DATA PROCESSING
FROM THE FIELD TO THE SUPERMARKETS

By

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In the Citrus Industry, where production and distribution problems are compounded by product perishability, mechanized data processing systems are helping organizations to operate more efficiently and to reap greater profits.

Although only a fraction of their potential has been realized, such systems are already being used by many segments of the industry -- from growers to retailers -- to handle accounting and record-keeping functions and to manipulate data into meaningful reports for use as guidelines in decision-making.

Let's look at some of the current and future applications of punched card equipment and computers in the industry, beginning with the first link in the chain: the grower.

The Computer "On the Farm"

It is estimated that approximately 10,000 growers and farmers in this country directly or indirectly utilize electronic data processing equipment to maintain better records and to prepare byproduct reports.

A number of western grower associations or cooperatives, for example, employ computers to keep tabs on receipts and expenses for members on a monthly, quarterly and cumulative year-to-date basis. In addition, the systems produce tax information and summary reports which show the quantity and value of row crops sold and in production, the amount of capital invested, and

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the return for the current and preceding growing seasons.

With the switch from human labor to capital investment in complex machinery, fertilizers, insecticides, etc., as the principal farm outlay, today's grower needs such information. He can no longer afford the luxury of operating for extended periods without knowing whether he is making or losing money and the areas in which these profits or losses occur.

By 1970, the application of computers in agriculture is expected to broaden beyond record-keeping to encompass virtually every aspect of food production. This will include enterprise planning, sophisticated profit forecasting, and even on-farm equipment control -- the agricultural equivalent of process control in manufacturing.

One area of profit potential is the simulation of a grower's entire operation by setting up a mathematical model of it within the computer. With such a model, the computer can test what effect hundreds of variables -- such as price, weather, available capital, soil conditions, production needs and profit goals -- have on the operation. By varying the alternatives, the computer can indicate the combination that best meets the individual grower's particular situation. In this way the grower can evaluate current utilization and set up long-range plans for greater profitability in seasons to come without first having to put the actual plans into effect.

Such data analyses have provided growers with guidelines on what crops to plant, the amounts and ratios of fertilizers required for each crop, the insecticide and herbicides to use, how much labor to apply against each crop, how much capital to apply against each rotation, and the minimum tillage required for good seed beds and maximum crop yield. The results achieved by the growers who followed the guidelines coincided very closely with the computer predictions.

As the trend toward volume farming continues, harvesting devices will inevitably become even larger and more complex. Ultimately, the operator will monitor the equipment via electronic sensing devices linked to a central computer at a control headquarters. Critical harvesting functions and crop conditions will be electronically sensed to reduce crop loss during machine picking, permitting once-over harvesting with maximum profit. Agronomists are already developing new crops better suited to this non-selective picking and some of the machinery is already being developed. An example is a lettuce "picker" that senses electronically whether the head is ready to harvest.
Although electronic data processing equipment will, one day, be as common on the farm as field machinery, only a few large operators have installed equipment of their own. Many others take advantage of computer facilities available through land grant schools, universities, agricultural associations, the U. S. Department of Agriculture, state cooperatives and some banks.

The Shippers

Today, shippers, too, need and can benefit from the record-keeping and analytical abilities of computers. Initially, shippers can produce invoices, bills-of-lading, statements and other routine paperwork much more efficiently, accurately and economically -- as many are already doing. Then, as byproducts of these operations, they can derive many valuable management reports.

But shippers do not have to limit use of computers to determining where they have been. There are many ways in which they can help direct and optimize operations. Computer scheduling of truck loading, for example, reduces delays to the bare minimum and insures that each trailer is properly loaded for maximum profit. Similarly, trucks can be routed to achieve maximum service at least cost. Even truck maintenance procedures can be computer-scheduled, and exception reports can automatically flag vehicles racking-up excessive down-time or unreasonable maintenance costs.

