CHAPTER 2

Organizational Dynamics in a Corporate-Type Irrigation Organization: an Analysis of the National Irrigation Administration in the Philippines

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THIS STUDY SETS out to examine the internal dynamics or internal administrative behavior of irrigation organizations relative to environmental changes, policy changes, and clientele demands, and to explain how different types of behavior adopted by the organizations related to the performance or effectiveness of the organizations, and how they should be seen as a comprehensive study of organizational behavior.

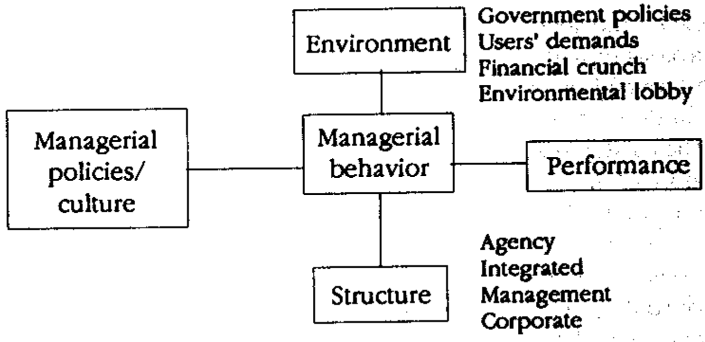
Irrigation organizations, as most governmental agencies in their original setting in developing countries, were originally introduced or designed to be run as bureaucratic and welfare-dispensing organizations. If we look at the classic case of the *warabandi* system, water is allocated to farmers on a ration basis since available water can never be sufficient for the needs of all the farmers. It is the job of the organization to deliver the water according to the rationing principles, and it is then left to the farmers to utilize it in the best possible way. Under these circumstances, irrigation systems are organized to follow uniform procedures to ensure regularity, fairness, and reliability — the characteristics of the "machine type" of bureaucracy. However, the nature of demand, the condition of the physical structure of canals, and the nature of the social environment and social pressures have changed. In recent years some of the newer structures have been built to allow for more flexible responses to the demands of different types of clientele. Nonetheless, in most irrigation organizations, the basic structural or strategic changes or changes in styles needed to relate to environmental demands have not taken place. Instead, the old bureaucracy has deteriorated; a new set of behavior has arisen and, instead of following or adhering to the original rules, selective use, and evasion or disregard of these rules has been practiced to meet ad hoc requirements or as opportunistic short-term responses. Under this scenario agencies could reap neither the advantages of machine bureaucracy such as precision, regularity, and fairness, nor the flexibility or responsiveness of market-oriented systems.

Recently, a movement towards introducing modern management methods has begun in some irrigation organizations. This "managerial mode" is defined as the rational organization and management of work to achieve clearly defined objectives including their attendant motivational structure. This is different from the entrepreneurial mode, which adapts the organization to take advantage of the environment and capitalize on its own strength. The emergence of this mode in irrigation organizations is still too early to be visible at this stage. But government policies, financial constraints, the need for accountability and results, and increased participation and awareness of farmers are exerting pressure on agencies to adopt more managerial or entrepreneurial practices.

Some governments have also introduced new forms of structure to influence or change the behavior of irrigation agencies. The corporate form of organization introduced in the Philippines, or the integrated management methods initiated in India and Sri Lanka such as command area authority and river valley authority are examples of attempts to effect organizational change.

Certain administrative behaviors — bureaucratic, pseudobureaucratic, managerial or entrepreneurial — are considered as focal points of the study and they are related to variables such as environmental changes, including government policies, financial constraints, clientele pressures, donors' influence, changes in organizational structure such as integrated management or corporate form, and also prevailing management policies and management culture. The study will examine how different administrative patterns arising from differing mixes of antecedent factors in turn influence systems performance, which again react with the environments. This model, shown diagrammatically in Figure 2.1, is the basic frame of this study.

Figure 2.1. A model of management behaviour and performance in irrigation organizations.



Managerial behavior
1. Bureaucratic
2. Pseudobureaucratic
3. Managerial
4. Entrepreneurial

This study will be accomplished at two levels — inter-organizational comparison and intra-organizational analysis. It examines three different types of organizations, the corporate type, the project type, and the traditional departmental type as exemplified by the National Irrigation Administration (NIA) of the Philippines, the Mahaweli Authority of Sri Lanka, and the Irrigation Department of Sri Lanka, respectively. While the inter-organizational comparison will consider these three organizations, the intra-organizational study will concentrate on the work units or responsibility centers of the organizations. Many organizational studies take the macro approach; this approach, however, often fails to go deep into the internal workings inside the organizations. Our approach is based on the detailed study of how various work units and individual responses make up the various dimensions of the group process within the organization.

