WHAT IS THE RIGHT FORM OF IRRIGATION ORGANIZATION?

by

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Preface

Any self-respecting management specialist will know that my title is dead at the starting gate. Is it not by now well known that the appropriate form of organization for carrying out a specific set of tasks depends on the nature of the environment? That is said to be the essential message of 'contingency theory', which is widely proposed as the single most important advance in organizational theory over the past two decades.

I have been making an excursion through the literature on organizational theory and management science to see what could be brought back to use in thinking about how to improve the performance of large surface irrigation systems. The economist James Berliner made a similar excursion through the discipline of anthropology some years ago, and came back with the message that 'the feet of the natives are large' (196__). My finding about the management literature is, I have to say, less complimentary. The natives of management science and **organisational** theory seem quite capable of subsisting on a diet of either uninterpreted case studies (of the Harvard Business School type) or abstract categorizations with little empirical specification. Take as just one of many examples Robert Duncan's discussion of contingency theory (1982) in an article entitled 'What is the right form of organizational structure?'.

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This is a very preliminary draft, on which I more than welcome comments. I have greatly benefitted from discussions with Harald Frederiksen in formulating the argument, but it is more than usually important to dissociate him from the result.

If, as he says, the appropriate form or organization depends on the environment, we must know how to specify the environment. The environment of an organization, Duncan tells us, can be broken down along two dimensions: simple or complex, and static or dynamic. Any particular environment can therefore be located in a simple 2x2 matrix, as simple-static, simple-dynamic, complex-static or complex-dynamic. Each of these four types of environment is associated with an appropriate form of organization, or at any rate with key constraints on the appropriate form of organization. The problem is that neither Duncan nor others who use this framework seem to be much interested in specifying the criteria for empirically identifying environments in terms of these categories. One can read many articles on how the environment affects the organization without getting any idea as to whether the environment of an irrigation organization might be classed as simple or complex, as. static or dynamic.

At least one leading practitioner of organizational design has come, like myself, to the conclusion that organizaton theory does not have much to offer on the question of appropriate design. William Smith, who in 1980 wrote a long paper called 'The design of organizations for rural development—a progress report', which set out a very abstract framework for that purpose, has in the Intervening years come to the conclusion that no generalizations are possible about appropriate organizational arrangements. The only plausible generalizations are those to do with the process by which an appropriate form of organization may be discovered for each unique case. But that is to throw the baby out with the bathwater. Smith's sui generis method seems to rule out drawing upon generalizations about experience with different forms of organization elsewhere, as well as

(such as crdit, fertilizer, agricultural extension). Others at the other extreme say that it should be a single-purpose agency, concerned only with the supply of water and maintenance of the water supply facilities. We could call these two camps the 'integrationists' on the one hand, and the 'specializationists' on the other.

I shall discuss these issues of horizontal organization first, and come back later to the important but less contested questions of vertical organization.

HORIZONTAL ORGANIZATION

The integrationalist case

The extreme integrationalist position is simply that, since production from an irrigated area depends on the use of several inputs in addition to water as well as on roads and marketing facilities, therefore the irrigation agency should also include within its responsibilities the provision of these other necessities, or at least as many as can conveniently be managed. Like the integrated rural development projects of the 1970s, the assumption is that the more necessities whose supply is administratively controlled by one hierarchy the better, because the more likely all the necessities will be supplied when needed.

This may sound extreme, but it is in fact the underlying principle of the governmental irrigation organization most commonly used in North and Sub-saharan Africa. The British used it in the Gazira scheme in the early twentieth century, the French followed suit with the Office du

Niger in 192_, and subseqent developments adopted the same model. In some Sub-saharan countries the single organization which runs the irrigation facilities also provides so many other inputs and marketing services that the farmer is essentially a wage laborer working under the agency's direction, without the security of a wage. This is true of SAED's projects in Senegal and the Semry project in the Cameroons, for example; also of the Mwea project in Kenya.

