THE MULTIDISCIPLINE APPROACH: A MARKETING APPLICATION

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No approach is more widely heralded, yet more effectively ignored in actual practice, than the multidiscipline technique in systems design.

It has been long apparent that for effective systems design practitioners must:

1. understand the dynamics of the specific business,
2. know the difference between essential and nonessential business activities,
3. be aware of—and understand—existing technology and emerging developments,
4. appreciate the economics of developing specialized equipment versus using standard equipment, and
5. be sensitive to the external environment in which the company must operate.

These criteria are difficult to meet; the American business scene is littered with systems which aptly demonstrate insensitivity to the real systems needs of businesses.

Once management makes a decision for a traditional capital investment they proceed to allocate the necessary ingredients to make that capital asset a reality. If it's a new factory, they provide funds, time and the necessary personnel to complete the project. No ingredient is left out, for that elimination could jeopardize the project. Assistance is secured from lawyers, bankers, real estate men, engineers—everyone that is required. The latest technology is used; the most efficient layout is determined. The life of a plant is long and initial mistakes can prove crucial, even fatal, to that life.

SYSTEMS DESIGN

But take the same management and give them the problem of providing an internal system which may be critical to corporate health and watch out! The finely wrought sense of proportion disappears. The problem is considered to require a departmental solution for, after all, the company is organized to provide departmental-type solutions on a daily basis. The personnel involved generally include those who have an accounting background plus the usual array of programmers. It is no coincidence that the first computer business applications for most companies encompass the financial areas.

Somehow the early history of bookkeeping machines and accounting machines lingers in the background as the proper ancestors for the "new system." The boundaries are departmental, personality and supplier. The lingo is new, the technology is exciting, but the application is archaic.

The application of the multidisciplinary approach has been, when used, in defense activities or in civilian manufacturing projects. Rarely has it been tried in the area which is the stepchild of the
data processing revolution—marketing. And yet, the potential benefits here are staggering. The sheer size of the field, the cash flow involved, the multitude of problems all add up to the need for intensive, structured problem-solving.

RETAIL GASOLINE MARKETING

In this area, one of the most complex marketing operations today is the retail gasoline business. Everyone is an expert in the gasoline market! The sheer size, the pricing, the distribution, the vast amounts of capital involved make this a prime candidate for automation consideration. And this incredible complexity makes it a primary candidate for the multidisciplinary approach. Not only is the traditional systems experience and the obvious electronics design talent needed, but a measure of legal, marketing, and accounting background is required.

Much work has been done in the automation of distribution facilities in the petroleum business. Today a driver using a credit card can secure access to a bulk terminal and draw the products he is authorized, while the system records who he is, where he is taking the product, what the product is, its temperature, the time, product totals, and tank levels. This data is then often transmitted to remote central processing locations, usually by teletype. Invoices or bills of lading are prepared in many cases and returned to the driver before he leaves on his delivery.

Fine, that solves one part of the marketing system. But why not use the same general idea and apply it to the over 220,000 service stations in the United States? The techniques are known, the idea is here, so all we need is a black box!

Unfortunately, such simplification rarely produces valuable results.

Since Motorola has had considerable experience in the petroleum field it was decided to take the multidiscipline approach to this problem. A group was formed embodying the disciplines which were considered essential: electronic design, communications, internal systems, marketing.

The actual key to the ultimate solution was in defining the basic data need of the operation. In this case information content was in each gallon of gasoline as it was pumped into the motorist's automobile. The resulting statistical structure depends upon that one element. (Actually petroleum marketing data has been based historically upon the quantity of gasoline delivered to a station. Actual sales to the motorist have not been available on a practical basis.) Capture that data at the source. Simple. But do it rapidly, accurately, periodically and on-call, and, above all, inexpensively. There was the design problem.

EQUIPMENT AND PROCEDURES

The resulting hardware and procedures was an outgrowth of automated terminal techniques married to Bell System DATA-PHONE techniques. The system, as designed, applies not only to service stations, but to any outlet where a discrete amount can be measured. It does not matter whether the measure is in gallons, barrels, pounds or tons. The increment is recorded and transmitted on request to the central location in machine-acceptable form.