In the case presented here, the NIA of the Philippines, the organization functions in the context of a changing environment and adapts new managerial policies to suit this changing condition. In addition, we explain how different work units in the NIA, both at the headquarters and at the local level, perform in relation to these changes; why some units have adapted well to the new environment and policies, while others are failing to do so.

BACKGROUND AND SETTING

The National Irrigation Administration (NIA) was first established in 1964 as a corporation under an Act of the Philippine Congress. Essentially, it took over the functions of the irrigation division of the Bureau of Public Works. The development of NIA as a public corporation followed the trend where special-function agencies were created to operate development activities independently, unencumbered by the existing bureaucratic rules. The growth of public corporations increased with increasing finances — and also increasing governmental initiatives in the development process at that period. Although NIA was a corporate organization, it functioned initially as a department system because its cost of operation and maintenance was essentially financed by a general appropriation of the government, and not by its own resources. Even the fees collected were transmitted to the Treasury and the budget needed was appropriated by the Congress. In 1984, a fundamental change was initiated. The NIA was made to pay progressively for its own operation and maintenance costs, and collection of fees, sale of unused equipment, and equipment rental became the major sources of revenue for the NIA though there were special subsidies. Thus dawned an era of corporate financial decision-making with a substantial degree of independence and latitude. A further detailed policy for recovering costs was laid down in 1978. A new charter in 1980 gave NIA the right to charge an overhead of five percent on foreign loan accounts and construction projects carried out with foreign financial support.

In response to these changing conditions, a series of measures were initiated by NIA to achieve financial viability. These included the devolution of responsibility to the various administrative units (systems, in the case of field operation), and also to regional office and central office departments and divisions. The operational national irrigation systems and provincial irrigation systems were treated as autonomous financial responsibility centers, each unit accountable for its own financial profitability. Measures to improve the collection of fees such as for parcellary mapping, close supervision and coordinating of collecting officials, as well as cost-cutting exercises such as selling obsolete equipment or eliminating unproductive operation sections were undertaken.

PERFORMANCE-ORIENTED APPROACH

In the NIA setting, the basic responsibility centers include national irrigation systems which operate the state-owned irrigation systems and also provincial irrigation offices responsible for construction and providing services to the communal irrigation associations. As these form the major revenue earners of NIA, the efficient running of these systems has become the priority of NIA's new strategy. Accordingly, NIA introduced an incentive system based principally on the financial performance of these responsibility centers. Every system manager in the national irrigation system is evaluated on the basis of four criteria. The score points for each System Manager for irrigation are:

		Points allotted (%)
1. Operating efficiency		40
2. Maintenance		20
3. Collection efficiency		20
4. Viability index		20
5. Additional bonus points		20
a) Operation index	6	
b) Collection efficiency	6	
c) Viability index	6	
d) Report submission	2	

The operating efficiency has two indices: 1) irrigation intensity of dry and wet seasons, which is given 30 points; and 2) irrigation system efficiency index, essentially the efficiency index of the water distribution system (demand for water divided by supply of water) which is given 10 points.

Under this system, the maximum of 10 percent of the net earning or income is entitled to the system which performs well in these indices. In measuring the performance itself, the financial factors — collection efficiency (20 points), viability index (20 points), extra bonus points (12 points) — were taken into account: a total of 52 points in the bonus points system of 100 points.

As other measures such as the water distribution efficiency index and the maintenance efficiency index include many approximate and judgmental items, the results of these measurements will not probably be sharp enough to discriminate much between the systems. Consequently, the financial indices based on hard data such as the collected revenue and expenditure necessarily become the backbone of the performance measures.

