best use of the plastic product or to find remedy for his problems
Evaluating a customer's product to determine whether or not he has made most profitable use of the most suitable product

And even this general listing is far from complete. At times plastics producers find themselves—in the guise of technical service—involved in such detail as plant design and layout for a customer's installations; in consultation service to technical training institutions; and as consultants to the maze of U. S. Government offices and agencies which need to know how, when, and what plastics to specify. Perhaps a case history of a development-technical service activity in our laboratory will give a better understanding of these functions.

The coatings group was approached by a major glass supplier who had designed an improved television tube and implosion panel. The glass com-

pany needed some kind of resin laminate which would be clear and colorless, would not interfere with vision, would implement protection from tube implosion—and as some of our laboratory people put it—would be unaffected by everything and would last forever!

Our development team surveyed all the commercially available materials which could have possible utility—Dow was not the only plastic producer approached—and determined that none of them were fully satisfactory. The next bit of work decided that liquid epoxy resins showed most promise.

Research, production, and CTS worked together on the design and manufacture of a unique liquid epoxy resin and epoxy hardener. At the same time, sales, market research, and merchandising were alerted and were asked to provide information on customer attitudes, market potential, and advisable marketing procedure. When a satisfactory product was developed, our patent and legal departments were called in.

All the basic work was done with technical service and sales personnel of Dow and the several glass and tube suppliers maintaining a three-way flow of information. The technical service groups of our customers contributed as important facts and data, as did we. The cooperation of the several groups was necessary to accomplish a successful development.

In addition to resin development it was necessary to build a mock-up production line, to design spacing devices, to evaluate heaters, to recommend an automatic dispenser, to purchase and modify this equipment, and to put on laboratory demonstrations exhibiting the mass production feasibility of the resin system. Then, when the time came for in-plant trials, equipment setup and operation, and evaluation of the end product required similar mutually benefiting cooperation. Today we have a product, D.E.R. 741, and some of your television sets have a new look this year. This could not have happened if the several companies had not had many technical service tools to do the job.

The details of technical service such as were just described are typical. Recently, a customer—a large and worthy one—evaluating a new molding powder for a special end use asked PTS to provide him with the molds, install them on his machines, give him the resin, supervise the test runs, and evaluate his product. In this instance the supplier said "No" in part, and got away with it. We suspect that in the "Mid-Competitive Sixties," plastics producers might have to say "yes" to such requests.

The expense of such a project will be one of the primary considerations, because such expense cannot always be passed on to the customer as an increased charge for the product. Therefore the *who* technical service is provided for and the potential return are going to be even more carefully evaluated in the future than they are now. The technical service groups, aided and abetted by sales and market research, will make such evaluations. The plastics producer in the sixties who experiences the most equable growth may well be the one who spends his technical service dollars most wisely.

To protect themselves for the vast sums spent in both product development and technical service, plastics producers are going to have to exercise more strict control over patents, and may well have to pay closer attention to the licensing of certain applications. In times of heavy competition, all possible sources of income must be investigated. Even now, many companies are licensing the by-products of plastics developments. New instruments, new coating and molding equipment, and new techniques of handling and application are no

longer given away, but are made available for a small percentage of the sales price.

Our own company and its competitors have in the last 10 years given away a great deal of valuable information. The polystyrene molding technology and the latex paint technology developed by Dow were made freely available to industry at large. We suggest that in the sixties, the major plastics producers may be less generous. This attitude is not punitive; it is protective. It is not intended to restrict customers, but to ensure value return for the capital invested. The technical service and sales groups must, in the ultimate sense, be responsible for recommending this or other approach to management.

Equipment

To do a comprehensive job of technical service and product development requires a vast amount of specialized equipment. We are not going to detail the various testing, evaluation, molding, and formulating equipment necessary in an adequate laboratory. However, only when we can duplicate in our laboratories most of the processes and applications encountered in our customer's plants, can we do a thorough job of service. And the amount of new equipment necessary to work with the polymers and processes of the competitive sixties will require an investment for which astute companies are now planning.

In addition to mechanical and electrical equipment, the technical service and development laboratory—the plant itself—must measure up to the demands made of it. Laboratory areas, work areas, and office areas are needed, but so are conference rooms, projection rooms, lecture halls and the like. Because it takes years to get a plant from the idea to the drawing board to the sitting-down-across-from-a-customer, the technical service facilities of the mid 1960's are even now being planned.

Personnel

The rooms, equipment, and organizational plans for technical service and product development in plastics are completely useless without the people to use them and give them a purpose. The technical service people are considered to be the greatest single asset in the technical service organization. They are in the ultimate sense, the ones who will bring the company successfully or unsuccessfully to the competitive sixties.

The personnel of technical service organizations possess a combination of talents not usually found elsewhere in a company. A primary requirement is an intimate understanding of the industries served, of the equipment involved, the language spoken within each industry, and a deep appreciation of the way business is done in each industry—these are vital if a good development or service job is to be done.

Coupled with this intimate knowledge of customer industries must be a detailed familiarity with their own company's capabilities, personalities, and methods of doing business. Often the philosophy and general tenor of the customer industry are different from our own. A major task of technical service is to bridge this difference.

Two to three years are commonly spent in specialized training programs for technical service and product development people. This education, in the light of never-ending new products, new processes, and new end uses, obviously

never ceases. This education costs the plastics producer money. Figure 4 shows what has happened at Dow to technical service training costs in CTS and PTS over the last 10 years. The approximate 1/3 increase in training cost per man can be expected to continue to rise at about the same rate, if not more, over the next ten years.

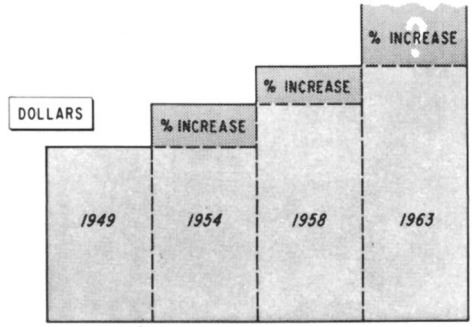


Figure 4. Cost per man of training technical personnel in plastics

The costs per man are relatively unimportant as compared to getting the right man to train to do the best possible job. As the plastics industry has grown, so has the size of technical service groups. Figure 5 gives some idea of personnel expansion in the Dow Chemical Co. Coatings Technical Service and Plastics Technical Service. The figures are not compensated for persons leaving our company or transferring to other departments. But in the 10-year span, that number is little more than the average year's gain.

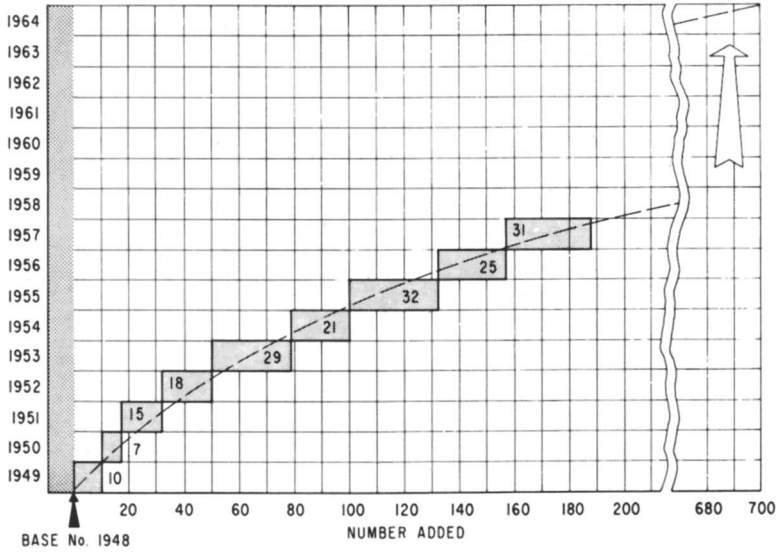


Figure 5. Number of new people added per year in plastics and coatings technical services

We wonder if it might not be difficult, in the sixties, to hire the kind of people we want. Manpower needs must be anticipated at least five years in advance. At Dow we have 15 years of successful experience in such preplanning, recruitment, and training. Therefore our hiring policy today is in expectation of possible needs in the mid sixties.

In addition to other traits, technical service personnel must have an unusually stringent set of personal and professional ethics. It is through these people that the plastics producer gains the professional respect and personal favor of his customers. These technical service men, along with sales people, build up invaluable customer loyalties. Establishment of such feelings of respect and confidence pays off when other things are equal in a fiercely competitive market.

This is not just "being nice" to customers. It is another imperative condition of doing business in plastics. If products are to be designed to meet customer needs, the plastics producer's reputation must be such that customers have no fear that their trade secrets will become known elsewhere, or be used to their disadvantage. The reputation of the plastics producer is often synonymous in the customer's opinion with the reputation of the technical service man with whom he is in contact.

Conclusion

Thus far our discussion has been of technical service and development organizations in being. In retrospect, this has perhaps provided a picture of too monolithic a structure. In plastics particularly, change is nearly the only constant factor. This means that technical service and product development organizations—as well as the over-all company organization—must have sufficient built-in flexibility to design themselves to meet the challenges of new products, new application techniques, new end uses, even new personalities. Flexibility in structure and in attitude is necessary to gear the plastics producers to the needs of the competitive sixties.

In the competitive sixties, the key words to sum up the technical service organizations in plastics will be Education and Communication. They will be the technical knowledge seekers who specialize in plastic products and end uses. They will pass on that knowledge to management to assist in intelligent decision-making. They will communicate with other in-company groups to assure uniformity of company action and with customers to help them understand and make best use of plastic products.

In the sixties, because of the role of technical service organizations in education and communication, the integrated company effectiveness in plastics development and sales will, we trust, be increased. We feel that the technical service and product development organizations in plastics are one of management's most useful tools to do the job.

Technical Service and Application Research for Organics

FARRIS S. SWACKHAMER

Shell Chemical Corp., Union, N. J.

Technical service and application research, in this paper, is thought of as concerning the company's existing products. Technical service is considered as the solution of a specific problem for a specific customer, applications research as the solution of a problem which affects a whole group of customers. The subject is discussed in terms of two types of products: performance or end-use chemicals and intermediates. For performance chemicals, the job of technical service and application research is to prove that the company's product works better than competing products or will do the same job at a lower cost. For intermediates, it involves such aspects as determination of safe handling techniques and the availability of engineering services. Companies must ask themselves several questions in handling customers' problems. How much work should be done on any problem? When should the job be cut off? Should new companies be set up in competition with established firms? What should be done about price competition from the supplier who does not offer technical services?

There is one word that all of the great inventors have used in common. Ben Franklin supposedly said it, when he finally got a bolt of lightening to run down the metal string of his famous kite. And I'm sure that our primitive ancestor—the man who invented fire—spoke it when he saw the tinder catch and the blaze begin to spread through the forest.

That word is "Help!"

