Prerequisites for a Successful Project Management Information System

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The use of the Management Information System (MIS) is seen as one way of improving the management of project implementation in Third World countries. This article outlines a recent study of MIS applications in a number of development projects, and summarizes users' and observers' perceptions about the utility of such MIS for project management. One relatively successful USAID-assisted MIS project in the Philippines was scrutinized in-depth, while still other MIS applications were surveyed. Twelve variables were also isolated and tested in an attempt to establish some common criteria for successful MIS design and application. The study confirms that while there are really no guarantees for success in using MIS, the prospect for improved monitoring, management and evaluation of development activities can be increased substantially.

Introduction

Development planners usually presume that their initiatives[1] will have positive results. However, there are many constraints to successful project implementation in the Third World environment--both cultural as well as technical--and more often than not, projects deviate from plans. Of all the obstacles encountered, *inadequate management*, i.e., ineffective implementation, monitoring, administrative management, and follow-up evaluation, has been cited by numerous observers as one of the major reasons for poor implementation and lack of success in project attainment.

Many successful Management Information System (MIS) applications[2] exist in the profit-oriented private sector, and are increasingly being recommended by development donor organizations and individuals in an attempt to improve public sector management. To date, however, while much lip service has been paid to "improving management," there seems to be little appreciation for what an *MIS is specifically*, or what it can be expected to do. Furthermore, even where they have been used, the systems have not always lived up to management's expectations.

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A recent study (Smith 1988) examined the Philippine "Masagana 99" Rice Production Program in-depth.[3] Twelve variables, each of which is asserted in the management literature to be significant in MIS design and utilization, were examined in terms of Masagana's experience, then compared (and contrasted) to other practitioners' experiences on over a hundred other development activities--both successful and unsuccessful.[4] The principal finding of the study was that although there was a strong positive correlation between MIS application and improved project performance, *and several variables were found to be desirable* for systems design and application, none of the *twelve variables was necessary and/or sufficient* for successful MIS design and utilization. This paper reviews a key issue discussed in the study, highlights the variables tentatively associated with MIS success, and summarizes some related findings.

Management Styles and Management Systems

There are two diametrically opposed approaches to managing (and/or coping with) a bureaucratic program to generate economic and social improvement in the Third World environment, often referred to as the "Blueprint" and the "Learning Process." Blueprinting is a rational, deterministic, and progress-oriented perspective whose adherents view underdevelopment as a problem that can be remedied by technological interventions. The blueprinter's emphasis is on accomplishing predetermined targets within a set time period and budget, an approach which is characterized by the adage "Plan Your Work, then Work Your Plan." Problems/shortfalls encountered during implementation are usually attributed by blueprinters to poor planning, or failure to follow plans.

The learning process on the other hand is a more flexible, open-ended approach which stresses the uncertainty and complexities inherent in economic and social development. Learning process proponents generally have little empathy with detailed up-front planning, but tend to rely more on intuition, informally structured feedback and personal situation-sensitive "networking" during implementation to deal with issues as they arise. From the learning process perspective, most so-called "implementation problems" are simply "unrealistic expectations" generated by planners. As opposed to the blueprinter's exhortations to "get the project back on track," the *modus operandi* of the learning processor is continual accommodation with, and adjustment of, types of levels of inputs, activities and outputs until a satisfactory status is achieved.

The diverse, decentralized program environment of the US Agency for International Development (USAID), for instance, as well as its internal management rhetoric, supports flexibility. However, because of bureaucratic organizational and functional demands for delineation of responsibility and accountability, USAID's project design process is essentially captive to the blueprint approach. This is not exclusively a USAID dilemma. In general, external donor organizations (and those who fund them) want to know ahead of time precisely what their assistance is buying, and great emphasis is placed on preparing

detailed plans.[5] Once a plan is agreed to, recipient governments are legally bound to the substance of that plan.[6] Furthermore, since most Third World governments are very hierarchical (with power concentrated in the Ministry in the capital city), implementation is usually carried out in the field with minimal delegation of authority and flexibility. The primary function of regional/provincial/field management is thus to adhere to the plan, and follow orders from above.