IDENTIFYING THE PROBLEM

We now have to examine the relationship between performance and various organizational factors in responsibility centers. Under the circumstances of change and dynamism, irrigation systems in the Philippines give us a very good opportunity to question or examine the supposed relationship between performance and organizational and environmental factors. The problem in the Philippines is that although the viability index has been in operation for about six years there are still many systems which barely survive or which are below the expected performance level of recovering its operating costs. In many systems a situation of financial nonviability persists. Therefore, NIA was greatly concerned with raising the productivity of low performing systems. A number of explanations are given for this low performance. It has been pointed out that some systems are not successful because their sizes or service areas are not sufficiently large and, therefore, an economy of scale cannot be reaped. On the other hand, it is also often posited that variations in system performance are mainly due to the scarcity of water or rain during the summer months in parts of the Philippines. The systems in the Philippines provide more or less sufficient secondary irrigation during the rainy season, except for a few weeks in which irrigation is needed. However, in the dry season agriculture is almost entirely dependent on irrigation. As the amount of water available during the dry season determines to a great extent the area that could be farmed during the season, systems which have an insufficient amount of water during the dry season are unlikely to achieve any level of viability performance. It should also be noted that in the dry season irrigation service fees can easily be collected because users are ready and willing to pay for water which they cannot otherwise obtain. Alternatively, some have pointed out that yield is another important factor in indirectly influencing the viability of the systems. Farmers producing high-yielding crops with resultant high surpluses can afford to pay irrigation fees, but those in areas where the yield is lower, find it difficult to pay irrigation fees.

These are some of the conditions highlighted as causes of variation between low and high performing systems. In addition, we have also observed that there exists, in almost every system, an intense management activity towards the end of the season. We also suspect that, since collection of fees and reducing costs are directly contributory to financial performance, any factor which in turn promotes these conditions will be very important from the management point of view. The effective revenue collection and cost-reduction being highly management-intensive, they naturally demand appropriate organizational development and changes. It is likely that styles of management and organization practiced in some of the high-performing systems will be different from the low-performing systems as each center manager attempts to effect the desired changes. In other words, the managerial styles, organizational tactics, and practices could also be importantly related to financial performance variations in these systems.

Because of these reasons, we hypothesize *that the financial viability of the system may depend on a number of conditions which include both physical and managerial factors*. As NIA is one of the organizations that maintains a good information system, we could verify the importance of physical factors on the basis of available information.

Data on management factors and managerial profiles had also been collected in our research. In consequence, examining these factors and also unraveling the detailed workings of the management system itself will likely highlight the causes of variation in the financial performance of these systems.

Of course, we acknowledge that an evaluation of the performance of irrigation systems should include criteria other than purely financial success. For example, the sustainability of the system, the satisfaction of users, the reliability and adequacy of water supply, and environmental impact are other criteria that are to be looked at in analyzing system performance. However, we are concentrating here on the use of the viability index as a measure of performance. The reasons are obvious. As management itself introduces the viability index as an important criterion, because staff themselves are rewarded on these financial criteria and all activities are directed towards achieving this objective, we use this as a focal point for our study. In addition, in the context of financial independence, financial viability itself is a good indicator of the efficiency of management systems.

Financial viability depends on two variables, revenue and costs. In addition, the collection of fees will most likely be correlated with the service provided by NIA. Unhappy or unsatisfied farmers are not likely to pay for the use of the service. The fact that the collection rate is high in a particular system is partially attributed to a higher level of service achieved in that system. All these factors point out that the study of financial viability as a focal point is desirable and meaningful in this context.

METHODOLOGY

A selected number of sample systems, roughly forming one third of the total systems in NIA were surveyed. The data collected was the result of a structured questionnaire and economic and general information gathering from existing records and reports. The questionnaires invited information about how the systems determine their objectives, who influences the process, and an evaluation of the performance of the supervisor and staff members in each system. In addition, these questions covered various management processes such as information and activity flow, the chain of command, organization of work, different types of motivations applied, different management styles including the group process, individualized management, and the interconnections between systems and other units in NIA itself or with outside units. All these variables provided information to gauge the relative importance of both physical factors and managerial factors which existed in these systems. Conditions relating to each of these categories were correlated with the final financial performance. The questionnaires included different sets of questions, each to be answered by different respondents such as supervisors and members of the work unit.

To analyze large magnitudes of data thus compiled, data reduction and the construction of appropriate indices comprising answers to different questionnaires were used. Item selection for each scale was done on the methodology developed by early research. This research used questionnaires and methodology designed by the Organizational Assessment Centre, Wharton School of Commerce of the University of Pennsylvania. Such questionnaires had already been applied to various types of service organizations, including the various scales and subscales of important management categories. We adopted these scales and the rationale used by the earlier research as a starting basis for constructing the scales.