History doesn't say whether or not any help was forthcoming, and I'm inclined to doubt that there was. For who could have given Franklin any competent help at the moment of his initial shock, but the technical service man from some insulating company? And at the time of the first man-made fire, nature was the only fire department. So each must have cried "help" in vain.

Since then things have changed a bit. But man hasn't. At least he hasn't yet lost that human characteristic that makes him wary of new things. Most of us still approach change with some degree of trepidation. And because we

do, companies need technical service and application research effort. For the goal of both these fields of work is simply this: to get the human beings we call customers to do something they haven't been doing before. This something involves their use of a company's product, and we try to get them to adopt this use by developing the information that proves the use as a sound business venture.

Several years ago, during a sojourn in a hospital, I got an inkling of what can happen when this help is not given. This hospital—as I came to find out during my time-killing visits with the laboratory technicians—had recently purchased a blood comparator. It was claimed to be the speediest and most accurate apparatus for comparing blood on the market.

But despite the claims of its manufacturer, the machine sat in the corner gathering dust and ill will. Why? Because of some ir-rationale, the supplier had not only made no attempt to teach the technicians how to operate the machine, but had acutally refused to do so. He had told a staff member that the company was in business to sell machines, not to teach people how to use them.

An operations manual had accompanied the machine, but the staff couldn't translate the technical jargon. The idiocy of the situation had a strange effect on my curiosity or practicality, I'm not sure which. Anyway, I began studying the manual. The hospital technicans were right. The jargon read almost like a secret code.

Soon I discovered that blood comparators are essentially colorimeters, and with that fact as the key it wasn't difficult to translate the technicalese into an understandable method of operation. I showed the procedure to the staff. The last I knew they were using the machine, but not, I'm sure, with any fondness for the manufacturer. Judge for yourselves the intelligence of the decision to leave technical service in the hands of fate, when fate is capable of assigning the job to a wandering temperature taker.

So, it seems that technical service is necessary to a company that makes something which requires technological skill in its handling or use. And this applies to the field of organics.

Technical Service and Application Research

What is the function of technical service and application research?

The book, "Successful Commercial Chemical Development," edited by Corley, says that technical service is "the application of technical knowledge to assist customers in understanding a company's standard products and in making the best and most efficient use of them." Application research is defined as "applied research in the laboratory, field, or plant necessary for the successful development or improvement of uses for a product."

In this paper both technical service and application research will be thought of as concerning the company's existing products. The terms are doubtless applicable to development products, but this aspect of chemical marketing is left to others in this symposium. For our purposes, it might be easier to think of technical service as work that deals with a specific problem of a specific customer, and application research as work involving a problem which affects a group of customers or a segment of an industry.

Example from Surface Coating Field. An example drawn from the surface coating field may serve to illustrate the difference and also help show the benefits of the two functions.

Some years ago, we were asked by a customer to help him develop a primer for washing machines and dishwashers which would withstand 1000 hours in a hot solution of detergent. A couple of weeks' work in the laboratory and conversations with some of our salesmen brought two facts to light. First, the problem would be a long and expensive one to solve, costing substantially more than the return we could get in sales to this single customer. Secondly, the results would benefit a major portion of the coatings industry—not only the customer we had in mind.

Up until now, the problem had been classified as technical service. Because we were not using customer formulations—actually we had started almost from scratch trying to design this ideal primer in our laboratory—we broadened the scope of the work as soon as we realized it was an industrywide problem. So, its classification was changed to application research. The investigation was given the larger budget that the complexity of the problem necessitated, and a full-scale effort was undertaken.

We informed other coatings' manufacturers that we were working on the problem, and asked what tests they used to judge the performance of such a coating. After several months' work, we developed the primer. From this work came a new application of one of our products and a ready-made market to sell it in.

There, in general, is the distinction we draw between technical service and application research. Now into the specific function—and problems—of each type of work.

Types of Organics. First, though, I must do something about making this cumbersome term "organics" a little more manageable. In the bounds of this symposium the term covers everything except plastics, inorganics, and heavy chemicals . . . an area too wide for either your time or my knowledge.

Conveniently, all the organics can be broken into two general types.

End-Use Chemicals. First, there are performance or end-use chemicals. The properties of their boiling points, melting points, and specific gravities are incidental to the manner in which the materials perform when used to formulate a given consumer product. The group would include, for example, dyes, which are judged for their light-fastness, stability, tinting qualities, etc., and certain antioxidants used in paperboard, which are judged on whether or not they keep the cookies from getting rancid.

Intermediate Chemicals. The second category is intermediate chemicals. The chemical industry, which is its own best customer, buys many of this type of chemical to react with other materials to produce an end product. Such materials include epichlorohydrin, used as an intermediate in the manufacture of epoxy resins, acetone, an intermediate in the formulation of methacrylate polymers, and ethyl formate, used to synthesize vitamin B_1.

Technical service and application research on performance chemicals are similar to that for plastics. Usually the potential customer has only two questions: "How well will the product work in my application of it?" and "What are the costs?"

Competition in this area can come from two sides: from the same product put out by a competitor, or a different material that will do the same job. In each case, the burden is on the back of the technical service or application research man to prove that his company's product works better or that it will do the same job at a lower cost.

Technical service on intermediate chemicals, however, is a bit different.

Oftentimes, a customer will not tell you what he is doing, simply because by safeguarding his processes and know-how he protects an exclusive position. There is, however, a great deal that can be done in the field of technical service and application research on intermediates.

One of the most important aspects in the intermediate field is to determine and make known safe handling techniques for your products. Many intermediates have an element of hazard in their use. The supplier generally takes upon himself the determination of such data as flash point, explosive properties, and toxicology and publishes them in a manual. Here, unlike the field of performance chemicals, suppliers frequently pool their information to give their user the benefit of broader experience and more detailed data. Oftentimes, manuals of this type are published by such organizations as the Manufacturing Chemists' Association for the entire industry.

Technical service groups in this field also use engineers. These men are frequently sent into the customers' plants by a raw material supplier to assist in the design and/or installation of tankage, pipe lines, valves, pumps, and the like, thus implementing the suggestions in the safety manual. Classes are frequently held for the customer's personnel, so that they may learn firsthand how to handle these chemicals.

Seminars. Technical service and application research frequently take the form of seminars for the customer's technical staff or the technical staffs of a group of companies. We have given such seminars on hydrogen peroxide reactions and on the chemistry of acrolein.

This type of activity might be considered as updating the organic textbooks. Such sessions include information on how to improve yields in various types of reactions using the intermediate, what catalysts to use for certain types of reactions, and the effect of possible impurities on the yield and on the catalyst life.

Before the seminar begins we conduct an exhaustive survey of the literature on the subject compound. To this are added the results of the application research done in the course of our search for uses for the product. The data presented are also generally made available in book form. We have published a number of books summarizing, for example, all the available data on acetone or, more recently, acrolein.

Break-Off Point. The question comes up in every company concerning the amount of work that should be done on any technical service or application research problem. The break-off point is sometimes difficult to determine in the field of intermediate chemicals. For here your product plays only a part in the production of something else. Though you are primarily concerned with selling your product, you are obviously not going to sell very much unless your customer can successfully sell the end product which your product helps to make. Conceivably then, situations can develop where a customer may begin to look to your technical service or application research staffs for answers that are more directly related to his product than to yours.

The precise moment at which to cut off a problem calls for a Solomon to decide. The director of the laboratory must be hard-hearted and almost ruthless with the red pencil at times. Unless a substantial and reasonably immediate return is indicated, the work should not be pursued. Technical service and application research are like a short-term investment. If the potential return is not quickly foreseeable, another more profitable addition should be made to the portfolio. It is here that technical service or application

research differs from long-term or basic research. The former does not allow the searching of the myriad alleys that always beckon the chemist or engineer.

Frequently, customers do not want a complete job. They prefer to adapt our work to their own peculiar conditions. The smaller companies, of course, representing the smaller sales potential, more frequently want a complete research job, for most of them have no research facilities of their own.

The type of work done in the technical service or application research laboratory also calls for a particular type of worker. He can't take a leisurely or lengthy approach to a problem. He must get to its heart and evolve a solution in the shortest possible time. Customers lose interest if their queries take too long to answer.

The technical service representative or application research man must be a combination scientist-salesman. He must be able to present the solution of the problem clearly and succinctly in good English. He must have the personality, technical background, and self-confidence to go into the customer's plant if need be and be welcomed by that plant's personnel. He must command the respect of the customer. He must be factual and intellectually honest in his dealings.

The raw material supplier must maintain rigid security measures on any information given him by a customer. Great care is taken in our laboratories to see that no such information is ever given out to anyone but the customer from whom it was originally received. It should be recognized by customers, however, that the knowledge gained working with their formulations will become part of the raw material supplier's broad background of information and that it often enables him to solve other customers' problems more rapidly.

Should new companies be set up in competition with old established members of the industry? To me the American free enterprise system makes it mandatory to help any legitimate prospect to an extent dependent on his ultimate potential.

The customer who accepts the results of a raw material supplier's technical service and application research also has certain responsibilities which he cannot shirk if he is to continue to receive the benefits of this type of work.

We have all had the experience of solving a rather long and expensive problem for a customer, giving him the results of our work, and then having a competitor, who has provided little or no technical service or application research, step in and take the business away from us for an eighth of a cent per pound less on a long-term contract. Sometimes this is done innocently, because we have performed the technical work and given the results only to someone in the customer's laboratory. We have forgotten that the customer's management and particularly his purchasing agent should be made aware of the fact that we have solved the problem for him and of the magnitude of the effort that was involved in the solution.

However, some potential customers deliberately milk a raw material supplier for any information they can get and then buy from the competitor who offers an almost negligible cost saving. Such people should realize that their actions only dry up the source of good technical information and that in the long run they will be the losers.

Another type of supplier, who occupies a rather dubious position in the chemical industry today, is the "cut-rate" operator. He builds a new plant to make a particular material which he can offer at a cheaper price because, like the manufacturer of the blood comparator, he is in business to sell a

product and can eliminate the cost of technical service from his price. What he fails to foresee is that all the other suppliers will undoubtedly meet his price and eventually he will be forced to provide technical service in order to sell his product.

The Picture in the Sixties

An important aspect of our discussions during this symposium concerns the future. What will the picture be in the sixties? In my opinion several of the trends that were briefly touched on above will become more pronounced in the next ten years.

Along with many other costs, the cost of technical service and application research will come in for increased scrutiny and require sounder justification. During World War II and the Korean police action, the saving of the lives of our service men far outweighed the cost of any program. Technical service and application research are frequently all-out efforts to find the solution to a knotty problem in the shortest possible time. Most problems today are commercial in nature and a great deal of money can and will be saved by more careful assessment of the return on the investment in such work.

Technical service and application research in the field of organics are certainly here to stay for the foreseeable future. They have many aspects in common with similar activities in other segments of the chemical industry and others peculiar to themselves. They need most of all a strong hand on the tiller, since they represent investments on which good returns must be realized.

