THE CHANGING CONCEPT OF MANAGEMENT IN IRRIGATION

Mark Svendsen[1]

It was only a few years ago that most definitions of "water management" looked something like the following:

> The application of the right amount of water to the root zone of a growing crop at the right time.

Definitions might be more elaborate than this, speaking of delivering water to "the farm" instead of the "crop root zone," or adding qualifications related to drainage, production, or sustainability. At their core, however, was a concern with measuring and meeting the demand for water generated by plant physiology.

In recent years, the use of the term "water management" has been largely overtaken by "irrigation management," implying a broader scope of interest and the inclusion of things other than water in the management equation -- things such as people, finances, and equipment. The central idea of this short note is that while we as irrigation system managers or researchers or advisors have embraced the term, we have not yet completely accepted or understood its implications. Moreover, to take advantage of the opportunities for improving irrigation performance that it offers, we must change the categories in which we think, not marginally, but radically.

To get started on this, a number of us have turned for guidance toward the literature on "management" as applied in the world of business and public administration. This literature has a powerful and somewhat mysterious aura about it and borrowing from it offers promise of energizing and enriching our own quest. This is an exciting prospect, but at the same time a bit daunting since the literature is vast and many of us are not particularly conversant with it.

One indication of the stage of development of our thinking here is that we have yet to frame a succinct, widely-accepted definition of irrigation management such as we had for water management. Perhaps the management literature can offer some guidance.

DEFINITIONS AND TERMS

Management

Assembling and examining a dozen more or less explicit definitions of "management" taken from texts and other books and articles reveals some common threads and a good deal of diversity. Most authorities frame their definition of management in terms of "actions", "processes," or "functions." Of these, process definitions are the most common, though in fact this does not seem to be a terribly important distinction. What is strikingly universal to the definitions is that all of them relate activities or processes to a **goal.** In the Dictionary of Economics, the goal is simple and clear -- "maximum efficiency," in the specialized economic sense.[2] For those interested in project management, the goal is "to get the job done."[3] For the others it is open-ended and relative. This openness leads one pair of authors to define a higher level process they term "strategic management" where managers establish their organization's longer term aims and the strategies to achieve them.[4] It is, in fact, this goal or accomplishment orientation that distinguishes management from other control processes. As Norbert Wiener says, management systems are "purposive systems, whether in man or machine."

But what are the processes and actions that characterize management? Here a good deal more diversity becomes evident. Generally, however, they tend to fall into two groups. The first of these focuses on organizing the activities of people. Thus management is "the process by which a cooperative group directs actions toward a common goal,"[5] or "the art of getting things done through other people,"[6] or "the process undertaken by one or more individuals to coordinate the activities of others to achieve results not achievable by one individual acting alone."[7]

The other group of definitions emphasizes the process or factors involved in achieving the goal. Thus management is "the organization and coordination of the factors of production -- land, labor, and capital.[2] In a more implicit definition, "management... refers to the process of decision-taking affecting an institution's achievement of its specified objectives."[8] Management is also defined in terms of a four-step process of "goal-setting, performance measurement, performance diagnosis, and corrective action."[9]

One of the best known approaches to management, at least in terms of name recognition, is that of management by objectives (MBO), a term first used by Peter Drucker in 1954. MBO focuses explicit attention on the objectives of an enterprise and "presumes that the first step in management is to identify by one means or another the **goals** of the organization."[10] One of its chief architects defines MBO as "a process whereby superior and subordinate managers of an organization jointly identify its common goals, define each individual's major areas of responsibility in terms of the results expected, and use these measures as guides for operating the unit and assessing the contribution of its members.[10]

These two groups of definitions correspond roughly to the "social/rational" dichotomy developed by Peters and Waterman in their best-selling book *In Search of Excellence* to categorize theories of management.[11] Clearly an adequate approach to the problem of managing must include both processes for *setting and achieving goals* and for *organizing and coordinating* the efforts of individuals and groups. Given the centrality of goals in both types of definitions and given the confusion and vagueness surrounding the goals of most irrigation management agencies, it may be that an elucidation of the **mission** and **goals** of the agencies and the relationship they bear to system outcomes deserves the highest claim on our attention.