In addition, we improved the indices by studying how our own data actually appear with respect to categories. Each question included in each of the subscales was factor-analyzed and the factor scores for each category used as an alternative scale. When factor analysis was used, coefficient theta was applied as a reliability index and the cut-off rate for acceptance of any scale was 0.80 or thereabouts. Resultant scores for both methods were analyzed to ascertain differences between the various sets of systems or between more-viable and less-viable systems or between the various levels of employees or various types of employees within the subsets of the organization.

SAMPLING

As we defined performance as one category of analysis, we selected three regions in NIA representing different levels of system performance. Region III in Luzon was considered a lower performing group whereas Region XI in Mindanao was considered as the best performing group, while Region VI in Iloilo was taken to represent medium-level performing groups. From each region, Provincial Irrigation Offices and the National Irrigation Systems were selected, and from each system five to seven respondents including the supervisor or the superintendent of the system, the engineers, and other officials, including watermasters, were assigned to answer a different questionnaire designated for each category of respondent. The superintendents answered the Supervisor Questionnaire, and the members of the group answered the Member Questionnaire. The Job Design Questionnaire was answered by one or two other members of the group. The Focal Unit Questionnaire which examines interrelationships between the responsibility centers and other units or outside agencies was answered by the second in command of the systems or work unit, and one of the watermasters answered the Water Distribution Questionnaire. In constructing the scales, various items from the questionnaires were combined to represent an average situation of each system. Table 2.1 describes the types and number of the work units selected.

Table 2.1. Type and number of work units selected.

	Central office	Regional office	NIS	PIO
Sample	35	23	36	16
Total	70	63	95	67

NIS = National Irrigation Systems.
PIO = Provincial Irrigation Offices.

A total of 110 responsibility centers or work units were selected in these samples. These included 35 divisions from the central offices and 75 work units from the field. The 75 work units in the field comprised 36 National Irrigation Systems, 16 Provincial Irrigation Offices and 23 divisions of Regional Headquarters Offices. The total number of work units selected from the National Irrigation Systems and Provincial Irrigation Offices was approximately 30 percent of the total number of systems and 25 percent of Provincial Irrigation offices. In the case of regional offices, there were usually five to six divisions and all of them were selected. In the case of the Central Office, approximately 50 percent of responsibility centers or work units were selected. In other words, the samples formed a fairly large percentage of the total universe. From each system or Provincial Irrigation Office, six to seven officials (forming the bulk of important members of the staff in these systems) answered the questionnaires. Approximately 700 questionnaires were collected in the survey, in addition to data from existing records and from field interviews with various officials in these systems.

Table 2.2 describes the characteristics of sample irrigation systems. It will be noticed that among the three Regions, Region III, Region VI and Region XI, the average size of the system varies from 3,400 ha to 7,400 ha. The median is between 4,000 ha and 5,000 ha. However, the Upper Pampanga River Integrated Irrigation System (UPRIIS), a reservoir system in the Pampanga Valley, includes four systems with an average size of 25,000 ha. Unlike other systems which are only run-of-the-river systems with a small service area, the system in the UPRIIS forms part of a large river valley project which uses the reservoir system. Apart from Region XI, all other regions have similar patterns in percentage of actual to programmed irrigated area in the wet season or the actual to programmed irrigated area in the dry season. The collection efficiency and viability index in Region XI are definitely superior. An observation may be made: several basic characteristics such as average size, the cropping intensity ratio of rice to other crops, and farm size do not really differ between regions.

RESEARCH FINDINGS

In identifying the problem the following two hypotheses were made:

1. Variations in performance are to some extent influenced by physical and economic factors which are beyond the immediate short-run control of the system managers.
2. Variations in performance of an irrigation system in relation to the viability index is greatly influenced by the way in which the system management is organized, operated, motivated, and accounted for.

In regard to the first hypothesis, the following are identified from the available data as plausible physical explanations for the variation in the system performance:

- The service area of each system.
- The size of the landholding.
- The average yield per hectare.
- The percentage of rice crop to other crops.

Table 2.2. Characteristics of the sample irrigation systems as at end of 1989.