Technical Service and Applications Research for Inorganic and Heavy Chemicals

R. A. SPRINGER and G. F. RUGAR
Diamond Alkali Co., Painesville, Ohio

Technical service and applied research, which had their beginnings in the early twenties, have come to the forefront since the end of World War II. In the competitive sixties, expansion of new products and processes will be even greater than in the past. Thus, successful marketing will depend more and more on improving application research and technical service, both of which will be more needed. There are at least two reasons for this. Overcapacity will continue for several heavy inorganic chemicals and foreign competition will be an important factor.

Technical service is as old as the chemical industry itself. We have no record of the service that was rendered by John Winthrop, Jr., in connection with his early chemical manufacture. He is credited with being the first entrepreneur in the chemical field in colonial days. However, without a chemical process industry available we can be sure that John had to work with and for his customers along the lines of what today we call technical service. This service had to be based on activities in the area now known as applications research. Measured by present-day standards, Winthrop's program was very small and did not encompass a wide range of uses, but actually it was the beginning of today's tremendous effort.

The history of the chemical industry in this country shows that there was little service offered prior to World War I. Although the industry began to flourish in the early twenties, there seems to have been very little organization for technical service and applied research. We can remember very well that in the late twenties advertisements began to appear offering help in the use of products and suggesting uses based on applications research. As the twenties led into the thirties, with the downtrend in business, ways and means were sought to slow up and eventually to stop the decline and, hopefully, to reverse the trend. Many chemical companies organized and set up technical service departments and supported them with applications research laboratories.

We recall one company that directed its attention to the pulp and paper industry and in particular to the bleaching of pulp and paper. Its objective,

of course, was to enlarge the sale of its products to this industry. It hoped to do this by developing new methods of bleaching which would use chlorine and chlorine-based bleaching agents more efficiently; the net result to the paper maker would be a decrease in cost for a desired brightness. The study, which did lead to improved bleaching processes, was properly called applications research. The technical service came later—in taking these new ideas to individual paper companies and demonstrating to the prospects' satisfaction that they would benefit economically by changing to these new methods. This took place in the period just before 1935 and very little thought was given to a formal organization or name for what was being done. A job had to be done and people were put on it and did it.

Time sped along and we became involved in World War II. From the start of this holocaust, there was no need for technical service as we think of it today. It was downright remarkable how usable and satisfactory any grade of chemical was in that period. The remark has often been made that a small decrease in price can improve the quality of a product immensely or render its impurities harmless, but in the period we are talking about price was inconsequential; the problem was to get the material. That situation was much too good to last and eventually it came to an end.

During the war, the American chemical industry expanded by leaps and bounds to satisfy the needs of our own war effort and those who were fighting with us. That sounds a little odd, but I guess it is correct, because we are still fighting with some of them. In any case, as the war boomed to the end, chemical manufacturers realized that there would be a surplus of many of their products and some plans had best be made to find ways to market them.

Many companies set up planning departments to chart programs for the postwar era and at this time the idea of technical service came to the forefront. Those companies which had such groups expanded them, while others established and placed them in various locations in the corporate structure. Perhaps the best evidence of the recognition of the part technical service was to play in the chemical industry was the formation of the Technical Service Group in 1943. After a few years it became the Commercial Chemical Development Association and in turn was responsible in large measure for the Chemical Marketing and Economics Division of the American Chemical Society. We do not need to remind anyone here that the CCDA has had a remarkable growth in membership and influence and that this division has had the steepest growth curve of any division in the Society.

So much for history, where do we go from here and why?

We are going to have much more of both technical service and applications research in the competitive sixties. Trends in marketing methods are indicated by the themes used in advertising. One inorganic and heavy chemicals company has been running a series of advertisements directed boldly to the help its technical service can provide. The first in the series was a little startling to us conservatives; it featured a magician, who, of all things, was conjuring up a beautiful brunette from a silk hat. We hope our friends in the sponsoring company will not resent our having a little fun at their expense; they could undoubtedly find some advertisements of ours which amused them and other people, too. However, this particular series of advertisements seems to us to point the direction which technical service and applied research will take in the competitive sixties.

We want to look seriously at several of the services which are offered. But before doing this, it would seem desirable to enumerate the chemicals that are under discussion: soda ash, caustic soda, chlorine, bicarbonate of soda, muriatic acid, calcium carbonate, biochromate of soda, silicate of soda, sulfuric acid, nitric acid, phosphoric acid, salt cake, nitrate of soda, sodium phosphates, caustic potash, potash, calcium chloride, and others. These chemicals are marketed in large volume at relatively low prices. There are several producers of each of them and if we are realistic we must admit that quality is similar, regardless of who the producer is. Another point to keep in mind is that production facilities are close to the major consuming areas. In addition, prices customarily are on a delivered basis. These conditions pose some tough problems in marketing. In fact, they were largely responsible in the first place for technical service and applications research.

Technical Service

Technical service and applications research have been discussed as one subject. This approach was taken because both are adjuncts to the sale of products. To delineate properly the functions of these two aids to the sales effort, we must define the terms technical service and applications research. We consider technical service a direct aid to sales because the major portion of its work load comes directly from the customer. The sale of the product very often depends upon the ability of the technical serviceman to solve the customer's current technical problems.

Applications research is primarily a long-range aid to sales and most of the ideas for products are generated within the seller's organization. Technical service problems, originally specific for one customer, may eventually have applications for others, or even an entire industry, thereby becoming a routine type of operation. Applied research problems, usually general to start with, may supply answers to only a few customers. The one big idea that really pays off on an application to the entire consuming industry may not occur oftener than once in twenty.

The functions of technical service are as diversified as the number of chemical products manufactured. The individual technical serviceman must have a comprehensive knowledge of the product he is servicing in order to carry out the basic responsibilities of his job. Supplying the physical and chemical characteristics and specifications of products is only one of the essential requirements for the sale of any chemical. The technical serviceman must provide information on the safe handling and storage of chemicals, advice on the grade and form to use, materials of construction required for process equipment, and hazards that may be encountered. Technical and sales bulletins must be prepared, revised, and kept up to date. The education of the technical and operating staff and of prospects and regular customers must be accomplished. All of these basic duties, while aimed primarily at customer service, also accomplish one more major objective—the education of the producer's sales staff as well as making the entire company customer conscious.

Another important function of technical service is to obtain publicity and good will for the company. Attendance and presentation of papers at technical and trade association meetings, publication and distribution of technical bulletins, and entertainment of customers are only a few ways of keeping the company's name in front of the consumer. The technical serviceman, because

of his training and background, also has access to places and people in consuming industries that sales personnel cannot reach. These contacts promote business and make the salesman's job easier.

In these ways the technical serviceman provides liaison between sales and the customer. Perhaps more important, technical service is the connecting link between sales and manufacturing and between the customer and manufacturing. The technical serviceman is best qualified to handle complaints for it is his responsibility to know the product, its use, and the customer. The serviceman must protect "operations" from overenthusiasm by the sales force and yet be the guardian of product quality for the salesman. To the sales department, the customer is never wrong and to manufacturing, the product is always perfect. For management, the serviceman is the referee or the umpire.

Another function of technical service is to know what competition is doing, has been doing, or will be doing. This "keeping up with the Joneses," so to speak, can become very expensive. There should be a control of these operations, but the big question which confronts the business man is—Where do we stop? We do not believe that any formal rule can be established to place definite limitations on this service. Each individual case must be evaluated to determine what effect the technical service operation will have on the immediate and long-term business returns. Consideration must be given to the amount of business to be gained from the particular plant requesting the service, other plants of the same company, other products used in addition to the one being serviced, and finally, application of the same product or process to other companies. Technical service is like any other part of a business venture, it must bring a fair return on the investment; therefore, a careful control tempered with long-range planning must be maintained.

In addition to the above basic duties of a technical service department, the chemical producers have found it necessary to maintain a staff of specialists. These experts must know specific industries, methods of manufacture peculiar to those industries, and to a major degree, the personnel in the field in which the producer wishes to solicit business. Basic alkali producers maintain specialists in the consuming areas of glass, chemicals, pulp and paper, water treatment, detergents, foundry, nonferrous metal processing, paint, rubber, plastics, and others. To serve all industries, an expert materials handling group is required, to offer service in the design and engineering of systems to handle and store the products the customer is purchasing.

Applications Research

Applications research cannot be measured by factors involving immediate return on the investment. This type of service is aimed at broad industrial fields, rather than specific customers and as such must be exploited over a longer period of time. Through applications research uses and applications must be found for old line, modified, and new products. This group must determine the needs of industry and try to meet those needs with old or new products. If a completely new chemical is needed to satisfy a requirement, the project is turned over to the research department. In this way, applications research functions as a guide to the research activities. Conversely, new products generated by basic research must be turned over to applications research to develop uses, markets, and sales potential. Just as technical service is "the

liaison" between manufacturing, sales, and customers, the applications research department is the connecting link among research, the semicommercial plant operations, and the potential consumer.

Once new uses are developed, technical service will go into action to exploit them. However, applications research must continue with the objective of finding additional new uses in order to maintain the modest growth rate that most of the heavy chemicals exhibit. The purpose here is to strengthen the position of the chemical producer rather than to do the research work of the consumer.

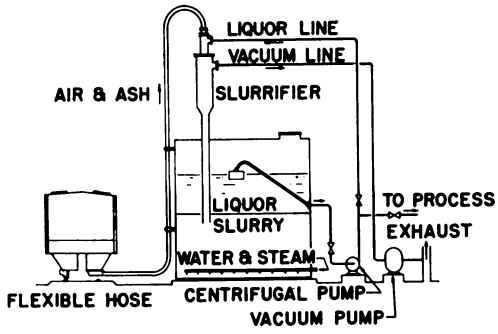
There is no way to get new products on the market when the chemical is a substitute for existing materials, except through a vigorous program of applications research and technical service. This is a necessary adjunct of the true research function, for without the commercialization of new products the costs of research represent an expensive hobby. As long as the apparent uses have promise and are economically sound, money must be put into this phase at a rate that will ensure speedy acceptance of the product. It is false economy to operate at a rate such that sales for the chemical will be delayed for any considerable period of time. The old maxim "to strike while the iron is hot" should be applied at this point. Establishing of markets promptly often means the difference between a highly successful project and complete failure.

The Future

With this background, we will proceed with our look into the future. Our crystal ball is a bit hazy and unclear, but that seems to be one of its inherent characteristics and we will do our best under these circumstances.

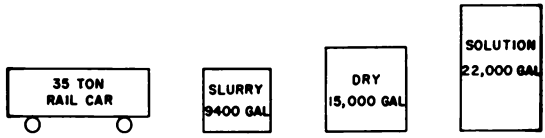
In the competitive sixties, it appears to us, there will be greater emphasis on applications research and technical service in the marketing of chemicals. There are least two and perhaps more reasons for this. Overcapacity will be with us for several of the heavy inorganic chemicals. One of the obvious ways for all producers to improve their own positions and of course that of industry is to increase sales by creating and exploiting new uses. The companies with the most imagination, which are alert to new ideas and can work out new applications, will be the ones who will benefit most. In many instances the increased sales will come through other means than from the development of new uses. We would like to mention the success the Diamond Alkali Co. has had with the slurry storage of soda ash.

