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SOME CONCEPTS AND DEFINITIONS USEFUL TO AGRICULTURAL ECONOMISTS

WORKING IN THE "INFORMATIONAL AGE"

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SOME CONCEPTS AND DEFINITIONS USEFUL TO AGRICULTURAL ECONOMISTS WORKING IN THE "INFORMATIONAL AGE"*

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We truly do live in an "informational age". We are now at a time in history where what we collectively "know", society's knowledge base, is a most important resource in the conduct of our individual and collective affairs. Knowledge is a peculiar resource. Knowledge as a concept deserves further comment before we proceed.

Our knowledge base is much broader than what is verifiable in the scientific sense. Further, any individual, no matter how carefully schooled in the sciences, uses approaches to knowing quite afield from those generally identified as being scientific. Psychologists have identified a number of approaches to knowing. (Royce, 64) They have identified the propensity of different professional groups to use various combinations of these approaches.

As used in this paper, the terms "knowing", "information", "learning" and "message" are meant to encompass other pathways to knowledge besides those said to be appropriate for work in economics as a science. They are used while recognizing that human activity is a mixture of intuitive, logical and "scientific", along with the creative and mystical.

In an open society, the knowledge base can even increase in value as parts of it are used, assimilated, clarified, or otherwise disseminated. Yet, at the same time, some parts of it are also an economic commodity--a product of governmental or industrial intelligence operations built on an assumption that knowledge has a time dimension; that easy and timely access to parts of the knowledge base can have a considerable bearing on its value.

An Economic Problem Solving Perspective

There are economic issues associated with a society's public policy concerning individual and group access to the knowledge base. They are much the same issues as those associated with access to the educational training services of the society. Access is a necessity for people to

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feel an equity of opportunity in a society. At the same time, economic efficiency criterion and, perhaps more importantly, economic productivity criterion often requires an assured access to society's members who can most productively utilize the knowledge base.

There are many dimensions to freedom in any society--no matter how open or closed. But basic to an individual's feelings of psychological well-being is that of being "in control of one's destiny;" at least in control of one's destiny with respect to those attributes or dimensions of one's life that the individual feels are important.

Control is only partial in any situation. There are always matters beyond the control of the individual or even of the society as a whole. Much of man's quest for knowledge is a quest founded in the belief that knowing is the first step to controlling; that knowing the alternatives and their consequences is necessary for personal choice or freedom. Further, the quest for understanding is also based on the notion that change is normal and that change can be directed due, in part, to learning more about one's environment and, in the process, gaining an understanding sufficient to reduce the previous uncertainties to probabilistic knowledge of the environment.

Coping with change presumes a conditionally normative approach to economics. It presumes that what we as agricultural economists are frequently about is not the positive economic analysis of description and prediction. Rather, it presumes that we are engaged in the task of evaluating alternatives in resource use to help ourselves as individuals and others, either individually or collectively, to utilize the scarce means available to attain desired ends.

Conditionally normative approaches presume the validity of logical problem solving in economic analysis. It presumes the validity of economically rational decision processes. It presumes that there is validity in the clarification of problematic situations as being differences between "what is" and "what ought to be." It assumes that there is merit in the objective study of subjective things through examination of the structure of beliefs and values.

It further presumes that there is validity in the evaluation of alternative solutions to problems. It presumes that through learning one can improve one's ability to deal with new problem situations as they arise. It calls for both economic marginality and opportunity value approaches to resource use and alternative selection. It allows for probabilistic evaluations of the alternatives such as the bayesian approaches to risk and uncertainty, and recognizes the need to deal with both the impacts of profits and the impacts of security of position as decision criterion.

Concepts And Definitions

The above comments implicitly assume an understanding of a number of concepts and definitions useful in the informational age. Yet, perhaps some further definitions of these terms are still in order.

Knowledge - Knowledge is a stock concept. The knowledge base is the existing stock of what an individual, a society or collective humanity has learned about reality to this point in time. It may be recorded on communication media or carried about in our minds as models of our environment. It can be folklore also.

Control implies that the knowledge and the ability exists to direct, adjust or manipulate one's environment, particularly as it applies to the commitment to use of resources useful in the attainment of desired ends.

Problem - A problem is the difference between what is known or understood and what ought to be. If there is a big difference, it is a big problem; if not, a small one.

Decision Process - The decision process is a problem solving process made up of the observation and analysis of alternative solutions (course of action) applicable to a problem, followed by the selection of one, the taking of action based on that selection, and the bearing of responsibility for having taken it.

Learning - Learning is a flow concept analogous to the stock of knowledge. It also adds a dynamic dimension to problem solving. Learning is a process which requires observing what occured, and the product becomes part of the knowledge base upon which new problems are defined or clarified and new alternatives are specified for evaluation the next time analogous situations occur.