	Region III	Region VI	Region XI	UPRIIS
1. Total service area (ha)	67,179	53,500	38,370	100,781
Average service area per system (ha)	7,464	5,944	3,488	25,195
2. Irrigated area (ha)				
a) Program	53,067	46,783	27,426	91,544
Wet season	50,893	43,108	31,272	85,787
Actual/program (%)	(96)	(92)	(114)	(93)
b) Program	41,808	30,293	25,352	65,077
Dry season	41,969	31,944	29,097	68,567
Actual/program (%)	(100)	(105)	(115)	(105)
3. Benefited area (ha)				
a) Wet season	48,437	41,766	21,445	72,819
b) Dry season	40,900	29,297	24,223	53,261
4. Cropping intensity				
a) Program	141	144	138	155
b) Actual irrigated area/service area	138	140	157	153
c) Actual benefited area/service area	133	133	119	98
5. Collection efficiency				
a) Program	72	70	83	76
b) Actual collectibles/estimated collectibles	44	50	81	32
c) Actual collectibles/collectibles based on benefited area	52	50	86	42
6. Viability index				
a) Program	0.97	1.54	120	2.19
b) Actual	0.79	1.22	188	0.99
c) Actual/program (%)	81	79	156	97
7. O&M Cost/ha (P/ha)				
a) Expenses/service area	415	291	275	339
b) Expenses/total benefited area	312	219	231	271

- The cropping intensity.
- The area cultivated in the dry season as percentage of service area.

Among these variables, the service area of the systems addresses the question of economy of scale. The implication is that larger-size systems or systems with a greater service area could utilize overhead staff or overhead costs more effectively or spread the overhead costs over a larger area served. It is also likely that because of their larger size, bigger systems may be able to afford a specialist, special service or equipment for their use.

The size of the landholding, on the other hand, is related to the ability of the consumer to pay. It is reasoned that the owner of the larger-size farm will enjoy a greater agricultural surplus and, therefore, is more likely to be able to afford the irrigation fees.

Likewise, the average yield per hectare contributes to the income of the farmer. A farmer with higher yields should be able to earn more, accumulate more surplus, and accordingly be more willing or at least more able to pay for irrigation fees.

In addition, the percentage of rice crop to other crops also indicates the income level of the farmers. The farm which grows crops other than rice, such as banana or sugarcane will be more profitable and the farmer will be willing to pay irrigation fees, determined essentially on rice yield, that is imposed at a comparatively lower rate.

The cropping intensity is yet another indicator of how effectively irrigation water is utilized or how available water is. The greater the cropping intensity the greater the number of users or the area used, and more likely will be the collection of revenue — although irrigated area and the revenue collected have never been clearly correlated in many parts of the world. The area cultivated in the dry season as a percentage of the total area is a proxy variable for the availability of both rain and irrigated water in the dry season. It has been argued that in regions where rain is even throughout the year the cropping area and also the yield in the dry season will be higher. In fact, all these explanations are usually given by system managers when asked why their own or a particular system performs less than what is expected.

To test these suppositions, these variables are utilized as independent factors in a regression model which uses the viability index as a dependent variable. None of these variables are related significantly to the dependent variable. The relationship between each of these variables and the dependent variable, the viability index, is, surprisingly, almost zero. Why these factors have no influence on the viability index needs to be examined. However, a careful look at the nature of the viability index, and also the general characteristics of these systems will probably give us plausible reasons for this finding. For instance, certain system characteristics such as size of the systems, the cropping intensity, and farm size are more or less the same in all the systems except in the four systems of UPRIIS which are large-size reservoir systems. As the sample itself is fairly uniform it will be difficult to discriminate between the significance of the physical factors in systems. In other words, physical factors are controlled or considered constant to a large extent in the Philippine setting. Systems are all run-of-the-river small systems, managed by four or five engineers and their assistants, where more or less very similar crops are grown, and which are subjected to more or less uniform vagaries of climatic conditions.

It should be noted that the systems performance which we have defined here as a dependent variable has a very limited scope. In effect, we presume that physical factors have no influence in the Philippines, that is, performance indicators defined as the viability index, and the physical factors, are not really related. It does not, however, preclude the fact that physical factors may have influenced the distribution of water, or the maintenance and sustainability of the system.