It had been evident for a long time that improvements in handling and storing soda ash would be a boon to the paper industry. The principle of converting dry sodium carbonate into a storable slurry had been known for many years. It is merely one of transforming dry soda ash with a bulk density of 35 pounds per cubic foot into a wet sodium carbonate monohydrate with a density of 65 pounds per cubic foot. It was not until recent years that this principle was fully exploited by Diamond and a practical system for storing soda ash as slurry was perfected. A slurry storage system allows the consumer to store soda ash at a much higher density than is possible with solution or dry storage. A 10,000 gallon tank would hold 75,000 pounds of soda ash as slurry, 47,000 pounds as dry material, and only 33,000 pounds as saturated solution. The storage volumes needed for a 35-ton car of soda ash are illustrated in Figure 1.



Pneumatic pilot plant

The capital investment required to store 1 ton of soda ash as dry material is about $46, compared to $27 to store a ton in the slurried form. This saving, along with many operating advantages, has enticed 26 soda ash consumers to install Diamond's slurry storage systems with a total storage capacity of 20,000 tons. For supplying engineering details of the system (Figure 2) and following up with service of the installation, Diamond has been rewarded with thousands of tons of soda ash business, which it might not have obtained otherwise. This illustrates the sort of thing that in the next decade will have to be done many times.



Types of storage

A second example illustrates even more pointedly how good applications research and technical service can make it possible for a company to obtain and hold a favored position for a period of many years. Prior to 1920, the bleaching of shellac had been done by the use of bleaching powder or of chloride of lime. Liquid chlorine had recently become commercially available and it occurred to Wm. J. Weed at the Electro-Bleaching Gas Co., Niagara Falls, that there was a potential use for it. In about three years, Mr. Weed and his associates worked out a process for making sodium hypochlorite from liquid chlorine and caustic soda and demonstrated its advantages to the shellac producers. They were so pleased with the process and results that it became traditional in the industry that Bill Weed's company was practically the only one to be considered as the source of chlorine and caustic soda for bleaching shellac. And this practice persists even today.

Foreign Competition

Overcapacity was mentioned as one of the basic reasons for strong competition in the sixties. Foreign competition is going to be tough also. In addi-

tion to our concern regarding the European Common Market and the plans of England, France, Germany, Russia, and Japan to take their share of the world markets in Asia, Africa, and South America, we should heed the warnings of several writers who have recently pointed out that the St. Lawrence Seaway is a two-way street. The ocean going ships that take our manufactured goods from the Great Lakes ports will not come in empty. They are bringing in chemicals from countries where costs of manufacture are lower than those in this country and they can undersell our domestic producers. This adds up to another headache for the chemical marketer in the competitive sixties.

To meet this challenge, the U. S. chemical industry will have to stress several facets of technical service and applications research. Important among these will be ease of communication and prompt attention to customer needs. There will always be delays and the possibility of misunderstanding the problem. Our experience has been that relaying information from one part of an organization to another can result in loss of accuracy and in some cases the problem is completely misunderstood. Technical service, working with the production department and the traffic department, can work out delivery schedules which cannot be met by foreign competition.

During the past decade, we have seen new chemical consuming processes come into being, such as uranium refining in the atomic energy process, rocket fuels, ore beneficiation for copper, iron, and many rare metals, drilling muds, new pulping processes, new paper products and applications, vegetable oil refining, protective coatings, etc. Applications research and technical service have expanded to meet the challenge of these new developments and have adapted their products to meet the demands.

The complexion of these services will be changed considerably in some of the more mature industries. It seems to have been true that the technical serviceman who was backed up with a top-notch applications research group had much to offer the customer; he had a broader training and in many instances a better insight into the technical problems of a particular industry. With the passage of years the man in industry has developed to the point where now he may be the expert and have the greater knowledge. In this new situation, the process industries will look to the chemical supplier for very little service on old chemicals and a great deal more on new chemicals. This will require less activity by the chemical companies on established uses for established chemicals but an increase in activity on applications research on new chemicals. As technology continues to advance and the quality of technical service and applications research advances, the qualifications of personnel engaged in these activities will become more exacting. The people who carry out applications research will be better trained in their formal education and will need years of experience in their own plants and in the chemical process industries. They will have to have the broad experience and active imagination that will suggest many uses for the new chemicals that research will develop.

In the competitive sixties, the expansion of industry with new products and processes will be even greater than in the past. There will be opportunity for increased business, and it is therefore necessary for the basic chemical industries to plan ahead and prepare to meet these technical requirements. Successful chemical marketing, in our opinion, will depend more and more on improved applications research and technical service.

The Development of Markets for a New Plastic

M. J. ROEDEL

Polychemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

After management has decided to manufacture and sell a new plastic, a market must be developed, based on the necessary knowledge of its qualities and commercial possibilities. Market opportunity studies are made available to the market development manager, and from this base he organizes his effort. One can start with four broad end-use market categories: component parts, packaging, construction, and consumer, each of which may be subdivided. A development man is then assigned to study each end-use industry, with the first part of the study defining the structure, calling points, sales potential, development goal forecast, development manpower requirements, and total budget. The next step is approval by sales management. Once that decision is made, development tools come into play. The area of actual operations is where the work gets done, and success here, with good liaison among the various functional groups, will bring success to the venture.

To set the stage, we are assuming that management has made the affirmative decision to manufacture and sell this new plastic after having been convinced by research that the product is unique and useful, by production that the manufacturing process is feasible and specifications can be met, by control that the new investment will earn adequate return at projected costs and sales volume, and by sales that they can meet the price-volume-time forecast established by their market research, development, and direct sales personnel.

Thus the die has been cast. A multimillion dollar commitment in permanent investment has been made. The new plant will be on stream two years hence.

You will recall we have defined our plastic product as a new material. Our problem is not one of entering an established market with a known product new to us and gaining an appreciable share of established business by doing an outstanding sales development job. Because our product is unique, its place in the sun has to be established starting from scratch, using market development techniques aimed at displacing dissimilar materials in established end uses

and in developing new end uses satisfying unfulfilled needs. This means that an end user will require our new material in the form of a shape manufactured by a plastic processor from our raw material.

Prior to management decision to invest considerable new money in a commercial plant it was essential to have the new plastic characterized under a host of end-use environmental conditions to characterize the utility of the new product. For a versatile plastic this task is never finished. Establishing and defining processing characteristics and developing new processing techniques are also a continuing task. Likewise, appreciable in-company product knowledge is necessary at the start to establish where and why the new plastic will do a better job at equivalent or lower cost. This means ready access to ap-

Table I. End-Use Markets for New Plastic

End-Use Market	Sales Potential, × Lb.	196× Sales Forecast, × Lb.	Development Manpower Requirements, Man-Years
Component parts			
Transportation			
Automotive	50×	10×	3.0
Aircraft and missile	10×	1×	0.7
Marine	10×	1×	0.3
Industrial machinery			
Office machines	30×	3×	1.0
Vending	10×	1×	0.3
Food processing	15×	1×	0.7
Appliances			
Refrigerators	20×	2×	0.5
Washing machines	10×	2×	0.5
Plumbing	10×	1×	0.5
Hardware	20×	1×	0.5
Total	185×	23×	8.0
Packaging			
Food and beverage	100×	8×	1.0
Drug and cosmetic	10×	1×	0.5
Industrial	20×	3×	0.5
Total	130×	12×	2.0
Construction			
Housing	50×	2×	1.0
Wire and cable	10×	2×	1.0
Pipe	20×	2×	1.0
Total	80×	6×	3.0
Consumer			
Housewares	10×	2×	0.5
Sporting goods	5×	1×	0.5
Toys	5×	1×	0.3
Apparel	2×	1×	0.4
Accessories	4×	1×	0.3
Total	26×	6×	2.0
Supervision			3.0
Total direct development manpower			18.0
Supporting sales services			
Design and costing			6.0
Prototyping and testing			4.0
Field sales assistance			3.0
Market analysis			1.0
Overhead			2.0
Total indirect			16.0
Total Development	421×	47×	34.0

preciable background data on market opportunities in various major end-use industries as well as reasonably accurate cost data to establish value-in-use potentials. From these studies, and the knowledge and opinions of various experienced personnel, a reasonably good starter analysis evolves on where various market opportunities are located, and on a price-volume basis. From these analyses and process data, the plan size and introductory price are established and sales and profit objectives are set for a certain period after plant start-up, at which point 90% capacity should be achieved at the appropriate operative return on rolled-up investment. These market opportunity studies which led to the decision to commercialize the product are available to the market development manager. From this base he organizes the market development effort.

One can start out with four broad end-use market categories: component parts, packaging, construction, and the consumer, which are subdivided further into the specific end-use industries of concern for the particular product, as shown in Table I.

The development manpower requirements listed in Table I are designed to meet the sales forecast for five succeeding years after the plant start-up of 4×, 10×, 18×, 30×, and 45× pounds, at which point the initial plant is operating at 90% of design capacity and the introductory price has been decreased substantially as sales volume has increased to the profitable stage.

As soon as plant project approval has been obtained, the market development plan is activated on a commercial scale with technical personnel recruited by matching qualifications and experience against the job assignment. Each development man then receives intensive training on product properties, processing characteristics, design methods, costing data, market information, and his specific development goals in pounds *vs.* time for his assigned end-use industry.

We now have a development man assigned to a specific end-use industry. What is the best way to maximize his efforts? First, what are we trying to accomplish in this industry? We know from our market analysis studies that there are numerous specific applications where the new plastic will do the end-use job better at equivalent or lower cost. Does this mean that our man should take on a host of end-use applications, selling each in turn with priority dependent upon potential volume and probability of success? This is one way to do the development job. However, our experience indicates that more business is developed in the long run by market development activity than by end-use application activity. It is important to understand the difference between these two sales activities.

End-use application activity is sales activity aimed at commercializing a specific new use.

Market development activity is long-range missionary activity aimed at educating industry on how to design, fabricate, and use our materials.

The purpose of the latter sales activity is to get the many hands of industry doing end-use application work with our material, thus multiplying our total development effort manifold.

How do we go about educating an industry where our material has considerable sales potential? To assure the success of the industry approach it is essential to develop industry experts who, with the passage of time, become completely familiar with the make-up, operations, and problems of their assigned industry and particularly with the key personnel therein. Once these experts have gained the technical and economic background and the close

personal contact, the development effort can be aimed in intelligent fashion to achieve maximum benefits at minimum development cost in dollars and in manpower.