I have not done the historical research which would be needed to establish why, in the minds of the organizational designers, this form of organization was used. It seems plausible that two reasons were uppermost:

(i) The colonial governments wished to have the schemes pay for themselves (in terms of government expenditure and revenue), and therefore required that the farmers not only grew the crops stipulated by the government but also that they sold them through government marketing channels, allowing the government to recoup costs before passing the residual on to the farmers.

(ii) The colonial governments saw the farmers as unfamiliar with irrigation and unresponsive to price incentives, and therefore in need of strict tutelage.

In South and Southeast Asia, government involvement in irrigation has a much longer tradition than in Africa, and large systems have typically been constructed, operated, and maintained by narrowly-focussed Irrigation Departments operating with a state- or province-wide jurisdiction. But there are also a number of examples of basin authorities with a more comprehensive scope, similar to those in Africa. The Muda

scheme in Malaysia is a case in point. For an irrigated area of about 00,000 hectares (net), the Muda authority not only supplies irrigation water and maintains the facilities, but also provides, from its own staff, agricultural extension, credit, and marketing. It has a monopoly over the supply of agricultural extension and credit but not over marketing. (CHECK). It has been in existence since 1 9 .

The Command Area Development Authorities in India are another example. They were started as part of the Command Area Development Program, initiated from the central government in the early 1970s. The Authorities' scope and relationship to the Irrigation Department varies from state to state within India. In those states where the idea has been taken furthest, the Authority at project level has power for running and maintaining the irrigation system, not the Irrigation Department. Often but not always, the head of the Agency has been seconded from the Irrigation Department; but the same agency has 'wings' to provide for other complimentary inputs, such as an agricultural extension wing and an agricultural credit wing, with staff seconded from their respective line departments. This too Is an attempt to provide complimentary inputs via a single administrative unit.

In the Philippines the National Irrigation Authority (NIA) over the 1970s likewise broadened its scope. From about 197__ NIA began employing its own 'community organizers', to organize water users' associations for small-scale projects; and from 197 it began employing its own agricultural extension experts, under the name of 'water management technicians'.

All these cases have In common that they attempt to administratively integrate water supply with the supply of (some) complimentary inputs. In other words, the attempt is to broaden the scope of the water supply organization so that those who control the water also control the compliments to water. This constitutes an enlargement of the 'controlled environment' of the water supply organization (Smith et al. 1980).

However, attempts have also been made to move in the same direction but less far, by expanding the 'influenceable' environment of the water supply organization. So in the case of NIA in the Philippines, at the same time as it was expanding the range of its 'controlled' environment (as described above), it was also putting in place a pilot monitoring and evaluation system on one large project. The central object of the monitoring and evaluation system was to provide a wide range of information about what was happening in the command area at various places and at various times, in terms of farmers' cropping patterns, fertilizer use, pest attack, yields, and so on. The information was to be provided at least three times a season: first, before the planting, to find out about farmers' intentions and state of preparedness, second, some weeks after the planting to determine actual cropping pattern and input use, and third, after the harvest, to find out about cropped area, input supply problems, marketing problems, etc. This information was to go to a coordinating committee, composed of senior representatives of all the line departments concerned.

In the Phitsanuluk project in Thailand (hectares net), a revised version of the NIA monitoring and evaluation information

system has been established, including a coordinating committee involving several departments; but no attempt to broaden the scope of the Royal Irrigation Department itself (the 'controlled' environment) has been made.