The remote station equipment consists of impulse transmitters installed on each product pump or point of flow. One pulse for each gallon of throughput is stored in magnetic memory. The totals of all like products are added together and held in storage for interrogation by the central. The remote also contains a 3-digit station identification code along with the necessary equipment for tying into the Bell System DATA-PHONE installation.

The central equipment consists of a Motorola console for inquiry of the remotes and for recording the captured data. Included are a typewriter, paper-tape punches, a manual entry unit for adding local information, together with automatic telephone dialing equipment of the Bell System and the receiving DATA-PHONE equipment.

Dialing from the central is accomplished automatically at set times by feeding paper tape containing the telephone numbers into the dialer, by using the different types of card and magnetic tape dialers, or by manually dialing the remote number.

The data returned from the remote station includes throughput figures for each product, the identification of the station, and status codes pertaining to the condition of the pumps.

The need for a one-way DATA-PHONE was solved when the Bell System developed their low-cost 401-H for this application. The call is made always from the central to the remote, consequently, the normal two-way dataset was not required.

An even newer dataset permits the central control station to turn off and on the remote product dispensers.
BENEFITS TO MANAGEMENT

The benefits to management from having such source sales information immediately available on demand are difficult to calculate. The data can be useless or it can be invaluable. The critical feedback is now within reach of all levels of management. How does one calculate the pay-out of individual marketing decisions except in the overall health of the marketing effort?

For petroleum marketing management, this system, for example, provides immediate response by station to the sales campaigns, new marketing concepts, special events, credit card promotions, cooperative advertising, radio and television programs so important to a successful marketing effort. It provides rapid response to the sales effect of weather conditions, traffic flow, road impediments and other local occurrences on a specific time basis—information unique to highway-type locations. Further, it eliminates statistical distortion of “sale by delivery,” and above all, provides the basic data for market studies in depth.

No one point in the petroleum distribution picture is more critical today than the economic health of the service station dealer. With an annual operator turnover in the neighborhood of 25 percent, this group has been caught in a spiraling profit squeeze. The objective was to achieve the following effects:

1. Eliminate the basis for dealer complaints and fears associated with the effect of price changes on inventories.
2. Eliminate manipulation of inventory during periods of price fluctuations.
3. Eliminate paper work.
4. Reduce possibilities of product substitution.
5. Allow tighter inventory control.
6. Eliminate danger of “running dry.”
7. Eliminate any necessity for trucks to deliver only during open hours.

Happily, the resulting system design met these qualifications.

It is now possible to suggest a model financial management system to a dealer having a substantial chance of being successful. By eliminating the periodic large withdrawals from the working capital of a dealer for delivery payments, a systematic payment schedule to the supplier can be established. This, together with the elimination of the large gasoline inventory investment usually required, provides much of the groundwork for a financially stable dealership. With an operation that survives on the slimmest of margins, the potential saving is substantial.

The invoicing of service station deliveries has long been a cumbersome error-filled procedure. Even with computers available for the processing of sales data, the reliability of the high-speed output is still tied to the accuracy of the oftentimes manually prepared input data.

An extensive system of paper work has been developed over the years to provide the driver with pricing and tax information to prepare invoices at the time of delivery. To back up the driver, clerical staffs have been formed at various levels to correct his mathematical and coding errors.

By installing this data acquisition system, drivers are allowed to do what they do best: drive. The dual functions of pricing and billing are transferred to computers where they can be most economically handled. The tape output from the central control is fed directly into the data processing flow. Individual invoices are prepared or, more economically, statement-type invoicing is instituted. Under the latter method, the dealer receives a combination statement/invoice which records product used at whatever prices existed during the specific periods, together with remittances received by the company.

The severe competition of major commercial accounts has put a premium on services which can be offered profitably to these important customers. The theory of the supplier carrying the financial burden of a large product inventory applies as well to this type of account as it does to a service station. By installing the system at the location of a large consumer account, the customer can be converted from a “charged as delivered” to a “charged as used” basis. Whether the customer operates a truck fleet, a manufacturing facility, a marina, or an airport installation, is of little importance. This elimination of his investment in stored bulk product is a tangible dollars-and-cents advantage to him.

An important by-product of the Motorola data acquisition system is the new tool for credit administration that it generates. By checking product usage with remittances received on a basis suited to the particular customer, credit management assumes a new aspect.