The different perceptions of blueprinters and learning processors have carry-over effect to what data are required for monitoring and management,[7] and how they are to be gathered and processed.[8] Some theorists suggest that a mechanistic system is appropriate for a stable environment, but a more open-ended approach is needed in a dynamic environment (Burns and Stalker 1961; Shafritz and Whitbeck 1978), and a number of development specialists have pursued this direction (Moris 1981; Agency for International Development 1979a: 8). In my opinion, however, the two are not incompatible; the "Blueprint-Learning Process" debate merely clouds the issue and perpetuates a false dichotomy. Management Information Systems are not independent entities which preclude managerial judgment, but merely artifacts to provide data. Indeed, synthesis (Baum and Tolbert 1985: 361; Brinkerhoff 1987) can be attained through a continually updated "rolling plan" where the type, number, level of accomplishment, and timing of earlier identified objectives are periodically reviewed and modified to reflect current reality. Ultimately, *however, it is the manager's responsibility to decide how to use the information provided,* that is, whether to attempt to get back "on track" or adjust to a different level.

Management Information Systems

Seven basic functions have to be provided for in any Management Information System:

(1) Determine information requirements;

(2) Select data elements to be reported;

(3) Collect data;

(4) Transmit data;

(5) Process data for analysis;

(6) Analyze data to develop meaningful information; and

(7) Report (and feedback) important information--to managers, line operators and other interested parties--to guide future actions.

Steps one and two above require considerable managerial judgment, while steps three through seven are primarily administrative and technical support functions.

Given the diversity of economic and social development projects in so many different settings, there is no "one best way" to obtain and process information to monitor, manage and evaluate them. However, extant MIS practice in development programs and projects appears to be dominated by the personal whims of managers, rather than guided by some overarching concepts.

Twelve Key Variables for MIS Design

The study of the Masagana 99 Program attempted to identify some generic guidelines for MIS development and use based on the field practitioner's experience. From a review of the administrative management literature, twelve variables were identified which, as asserted, should enhance the management of development activities if addressed at appropriate stages.

MIS Design

The three main factors in designing an information system are said to be:

(1) *Collaborative Design.* A system should be designed by a team comprised of both MIS experts and operational personnel.

(2) *Results Orientation.* Objectives (i.e., goals, purposes, targets) should be elucidated as clearly and precisely as possible.

(3) *Structure.* Data for collection, transmission and analysis should be preformatted, and standardized in consonance with the capabilities of the personnel providing and processing the data.

MIS Utilization

Implementation. The literature suggests that five elements are essential to successful MIS implementation:

(1) *Leadership Support.* There should be continuous, overt support for the MIS by top management.

(2) *Orientation and Training.* A combination of formal and informal training in the MIS should be given to the data providers, analysts and manager-users.

(3) *Incentives.* Rewards and sanctions should be developed to encourage personnel to provide data for, and utilize the system correctly.

(4) *Feedback.* Information should be disseminated via both formal and informal channels to providers of the raw data, and other concerned personnel.

(5) *Administrative Capability.* Data should be processed and disseminated centrally, with decisionmaking decentralized to the maximum extent possible.

Evaluation. Finally, for operational evaluation of development activities, the common consensus is that an MIS should provide sufficient data so that four types of analyses can be conducted:

(1) *Performance Measurement* to determine whether the program/project attained its objectives;

(2) *Hypothesis Testing* to determine whether the basic policy assumptions[9] were correct;

(3) *Alternate Hypothesis Testing* to determine whether there were any other "Planned Cause-Unplanned Effects" and/or "Unplanned Cause-Planned Effects;" and

(4) *Cost-Benefit/Cost-Effectiveness Analysis* to determine whether the program was economically worthwhile, i.e., if the best use of available resources was made.

The study put these twelve variables "to the test" and examined them by three different methods:

(1) A "Design Science" case study which constituted an in-depth examination of a successful MIS -- "Masagana 99."[10]

(2) A "Quasi-Delphi" workshop on the relative importance of the twelve variables, as perceived by the participants, given a structured review and critique of the Masagana case study, and subsequent discussion.

(3) A comparative statistical analysis of survey data (with respect to the twelve variables) gathered on a wide variety of MIS applications from key informants.

The study results are presented in the remaining part of this paper.