Behind these developments in South and Southeast Asia is an argument which runs as follows: Irrigation departments in these countries grew out of a public works department, not out of an agricultural department. Their history has been anchored in the construction of new projects, with the operation and maintenance of those projects treated as a secondary issue. Now further construction opportunities are running out, while the demand for food keeps rising with population and income growth. Existing irrigation systems are producing far less than they were expected to or than present experience elsewhere suggests they could. Both because of the need to improve existing systems and because construction opportunities are shrinking, the Irrigation departments of South and Southeast Asia are faced with the need to reorient their mandate away from construction to production as the primary objective. This means, at the minimum, that there must be much stronger coordination arrangements between Irrigation and complimentary departments–such as liaison committees; or the even stronger control arrangements made possible by merging complimentary functions in the same organization. A variety of ways might be used to effect such an organizational merging: by bringing together specialists from different disciplines, in separate hierarchies within the same organization; or by training engineers in complimentary disciplines, notably agronomy; or by creating a whole new cadre specialized in water supply and irrigated crop production.

One big advantage of a strong control arrangement (so it is argued) is accountability. There is a clear locus of responsibility for crop production from irrigated areas.

Whether there are coordination arrangements or control arrangements, an information system must be put In place with a scope as wide as that attempted in the Philippines and Thai projects described earlier. To see why this is so, consider the case where stronger coordination arrangements are introduced, such as a liaison committee. With all departments taking increased production from a given irrigation system as a common goal, it is possible to decompose a range of possible production targets into the actions that they imply for each department, and for negotiation about the target to be conducted on the basis of what each department thinks it is able to do. Once a target increase in production and its associated departmental requirements is agreed upon, the coordinatingbody then requires information about what is happening with respect to those areas of concern in the command area. If one department is seen to be falling behind, the others can bring pressure to bear upon it to perform, in the interests of achieving the overall agreed-upon target. In other words, the essential rationale for collecting the wide range of information about the whole range of agricultural operations, as in the Philippine and the Thai projects, is that without it there is no continuing basis for coordination between separate line departments or, in the case of an integrated authority, between parts of the same organization.

Notice that of the Asian cases mentioned above, all of them have had the strong backing of the World Bank. That is, the Bank has been a leading source of influence to broaden the mandate of the water supply

organization. (CHECK MUDA) India's Command Area Development Programme was indeed conceived in the Bank and promoted against the resistance of parts of the Indian government. The person inside the Bank who did most to encourage the Philippines' NIA to redefine its role in terms of production had earlier been the organizational designer and then manager of Kenya's National Irrigation Board (whose responsibilities, despite the title, were in practice limited to the Mwea project, the only sizable scheme in the country). The monitoring and evaluation system drawn up for the NIA pilot scheme was the work of World Bank staff members. The Phitsanuluk project's monitoring and evaluation system, in Thailand, was stimulated and operationally guided by one of the Bank staff members who had earlier worked with the NIA pilot scheme in the Philippines.

Weaknesses in the integrationist case

The case for a more functionally-specific form of organization follows from several weaknesses in the integrationist case.

(i) It is too easy to diagnose 'poor coordination' as the source of difficulties in any bureaucratic organization. Since what constitutes 'good' or 'adequate' coordination is never defined, almost any bureaucratic situation can be said to need more coordination. The number of times 'poor coordination' or 'need for coordination' is mentioned in a program for bureaucratic reform is an inverse indicator of the amount of thought that has gone into the program.

(ii) More coordination not only brings benefits, but also brings more costs, and the costs are generally not considered. Just why the stronger forms of coordination between line departments are so expensive is not clear (we could label our ignorance 'transactions costs'). Rivalries between different professional groups (engineers and agronomists, for example) are part of the problem. NIA in the Philippines only accepted the 'community organizers' program' after heated internal conflict, in which many engineers said that NIA, as an engineering agency, should have nothing to do with it.

(iii) Whether for these or other reasons, the actual record of success of the 'Integrated Rural Development projects' which the World Bank heavily promoted during the 1970s has been poor on the whole (SOURCE AND EVIDENCE)

(iv) When strong coordination is required between departments of very different management capability, the coordination arrangement can impair or paralyze both, leading to less overall action than would be likely with less coordination. Commonly, the Agricultural Extension departments are poorly managed and the Irrigation Departments well managed (even if well managed for design and construction rather then water supply tasks). A requirement of strong coordination may simply cause the Irrigation Department to slow down with no effect on the performance of the Agriculture Department.