It should be realized that the financial performance indicator is based on revenue collection and expenditure. Achievements in revenue collection could be more a result of management activity than a result of the ability to pay. According to a study by Small, it was found that farmers in most Southeast Asian countries could pay limited irrigation fees, or a limited but fairly decent coverage of the actual cost of maintenance. If it is the case, the question will be whether legislation, conventions, and management practices could be influencing factors for farmers' actual payments. Likewise, the amount of expenditure could be quite independent of any physical factors that have been mentioned and, therefore, it should be proposed that the viability index be more a management function than a physically related variable. In consequence, the influence of physical factors on the index, especially in the case of uniformly comparable systems, is minimal. It should not, however, be inferred that the physical factors are unimportant in all cases. This only indicates that under certain contingent or limiting conditions the physical factors may not be significant in relation to certain aspects of the performance data.

On the other hand, very surprising results are found when financial performance is related to management variables. These results are found in the organizational questionnaires answered by the supervisors and members through a set of questions which relate to how work units are organized. All are related to important aspects of the ongoing management process within the system management itself. Questions include such categories as, "how are the objectives determined?," "how are the specific targets set?," "how precisely are objectives determined?," "how is consensus on the performance reached?," and "who influences the decision making?" When these management questions are related to the financial performance variable, it is found, surprisingly, that fifteen questions relating to various management variables account for 89 percent of the variance in a regression model. The slopes representing all these factors, individually, are also highly significant in statistical terms. This gives us a very strong indication that management factors are very significant in explaining financial performance.

If we look at the significant cluster of items, four important variable clusters can be identified. A number of items are related to clarity, approval, or the consensual aspects of performance criteria; another group relates to information flow, another set to incentives, and the last set to conflict and conflict resolution. Clarity and consensus of performance standards and collective influence on enforcing the rules are influential in enhancing the viability scores. This is not surprising because in any result-oriented system, the clear definition of results and the acceptance of criteria are important preconditions or prerequisites for success. On the other hand, not following through the chain of command, the acceptance of an independent work flow, and intense interactions between supervisor and employees, indicate that a more interactive but less formal management operates in successful systems. It is interesting to note that the idea of group and consensual decision making is not significant. Nor is the group process or Japanese type of management significant here. Again, it is also found that the frequency of occurrence of conflict among members and the need for conflict resolution by the hierarchy also increase commensurate with more management activities in the successful systems.

A clearer definition and acceptance of performance, and a more directive leadership but with high interaction with members of the groups seem to be the criteria of success when evaluated in terms of financial viability. The high intensity of occurrence of conflicts and conflict resolution serves to reiterate the highly tense nature of the atmosphere under these circumstances, as well as the more direct leadership which further heightens these tensions. These are, in fact, characteristics of management in a high-tension setting in the business world.

This information will contribute to the decision making on what kind of management systems are to be prepared to enhance the performance of national irrigation systems. Our findings indicate quite differently from the usual text book advocacy on human relation or the permissive type of leadership styles. Here, decisive leadership coupled with the appropriate intensity of interaction, the ability to sidestep some work rules in the context of clarity of objectives, are all at work in successful systems.

Our findings are of necessity preliminary as we are using only the single item variables. When single item variables are combined into various meaningful indices through factor analysis, we still find the same patterns or styles remaining operative although the significant levels as well as the total amount of variance explained are reduced. But unmistakably the same pattern persists. This indicates that performance-related organizations, effective management styles, and management process are unmistakably very important. Any organization which can effect or which can activate and put into motion this kind of process is likely to be effective.

The comparison between the Provisional Irrigation Offices and the National Irrigation Systems as well as how they differ from Headquarters and how NIA as a whole operates as a management system are still to be explored. Further results will be interpreted in a larger context and especially in relation to the findings from the other two organizations in Sri Lanka. When all findings from these are compared, a more comprehensive and definitive picture should appear.

PROBLEMS AND DYSFUNCTIONS OF PERFORMANCE MEASURES

This research indicates how effectively systems are organized to achieve the overriding objectives of financial viability and to explain some of the probable reasons why some systems perform better than others. This is not the whole story of the management process. As an organization attempts to direct all its activities on a particular or a narrow set of objectives, what consequences might follow from neglecting other objectives, plausible or desirable but obviously not emphasized at the moment, and what the dysfunctions of performance measurement in use are, are questions one might want to raise.