The Masagana MIS

Masagana's MIS was designed in May 1973 in a near-crisis atmosphere. Even so, the MIS was systematically constructed to meet management's expressed needs and indeed *ten of the twelve aforementioned variables were consciously addressed and satisfactorily provided for.*[11] Inasmuch as Masagana's MIS was deemed successful, and the first ten variables listed were present, one might reach the conclusion that these ten variables were "necessary, if not sufficient" factors to attain that successful outcome. However, such a finding would have been premature. No matter how completely or carefully a case study is conducted, *a single case is simply not a sufficient basis for sustaining a hypothesis.*[12] The real test of "necessity" is whether the findings are supported by other independently developed evidence, and whether the results are replicable in the general situation.

For this reason, a comparison was undertaken between the Masagana Program's MIS, and the MISs of other development programs. This revealed that *although the Masagana MIS was a successful system, it was atypical.* From a sampling of 143 MISs --ninety of which were reported as "successful"--only six had the same combination of variables as Masagana; five successful, and one unsuccessful.[13]

A comparison with other Philippine projects[14] substantially reduced the number of variables where the "necessity" hypotheses could be sustained, from ten to only *two* variables: "Results Orientation" and "Leadership Support." When comparisons included other Third World countries and development sectors, even these remaining variables were eliminated from contention as necessary to successful MIS design and implementation.[15] (See Table 1.)

Conclusions

In summary then, although there were no situations where all of the variables were absent, *there were successful MISs where these variables (severally or individually) were not present.* This empirical study was therefore unable to confirm conventional wisdom that certain variables are necessary to successful Management Information System design and utilization. On the contrary, it was unequivocally discovered *that none of the variables was necessary." Thus, it is apparent that successful Management Information Systems can take many forms.*

There is obviously much greater tolerance in what constitutes a "Successful" Management Information System and *far wider latitude is permissible in MIS design than "experts" have ever recognized (or acknowledged) heretofore.* Since none of the foregoing variables *is essential, the currently perceived complexity of MIS development can also be substantially reduced.*

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Table 1. The Necessity of Twelve Hypothesized Variables in the Successful Design and Utilization of Management Information Systems for the Third World Development Programs

Variable	*Masagana*	*"Necessary" in Philippine Agriculture*	*Third World Miscellaneous*	*S/R Rate*
MIS DESIGN				
1. Collaborative Design	Supported (S)	Rejected (R)	Rejected	1/3
2. Results Orientation	Supported	Supported	Rejected	2/3
3. Structure	Supported	Rejected	Rejected	1/3
MIS UTILIZATION				
A. *Implementation of MIS*				
4. Leadership Support	Supported	Supported	Rejected	2/3
5. Orientation & Training	Supported	Rejected	Rejected	1/3
6. Incentives	Supported	Rejected	Rejected	1/3
7. Feedback	Supported	Rejected	Rejected	1/3
8. Administrative Capability	Supported	Rejected	Rejected	1/3
9. Performance Monitoring	Supported	Rejected	Rejected	1/3
B. *Evaluation of the Program*				
10. Basic Hypothesis Testing	Supported	Rejected	Rejected	1/3
11. Alternate Hypothesis Testing	Rejected	Rejected	Rejected	0/3
12. Cost-Benefit/ Effectiveness	Rejected	Rejected	Rejected	0/3

Table 2. The Desirability of Twelve Hypothesized Variables in the Successful Design and Utilization of Management Information Systems for Third World Development Programs

Variable	*"Desirability" as Evidenced in*				
	Masagana	*Phil. Agric.*	*Delphi Expert*	*Third World Miscellaneous*	*D/R Rate*
MIS DESIGN					
1. Collaboration	Desired (D)	Rejected (R)	Rejected	Desired	2/4
2. Results Orientation	Desired	Desired	Desired	Desired	4/4*
3. Structure	Desired	Desired	Desired	Desired	4/4*
MIS UTILIZATION					
A. Implementation of MIS					
4. Leadership	Desired	Desired	Desired	Desired	4/4*
5. Orientation and Training	Desired	Desired	Desired	Desired	4/4*
6. Incentives	Desired	Desired	Rejected	Rejected	2/4
7. Feedback	Desired	Desired	Rejected	Rejected	2/4
8. Administrative Capability					
a. Centralized Processing	Desired	Rejected	Rejected	Rejected	1/4
b. Decentralized Use	Desired	Desired	Rejected	Desired	3/4
9. Performance Monitoring	Desired	Desired	Desired	Rejected	3/4
B. Evaluation of the Program					
10. Basic Hypothesis Testing	Desired	Desired	Rejected	Desired	3/4
11. Alternative Hypothesis Testing	Rejected	Desired	Rejected	Desired	2/4
12. Cost-Benefit/ Effectiveness	Rejected	Desired	Rejected	Rejected	1/4

*Equal to 100 percent.