Irrigation Management and Water Management

It is interesting to note here that the definitions of "water management" and "irrigation management" can be brought together by treating "the supplying of the right amount of water in the right place at the right time..." as the objective function or **goal** of the management process rather than as the process itself. This allows for failure to meet the ideal, which the simple definition does not, and provides a framework for understanding the dynamics and the human dimensions of the process of adjustment and correction. That said, however, it must be added that this goal formulation may not be a particularly **good** one when compared with Kotler's four tests for useful objectives -- that they be "hierarchical, quantitative, realistic, and consistent."[9]

Management and Administration

The terms "management" and "administration" are troublesome, sometimes used interchangeably and at other times presented as diametric opposites. Jayaweera in an excellent essay on management and development provides an example of the latter. "An administrator," he writes, "is basically oriented toward preserving the status quo whereas a manager is committed to transforming it."[12]

A more temperate distinction is drawn by Belshaw.

> The emphasis [in management] is on purposive achievement in conditions of change and uncertainty.... The achievement orientation of management necessitates deliberate planning activities. This may be compared with the merely pragmatic approach of dealing with circumstances as they arise, which frequently characterizes the system maintenance or survival behavior associated with administrative approaches.[8]

Distinctions drawn here are based on the existence of goals and a planning process. Bottrall emphasizes the more strategic question of who **sets** goals when he suggests that administrators are "reliable executors of policies and programmes determined for them at a higher level."[13]

Planning occurs again and again as a hallmark of the management process. Indeed it is difficult to separate the two concepts. **Planning** is defined by one authority as "setting objectives" and "specifying the steps needed to reach them."[14] These defining functions are virtually identical to those in the definition of "strategic **management**" advanced by another pair of authors:

> Strategic management is the process whereby managers establish an organization's long-term direction, get specific performance objectives, develop strategies to achieve these objectives in the light of all the relevant internal and external circumstances, and undertake to execute the chosen action plans.[4]

Clearly understanding how an organization plans is essential to understanding how it manages.

An interesting final note to this section is Peter Drucker's revelation of "the best-kept secret in management," which is that "the first systematic applications of management theory and management principles did not take place in business enterprise [but] in the public sector."[15] We should not, therefore, dismiss management science out of hand as applying only to commercial enterprises.

Management and Structure

Management processes occur within and interact extensively with an organizational structure. The structure of an organization is "the pattern according to which tasks and responsibilities are formally allocated among its members."[13] It is descriptive of the "more static features" of an organization, where management refers to the dynamic process of goal setting and achieving. As the matrix in which management operates, it obviously has a powerful influence on management, but is, in turn, influenced by the organization's goals and purposes. As Drucker points out, "the best structure will not guarantee results and performance... [but] the right [one] is a prerequisite of performance."[16]

Earlier approaches to the subject of management have emphasized structures heavily, while more recently, attention has shifted toward a more balanced concern with both structure and process. Still, because it is easier to picture and to manipulate, organizational structures are more often the target of changed programs than are the dynamics -- the management. We would do well to keep Drucker's admonition about the necessary but, by itself, insufficient nature of "right structure" in mind when we attempt to improve the performance of an irrigation agency. It is tempting and not entirely off the point to add as a postscript Louis Sullivan's famous dictum that "form ever follows function."[17]

Manage What?

A final question that comes to mind in connection with this discussion of terms and definitions is that of the "object" of our managerial attentions. In an earlier simpler era, **water** management was clearly our objective. Today's **irrigation** management, however, is somewhat more ambiguous. Is irrigation simply a fancier way to say water? Or are we actually concerned with the management of an irrigation **agency?** Or is our object something else entirely?

In my view, we are necessarily interested in something that goes beyond just water -- for otherwise we include only the effect, the dependent variable, in our net and ignore those factors which cause the effect. At the same time, a focus on **agency** management places inadequate emphasis on the physical and economic output of the irrigation enterprise. Irrigation agency management becomes simply another case study in the broader field of public administration (sic). What is required is a focus that recognizes the special character and problems of managing irrigation schemes while remaining able to draw on the wider body of knowledge and experience in the "management" arena.

To simplify here, I will separate out and ignore those irrigation agency functions that revolve around new system planning, design, and construction. This is somewhat arbitrary, but not entirely so. First, the argument is heard on all sides that opportunities for new system construction are diminishing and that improved management of existing systems must provide a major share of future increases in production. Secondly, it is the remaining functions, those geared toward the operation of existing facilities to deliver water to farmers, that are most in need of managerial improvement.