(v) The integrationist argument that weaknesses in the existing Agriculture departments require the water supply agency to build

up its own agricultural extension expertise can be challenged by the argument that those weaknesses should be tackled on their own ground. If the integrationist argument were accepted for water and extension, one would have no grounds for rejecting the understandable wish of an Agricultural Credit Department to have its own extension service in order to make sure that farmers use the credit effectively.

(vi) If agricultural extension is merged organizationally with Irrigation, this distorts priorities for agricultural extension. What tends to happen is that, in the name of avoiding overlap and duplication, the line department of Agricultural Extension gets left with the rump-rainfed agriculture. Since the irrigated areas are normally more prosperous than the rainfed areas, staff and budget money tend to move from the rainfed areas into the irrigated areas, and the irrigated areas tend for this reason to end up with the bulk of the resources for agricultural extension. This is no way to set the priorities for agricultural extension.

(vii) Commonly the integrationist approach calls for the O&M organization to enforce cropping patterns and/or to promote agricultural advice which the farmers may not like. This runs against the principle that those who are in a service role—in this case, providing water—should not also have a policing or coercive role, for the latter prompts evasive reactions on the part of the clients which interfere with the maintenance of confidence on the part of the farmers in the service capabilities

of the staff; specifically they lose confidence that if they do not tamper with the physical structures the water will come when and in the quantities it is meant to come.

(viii) The more coordination attempted, the less accountable is any one organization for overall performance. This seems paradoxical in relation to the earlier integrationist argument that strong coordination allows the coordinating agency to be held responsible for clearly defined production targets. The catch is that when, to take an extreme case, Irrigation and Agriculture are put under one management (for each specific project or at state-level), then each tends to blame the other for poor performance. Irrigation avoids accountability for water service by claiming that failure to meet production targets is due to poor performance of the Agriculture people—or to acts of God—rather than to poor water service. And vice versa.

(ix) The integrationalist view on the right form of irrigation organization stems from a failure to see the difference between the right form of design organization and the right form of O&M organization. The organization that designs irrigation systems has to have within itself (or be able to draw reliable from other organizations) a large amount of knowledge about agronomy, weather, farmers' cropping practices, economics, and so on. The problem is that those who recommend on the right form of organization for O&M tend themselves to be professionally concerned with the design of the systems; and they tend to extrapolate from the right form of organization for design to the

right form for O&M. That is, it is assumed that O&M should be organized much as the planning and design was organized, by the same kind of multi-faceted organization.

The specialization ist case

The specialization ist argument is that the irrigation agency should concentrate on water supply only: on supplying an agreed upon water service and maintaining the facilities. (What links it should have with the construction function we come to shortly.) The single-purpose entity is easier to create because the function of supplying and removing water, and maintaining the facilities, is carried out in physical separation from all the other farmer support activities. O&M, in other words, can be treated as a separate physical system, with a clear and specific output or service, which greatly facilitates a single-purpose organization. The outstanding advantages of the single-purpose form are (a) specialization, and (b) acountability. A secondary advantage is (c) easier cost recovery.

Typically where multi-faceted organizations run canal systems, there is little specialization on canal O&M. In the Indian case, for example, an engineer in charge of a Division or Sub-division (typically of the order of 300,000 acres and 80,000 acres of gross irrigated area, respectively) may have almost no previous O&M experience before being assigned to his current job. The bulk of his previous career will have been spent on the other tasks that the Irrigation Department carries out—notably, design and construction. Yet canal O&M is a matter where experience more than theory is very important, and for which the normal qualifications in civil engineering are of no help.

Accountability is an even more important advantage. The essence of accountability is that there should be a clear and specific definition of what service the organization is meant to provide. This becomes difficult where the organization is meant to provide a wider rather than narrower range of services. With a narrower range, escape by blaming poor service of one kind onto poor service of another kind is more difficult. So if the irrigation agency's performance is to be monitored primarily by yields, or aggregate production, its water supply activities will remain unaccountable. So many other factors determine yields and production that one or more of them can always be blamed for faults which are in reality the result of poor water supply.