Rather than waiting the many days it usually takes for a credit man to find out that a delivery
was made, the office charged with credit control knows, on call, the product actually used by the customer. This information, correlated with remittances received, gives an accurate up-to-the-minute picture of the credit standing of the customer.

Cumbersome credit control through the dispatcher, the plant cashier and the driver disappears and the techniques of credit management are allowed free play. Instead of adapting credit terms to the peculiarities of the distribution pattern, terms can be tailored to the requirements of the individual customer.

Nowhere is the effect of the system more dramatic than in the operation of the bulk plant/terminal. By using the full advantages of the system, the terminal becomes strictly a physical installation for the storage and dispensing of product rather than the major clerical organization it has been.

By removing the now extraneous activities from the bulk terminal, the real economics of product distribution can be investigated. No longer are dealers' hours of operation and credit positions a restriction on the use of the truck fleet. No longer must dispatching be done by the "seat of the pants."

Managerial abilities become free to determine the size of truck fleets, to schedule personnel hours, and to plan distribution patterns without outside restraints. By removing much of the terminal clerical overhead costs and reducing delivery expenses, the economics of distribution undergo a major improvement.

Having automatic equipment guarantees no competitive advantage to a company. However, the imaginative application of that same equipment can bestow a substantial competitive advantage. The very nature of this automated system—capturing data at the sources—allows many of its advantages to accrue in existing internal operations. However, the full application of the system changes much of the marketing distribution, accounting, and data processing structure as it is operated today. Obviously, the major payout rests in full integration. These changes are compatible with the "total systems" trend so evident now:

1. One-time automatic collection of data at the source,
2. transmitted automatically,
3. to high-speed processing computers
4. for distribution to all levels required, when required, and in the form required.

The automated terminal equipment used in conjunction with the data acquisition system completes the automation picture for bulk product movement.

THE CYCLE IS COMPLETE

What previously was considered a desirable but strictly "blue sky" operation is today a practical, existing situation. Let's describe it:

Each evening the console operator in the area office brings in throughput figures for all stations, large commercial accounts, fuel oil jobbers, and leased storage in a major geographical area on the flat-fee WATS telephone line, which has been used during the day for normal service. The output punched tape is fed to a small computer which prepares a dispatch schedule for the bulk terminals delivering in this area. The schedule is transmitted by teletype to each terminal during the night.

A by-product of this process is a listing of station sales on a salesman and district breakdown basis. This information is transmitted by teletype to each district sales office during the evening. Another by-product is the updating of accounts receivable, gallonage rents, and trend sales statistics for area and higher management. All information is available at the opening of the new business day.

During the early evening at each terminal, the by-product tape from the loading of all trucks and the measurement of the tank levels is transmitted to the area office. This information supplies the raw data for the bulk stock position. No calculations are made at the bulk terminal; rather, the facilities of the area computer are used. Should complete results of the stock picture show discrepancies, the information is transmitted by teletype to the bulk plant or terminal manager in time for corrective action.

Variations of the above, based on organizational structure and geographic dispersion, are infinite. But the principles of rapid collection of data in machine-sensible form plus immediate distribution of the refined data to management are inherent in the system in any pattern.
Data processing, distribution, and management information are integrated into a single economic flow. By eliminating—not changing, but eliminating—many of the steps in distribution and accounting, the tangible payout is substantial. The intangible benefit can be incalculable: a strong competitive position.

A VALID APPROACH

What I have outlined is an integrated system for a particular industry. It presumes an integrated environment for maximum operational benefits, an environmental situation which does not exist today. The development of this system is a result of the multidiscipline approach to problem-solving. I think it has been particularly successful in its relationship to the dynamics of petroleum marketing.

Will the results of the multidisciplinary approach ever really be satisfactory in today's corporate climate? Can departmental judgments ever be brought to bear adequately on the results of such multidiscipline solutions? The approach is valid, the techniques are proven. But now the real challenge: can system integration be effective in a nonintegrated environment?

The ripple effect of the multidiscipline approach is so widespread, the adaptability of the modern corporation so enormous, the economic pressures for profitability so great, the obvious trend must be toward an environmental change.

What we are really reviewing is the process of dynamic change with a glance at the near future, a future shaped by the creative combination of talent and technology.