Before all twelve of the variables are discounted as a *non sequitur*, it should be borne in mind that necessity is not the last word on the subject. Although there is as yet no standard "recipe" of variables that guarantees an MIS to be successful, the Masagana case study, together with the statistical analysis of the other programs and the opinion poll of several expert practitioners, *all clearly indicate varying degrees of positive association between most of the hypothesized variables and "MIS success."*[17] Thus, while not absolutely essential to MIS success, empirical experience indicates that attention to many of these variables during MIS design and utilization is certainly "desirable" as shown in Table 2.

Of the twelve variables, six stand out as being the most significant for improving Management Information Systems to support development administration programs and projects:

- Results-Orientation and Structure (for Design);
- Leadership Support, and Orientation and Training (for Implementation); and
- Performance Monitoring and Basic Hypothesis Testing (for Evaluation).

If nothing more can be done than focus attention on these six areas, a manager can be satisfied that the major variables under his/her control have been addressed.

Reducing and simplifying MIS complexity to its simplest terms, *the single most important ingredient for successful MIS design and implementation in the Masagana* case appears to have been the personal, informed and charismatic leadership of Secretary/ Minister Tanco.

That leadership was the single most important variable influencing effective utilization of Masagana's MIS reaffirms that despite the increasing demand for and the trend towards computerization, MIS design and usage is still largely a form of art rather than a technically engineered device which can be objectively perfected, procured, installed and ignored. Although an MIS has many mechanistic aspects, ultimately the system must be subordinated to the human factors inherent in the particular work situation.[18]

"Collaborative Design" (i.e., Teamwork) and "Incentives" are popular themes for MIS improvement in the literature. However, the evidence from this study is that both fared poorly as variables that had actually played a significant role in the design and utilization of successful systems.[19] Successful systems have been designed by every conceivable permutation of teams, individuals, experts, amateurs, "in-house" management and staff, and outside consultants. Although the common sense concept of collaboration between managers, designers and users at some stage is prevalent, the survey data shows that no one method seems to predominate in practice.

MIS Utilization: An Assessment

The Masagana MIS epitomized a formal blueprint control system, but all indications are that the MIS was used pragmatically, i.e., in a learning process mode, and not in a servomechanistic "prematurely programmed" manner as many Cassandras had feared. In other words, Masagana's managers used the MIS to manage their program instead of blindly letting it manage the program for them.[20] Insofar as "evaluation utility" is concerned, the Masagana MIS also proved useful for limited *ex post facto* summative policy analysis, as well as for program performance monitoring and formative evaluation during implementation. It is also apparent from both the Masagana case study and the survey data that an information system which meets management's needs for monitoring, management and formative evaluation during implementation is not necessarily an effective one for *ex post facto* summative evaluation. About a quarter of the successful systems were, in some manner, inadequate for formative evaluation, and almost one half for summative evaluation purposes.[21]

An interesting side note is raised with respect to evaluation. Two elements of the "evaluation" category were rated relatively low in "desirability." However, in the programs surveyed, a sifting of the various combinations of variables indicated that in those instances where attention was paid to ultimate use of the data by "field" level personnel, and for subsequent program evaluation, both the MIS and the program/project were most likely to be successful. A possible inference of this finding is that the tendency to treat summative evaluation as an aspect to be dealt with separately and subsequently, is detrimental to ultimate project success. In short, "summative evaluation" design can also have some formative side-effects. This finding also lends weight to organizational efforts to address Monitoring and Evaluation (M & E) considerations, and to institute formal M & E systems, as an integral aspect of the program/project at the design stage.

Again, the need for the Management Information System to be appropriately structured at the outset to accommodate feedback from diverse groups involved in implementing the program, and particularly the program's intended beneficiaries, was reinforced. With data presented frequently and systematically, management is able to do better planning in the first instance, and be proactive, breaking away from the preconceived blueprint during implementation when it ceases to be valid, and engaging in an evolving learning process.