Table II covers the industry approach. The first task of the industry specialist is to carry out a study of his assigned industry. He defines the structure of the industry and how it can be logically segmented into material selec-

Table II. The Industry Approach

I. The industry study
- Structure of the industry
  - By function and/or end-use product
  - Major accounts
  - Location of material selectors
- Sales potential
  - Major opportunity areas
  - Penetration rates in various segments
  - Development goals *vs.* time
- Manpower requirements
  - Whom do we see and how often
  - Required man-years
- Budget
  - Man-years direct
  - Man-years supporting services
  - Advertising, sales promotion, publicity
- Market development plan and recommendations

II. Management decision
- Is this a major opportunity area?
- Are the probabilities of success high?
- Is the market development plan technically and economically sound?
- Can we afford it?
- Are there better opportunities elsewhere?

III. Development tools
- Scheduled calling
- Product, processing, application, and design information
- Design, prototyping, and testing facilities
- Functional experts
- Advertising, promotion, and publicity

IV. Operations
- Assignment, training, and location of personnel
- Calling schedules and development goals
- Call reports and action points
- Weekly and/or monthly progress reports
- Control reports
  - Laboratory and product group requests
  - Allocation of effort
  - Monthly cost sheets and expense reports *vs.* budget
  - New sales forecasts

V. Liaison
- Direct sales
- Product manager
- Sales technical services
- Marketing analysis
- Advertising, sales promotion, publicity
- Research and development

tion points based on function or end-use product. This step also involves establishing what personnel at these locations should be called on. In general, the design engineers are the material selectors who have an assignment in one of these groups to design a functional part to do a satisfactory job at minimum cost. Next the industry specialist looks at the data provided by market

analysis on sales potential cost considered and wherein these opportunities lie in the various segments. He establishes a development goal forecast in pounds *vs.* time. Then he establishes who should be seen and how often, which gives the necessary manpower requirements to contact this industry on an organized basis with our product and design knowledge. He also is responsible for establishing the need for product modifications and long-range needs to guide research effort as well as alerting us on new competitive developments. This manpower assignment and related budget has to be justified by development goals which can in turn justify the expenditure in terms of future profits.

The first part of the industry study defines the structure, calling points, sales potential, development goal forecast, development manpower requirement, and total budget.

The next step is approval by sales management. The market development plan for a specific industry has to be sold. It takes 3 to 4 years of organized industry development effort before specific applications are being created in large enough volume to make the effort self-sufficient, with added profits in annual new business being in excess of the added annual development costs. This effort, like research effort, cannot be turned on and off depending upon current business conditions. Hence, the commitment to proceed is a long-range commitment, and an expensive decision amounting to around $140,000 per technical man over this span of time before success is assured. The management questions listed in Table II are not all inclusive but indicate the general tenor of establishing whether or not this is the place to spend your budgeted money.

In Table II is a condensed list of the tools needed to do the development job. Their purpose is to create initial and sustained interest in our product line and to get our materials accepted as standard engineering materials so that we have to provide only minimum development assistance on specific end-use applications. By calling on a scheduled basis we keep the design engineer up-dated on our product information, speed up specific developments, explain failures, help on redesign, weed out misapplications, help establish end-use specifications, and are in a position to alert line sales on developments that are nearing commercial reality so that they can alert and assist our plastic processor customers in mold design and processing conditions.

The area of operations is, of course, where the work gets done. To do it efficiently after proper planning it is important to institute adequate control procedures to make certain that costs are being kept in line with budget and that the effort is being directed properly. Major pitfalls for the sales manager to avoid are (1) overcontrol on reporting, resulting in too much desk work and keeping management informed in greater detail than necessary, (2) the very human tendency to try to out-expert your specific experts on how the job should be done in their area of responsibility, and (3) the diversion of market development activity into end-use application work when promising new uses develop.

Most sales organizations are set up on a functional basis and adequate liaison between sales sections is a must for the work to proceed promptly and effectively. In most instances our industrial specialists deal directly with the personnel concerned in another sales section rather than going through the line organization. That is, we depend upon their common sense and good judgment to go to the line organization when they deem it necessary for advice, for action, because of established policies, or when significant commitments in money or manpower are involved.

The most critical area is liaison with the direct sales section. The most important step in the whole process is getting the order and expanding the business at the customer level by end-use extension. This responsibility of direct sales can be met only when they are kept properly informed and it is up to the two managers involved to see to it that this is so. Likewise, the product manager must be kept fully informed on product deficiencies, required product modifications, required product and process data and bulletins, and competitive developments. The whole effort of is a team effort; no single man can get the business but a single man can lose it. Coordination and minimum friction are essential in a functional organization.

With the passage of time, performance against goals can be measured, goals are revised with added sophistication, unprofitable endeavors are halted, and new opportunities are explored. If the total job has been done well by the total team, the results are bound to be satisfactory as long as initial judgments and decisions were soundly based—that is, forecast sales goals are met on schedule.

At this point in our discussion we hope we have pointed out the value of organizing market development effort on an industrial basis and missionary in scope. Obviously one can fit more than one product into such an industry-oriented operation and it is almost necessary because of the expense involved in setting up specialized experts. This of course is not necessarily so if the product commands a premium price or sufficient volume exists to generate ample selling expense funds. Under these latter conditions a product marketing sales section may be preferable where direct sales, market development, and product-processing activities are all carried out under the direct responsibility of a single sales manager minimizing a major sales problem—effective communications.

Development of Organic Chemicals in the Sixties

L. PAUL SAXER

Market Development Department, Commercial Development Division, American Cyanamid Co., New York, N. Y.

The competitive sixties probably will not require new techniques for marketing new organic chemicals, but only a continuing refinement and application in practice of established principles. We face the same facts of life in the sixties that have always affected the industry. The marketing approach is inevitably tied in with business success. Therefore, potential profit from a new activity must be related to investment, in both time and money, in a way that will conform with company objectives. The relationship between investment and the likelihood of success must be established as early as possible. New products, moreover, must have recognizable traits which will warrant customers' interest. The competitive sixties can be expected to place a greater burden on people responsible for choosing a product for promotion. They will need the backing of a patient management and every trick in the book to get new products accepted and on a commercial basis as quickly as possible.

Marketing new organic chemicals, as all in the field are ruefully aware, involves problems common to all new product promotion. The competitive sixties will probably not require techniques which are new to those experienced in development, only a continuing refinement and application in practice of the established principles. These comments, then, are necessarily a review of some old truths.

The term "marketing" should be defined in attempting to deal with this subject. Although marketing is generally associated with sales and distribution, new product marketing of organic chemicals cannot be considered as an entity separate from product conception, research, manufacturing, and service. The activities in the early stages are intimately related, with emphasis shifting back and forth. The successful venture will embody a constant flow of information from each aspect of the endeavor to the others. The capabilities of the people in question will determine the extent to which this interchange is efficiently carried out.

The business press keeps reminding us of the opportunities which lie ahead in the "fabulous sixties." The man concerned with organic chemicals is pain-

fully sensitive to the areas of present overcapacity in his segment of the industry. What do these observations herald to guide activity in new organic chemicals in the next decade?

In looking at the situation for the sixties, we face the same facts of life which have always affected the industry. The emphasis on their importance will probably become more acute, of course. One way they might be stated is:

1. The marketing approach is inevitably tied in with the successful running of a business. And the successful running of a business, even in organic chemicals, must be the basis for action, taking precedence over "sentimental" factors in choice of product and potential profitability of the product.
2. Applied research in all industry is constantly increasing (up by a factor of 15 since 1930). Researchers in a well-run company must account for their time in applied research. They have been bombarded with an increasingly overwhelming number of new organic chemicals in recent years. Companies in allied fields are turning to production of organic chemicals for "diversification." Foreign producers are aggressive at low prices.
3. As we have mined out the more obvious areas laid bare by previous fundamental research in organic chemicals, new ventures are increasingly likely to require very large amounts of capital investment if they are to be really profitable.

These three statements, if allowed, lead to three corollaries:

Potential profit from the new activity must be related to the investment in money as well as to the energy required for development in a way which will conform to the objectives of the particular company.

The product should have recognizable traits which will warrant the expenditure of customers' research time.

The crucial relationship between extent of commitment and likelihood of successful results must be established at the earliest possible moment.

Each organization is likely to present a different basis for attempting to deal with these circumstances. Nevertheless, each assumption-corollary combination permits some general comment.

Business Responsibility

A good deal has already been said about the first area under the general heading of "business responsibility." New product people everywhere owe to their management the responsibility for choosing activities which have the best possibility for success. Experience shows that success will result more quickly if a product is chosen to fill an actual need rather than if it merely seeks to ferret out the need.

If, then, product choice seeks to fill needs, it follows that careful market appraisal to confirm the original judgment will be required before the program gets beyond the point of no return. We expect that successful market development of organic chemicals in the sixties will in this manner be strongly directed toward specific markets even more than in the past.

There is nothing exclusive about discovery of needs to be filled. Potential customers are vocal about what they would like to see achieved. Competitors are learning about those needs all the time. It will be necessary to think increasingly in terms of technological strength in choice of product versus corresponding needs, strength based on patents, raw materials, and men and their skill. Rating of projects and priority as never before takes on new significance. Because a sizable laboratory operation can produce so many organic chemical candidates, the decision to market, based on best chance of success, will demand prime attention.

The foregoing emphasis on products to meet needs does not exclude the desirability of development of products not aimed at a specific target. Many of the largest volume products today began in this manner. Despite reduced likelihood of recurrence, such experiences will undoubtedly be repeated. To be promotable, however, a new product for which no use can be visualized will have to avoid being a rerun of established products. It will require new attractions, chemical or economic or preferably both.

Pricing has always been the heart of marketing. For the most part, organic chemicals have been priced in reasonable relation to their cost at a given level of manufacture with reductions as appropriate. When a specific end use is governing the market activity, however, it is often necessary to deviate from the traditional approach. D. S. Alcorn of Union Carbide Chemicals, speaking of his firm's experience in providing organic chemicals to the synthetic resin industry, said:

> Pricing is another factor of the utmost importance. A realistic approach in keying the price of a new product to its intended use is absolutely essential.
>
> The old approach to pricing was to manufacture a material in pilot or semiworks quantity at high cost and to price the limited output at equally high levels. As business volume built up, there were downward price adjustments made in line with production economics realized through the larger volume.
>
> The modern approach to pricing is through a chemical developed for a specific end use, and then priced with competitive materials in that end use in accordance with its worth. A volume price is immediately put on the material in an attempt to get to volume usage as quickly as possible.

Market development of organic chemicals in the sixties will undoubtedly continue to require a readiness on the part of the supplier at some point in the chronology to take aggressive pricing action. Most responsible firms will pay sizable prices for small amounts of expensively prepared material. They do expect, however, that the supplier can give them a drum price and a long-range price on larger volume, so that they can base their own plans accordingly. Unless the chemical is completely experimental, customers want to be sure they can get drum quantities for evaluation and, in fact, seem much more likely to work with products where drum quantities can be provided. This latter fact tends to drive the price over onto the side of subsidization, at least for a time.