Cost recovery is also eased by a narrow definition of responsibility. The farmers must understand what they are paying for. They are more likely to pay for it if they are unambiguously sure they want it. They may well not be sure they want the agricultural extension activities which the multi-service agency tries to provide, or the prohibitions on cropping patterns it may be required to enforce. Unwillingness to pay for these parts can readily be translated into unwillingness to pay any water rate.

One would have a water delivery service specified in terms of how much water, at what discharge, is to be provided in a given period; during the rainy season, this may be further specified in terms of how many days after the last rains the given service will be resumed. Just how, organizationally, the service should be defined is a separate question which we come back to; here the point Is simply that a service does have to be clearly specified. The operating plan should specify the details for

each outlet from the canal, or at least for each tertiary offtake. The essential next step is that the agency must publish the measurements of the water actually delivered, so that not only the recipients but others as well can know what has happened. This should be done weekly or fortnightly. There has also to be some auditing process by which the accuracy of the agency's measurements can be checked, and some mechanism of appeal when farmers believe the measurements are inaccurate.

One has to remember that water has the unusual property of being not only vital in arid lands but also manipulable by human agents in a way that other natural resources are not. The people who control the water can use their power to raise large amounts of money for themselves, sometimes by increasing farmers' uncertainty about water supply so that farmers will offer them more money to shift the uncertainty onto somewhere else. If, however, the above accountability mechanism is in place, it becomes much more difficult for the water supply to be manipulated for particularistic ends. In the Indian context (outside the Northwest) the single step of publishing the actual supply to each outlet (or distributory offtake) weekly or fortnightly, in such a way that the results can be easily and widely known, would make very much more difficult the operation of the 'corruption system' I have described in another paper (Wade 1982).

O&M and construction

The other issue of horizontal scope concerns the relationship between the organization of O&M and that for construction. What degree of organizational separation should be aimed at? The disadvantage of having

both sets of functions carried out in a single organization is that construction tends to backwash O&M. The O&M budget normally being a small fraction of the construction budget, and the O&M posts normally being a small fraction of the number of construction posts, the department's attention tends to be on construction to the occlusion of O&M. But the standard operating procedures of a construction-oriented agency tend to be much more geared to exercise top-down control than is needed in an O&M agency. So the O&M part of the work tends to be marginalized in terms of prestige and professional skills.

This argues for some degree of organizational separation. The more separation, however, the greater the danger that those who design and construct will not take responsibility for the performance of the system, and will not learn from actual operational experience; feedback is blocked. There is a way around this problem, which I describe later. Here the conclusion is that whatever the organizational form, the O&M and construction staff should be separate enough so that there is not frequent rotation of individuals from one side to the other. Only in this way can O&M specialization develop.

VERTICAL ORGANIZATION

The main design issue of vertical organization is the degree of decentralization of authority.

There are two broad options. One can either have a single organization for operating and maintaining all canal systems (above a certain size) within a major political unit, such as a nation-state or a

state in a federal system. Or one can have distinct organizations based on catchments or on sub-state administrative units (provinces, counties), with some kind of national apex organization. Within the first option, there is a further option of a conventional main-line government department (as in India, or Thailand), or a national parastatal agency responsible to, say, the Ministry of Agriculture (as in Philippines and many Sub-saharan countries).

The advantage of a parastatal is specially in financing. The budget of the parastatal can be kept distinct from ordinary government revenue and expenditure. This not only allows a clearer financial accountability, but more important facilitates efforts to bring water charges into line with the costs of providing the water service. This is because it is much easier for water charges to go directly to the parastatal rather than into general government revenue and therefore much easier to identify how much of expenditure is being covered by user charges. On the other hand, it may well be difficult politically to transform a main-line departmental structure into a parastatal structure where irrigation accounts for a large part of public spending; cutting loose so much funding from close government scrutiny may be seen as too dangerous. Such a change may be more feasible in a relatively small country with relatively little irrigation.