Three concerns about the ineffectiveness of project managers despite information systems were raised by several individuals with respect to (1) bureaucratic "turf" struggles, (2) blatant mismanagement, and (3) corruption which oftentimes involves a deliberate "head in the sand" attitude to avoid confronting the issues.[22] Some statements to substantiate these categories are as follows:

Bureaucratic "Turf"

> It has been difficult to get ... [project MIS] off the ground because ... some persons want to maintain exclusive control.
>
> I found that there is a great reluctance to share information about MIS systems within ... [organization] because of security concerns.

Corruption

> This single item (corruption) is most prevalent in Third World Countries and is a significant feature in project failure.

Mismanagement

(1) Head-in-Sand Attitude

> In ... (geographic region) the USAID's (name of persons) are fearful of the results they might get, so MIS is not a part of project design.
>
> In my opinion it (the MIS) would have been very valuable. However, it was seen as a threat by some key host country officials since it allowed one to pinpoint problem areas/people. As a result they did their best to ensure it barely got off the ground.
>
> Both designers and operating personnel satisfied with existing poor system (perhaps because most don't know what a good system should do, and some who do) are pleased that the current system doesn't clearly expose their failures.

(2) Lack of Understanding/Use

> The major problem encountered was that the counterpart in the government (at the project level) did not understand the usefulness of the MIS.
>
> The MIS is a reporting system to the Director, (and is) not used by Project Managers to run projects.
>
> Limited operational success due to usage solely to satisfy AID reporting requirements.
>
> The basic problem with the ... MIS was that (name mentioned) was not using information generated by the MIS to make management decisions.
>
> Management wanted MIS as a "buzz-word" but did not understand it in practice, preferred, informed, personal network to formal MIS. Did not support MIS so it soon fell apart.

While no doubt a lot more could be said on the subject in a different forum, suffice it to say here that Development Administrators would do well to pay attention to people management issues as well as technical project problems during implementation.

Considerations for Future MIS Design and Application

In addition to the foregoing, several other lessons were learned. Seven items stand out with respect to the following items:

(1) Extension Agent Reporting;

(2) Positive Accomplishment Measurement;

(3) Incentives;

(4) Decentralization;

(5) The "Three Sigma" Syndrome;

(6) Report Styles and Formats; and

(7) Control Systems, Blueprinting and the Learning Process Approach.

Each of these elements is discussed below.

Extension Agent Reporting

Although it seemed expedient to do so at the time, Masagana's MIS experience indicates that it is not appropriate for extension agents to be responsible for reporting the production of the farmers they supervise. For the most part, extension agents have no direct means of obtaining or verifying the data, and because of their perceived vested interest in the outcome, the results are usually suspected even if these were accurately reported. Experience with the Masagana Program substantiates the fact that extension agent reporters distort the data to cast themselves--as the farmers' technical supervisors --in a favorable light, despite management's best efforts to curtail the practice.

It is therefore recommended that for any subsequent monitoring system with a similar objective, extension agent responsibilities for reporting be modified and greater effort be made to use (and increase the reliance placed upon) random surveys and rapid appraisal/assessment methods to monitor indicators of project progress. Modifications of this nature would eliminate (or substantially reduce) discrepancies between operational "program" and "official" data series, reduce a major source of antagonism between different departments, and improve the credibility of available program data.

Positive Accomplishment Measurement

Development programs and projects are usually formulated to provide "more and/or better" quantities/qualities of something which is seen by the program managers as economically and/or socially desirable. The "something" can usually be targeted and measured. In the case of the Masagana 99 Program, for instance, a target of "99 cavans/hectare" was established. The fact that the program fell short of this objective and only attained a reported 84.3 cavans/hectare at its peak performance (85 percent of its target--if one accepts the reported yield at face value) is the typical way of measuring accomplishment.

By casting performance in this negative light, the very real accomplishment is obscured: that average small farmer productivity was raised to 84.3 cavans/hectare from a base of 36.3 cavans/hectare.[23] In other words, the program resulted in an increase of 132 percent or more than double what it was at the outset. Positive reporting is not simply statistical sleight-of-hand but *de facto* accomplishment[24]--as opposed to *a priori* conjecture--and is therefore a much sounder basis for measuring progress.