The questions of adequacy and reliability are never explicitly paid attention to. There is the irrigation efficiency index which more or less follows the standard procedure for calculating water demand and supply. Supply is calculated on the basis of the amount diverted at the diversion gate and fixed parameters such as conveyance efficiency and distribution efficiency. Likewise, on the demand side, in calculating the water requirements, the numbers of days and areas under land preparation and under crop maintenance could be considered as the only operating variables. Other factors are fixed parameters, precalculated years ago for the whole region or the whole country. As, essentially, these are the only variables management can influence, a much simpler formulation which can be broadly compared in-between time in the seasons would be more useful to the system managers than the formula included in the incentive scheme. Since this system efficiency index forms only ten per cent of the total score in the bonus calculation, the whole exercise probably serves only as a ritual. It is most likely that almost every system obtains similar scores in this portion of the bonus index.

We have seen that the viability is the composite function of income and cost. To improve the ratio, the manager will be tempted to reduce various costs in the financial statements. This in itself is a very good idea indeed, leading to the development of a cost-conscious manager. If so, well and good, the results will be entirely positive. However, zeal in cutting down costs could also lead to cutting expenditures which, while improving the ratio, will produce undesirable consequences in the long run. For instance, cutting off O&M expenditure and postponing visibly postponable but potentially damaging maintenance programs will have disastrous effects in the long run. Independent observers complain that the maintenance of systems in the Philippines needs to be kept up. The trend in O&M expenditure itself, between 1983 and 1989, adjusted for inflation, is actually declining, indicating the seriousness of the problem.

The next question is revenue. Revenue is a function of collection efficiency, again dependent on the irrigation area or benefited area. An improvement in ratio could be entirely attributed to management efficiency if the absolute area of irrigated or benefited area is kept constant. Here again, there is a loophole that the ratio can be improved by manipulating the collectibles dependant on benefited area. The problem is already recognized, and attempts have been made to compile detailed parcellary maps for each system so that irrigable area and benefited area can easily be identified. In addition, a limiting feature in the bonus indices is that the cropping intensity and the collection efficiency are, in a way, opposite to each other in their effect. Improvement in the cropping intensity will likely lead to the larger benefited or collectible areas. Consequently, it will demand an improvement in the degree of collection efficiency on a larger area. In other words, with the increase in the cropping area adversely affecting the collection ratio, the manager has to balance between two contrary demands to maximize his benefits. Looking at which will give a better incentive bonus, increasing crop area or improving the ratio by management methods, is a question he must decide upon. How the manager actually behaves still needs to be studied on the basis of records of achievement. It is also possible that since we are examining ratios, not absolute amounts, the optimal ratio may be found without substantially improving the physical volume of area. In effect, with a smaller base and smaller area initially, a high ratio could be maintained without much real improvement. These are the hazards of the total reliance on a single set of performance criteria in this context.

One of the more important problems in this type of management is the sustainability of the approach in the longer run. This is particularly evidenced in the case of Provincial Irrigation Offices (PIOs). While revenues and expenditures in state-owned irrigation systems are more or less stable from year to year, the provincial systems' revenues are very much dependent on the cycle of construction activities. Provincial

Irrigation Offices receive their revenue on the basis of construction activity as well as from the recovery of cost from farmer organizations for the completed and transferred systems. At present, payment includes initial equity payments as well as yearly amortizations. These are the main sources of funds coming to the Provincial Irrigation Office. Recently, management has also introduced, as an alternative, outright payment of 30 percent of the cost of the project as equity which will thereafter absolve farmers' organizations of any responsibility for further payment. The outcome of all these conditions is that as long as construction activities are going on and new activities are added, revenue will be high. However, as the cycle of construction activity slackens on the basis of the availability of the funds under different administrative and political conditions, it will be very difficult to keep the finances of PIOs in balance over the long haul. In some years there would be a flurry of construction activities resulting in high income followed by lean years. It may also be difficult to extract the same quanta of payments from the farmers in the later stage of repayment as systems become old or deteriorating. On the other hand, expenditure is more or less fixed because Provincial Irrigation Offices are construction-oriented organizations with high fixed costs. There will be a number of engineers responsible for overseeing construction activities and also many other administrative activities are more or less fixed. In other words, with the high fixed expenditure, coupled with a highly unstable or variable structure, the viability of the Provincial Irrigation Office system in the long run is in doubt, so NIA will have to think through this problem more carefully for future re-organization.

CONCLUSION

Management targets are directly and importantly related to the variation of the financial performance of systems. The management system which typifies successful systems in the Philippine setting compromises more directive leadership with some flexibility to go beyond normal rules, backed up by more definite support for objective criteria and group incentives and processes, with more permissive, human-oriented, or consensual leadership.