As with the grower, the shipper's entire operation can be simulated to determine the effect, for example, of employing two more trucks and shortening routes; of releasing two trucks and lengthening routes; and of achieving maximum efficiency in the event of vehicle breakdowns at various points in the routes.

The Wholesalers

Wholesalers are probably a little further along in applying data processing techniques than other members of the produce chain. And the results generally have been excellent.

Computer systems enable the wholesaler to efficiently handle increasing volumes and variety of pack and, through fast, flexible pricing and improved service, to keep on top of competition.

In order entry, many wholesalers are utilizing various types of communications devices to expedite getting the information into computer systems for processing. These devices include two-way radio communication with salesmen's cars; teletype, punched card
and paper tape terminals at the retailers' locations, linked to the computer location, etc.

Order filing is also speeded by computer. The invoice-picking ticket is printed at high speed in legible form, with items usually sequenced by slot location. This means that the warehouse can pick faster and get the order together sooner.

In some systems, computers also analyze warehouse orders and print picker assignment data. Computer control of conveyors is also being used to some degree. And complete automation in order picking and conveying is probably just a question of time.

As with the shippers, the wholesaler's computer can schedule deliveries to the truck dock and schedule loading. Each invoice can also list total cubic footage to ease and optimize truck loading.

With improved methods of storage and transportation, the trend is toward larger, more complex inventories at wholesale. And these inventories may be held for longer periods. Consequently, effective inventory control has become increasingly important. Yet inventorying perishables was not considered a job for data processing equipment for many years. Recently, however, this has been handled successfully by computer with relatively simple systems which include built-in shrinkage factors. Some day, even scientific inventory management systems such as IBM's IMPACT (for Inventory Management Program and Control Techniques) will probably be made applicable to fruit and vegetable inventories.

Inventory By Computer

Just one of the things IMPACT does is to analyze once a week the stock status of each item in all of a company's stores and warehouses. If the inventory of an item reaches what the computer has previously determined is a reorder level, out comes a requisition card. All these cards then go back into the equipment. Then, the computer can search out other items from the same source that might be ordered at the same time for volume discounts or lower freight rates, even though their levels aren't yet critical.

The computers give so much information about every single product going through a retailer store that vendors are often embarrassed to find the retailer knows more about a product's acceptance than they do.

Crosstalk

Computers are not only mines of information; they can tell
each other what they know. One of the most exciting prospects in distribution comes from the possibility of two companies' computers talking to each other.

California Packing Corporation is currently teaming up with a pair of large grocery chains in two "direct ordering tests." The idea, says F. H. Bergtholdt, Calpak Director of Distribution, is to try out "computer-managed inventories and direct wire communications between customer and manufacturer."

"The customer's computer determines what, how much, and when to buy," explains Bergtholdt, "and the order is transmitted from the customer's data processing center to Calpak's data processing center."

All The Way

Several other food processors, too, are trying our computer-to-computer systems. If the tests succeed, the next step may well be to tie in a third computer, the transportation company's.

As stocks in a supermarket chain's warehouse neared a predetermined reorder level, the chain's computer would not only alert the producer, it would also alert the railroad or trucker to have equipment ready at the loading dock.

Then, the computers would follow the boxcar or trailer across the country, making nightly reports on its whereabouts. If and when such a system reaches perfection, big grocery chains could even do without warehouses, shipping directly to stores. Only shelf space and a back room in each store would be needed. Already, some venturesome chains are experimenting in this direction, though still on a primitive basis.

Management Reports

Based on invoicing and inventory data, a whole range of by-product management reports can be produced. These could include detailed information on item movement, and sales and gross profit by product, customer and salesman. This type of data enables the wholesaler to plan sales programs based on specific goals and makes it possible for him to achieve these goals by concentrating on the best items, customers and effective sales direction. With this type of data, buyers can do a better job, and advertising and sales promotion can be tied in much more effectively than was previously possible.
Emphasis on high-profit items does not mean that a wholesaler should handle less than a full line, but just indicates that he should gear to push the more profitable products. To implement this plan, perhaps, commissions could be based on gross profit as they are in some other distribution areas. If a wholesaler was concerned that salesmen would just sell high-profit items, he could adjust commissions to benefit salesmen who move the whole line.

