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1972

Agriculture

Proceedings of
THE NATIONAL AGRICULTURAL MARKETING CONFERENCE

Denver, Colorado

April 27-29, 1971

Sponsored by:

**Consumer and Marketing Service, USDA
USDA and State Extension Services
Experiment Station Committee on Organization and Policy
Foreign Agricultural Service, USDA
National Association of Marketing Officials
National Association of State Departments of Agriculture
USDA and Cooperative USDA-State Research Service**

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FOREWARD

The sponsoring agencies and the Program Committee express their appreciation to the speakers; the individuals who served as Steering Committee--Discussion Leaders for the various work groups; the Secretary-Consultants; and to those individuals who served as Chairmen of the various sessions. The smooth functioning of the Conference was due to work of many groups and individuals but particularly to the Colorado Department of Agriculture, the Colorado Extension Service, and the Colorado Experiment Station.

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IMPLICATIONS TO MARKETS AND MARKETING OF ELECTRONIC DATA PROCESSING

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Introduction

This subject has commanded much of my attention for nearly two decades. Obviously, I view it as important.

Periodically, I have tried to make a systematic check on progress in this field, (1, 2, and 3). ^{a/} My conclusion is that important progress has been made in use of electronic data processing in food and fiber marketing. But this progress is less than it should have been and less than that in many other industries. The reasons for such conclusions are unsure. The facts are not easy to establish. Possibly this discussion can shed some light on the subject.

My concept of EDP will be broad. I equate it with the idea of cybernetics, (12 and 26). It encompasses the whole field of computers, information, and control. I will use the terms EDP and cybernetics interchangeably.

My concept of markets and marketing is equally broad. Bill Manley of U.S.D.A. recently identified agriculture as being "a party to an intensifying business amalgam". I concur. The stage of industrialization in American agriculture is much more advanced than many realize. Work by Shaffer, (4) of Michigan State University and collaborated by Goldberg of Harvard, (5) gives the following breakdown of who contributes what to the value added in the food industry:

	<u>Percentage Contribution to Value Added in Food Industry</u>
Farming	15
Farm Supply Industry	23
Food Processors and Manufacturers	35
Retailers and Wholesalers	21
Transportation Industry	<u>6</u>
	100

This does not say that farming is relatively unimportant, but if it were not for the overwhelming systems concept of modern society, it might approach it. Or, put another way, straightline projection of the industrialization trend in U. S. agriculture would predict completion of the last hour of farm work in 1984.

^{a/}The number in parenthesis refers to literature cited in Bibliography.

Marketing - The Implicatee

If we are to establish whether or not the technology of EDP is to have implications on marketing, we must take a brief look at modern marketing - the implicatee. Many analyses have been made, (6, 7, 8, 9, 10, 11, 14 and 15). We can only skim a few of the big ideas as background.

American markets and marketing have many problems. Solution of these problems will be the proving ground for EDP in this field. Some of the key problems are these:

1. Coordination of far flung systems of production units, marketing agencies and volatile consumers.
2. Maintenance of high-level, short-run efficiency of large scale while protecting against inevitable long-run, low-level efficiency which would result if we allowed all business to be done by only a few oligopolies.
3. Establishment of materials handling techniques of the highest order to move inputs into and products from the great food and fiber industry.
4. Determination of quality standards acceptable to the American food consumer and maintenance of such standards.
5. Monitoring of changes in moods and needs of modern consumers, who are the most fickle, volatile and demanding the world has ever known.
6. Designing of versatile institutions capable of maneuvering and adjusting to a dynamic society geared to rapid change and accelerated by more and more efficient information and feed-back apparatus.
7. Protection of the system from the creeping bureaucracy of large scale.
8. Standing up under social accountability of growing intensity.

Electronic Data Processing - The Implicator

For our analysis we also need a look at the implicator - EDP. The literature is replete with discussions. ^{b/} Only a few ideas will be skimmed for background.

Historians may not fully concur, but certain engulfing urges seem to sweep through our economic and social system from time to time. These become societal prime movers. Some such urges can be identified, e.g. the urge to explore, the urge to mechanize, the urge to organize, the urge to accelerate,

^{b/} Other than the survey articles listed above, I have not attempted to list general references in this area but will be glad to do so upon request.

and the urge to socialize. Two or more of these may interface at times. Cybernetics seems to be such a prime mover balanced on modern urges to industrialize and accelerate. Thus, my contention is that it is profound and powerful among events of our time.