A parastatal may have a national or state-wide jurisdiction; or a basin or catchment-wide jurisdiction. The advantage of the latter is that it facilitates the build-up of local experience, and experience of local conditions—of climate, of hydrology, of farming practices, and so on—is (I hypothesize) a major factor in effective canal management. Each

parastatal hires its own staff, and its staff expect to spend most of their working lives in that one agency. The identification between staff and area is enhanced. The disadvantage of the locally-circumscribed rather than national parastatal is that it may find it difficult to obtain technical support and advice. Also, without any provision for additions to the budget independently of water charges, there may be an inter-regional equity problem, such that farmers in poor regions, where agricultural profits are low, have to pay the same for water as farmers in rich regions, depending on the overall costs of each parastatal.

This discussion of the vertical dimension of organizations lays out the main options. Now let us bring together the discussion of the horizontal and vertical dimensions to define the right structure for irrigationorganization.

THE RIGHT STRUCTURE

The first and most important principle is to separate out the organization for water supply and system maintenance from the organization for the supply of other complimentary inputs.

This has an important implication for the design of management information systems. The managers in an irrigation organization structured by this principle do not need to have information about yields, cropping practices, fertilizer use, credit needs of farmers, and so on. This information should be collected by the agricultural statistics agency.

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coordination between those responsible for irrigation design and those responsible for complimentary inputs. Once the service is defined, however, the managers of the O&M parastatals do not need to know this agricultural information, and so they do not need to ensure its collection through their own information system. What they do need information about is (a) cropped area, and (b) how much water is being discharged from each outlet; as well as (c) the state of repair of the physical facilities.

The second principle is that planning, design and construction should be undertaken by an organization separate from the O&M organization; or if not, then there should be two distinct hierarchies within a unified Irrigation Department such that rotation between hierarchies is not common. Third, Irrigation systems should be operated and maintained by parastatal bodies based on catchments (or if not, fairly small administrative units). There should be two kinds of organizations at the national or state level complimenting the local parastatals. One of them—this is the fourth principle—should specialize in planning, design, and construction for the whole nation or state. Ideally, this same organization would cover all water use, including municipal water supply, flood control, and so on; but this requires a very sophisticated administrative capacity, and in practice an organization limited to irrigation and drainage would suffice. The same organization would provide training courses for the staff of the parastatals. The other national organization should be responsible for—the fifth principle—laying down the general framework of regulation in which the parastatals are to operate, and monitoring their performance. It would pull together data on yields and production for each irrigation system and raise questions with

the management when the trends were unfavorable; it would set guidelines for the maximum proportion of total expenditures to be spent on administration, or the minimum to be spent on maintenance; and would carry out periodic audits of the accounts. It would be a channel of redress of grievances in cases where farmers felt that the measurements of water supplied to them were not accurate.

If the organization which designs and constructs canal systems is separate from the organization(s) which runs them there is a danger that feedback from operational experience to the designers will be blocked. This danger can be reduced by—the sixth principle—having the construction organization itself operate and maintain the system for the first two or three years, during which a local staff is gradually built up and trained by the construction organization. At the end of the period the system is handed over to the newly constituted parastatal, in good running order and with a staff which already has experience of it.

Suppose, however, it is not possible to have a bifurcated structure of local operational parastatals plus national planning, construction and monitoring organizations. Suppose, that is, one is stuck with an existing single organization, such as the Irrigation Departments of Indian states or the Royal Irrigation Department of Thailand. In this context, one should aim at—the seventh principle—a personnel transfer system which allows a stable set of staff to remain on any given system for several years at a time (as well as put O&M in a separate hierarchy from the other activities of the department).

My question now to those who know about either irrigation O&M or management science: what is wrong with this prescription?