Regardless of the approach to pricing which is taken, the responsible activity with new organic chemicals in the sixties will be required to show a relationship between profit and the necessary investment. This depends upon the most accurate prediction of price and volume relationship. Unless the marketing function is geared to make use of all available knowledge which can be applied and reapplied to ensure the accuracy of this projection, the chances of unsatisfactory results will increase greatly. If we are to avoid the kind of situation which has plagued the textile and other commodity industries for years, organic chemical development people must be thinking along these lines.

Making the Product Attractive

The second broad area involves the lengths to which we can expect to have to go in trying to promote new organic chemicals in terms of competing for customers' research time. Certainly the first step in this respect is to attempt to lead from strength with the uniqueness of chemical structure. As emphasized by Mr. Alcorn, the "me too" approach has already proved extremely unlikely to produce a profit commensurate with the investment involved.

At least some of the ways toward which other chemicals have turned to capture the researcher's attention are clearly shown in a few specific examples. Functionality in the new product is most important where the ultimate application involves its use as an intermediate or as a monomer. Development of bisphenol, epichlorohydrin, and peroxygenated compounds are examples resting upon this type of situation. Our own diallylmelamine is a similar example.

If the objective is to fill needs, then specifications of the product must be developed to conform to the requirements of the customer. Increasing refinements in the purity of ester plasticizers to meet the requirements of electric grade applications have offered an example of this sort. A new product for this field must meet or surpass the established performance, if it is to stand a chance of fair evaluation.

Indicative of an all-encompassing approach is the development of the market in depth. The promotion of toluene diisocyanate furnishes an excellent example. The producers of this product as an element in foam have been forced to go all out in developing techniques of fabrication of the finished product, to demonstrate to the ultimate user of foam that systems containing TDI are indeed competitive with and superior to the existing foam (nonchemical) products. The technical service charges which result from such an endeavor loom large. Yet, without them, the chances of success were slim.

In developing organic chemicals in the sixties, the marketing man (as well as those involved in all the related activities) must visualize the likelihood of the candidate's requiring a massive effort of the sort described for commercial development. Having done so, he must estimate the chances of that venture being repaid.

Reappraisal

In the third area of activity mentioned, timing under the threat of ready reprisal will become even more acute than in the past. Successful development of organic chemicals, again as is true in all development work, will require reappraisal even more frequently, to be certain in the early stages that the relationship between likelihood of success and commitment is most clearly understood.

A Case History

Let us examine in the light of these textbooklike comments a case history to see what lessons may be learned. In Figures 1 and 2 is plotted the experience of a group of products for part of their development career as experienced by the American Cyanamid Co. These are chosen as "an average group of products"—they demonstrate reasonable growth; the products were not "me too"; they serve a broad market with many uses. During the years of effort which have been invested to date, there have been repeated trials, losses, and tribulations. Finally, and most encouraging, the corner appears to have been turned with regard to a payoff on the venture.

Some definitions are necessary to interpret this information adequately. Figure 1 shows the sales price on a per pound basis. It also demonstrates cost on a per pound basis. Because there are several products involved, these numbers have been averaged out. Moreover, the cost does not include provisions for research and development expense. However, it was felt that the latter figures were not sufficiently sizable on a prorated basis to affect the results unduly.

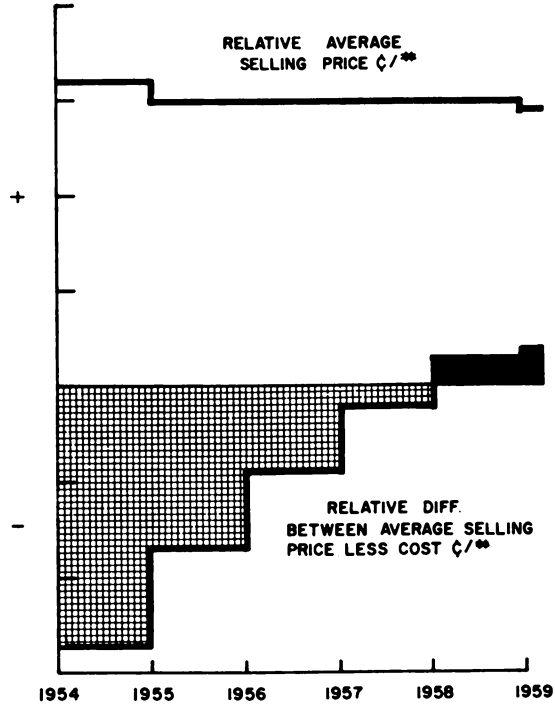


Figure 1. Sales price and cost on per pound basis

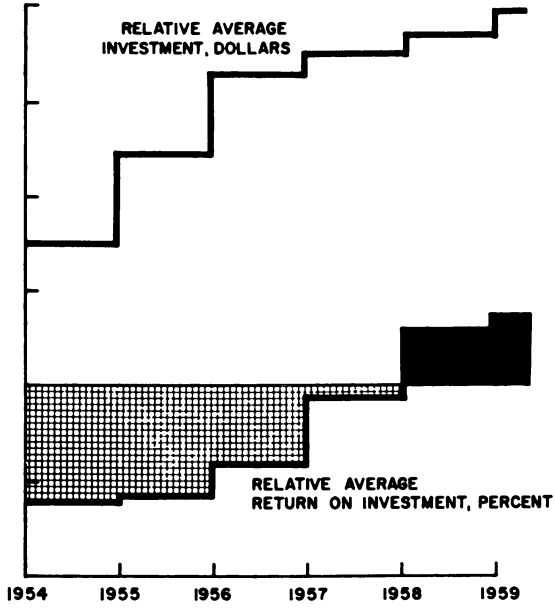


Figure 2. Total investment prorated on a dollar basis and per cent return

Figure 2 shows the total investment prorated on a dollar basis. The return is expressed on a per cent basis, but the two do not employ the same scale.

The case taken here is an example of products "priced to meet the market." The best possible estimate of properties versus requirements and competitive materials was made.

Our period of examining the record begins with the initial large capital investment. If this curve is traced backward, it will be evident that there was a previous pilot experience whose expense does not show in this discussion. The various increments include one increase in the physical investment but for the most part reflect increased working capital necessary to carry the larger sales volume.

Although the manner in which this information must necessarily be presented obscures the fact, at one point there was a serious process problem which resulted in sizable cost increases for one aspect of the program, although, fortunately, this was offset by an increasing sales volume in another aspect, so that the net effect on profit was approximately zero.

What conclusions can we reach from this experience about the development of new organic chemicals? First of all, because this took place during the supposedly "lethargic fifties," then presumably in the "competitive sixties," the amplitude of the effects may be even greater. If this is so, there is an ever greater burden placed upon those responsible for choosing a product for promotion to get something worthy of the kind of effort that is likely to be required.

Secondly, when planning to subsidize the venture, the market development man had better have a very patient management.

Finally, once a course is chosen, he will need every trick in the book to get his product accepted and on a successful commercial basis in the most rapid manner.

Earlier discussions have dealt with the problem of moving from test tube to tank car on the most compressed possible time schedule. The comments in this discussion have largely been aligned toward a textbook approach designed for minimum risk. Despite all the fine phrases about the latter, the fact remains that under the pressure of the need to get results in the competitive sixties, just as in the past, the people promoting new organic chemicals will in many cases "go for broke," ignoring the incremental approach in favor of trying to get the jump on others who might be able to do the same job. Some such ventures will undoubtedly be costly, wasteful of time and manpower, and will become failures. On the other hand — — — —, some will make a lot of money!

The Marketing of New Chemical Specialties

J. M. ROGERS and J. W. SELDEN

Minnesota Mining & Manufacturing Co., 900 Bush Ave., Saint Paul, Minn.

The ultimate goal of marketing specialties is to take the product out of the specialty class by creating new large fields of general applications. To meet the competition of the sixties, novelty will not be enough. Companies must provide performance, service, or a better price-to-performance ratio. As more chemical specialties appear in retail products, selling will become more impersonal and depend more upon the advertising of brand names. Salesmen will be subjected to additional pressures for developing new business as well as maintaining present customers. Specialty manufacturers may find it to their advantage to become more specialized in the specialty field. In addition, they must assume an increasing responsibility to protect the public from any hazards of misuse of their products.

We have chosen to classify chemical specialties as products of a chemical process having uniqueness in raw material, process, or end product, but modest present sales volume. Specialties can be, by this definition, finished products, intermediates, or raw materials. This discussion is confined to industrial materials and chemicals that find their way to retail shelves.

The term "specialty chemicals" could be applied to almost any chemical at one time in its development. In looking at many of the large volume chemicals in general use today, one's memory does not have to be taxed to remember when they were specialties. We can all remember the early days of thermoplastics and synthetic rubbers, which only a few short years ago were confined to rather expensive and technically demanding applications. While many people must have foreseen the rapid growth of these things, many of the rest of us were skeptical and doubted that some of these would ever reach the multimillion-pound sales they enjoy today.

Perhaps we can say then that the chemical specialty is a potential candidate for a general-purpose material, depending on the product's characteristics and the imagination, energy, and enthusiasm that are put to work on changing its status.

Fluorocarbon Gases

To illustrate this theory, we have chosen as outstanding examples the fluorocarbon gases. Developed in the early thirties to meet the specific require-

ment for better refrigerants, their usage has continued to grow in this field, but equally important are their usage and growth in the field of aerosols.

The first aerosol packages were introduced in the early 40's as "bug bombs" for the Armed Services, but their commercial growth was delayed until shortly after World War II in 1947. In that year several sources indicated that consumer aerosol units numbered about 5,000,000, and that these units were confined almost exclusively to insecticide packages. By 1952, five years later, 96,000,000 consumer units were marketed and the list of household products packaged with fluorocarbon propellants had expanded to include room deodorants, moth sprays, protective coatings, and paints. In 1958 about 470,000,000 household aerosol units were produced, most of them containing fluorocarbon gas propellants. Hundreds of products are now available to the retail buyer packaged in this form; in 1958 at a special event over 100 fillers and marketers of aerosol packaged products displayed their wares.

In the meantime plastic materials having unusual heat and chemical resistance were developed using the fluorocarbon gases as chemical intermediates. Markets for these plastics expanded usage of fluorocarbon gases and led to further diversification of end uses and products. Surely this is an outstanding example of a chemical specialty working its way to a high volume, general-purpose material by application not only in new end uses for the original compound itself, but also as a building block to make other unusual materials.

Glass Fibers

As another example of a special product making the transition from a specialty to a general-purpose material, glass fibers follow the general pattern. In a little more than 20 years out of the pilot plant, this product, developed originally as an insulation material, has found markets in woven textiles, molded parts, automobile bodies, aircraft assemblies, transmission pipe, boats, and many other end uses. From practically nothing in 1938 to a substantial $200,000,000 business is pretty fair progress. Perhaps glass fiber should not be classed as a chemical material, but it does illustrate the growth of a specialty into the position of a basic material.

There are many laboratory curiosities today, which will find their way into the specialty chemical field, and thence to the high volume, general-purpose category.

Under the definition that we have chosen for specialty chemicals, we have increased the complexity of our subject tremendously, for now we should cover the introduction of all new chemical materials to the market.