Marginality - Economic marginality presumes, among other things, that as alternatives are evaluated approaches such as the partial budget--where the calculation compares marginal revenue with marginal costs--are used to adjust resource use. Marginality has also been expressed as summing the projected benefits of each alternative and comparing them with the projected detriments in order to evaluate them against the status quo--the do nothing choice existing in every problem solving situation.

Risk and Uncertainty - Uncertainty implies a condition where so little is known concerning the possible outcomes as to make it impossible to specify, based on one's knowledge state, the likelihood of potential outcomes in a probablistic sense. Risk, conversely, implies the situation where it is possible to specify, even though subjectively, the likelihood of potential outcomes from following a given course of action. While the literature often implies somewhat different definitions, from the standpoint of this paper the basic idea is that it is useful to incorporate into one's knowledge store notions of the objective and subjective probability of different outcomes from following different courses of action.

A Management Information System Perspective

The term "informational age" has not generally been well defined. However, there are a number of definitions and/or concepts associated with the idea of knowledge as a resource and its use through formalized management information systems which offer potential for coping with this time in history.

Information - The first of these is "information". The usual dictionary definitions of information will not do--they are too broad and too general. The information sciences definition is more to the point. It is also a much more restrictive definition. It says in effect that information is "that which affects individual behavior or action (after the fact)." By definition, if it did not affect behavior or action, it was not information.

Data - Data, as defined in the information sciences, implies what the knowledge base really contains (in a raw state) is data. Data is not necessarily information to an individual involved in making a decision. Yet, prior to the time that a problem is defined or certainly before an action is called for, it is hard to determine what parts of the data contained in any accessible part of the knowledge base will be--after the fact--information.

Noise/Filters - The information sciences then say that if one "filters" out the "noise" content of the data, one is left with, minimally, "data of high information potential," and that is the best we can hope for prior to the time an actual behavior occurs or a decision is made.

MIS - Management information systems can be formalized partly through the use of an organized data base where that data is believed to be of "high informational potential." This position infers that all firms and individuals do have management information systems. It further presumes that the act of "formalizing" it is one where cost and benefits of doing so need to be weighed against the consequences of so-doing. The management of complexity requires taking a systematic or systems approach to the structuring of formalized data bases in order to assure a high likelihood that the majority of the data contained therein will be of high informational potential.

This perspective implies that one recognizes the role of learning over time and the resulting reduction of future uncertainties to risky probabilities. Also, that there is a need to consider data bases and informational systems as being dynamic entities requiring adjustments in their structure as time goes on. It further means that periodic re-evaluations of the cost and benefits associated with the maintenance of the data bases and other components of formalized management information systems are required. Otherwise their usefulness declines as time goes on, people learn, etc.

It further means that the data base structure and content should be designed to aid in the process of problem definition, feasible alternative specification and economic marginality in the analysis of those alternatives. Process unit gross margin budgets detailed in time and with physical units have proved useful. Computations of time trends, along with standard errors and coefficients of variation or correlation are often helpful, along with observations in time of input and output rates and the related production conditions. Parenthetically, such an approach would imply that there is little use in such a system for the computation of percentages of a whole or the average total cost of production.

The above comments are by no means even a synopsis of mankind's understanding of system analysis or management information system structures. Yet it is an introduction to some of the basic concepts which laymen, with respect to many resource management disciplines, should now be able to use and to incorporate into their professional and personal thinking processes.

Control Systems - To offer one example of why such an understanding is necessary, one need only think of the current developments occurring in cybernetics and control system modeling. Availability of the so-called high technologies offers the opportunity to, and the potential for the formalization of control systems for all matters of economic activity. Economic forces also encourage their development. The development of such control systems requires a recognition of what is known about the underlying production processes and relationships and how to measure outputs as well as regulate inputs. It also requires a recognition of how to structure learning processes associated with the observation of the ongoing activity and then, in turn, to develop the management by exception rules associated with reducing the intellectual demands on the individual's charged with managing them.

Interpersonal Message Implications

Communications - Another broad dimension to coping with the informational age is associated with the transmission of messages, both personally and by less personal means such as through printed or electronic message forms. From the above perspective, one could state that senders transmit messages--the content of which is data, not information. The best the sender of a message can hope for is that the data will be of "high informational potential" to the receiver. Even in highly structured superior/inferior social orders, a message sender should be cautioned against the position that declares his transmitted message to be information to the receiver. If the receiver does not change behavior based upon the message, then behaviorly as well as definitionally, the message was not information. To say, "I informed him" is not valid; but,"I was informed" may be valid.