Effectiveness of cybernetics comes in the speed of specifying needs of, searching for, collecting, organizing, controlling, and manipulating information.

The strength of this relationship increases as one moves from specifying the data needs to manipulating them, in that order. No doubt, we can quickly control and manipulate data; we can even organize it fairly rapidly. Increasingly we are speeding up the search for and collection of data. But, some contend that cybernetics cannot yet really help in specifying needs. Strong as cybernetics may be, it has its weaknesses.

This new science is a willing aid to an industry such as the food industry but demands on it are many. It will be slow to invade this industry if the initiative is left primarily to it. The food industry should have learned this lesson from its experience with mechanization and automation of processes. In both cases, it was one of the last industries to establish these waves of technology.

The Interface - Or, Where the Action Is

EDP has established itself on three basic fronts, each with implications for the food and fiber industry. These are: a) data and information handling, b) product and process control, and c) managerial decision assistance.

Electronic data and information handling has been effected mainly on accounting chores, or simple mechanization of paper work. Yet, it is rapidly moving out from this mundane area where it has resulted in only nominal savings in the straight capital-for-labor substitution issues.

Laboratory instruments of almost any type can now be tied directly to a computer.

Farm field monitors for measuring such as moisture, humidity, temperature, and soil texture are similar adaptations of this. The range of data generation possibilities for direct computer input is wide, indeed, and expanding rapidly.

Mass observation by remote sensing techniques and effective retrieval from storage are both adding greatly to the range of information generation and handling ideas. This area will provide increasing opportunities for innovations and savings.

Production and processing control has evolved effectively in many industries. So farm food applications, except in materials handling, have been few. Yet, these techniques seem sound in both the engineering and economic sense and should increase in use.

The great coordination problems in food assembly and disassembly have been well subjected to managerial decision models with EDP. The physical processes,

transportation issues, and quality control notions all appear to have the same type of potential as has been found in the decision models.

Managerial decision techniques are paying off especially in the livestock packing, vegetable processing, and food manufacturing industries. These involve essentially applied mathematical programming notions on rather conventional planning problems of control, organization, coordination and assembly - dis-assembly.

Applied statistical simulations of risk situations have often given great notions to help managers in optimizing given situations. Such simulation tends to offset some needs for experience. When simulation can save on experience, it saves on a costly item, indeed.

The newest ideas of decision models are in the area where a manager or management team interacts with the computers. This interaction of man with this inanimate machine holds great fascination in many, many fields. Some contend that this is not mere fascination, but great potential. Exciting new work is coming on in this area, (13).

The Probable Results ^{c/}

The problems of markets and marketing discussed earlier all have elements wherein data handling improvements and production processes have much to add. EDP will have important implications and resulting savings. These innovations in data handling and production control will be continuous, pervasive, but probably not spectacular.

A more important perspective for us today has to do with the potential of EDP in managerial decision making. Let us sketch the big decisions that managers will distill from the problems laid out above. We will delineate five big decisions and make a few observations on probable implications of EDP for each.

How big? This is a big social problem, but it is also a big management problem. Not only does it involve problems of important in-plant planning, but problems of distribution of products and assembly of raw materials loom important. All these lend themselves to EDP techniques. The techniques lack some preferred factors, but EDP has important implications on this big decision area.

^{c/}The U.S.D.A. has an extensive set of committees assessing this overall EDP situation. One on which I serve is inventorying what is going on and what is planned in food marketing. Several of my conclusions in this section are based on very tentative results of this survey. Hopefully, a substantial report in this area will be forthcoming from the U.S.D.A. Other references have interesting, if oblique, relation to some of my ideas in this section, (17, 18, 19, 20 and 21).

How to organize? This decision may or may not be interlaced with the size decision. It can involve conglomerate issues, buy-or-make decisions, internal coordinating questions, control of a range of variables, general communications, and issues of innovativeness. One organization may be more evasive than another. This can be important in formal notions of antitrust and taxes or in informal notions of shifting demand. Basically, EDP can handle such ranging problems and gradually techniques will be hammered out in this area.

How much risk? Historically the main idea in food marketing was basically to evade risk, usually by diversification or insurance. Today more and more management decisions deal with when to make returns by managing risk. Simulation notions of EDP appear to hold promise in this area. A variety of approximating tools are available in EDP and this will be a decision area of increasing use of these ideas.