Trends in Marketing

During the past 20 years, the chemical industry has been one of the favorite growth industries of the investing public. It has come into its own as one of the most important suppliers to industry, to the public, and to the national defense establishment by bringing to its customers hosts of new materials to improve performance and reduce costs. As such, the chemical industry has attracted many new applicants for membership.

While the field of chemistry is by no means exhausted as a source of new products, each new entrant into the field creates a measure of competition. Everyone has his own ideas on how to deal with his competition.

There are many new companies entering the chemical industry. Probably

the most logical starting place for a new company desirous of entering the chemical industry is a single chemical specialty. Here it is possible to start business on a modest scale, concentrate sales, technical, and production effort on a single product, or a small family of products, and grow as the demand grows at minimum risk.

If this is the logical starting place for new companies in the chemical field, and a predominant number of the new chemicals produced by already established chemical companies start their commercial life as specialties, we should expect this area of the chemical business to furnish pretty lively competition in the 1960's. Like all other businesses, there is always room at the top for a better product, merchandised better, and used more widely. Fortunately, it is very seldom that an existing product is completely replaced by a new product, and invariably the total market is expanded by this action. If, however, we are anxious to increase our participation in the total market, we must find ways to cope with the increasing number of products that are being introduced by an increasing number of companies.

We do not like to think of ourselves as price cutters, but faced with a competitive situation we must furnish our customers with bigger "bargains." We must provide more to our customers through better products, more in technical service, more dependable deliveries, a better price-performance ratio, or some other measurable advantage to enable us to maintain our position with our customers. Recently a director of purchases told us that his suppliers had kept telling him that their prices included a sizable sum for new product research. A search of the records in several cases failed to show anything unusual in the way of contributions from new products. Surely, all purchasing people are going to become more alert to this type of thing, and we as sellers must do a better job of keeping our customers informed of our activities in their behalf, so that the "bargains" we are giving in added service are recognized.

In an increasingly competitive general market, uniqueness takes on added significance. While the word "new" is enough to arouse curiosity on the part of a customer, more and more new things are coming to his attention, so that we cannot depend on newness alone; we must strive to be unique in our products. Patents will surely take on increased importance in the 1960's. These at least allow the patent owner to recoup the expenses he incurred in developing his particular new product without battling an identical competitor's product. Even then the patented product must offer the advantages of better performance and economies over other products already available. Holders of patents have often been accused of practices harmful to the general public. We believe that these accusations are unjust, for even if the patent owner wished to take unfair advantage of a legal monopoly, the product covered must still show advantages to the consumer commensurate with the prices charged. The product must also favorably compare with other chemical products which can be substituted readily and are available from alternate sources. Competition, even though it be indirect, is the best self-policing system in this situation and will ensure that no one of us violates the ethics of good healthy business practices.

Another trend challenging the specialty chemical manufacturer now, and which will become more pronounced in the 1960's, is the need for multiple selling—i.e., the need to sell his product not only to the direct buyer, but often times to the buyer's customer or even the buyer's customer's customer. This is, of course, true only when our chemical becomes a recognizable or identifiable ingredient in a formulated or fabricated product and imparts some unusual

property having a value. Unless this particular formulator or fabricator has the exclusive use of our product by agreement or through use patents, other formulators or fabricators can be sold by creating a demand for our specific product with the ultimate consumer, who will, in turn, demand the use of our product from his various suppliers. By doing this, the value of a trade-mark or brand name is enhanced, further fortifying a position in the market. The need for multiple selling is here now and it will become greater in the 1960's.

Advertising and Merchandising

In multiple selling, advertising and merchandising become increasingly important tools. Obviously, if we intend to sell our customers' customers, as well as direct customers, we are going to have to reach a much larger audience with our sales story. As the number of potential customers increases, the chances of reaching every customer personally diminishes, and dependence on mass impact is increased. It is important to exercise extreme caution in the preparation of the advertising campaign, so that the consumer will not be misled, either by inference or by the actual content of the copy, to expect more from the product than it can offer, even under the most ideal circumstances.

Enthusiasm on the part of the manufacturer is the driving force behind a successful product, but this enthusiasm should be tempered with caution. The manufacturer's enthusiasm and claims for his product seem to be augmented in proportion to the number of subsequent handlers of his product. If he sells to a formulator who sells to a jobber, who sells to a dealer, who sells to a customer, each one seems to want to add a little more glamour and, incidentally, a few more performance claims. Oftentimes by the time the product reaches the consumer, the claims made for the product indicate that the millennium has arrived, and the ultimate miracle has been effected.

As manufacturers, we have the obligation to the public, to the industry, and to ourselves, to use our best efforts to prevent this type of exaggeration. If this practice is allowed to run rampant, the consumer, a pretty wise fellow, will soon believe nothing we tell him and will become so suspicious that he will resist anything new and refuse to pay any attention to any of our story, true or otherwise.

We do not underestimate the tremendous influence of advertising on the buying public, but recognize that anything having this much influence must also be controlled or contained, so that we will not be destroyed by our promiscuous abuse of its power.

Upgrading of Selling

Today's desire for growth dictates that the line salesman be subjected to additional pressures to develop new business as well as to maintain his position with present customers. If selling costs are to be kept within bounds, the salesman will be called on to shoulder more and more of the total selling effort. He will have to be equipped with more product knowledge, concerning his own as well as his competitors' products, he must know his company's policies better so he can interpret them promptly and accurately to his customers. Because he is the eyes and ears of his company in the field, he must be able to get pertinent market information to headquarters, so that action can be taken promptly.

The profession of selling is being gradually upgraded through better training methods, better material, and recognition by technical personnel of the

necessity for the selling function. Any era of increasing competition brings about this trend. A really good salesman, one who knows his product and his customers and how to put the two together on an order blank, is still too scarce. Thank goodness there are increasing numbers of technically trained people entering selling as a profession, bringing with them the necessary technical background for giving their present and future customers maximum service, and applying good logical reasoning to their day-to-day work. In the 1960's, this technical foundation will become more and more an essential part of the chemical specialty salesman's kit of tools.

If our premise of generally increased competition is true, it behooves the chemical specialty manufacturer to become more selective in his choice of horses to ride. If he has to invest more in testing and application work, if he is going to supply more and better technical service, if he is going to have to engage in multiple selling of his products, and if he does not have limitless funds, he will have to concentrate his efforts on a few products, rather than rush blindly into many fields at once. This concentration will result in his upgrading a limited product line in quality, uniformity, productive efficiency, and selling quality. As knowledge and experience become greater and greater in a relatively narrow field of products, his position in this limited product field becomes better fortified and entrenched, and a new entrant wishing to attack the identical product line will find the job difficult and costly. This is the most effective counter-irritant to competition we know.

The chemical manufacturer interested in specialties is going to have to supply his customers with more and more service. If he is aiming at pulling himself out of the specialty field by his boot straps, he is going to have to be aggressive in his technical, production, and marketing efforts. This seems to indicate that his investment in product and process development and in market research and development will be increased. It is our belief that the preliminary costs of introducing new products are going to rise, and that the ultimately successful companies will be those which can successfully apply their ingenuity and drive to keeping these costs from becoming so high as to make it unattractive if not impossible to launch new products.

The chemical industry is accustomed to taking risks in building production facilities. These risks should not increase appreciably, if the preliminary exploration in development and marketing is thorough; in fact, the chances of success should be improved. Let us not forget, however, that it is always more difficult to justify to ourselves the expenditure of money for intangible things like research and development, in either sales or technical areas, than it is to justify the same amount of money in brick, mortar, and machinery. There will be, then, an increasing amount of courage required on the part of chemical management, if future new products are to be launched with a fair chance of success.

Precautionary Labeling

There is a change taking place in the ultimate market for chemical specialties which we hope will continue. More chemical materials are being made available for home use on the supermarket and drug store shelves. This mass marketing of chemicals to the general public is placing another responsibility on the specialty chemical manufacturer. He now must undertake to prevent misuse of his materials which might lead to personal injuries or consequential

damages to customer's property. While we in the chemical industry do not consider the handling of chemicals dangerous (witness the excellent safety record of the chemical industry), we must remember that the public does not have the background of knowledge, nor the physical means that we have to protect himself. Therefore, we are obligated to protect him as completely as we can. Chemical specialties sold to the public should be packaged and labeled in such a manner that it becomes practically impossible to misuse them. Simply worded instructions for use and complete information on hazards and antidotes are essential.

The chemical manufacturer's responsibility goes beyond the minimum requirements of various government agencies. Even though the basic causes of household accidents are often mistakenly attributed to a chemical in the description of accidents, the news of accidents attributable either directly or indirectly to the use of chemicals travels like wildfire, and can quickly affect customer acceptance. These ill effects are far-reaching, in that they may affect a large segment of the chemical industry as well as the individual manufacturer. From the standpoint of self-preservation only, precautionary labeling has saved many a company from paying extremely expensive and unjustified claims made by individuals for personal injury due to that individual's carelessness.

Conclusions

What we have said here is certainly not original, nor is it specific. The variations in products and markets in the chemical specialty industry are too wide to make any general all-inclusive rules or even suggestions. The fact that a great deal of the all-product marketing in the chemical industry is of a special nature makes it an extremely active field and one in which increasing competition can be expected, bringing with it the need for better service, better products, and better marketing methods. Specialties put the chemical industry in intimate contact with almost every other branch of industry, for there are few factories, homes, or stores where chemicals, and particularly specialties, are not used. This wide contact is also partially responsible for the generation of further new product ideas, and new uses for present products. General usage carries with it definite responsibilities, and those companies which shoulder them and provide good products and service to their customers will be able to make interesting profits and promote the growth of the chemical industry as a whole. The chemical specialty business, then, can be fascinating and profitable, and can make a significant contribution to prosperity and progress.

Marketing Fine Chemicals for Food Use

RICHARD W. HAYES
Merck & Co., Inc., Rahway, N. J.

This paper deals with some of the implications of the Food Additive Amendment of 1958 as it relates to the marketing of food additives. Competition, timing, investment, and patent factors are considered. A brief summary is given of areas in the food additive field of future interest to the chemical manufacturer.

The phrase "fine chemicals" means many things to many people, so I will not attempt to offer a universal definition. It once applied only to chemicals such as those in the Merck line of high purity inorganic compounds and it is still used in that sense. In the sense in which I am using it now, however, it refers to organic and inorganic substances produced in bulk quantities and in high purity for food use. The majority of chemicals produced for food use today meet rigid specifications for quality just as do reagent chemicals produced for laboratory use. Fine chemicals used in the manufacture of food are many in number, diverse in character, and they come from all segments of our industry. My guess is that most of us engaged in chemical manufacture, although we do not consider ourselves primarily suppliers to the food industry, have one or more products in our line with important food applications. These include products sold directly to food processors as well as those sold indirectly to other suppliers to the food industry.