Useful schemes could be used to classify the content of messages. One such scheme hinges on the notion of positive and normative types of knowledge. The content of messages is presumed to offer the potential for receiver learning, and the result is an increase in the receiver's personal stock of knowledge. Presumably, an increase in the personal knowledge stock of an individual increases the collective stock as well.

Within this scheme, one broad classification of message content would be positive knowledge. The content would include data which is descriptive of the nature of reality as noted by the sender. It could also include productive applications of that knowledge to the future; a form of reality modeling.

It could also include content intended by the sender to be of a belief forming or belief reaffirming nature concerning the nature of reality.

The other broad classification is that of normative knowledge. This set includes persuasive and/or analytical content concerning what behavior of the receiver should be if desired ends are to be attained from limited means. It can also include persuasive and/or analytic content concerning the appropriate value or goal structure the receiver should have in the eyes of the sender.

Educators and other people in the communications business act as structurers of messages. They presumably structure the messages to enhance their content. At the same time, they act as filters and inhibitors as well! How many times have you seen misleading newspaper headlines which have little to do with the content of the news story? How frequently do advertisers declare their messages to have informational content when the receiver has so learned to filter out the form that there is now a real question as to whether or not even the brand name comes through?

There is much discussion these days about using electronic or computer based networks to transmit messages which promise to offer the receiver greater control over both the time of access and the content of the messages accepted. Stories circulate concerning electronic newspapers which permit an individual to selectively search an electronic data base for key words associated with topics of interest to him or her.

There are also discussions of the use of these techniques educationally. There are proposals to permit students at scattered sites to "seminar" using electronic message procedures transmitted to the instructor and the other students at such time as meets the sender's schedule. Similar message systems are also being considered as part of scattered site administration and management of business entities and government.

If these attempts are to be successful, it appears they must, of necessity, have the queing capability to permit people to respond on their timetable, not that of the message senders. It further seems necessary that the people involved are clear as to the meaning of the

phrase "data of high informational potential" and all that it denotes in terms of living in an informational age.

Implications To Practicing Agricultural Economists

Concepts and definitions are part of the tools of the trade for the practice of any profession. Tools can be used, underused, overused or misused. In the case at hand, the implications appear to fall into several groups. Some of the groups apply to virtually all professions, while others apply more directly to agricultural economics.

The Computer As A Tool For All Professionals

As pointed out elsewhere (Fuller, 1982), work styles, particularly for those in knowledge generating, data processing or informational enhancing vocations, are changing rapidly given the new computer technologies. Workers in such areas have an increasing access to data sources that provide the subject matter foundation to their efforts. The structure of these data sources and the techniques for searching them need to be designed with some care. The costs versus benefits need to be carefully thought out.

New divisions of labor between support staff and a practicing professional are beginning to develop. Word processing will permit and, in fact, encourage more editing by the professional. At the same time, more of the management of the supporting data base will likely be turned over to support personnel within one's own workgroup. Work roles will change.

The dynamic and stochastic attributes of economic models will become a more intricate part of economic analysis rather than an appended qualitative afterthought. Some of what today is considered subject only to qualitative analysis modeling will become quantitatively open to empirical verification.

Agricultural economists often develop and transmit messages to target clientele. The information age will require more careful targeting of both positive and conditionally normative analysis messages to clientele groups interested in the message content. There will be a greater need for separate messages sent to separate audiences, even when based on the same economic analysis.

Message Structuring

Circumstances will encourage a greater amount of structuring in the messages sent, the analysis procedures used, and the organization of the data bases containing relevant knowledge. The use of key words and phrases to search through data bases will be one such circumstance to encourage message structuring.

The nature of the decision process, with its need to divide analysis into comparisons of alternatives, is another. The nature of the separable effects and the cause and effect relationship noted in most scientific endeavors, including economics, provides still a third. The movement to separate size, scale, resource combination, output combination, time and other noted effects in economic analysis has its implications in the appropriate structuring of data bases for doing that analysis. The unit or block budget approach to enterprise data organization will be encouraged because of its utility in doing such analysis. Physical quantity data structured so as to allow adjustment for changes in relative and absolute price levels will be encouraged.

While problems may be identified or clarified through the use of average cost of production, pie charts or similar dissections of the whole, such analysis will by and large be eclipsed by analytic approaches based more on the implications of marginality. Unit budgets will again be one such approach. Sensitivity table analysis will be encouraged to lend the payoff matrix notion to an equivalent comparison of gross margins under stochastic conditions.

The partial derivative attribute of most statistical analysis will be seen to have greater potential in informational content than will calculations of elasticity to offer a positive analysis example.

Messages intended to "inform" a decisionmaker without analyzing alternative scenarios will also be eclipsed in favor of more analytical approaches.

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