How to get feedback? Feedback is an intuitive need of a manager. It is a natural component of EDP. Feedback is an integral part of many EDP models. Research and development ideas are coming harder and harder in the conglomerate age of food industries. A whole range of issues involving time come to focus in this area and these decisions will increasingly yield to EDP notions.

How to adjust? The big adjustment is a symbiotic relation of one company with his competitors and with the total environs of the market and the community. These are difficult problems. Data will come hard. Problem definition will be hard. Solution of such large problems will be expensive. EDP techniques will probably take less of this decision burden off the manager than it will the others.

Conclusions

So, what can we conclude?

The implications of EDP on markets and marketing will be extensive and important.

Probably most businesses of any size will go to EDP for routine data and information handling. The alternatives are not attractive.

Process control will come, but size will be necessary to afford it. This adaptation will come slowly with hard work and joint effort between the EDP companies and the marketing companies.

Decision making improvements will come primarily in the EDP area. Thus, this will be a great area of growth for EDP. A modern manager must move in this direction. The speed with which an individual manager adopts it will depend on many things, but the pressure will be on a manager to use the tools of EDP.

Time utility in marketing is important. EDP tools have not had great application to problems of time in large companies. Smaller companies in the food industry will find this a great untapped area of application. Larger

companies will need to explore this area now as they have skimmed off the easier applications elsewhere.

Form utility in marketing has possibilities, but basically in quality control and in routine, definable product formula building. The important area of creativity in food and fiber will still rest considerably with the man and not with the machine.

Place utility has been a natural problem for EDP application. Any business that has multiple outputs or multiple sales points with distance in between them has an opportunity.

Organizational innovation is a tough, but necessary, job in our day. Simulation and such approximating techniques could afford a breakthrough here.

EDP is only a tool, but, a powerful one. Marketing people can use it. They can get help in learning how. It will take some initiative on their part. It is not a game for amateurs alone. Walter Lippmann in 1920 said this of news gathering:

"It is altogether unthinkable that a society like ours should remain forever dependent on untrained accidental witnesses - the better course is to send out into reporting a generation of men who will, by sheer superiority, drive the incompetents out of the business," (22).

Should we expect less of a man selecting scientific facts and reporting scientific results?

Scientifically EDP has appeal, (16). As a scientist, three aspects fascinate me. All are involved in analytical or systematic concepts. First, the encompassing concept of finite mathematics. Calculus had a great reducing and simplifying quality. Finite mathematics encompasses large ideas. Its breadth of conceptualization is a unique advance in science. Second, EDP has a powerful estimating, dynamic and probabilistic nature. The discipline here comes from both statistics and mathematics. Feedback is the key. Third, the philosophical import of EDP is its speed. This recalls an admonition of Huxley when he said that the only major vice invented by modern man is the vice of speed. EDP in this sense is modern.

This is a time of people problems. This approach does not ignore man, (23, 24). Economic notions reflect conditions of the society in which they develop. Adam Smith evolved the free enterprise concept at a time of great philosophical concern for individual rights. Malthus wrote of population and starvation at a time of alarming population increases. Ricardo wrote of monetary theory when the currency system was terribly disorganized. Lord Keynes wrote mostly amid wide social re-evaluation. Kenneth Galbraith is writing in "an affluent society" dominated by "the new industrial state." Norbert Wiener wrote of "cybernetics" at a time of global complexity, managerial stress, and great communication innovations. But man was his focus. He introduced his early work with this comment: "I wish to devote this book to a protest against this inhuman use of human beings; for in my mind, any use of a human being in which less is demanded of him and less is attributed to him than his

full status is a degradation and a waste. It is a degradation to a human being to chain him to an oar and use him as a source of power; but it is an almost equal degradation to assign him a purely repetitive task in a factory, which demands less than a millionth of his brain capacity. . ." (23, p. 16).

The system must involve man. It has been claimed that a robot can learn by interacting with a computer, (25, p. 627). This may be so. But, think how much more man should be able to learn by interacting with a computer! This is one of the great thrills of computer application. Try it.

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 Kenneth Wilmore, Colorado
 James K. Wilson, Alabama
 R. B. Wilson, Indiana
 Erwyn Witte, Colorado
 Marsha Witte, Colorado
 - William Wood, California
 Bruce H. Wright, Washington, D. C.
 Clayton Yeutter, Washington, D. C.
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