Incentives

Insofar as "incentives" are concerned, most respondents indicated that appropriate incentives (rewards and/or sanctions) for personnel to collect and/or use the data were low and/or inadequate in their systems. On the other hand, the success rate where incentives were provided was only marginally better (i.e., 80 percent versus 72 percent) than without them. Furthermore, several respondents expressed concern that to consciously incorporate an incentive system into an MIS as a means to encourage appropriate behavior is simply unprofessional and demeaning. One commentator expressed the issue as follows:

> Incentives, appropriate or inappropriate, were not necessary as everyone involved in the maintenance of these systems recognized their involvement as *a normal part of their jobs, so no special incentives were needed or offered* [emphasis mine]. The wording of this question implies a belief that employees in developing countries are not sufficiently professional to do their jobs without offering extra "carrots or sticks."

The Masagana program created a number of inducements for "behavioral modification" (both positive and negative) for various personnel in the program. Many of these were financially oriented, but other tangible and intangible benefits were also offered. Thousands of individuals were paid bonuses (or otherwise rewarded) for doing some of the more onerous or difficult tasks. However, multiple differential incentives emanating from different organizations were not cohesively integrated.

While conceived with the best of intentions, the net effect of the various incentives --both overtly formal, and implied informal ones--was to send the wrong signal to the extension agents with the result that they became selective in their efforts and neglected some important aspects of the program. Many additional resentments were created between personnel who benefited from the system and those who were disadvantaged by it.

This is not to say that incentives do not work. Indeed, to the contrary, there is evidence that people did respond to inducements. The problem lies in articulating multiple incentives to work cohesively and constructively in support of a program's objectives. Program inducements should be carefully constructed with full *a priori* consideration of the potential negative consequences; then, applied with extreme caution. Otherwise, the resultant effect may be other than what was anticipated.

Decentralization

Masagana 99 was a nationwide Philippine program--implemented in the provinces but coordinated from Manila. Centralized monitoring and coordination were essential in those early days, but once the overall system was developed and routinized, the need for a central coordination role lessened considerably. While the need for some provincial data probably persists in Quezon City, much of the data formerly reported on a monthly basis are now superfluous to central management needs. In any event, with different provincial operations, local management needs for information evolved and diverged from the original, preconceived centralized blueprint system after a few months.

Thus, the validity of the Learning Process approach is reiterated. Therefore, the type of data being reported in a program, the frequency, and the means for gathering and processing it should be periodically reexamined for possible improvements in effectiveness and efficiency to reduce complexity and mindless form-filling.[25]

The "Three Sigma" Syndrome

When moving from a pilot or demonstration program to full- scale operational project implementation, there is a tendency for project designers to use the most outstanding results from previous experience as the "norm" for full implementation targetting. While previous achievement demonstrates what is achievable, and can encourage others to higher attainment by focusing on the ideal attainment to date, the friction inherent in new projects is ignored, and a formula for frustration for both program managers and participants is perpetuated.

In the absence of experience, there is usually nothing wrong with making educated guesses for establishing initial targets. Even with experience, however, such targets should not be set so high as to be generally unattainable. Nor should they be inflexible.

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It is much more realistic to modify expectations at the outset by setting targets closer to the "mean"--creating a climate where "success" is possible by most of the program's participants, rather than setting the stage for failure and negative reinforcement. Again, as experience is obtained, the targets should be periodically reevaluated for appropriateness, both in the sense of direction and level.

Report Styles and Formats

No matter how good the data is, or how faithfully it is analyzed and written up, unless the information is communicated effectively to the intended recipients, the report is essentially useless, except indirectly--as a consumer of materials and a generator of employment. In this regard, booklets of statistical tables may induce "MEGO"[26] while many lengthy, technically complete narrative reports can also be soporific. Mere disseminating copies of reports does not ensure that they will be read. A conscious effort should therefore be undertaken to make MIS reports attractive in appearance, not merely utilitarian. The data should also be presented redundantly in a variety of formats and media to ensure that the message is received and understood at different levels.