This is not to say that design and construction processes are uniformly effective and efficient, but rather that individual irrigation agencies are generally better at handling these functions than they are at managing water allocation and delivery. In part this is due to the nature of the tasks involved. The design and construction sequence is a time-bounded series of linked steps -- each of which has a well-established and technically-challenging set of procedures for its execution. We routinely find such management tools as Critical Path Analysis, PERT charting, and cost control procedures utilized in the design and construction of irrigation systems. To find these techniques applied in water allocation and delivery is almost unheard of. We speak of "construction management" and this phrase has real meaning. When we speak of "irrigation management," meaning water allocation and delivery, the phrase represents more promise than practice.

How do we define then the object of the "irrigation management" process, so delimited? We might take a clue from the field of **marketing** in order to reformulate our notion of what irrigation agencies produce. A leading text on marketing management posits that "market definitions of a business are superior to product definitions of a business.... A business must be viewed as a customer-satisfying process, not a goods-producing process. Products are transient, while basic needs and customer groups endure...."[9] Thus Xerox does not make copying equipment, it helps improve office productivity. Toyota does not manufacture cars and trucks, it facilitates the movement of people and goods.

Acknowledging that the analogy to the business product is not exact, exploration can still be enlightening. It suggests that irrigation agencies should not see themselves as capturing and delivering water but **providing irrigation service.** This at once establishes the time value of water -- since although a product may have intrinsic value, a service has value only if it is available when needed. It also allows flexibility in the customer population -- permitting a shift, for example from a large number of individual farmers to a much smaller number of irrigation districts or irrigators' associations. Finally, it suggests the importance of satisfying the customer, as indicated above.

It is, of course, naive to believe that simply redefining the outputs or goals of an irrigation agency will change its

performance. Nevertheless, it does provide a starting point for analysis and diagnosis. Moreover, it is a starting point that the management literature suggests rests on the most influential and basic of factors. In the last section of this note, I will try to suggest some implications of what this type of management definition has for programs which would study and improve irrigation performance.

IMPLICATIONS

New Models and Concepts

We need a better framework for organizing what we know, and what we would like to know, about irrigation management. Although frameworks exist within particular disciplines -- agricultural engineering or economics, for example -- we have little that cuts across them. When we want a more comprehensive understanding of something, we typically commission a one-time review of the topic utilizing an ad hoc conceptual framework of the author's preference. Reports and conferences are commonly organized to discuss "engineering aspects" of irrigation management, and "economic aspects," and "social aspects," and so on. It is limiting and therefore regrettable that we have been unable to find a more substantive and durable way of organizing our thinking and discussions regarding irrigation management.

Does management theory provide a solution to the dilemma? Probably not. Participants in a recent workshop on management science and irrigation management[18] concluded that there was little off-the-shelf theory that could usefully be imported into the irrigation domain intact.

On the other hand, there was a great deal of animated discussion stimulated by the injection of new ways of thinking about the old topics. The longer run utility of management science in irrigation management may rest on its "neutrality" with respect to the traditional irrigation-related disciplines and its cross-cutting nature. Moreover, we may extract as much value from it by using its principles as metaphors and analogies as by trying to import and translate these principles directly into irrigation terms.

New Taxonomy of Issues

One way that management science may help us in this regard is by providing a new set of conceptual categories with which to organize our thinking. New insights, and new questions, often emerge when we look at what we already know from a fresh perspective. What categories are these? Without attempting in any way to be comprehensive, the following are offered as illustrations and not as a complete taxonomy. A return to the earlier discussion of terms and definitions suggests that one basic division might be made into **management processes** and **organizational structures.** Focusing on the first of these, we could further subdivide management processes into:

Objective-setting processes,
Information systems,
Decision making processes,
Execution, and
Monitoring and feedback.

The **information systems** topic, for example, might then be applied to the primary task of water allocation and distribution and would involve looking at water measurement devices and calibrations, data collection procedures and incentives, communication systems, data processing and reduction, time lags, data-needs determinations, and so forth. Doing this would require the skills of the engineer, the sociologist, the management specialist, and perhaps the computer specialist. Looking at information systems used in supporting tasks, such as billing and fee collection, might require a different set of skills but would look at the same fundamental chain of data-needs determinations, data generation, communication, processing, quality control, and use.