Food additives can be considered conveniently from two standpoints, one from the standpoint of those used intentionally—e.g., preservatives, antioxidants, sequestrants, surfactants, stabilizers and thickeners, nutrients, colors, etc.—and the other from the standpoint of incidental additives such as those unavoidably becoming a part of food through their use in packaging material, animal feed supplements, or as pesticides for application to plant products.

Intentional food additives are the principal products in the field with which I am concerned and they are the subject of our discussion. One of the major points I would like to comment on, when looking ahead to the 1960's, is the commercial or marketing implications of the new Food Additive Amendment to the Federal Food, Drug, and Cosmetic Act signed into law last September by the President.

First of all I am not an expert on the Food Additive Amendment. As most of us recognize, this is a highly complex piece of legislation which is still under-

going extensive interpretation by both Government and industry. At Merck we rely on the opinions, advice, and recommendations of food law specialists to guide us in our marketing efforts. Therefore, I shall attempt to confine my observations to those implications of the law with a strictly commercial flavor.

The food additives of the future will be heavily regulated. This is a fact of life which all of us as either suppliers to the food industry or food processors must face as we look ahead.

The complexity of the Amendment places a premium on the ability to anticipate the detailed information needed to satisfy the requirements of the regulations, when a new product first shows commercial possibilities. Such information involves developing practical methods of analysis, conducting long-term animal feeding tests, and applying skilled judgment to the establishment of safety. The company which does not have available experienced scientists in the various disciplines who know the type of information required and the facilities necessary to secure it, and who can initiate their work at the appropriate time, may find itself under a severe handicap in reducing the time required to obtain regulatory approval and bring the product to market.

Chemical manufacturers, like ourselves, who have had many years of experience in developing new drugs for human and animal use have a definite advantage in this field, because the type of information necessary to support a food additive petition is similar to that needed to obtain an effective "new drug" application.

As a word of caution and constructive advice to the industrially smaller members of our group it would seem desirable that if possible, technical consultants and legal counsel with a broad background of experience in the field of food and drug legislation, be sought out to assure that when petitions are made, certain of your commercial interests are not inadvertently neglected.

In the scientific information required to obtain approval on a new food additive, the two most important items needed from the viewpoint of cost and time are data to establish safety and the development of practical analytical methods for determining the amount of the additive in food or substances derived from the additive in food.

The development of such data will involve the investment of an estimated minimum of $200,000. The cost may be much more if any complicating factors are encountered.

Another important aspect of the requirements in establishing safety, apart from the dollar considerations, is that a total elapsed time of about three years will be involved in the accumulation of such data. Although chronic toxicity studies may cover a two-year period, our best guess at the moment is that preliminary studies on subacute and acute toxicity will consume at least six months before chronic studies can be started, and that following the completion of the two-year feeding experiments, an additional six months will be required for evaluation of experimental animals and preparation and approval of the petition. Thus, the total time between the availability of the additive to the petitioner, in experimental quantities, and the filing of a petition for approval with the Federal Food and Drug Administration will be about three years. If any complications are encountered or if the work is not carefully planned, the time required may be longer.

What are some of the implications of these time and dollar factors?

One of the obvious consequences of the costly testing, which incidentally

responsible members of our industry have carried out voluntarily prior to the Food Additive Amendment, will be to discourage small companies or companies with only limited interest in foods, as factors in research and development on food additives. Committing one's resources to the extent of $200,000 and a three-year program with no positive assurance that it will result in a marketable product may even discourage large companies which have an opportunity to direct their efforts in other directions with a shorter pay-off time.

Secondly, it seems reasonable to conclude that in view of the substantially increased investment required, research and development efforts on food additives will be directed only toward those with potentially large markets. In all likelihood, the development of additives with relatively small markets—i.e., less than $1,000,000—will be avoided, because the cost of such development work, including process and product development, cannot be justified. Development of additives with narrow applications in specialty-type foods for example, will probably be avoided in future years. Also, those of us in search of new food additives will be looking for products which we anticipate will have a long life so that we have assurance that our investment will be paid off and a reasonable return will be realized. The alternative to this latter approach, of course, is an attempt to develop additives which might return a high and quick profit, but the risks inherent in this approach make it the less favorable of the two. None of us would prefer the alternative of gambling on the high costs of toxicity testing, process, and product development of a product whose estimated life would be only a few years, notwithstanding a high margin of profit.

Related to our search for food additives with a long life is the obvious result that the additives of the future will probably have a lower obsolescence rate than those of former years, because of the time involved in gaining approval for a substitute.

The product life of additives approved under the new Amendment will probably be longer for another reason, because where relatively small dollar markets are involved—in the neighborhood of $1,000,000—there may be no incentive or justification for the development of a less expensive or more effective substitute.

One of the most striking results of the new Amendment will be the loss of the element of surprise in introducing a new additive to the market. This is a consequence, of course, of the publication by the Food and Drug Administration, within 30 days of the date of filing a petition, of a brief description of the proposal in general terms. This is in striking contrast to the situation prevailing when applications for approval of new drugs are submitted to the FDA. In the latter case, petition for approval of the drug is a private communication between the Government and the supplier, and the introduction of a product on the market without foreknowledge of competition is usually the rule. In the case of a food additive petition, however, publication of the Notice of Filing is the tip-off to competition as to what your plans are. In instances where the petition for approval involves an additive already in commercial production for other uses, the Notice of Filing will immediately place competition on a practically equal footing with yourself.

Even in instances where the Notice of Filing reaveals a new food additive with a new use—an additive not commercially available at the time—competition may have an opportunity to appreciably narrow or eliminate whatever competitive advantage the petitioner might have had originally, by taking

advantage of the 90- to 180-day period between the Notice of Filing and the issuance of the proposed regulations by the FDA. Depending on the complexity of the additive in question, it may be a relatively simple task for competition to produce commercial quantities within this period or at least to put its production facilities in readiness pending publication of the regulations. A further result of the publication of the Notice of Filing and the disclosure of the identity of the additive and its proposed use, will be the greater emphasis on the part of the petitioner on gaining a strong patent position with respect to manufacture or use of the additive. Through the establishment of a favored position, perhaps competitive activity can be completely forestalled. Therefore, research and development efforts will undoubtedly be limited to products with patent possibilities.

It is important to recognize again the contrast between the processing of "new drug" applications and new food additive applications by the FDA. FDA sanction of new drugs is given on a company basis, while sanction of a new food additive is given on a product basis. In the former case, toxicity and efficacy data are held confidential, and another supplier wishing to market the same product must submit his own data. Issuance by the FDA of proposed regulations for the use of a food additive, however, constitutes official recognition of the substance in question as safe no matter who the manufacturer may be, and opens the door to sale of the product by all, though the petitioner may be the only one who has spent the time and money necessary to secure this approval.

The timing factor—the time of introduction of the additive to the market—formerly under control of the manufacturer, will now depend on the date of publication of regulations by the FDA.

The introduction of a product on the market at the optimal time from the standpoint of seasonal demand, competitive activity, etc., will therefore be subject to variables beyond our control which may, temporarily, reduce the flexibility and effectiveness of our marketing strategy. Whether or not this will constitute a long-term problem of any significance remains to be seen.

One should recognize that there is no assurance that the submission of a petition for approval of a new food additive will ultimately result in its approval by FDA. The FDA has the authority to reject the petition completely, to restrict, and to modify it. The experience of your company's technical staff and regulatory specialists will be of considerable help in predicting the probability it will be approved and will be helpful in determining the extent to which definite marketing commitments can be made in advance of actual approval of the petition. The fact that the Food Additive Amendment is a new law means that there are many areas in which FDA's attitude toward new food additives is difficult to predict. In those cases where we believe that there is a large likelihood of approval of a new additive, there will be an added incentive to have marketing plans set and completely ready for implementation no later than the date of filing of the petition for approval. In this way we will be best prepared to offset the contingency that damaging competitive activity might occur, should the issuance of regulations take place any time within the 90- to 180-day period subsequent to Notice of Filing.

Another subject related to the Food Additive Amendment but in many ways separate and distinct from it, is worthy of consideration here. It concerns the Federal Standards of Identity and the influence they will have on our marketing of new products to the food industries in the future. It should be

recognized from the start that approval of a new food additive under the Amendment involves an added consideration, if it is to be used in a standardized food. Thus, while a petitioner can pinpoint his objective with fair certainty in seeking approval for an additive in nonstandardized foods—to establish safety and utility—in the case of standardized foods, he must also demonstrate that the inclusion of the additive as either a required or an optional ingredient in that food promotes honesty and fair dealing in the interest of the consumer. The satisfaction of this latter requirement, because of its relatively tenuous nature, can be an extremely drawn out process if controversies arise requiring public hearings.

Because of the increasing number of foods for which standards are being established, we can predict a slower rate of acceptance of new additives for these foods as we progress through the 1960's. There would appear to be no insurmountable hurdles to overcome with regard to federal standards, but they nonetheless will deserve careful consideration by those of us contemplating the development of additives for use in standardized foods.

Now that we have considered briefly some of the implications of the Food Additive Amendment and Federal Standards of Identity on the development of food additives in the sixties, perhaps it would be appropriate to look ahead and speculate on which areas in the food field will probably offer the greatest rewards for the chemical manufacturer developing food additives.

First and most striking of these fields is that encompassing the so-called convenience foods. Instant drinks, frozen vegetables, cake mixes, and frozen precooked dinners are but a few examples of such convenience foods well known to us all.

The objective of producing foods of standard or uniform quality is another important goal of the food industry. A related objective is the development of foods with improved stability in which initial freshness and desirability will be retained during prolonged shelf life.

As a more enlightened public becomes increasingly aware of the need for adequate nutrition, the field of foods enriched or fortified with vitamins and amino acids will assume still greater importance in the years to come. It is conceivable that as these markets grow and as public education in nutrition progresses, there will be a consumer demand for foods with guaranteed, standardized nutritional value.

In considering new additives for any segment of the food industry, it should be recognized that in general, food manufacturers are interested in selling food products, not additives. Additives will be of interest only in so far as they benefit the consumer, either directly or indirectly, by making available more foods which are convenient, cheaper, more wholesome and nutritious, more stable, etc. Additives are only one means for product improvement available to the food manufacturer.

These are but a few of the factors which we at Merck will be thinking about as we market new food additives both nutritive and otherwise in the 1960's. Recognition of the Food Additive Amendment and other factors too numerous to cover here will shape our marketing plans for food and food additives in the years to come. We will all be facing some new problems in introducing our products to the food industry or the consumer, but most of us do not feel that these will be a serious impediment to the rapid growth of the knowledge of food technology and human nutrition, expansion of the market for food and

food additives and the general improvement of the quality and safety of our food supply.

We look forward to the competitive 1960's as a golden opportunity for chemical manufacturers and food processors alike to make valuable contributions both to the public welfare and to their company's growth and profits. The realization of these opportunities depends in no small measure on the continuing and close cooperation among all of us responsible, either directly or indirectly for the nation's food supply, the food industry, the chemical manufacturing industries, and the Government, on both federal and state levels.