One way to make salesmen more effective is to give them more time to sell. A computer's ability to handle price changes frees the salesmen from this tedious clerical chore, gets current prices to everyone at the same time, and thus avoids confusions and customer irritation. One wholesaler, for example, produces a new price sheet weekly for 180 customers, providing each salesman with a computer-produced supplemental list of price changes and deletions daily. When the salesman phones a customer, he passes along the price changes before taking the order. As the orders are entered into the computer, they are automatically processed at the new price level.

Data processing equipment can also be used to establish labor standards and to measure the efficiency of the wholesaler's operation at all levels as has been done for years in the manufacturing industries.

**EDP for the Retail Level**

Potential for a new level of service to his retail outlet is one of the greatest advantages of electronic data processing to the wholesaler. He can, for example, take over many of the retailers accounting chores, such as analysis of gross profit, item movement and inventory management with suggested levels.

Many retail produce managers are more interested in moving items than in manually filling-out reports on their movement. As a result, this is one detail job that often doesn't get done. But, a checkout-stand device to record produce sales by category or item would permit daily computer analysis of movement which could be measured against gross margin goals. This would permit fast reaction on non-moving items with ads or changes in display.

To help move retail produce, it has even been suggested that recipes could be stored in the wholesaler's computer. If a retailer orders eggplant, for example, the computer would print a supply of eggplant recipes which would go to the store along with the item.
Some supermarkets are looking into retail credit. A wholesaler with a computer can provide an extra service by processing the retailer's accounts receivable.

As with growers and shippers, wholesalers will ultimately utilize scientific computing techniques to stimulate and refine their operations. Larger companies, for example, will set up research staffs to solve distribution problems, such as the number and location of distribution centers. Similarly, product and conveyor layouts within the warehouses will be mathematically modeled and adjusted. So will truck routes.

"Nutrient Economics"

Along with these diverse applications of modern electronic equipment to food production/distribution, there is a universal theme which may be looming just over the horizon. It is "nutrient economics" -- a concept described by IBM's national agricultural representative Wendell A. Clithero at a meeting of the Midwest chapter of the National Agricultural Advertising and Marketing Association last September (1966). Mr. Clithero foresees the day when nutrition, rather than units, pounds, gallons, or ounces of crops, will be established as the basis for the production, buying and selling of farm and food products.

"Nutrient economics" would relate nutrient values to economic values and establish a chain of nutritional responsibility involving the producer and all elements of distribution right up to the end consumption. The grower would have the incentive to raise crops of higher nutritional value; and both the wholesalers and retailer could expect a higher return on produce of higher nutrition.

Clithero emphasized no indictment of agriculture or the food supply chain is implied in advocating this new approach. All links in the chain have done a remarkable job to date in furnishing a prodigious quantity at reasonable cost. But they have been handicapped, he believes, by a food supply system that puts little or no economic emphasis on nutritional values. And it is only within recent years that computer technology has provided a means for making a system of "nutrient economics" feasible.

With a computer, it is possible to examine quickly any and all combinations of food items, based on the nutritive value, availability and price, then calculate a diet to meet a specified nutritional standard at the least possible cost. This approach has been applied for years in livestock feeding. More recently it has been
used in the blending of sausage and prepared food items for human consumption, as well as to nutritionally balance diets at least cost in hospitals and other institutional feeding operations.

If accepted, this concept will evolve slowly over a long period of time, providing ample opportunity for the alert operator to gear himself to gain maximum profit.

Consequently, the future looks good. But it will belong even more to those who respond best to the changing marketplace. Data processing can make this response easier, faster and more economical and effective.