The other topics are equally cross-disciplinary, yet linked by the logic of the management process. The real attractiveness of organizing our critical thinking and analysis in this way, however, is that having done it, we are in a position to look at the irrigation management process as a whole with our knowledge classified so as to take advantage of already developed principles and relationships. Thus, I would argue, we enjoy a two-fold advantage. First by reorganizing our knowledge, we gain new insight into familiar topics such as "water control." Second, we have our accumulated experience and knowledge organized in such a way that we can ourselves bring basic and common-sense management principles to bear on the problem of improving the performance of irrigation systems through better management.

New Variables and Indicators

As an outgrowth of this reorganizing of topics, will come a need for new conceptual variables and quantitative indicators of those variables. Thus, while water has a volumetric dimension and a time value, irrigation **service** implies a preeminent **quality** dimension -- perhaps the most important component of which is predictability. How we subdivide and analyze quality of irrigation service, and predictability, in an operationally useful way is an open and little explored question, but a critically important one if we are interested in improving irrigation system performance through better management.

All of this suggests some significant changes in the ways that those of us trained as engineers, sociologists, economists, or agronomists think and act. One of the conclusions reached at the **Estes Park workshop**[18] mentioned earlier was that we cannot expect the management science people to do this job for us. If we truly feel that management in irrigation is important, then we must be the ones to explore, borrow, and learn from experience in other domains to develop understanding and the tools to improve it. □

Notes

[1]Research Fellow, International Food Policy Research Institute (IFPRI) and Resident Scientist, International Irrigation Management Institute (IIMI). The author wishes to acknowledge the significant intellectual debt owed to Anthony Bottrall following a rereading of his seminal "Comparative Study of the Management and Organization of Irrigation Projects" in the course of writing this article.

[2]Sloan, H.S. and A.J. Zurcher. 1970. Dictionary of economics. New York: Harper & Row.

[3]Frame, D.J. 1987. Managing projects in organizations: How to make the best use of time, techniques and people. San Francisco: Jossey Bass.

[4]Thompson and Strickland. 1985. Cases in strategic management. Plano, Texas: Business Publications.

[5]Haynes, H. and J. Massie. 1963. Management, analysis, concepts and cases. Englewood Cliffs, New Jersey: Prentice-Hall.

[6]Hellriegel, D. and J.W. Slocum. 1982. Management. Reading, Massachusetts: Addison-Wesley.

[7]Donnelly, Gibson, and Ivancevich. 1987. Fundamentals of management. Plano, Texas: Business Publications.

[8]Belshaw, D.G.R. 1976. Improving management procedures for agricultural development. In G. Hunter (ed.), Policy and Practice in Rural Development. London: Croom Helm. Quoted in Bottrall (1981).

[9]Kotler, Philip. 1984. Marketing management: Analysis, planning, and control. Englewood Cliffs, New Jersey: Prentice-Hall.

[10]Odiorne, G.S. 1979. MBO II: A system of managerial leadership for the 80s. Belmont, California: D.S. Lake.

[11]Peters, T.J. and R.H. Waterman, Jr. 1982. In search of excellence. New York: Harper and Roe.

[12]Jayaweera, N.D. 1981. Management and development. Colombo, Sri Lanka: Ceylon Daily News, 2 February 1981.

[13]Bottrall, Anthony F. 1981. Comparative study of the management and organization of irrigation projects. World Bank Staff Working Paper No. 458. Washington, DC: World Bank.

[14]Dale, E. and L.C. Michelson. 1966. Modern management methods. Cleveland: World Publisher Co.

[15]Drucker, P.F. 1986. The frontiers of management. New York: E.P. Dutton.

[16]Drucker, Peter. 1974. Management. 1981. Heinemann. Quoted in Bottrall (1981).

[17]Sullivan wrote this in an article entitled "The tall office building artistically considered" in the March 1981 issue of Lippincott's Magazine. It is interesting to consider this rule as permeating both office building design and the design of the organizations within them.

[18]"The Contributions of Management Science to the Management of Irrigation Systems", 15-17 April 1986, Estes Park, Colorado, sponsored by the Colorado Institute for Irrigation Management, Colorado State University.