Control Systems, Blueprinting and the Learning Process Approach

This study clearly demonstrated that while a control-type system is derived from a blueprint mold, and while there is no guarantee of success, a system such as the Masagana MIS can indeed function in a learning process mode. It is worth emphasizing however that the system *per se* is inanimate and indifferent to its usage. An MIS is an artifact for the manager and staff to use. Such systems do not preclude rational human judgment, but are merely a means to provide managers data to facilitate monitoring, evaluation and making appropriate adjustments.

None of the foregoing negates the necessity to plan ahead in as detailed a manner as possible. As long as the blueprint is open to modification during implementation, it simply offers a means for more effectively linking what was intended with what is feasible. Indeed, it is even more important to plot a course in an uncertain environment than a programmed one. "Trial and error" may be the only feasible approach for some development programs, but without reference points for subsequent analysis, selective replication and incremental improvement, each formulation is equally likely to lead to futility. In this regard, formal "road maps," "milestone charts," "PERT/CPM networks" and other "blueprint" control-type management information systems can be invaluable. The MIS serves an extremely useful documentation role during the journey, and after the fact, provides some basis for retracing the course to review where one came from, where one went, and which ways were worthwhile.

This study provides a heightened awareness of the capabilities of control-type Management Information Systems for operational management, and a better understanding of the role that "desirable, if not necessary" variables play in the design and implementation of development-oriented Management Information Systems. Hopefully, as this information gets disseminated, there will be some incremental increases in MIS adoption, adaptation and appropriate utilization in the management of Third World economic and social development programs and projects to the benefit of everyone involved.

Endnotes

[1]Development initiatives are usually referred to as "programs" or "projects" but the terms are often used loosely and interchangeably. Distinctions (where any are made) are primarily in terms of complexity, diversity and duration. The United Nations defines a program as "an organized set of activities, projects, processes or services which is oriented toward the attainment of specific objectives" whereas a project is more narrowly designed "to achieve certain specific objectives within a given budget and within a specified period of time" (UN 1984: 9-10). The term "project" is used by some donors merely as an accounting device to identify assistance categories, however AID makes a distinction between project and non-project assistance (USAID 1979b).

[2]These MIS applications which compare actual progress against plans and baseline data, highlight accomplishments and critical deficiencies, discern patterns and project trends.

[3]Masagana was an intensive nationwide program of the Philippine Government (assisted by AID) to increase small farmer productivity and national self-sufficiency in rice production by using high-yielding varieties in combination with improved farming methods, government extension services and non-collateral credit. The data on Masagana's MIS development and its early implementation was based on first-hand involvement, supplemented by official reports. The participant-observation conclusion that Masagana's MIS was relatively successful was bolstered by interviews and discussions with Masagana's program managers and many other participants; field follow-up with other researchers and program beneficiaries, as well as a review of other documentary sources. Note: Although designated a program, Masagana was characteristic of the development project mode in that it was designed to attain national self-sufficiency in rice production within a limited time period.

[4]These cases were elicited through a questionnaire mailed to development administration academicians and consultants, selected personnel in AID/Washington and USAID missions in each region, and several multilateral donor organizations.

[5]In AID, for example, the preparation of a Project Paper (PP).

[6]In AID, by a Project Agreement (PROAG) -- "except as AID may otherwise agree to, in writing." The "PROAG" is a specific USAID-Host Country agreement, but other donor organizations have similar formal documents to spell out the substance of their agreements.

[7]Because AID's operations are geographically scattered, and largely decentralized, monitoring requirements vary in both form and substance from region to region, mission to mission, and in many instances individual to individual. However, the most persistent requirements for information appear to revolve around project financial status, rather than work accomplishment and resource scheduling.

[8]In this regard, it is important to note that computers, *per se* are not essential to a good Management Information System, although in the United States, almost every reference to a Management Information System presupposes that it is computerized. The most appropriate MIS in the Third World rural development environment may well be a manual system because the physical environment, and lack of infrastructural support is generally not conducive to effective operation of sensitive electronic equipment; while the initial funding and human resources to operate the system are often equally scarce, or intractable.

[9]In Masagana for instance, the causes of low rice production were thought to be known and within the sphere of government influence. Specifically, it was assumed that individual small-farmer productivity would be significantly enhanced by government-provided technical assistance and non-collateral credit. In other words, an "If-Then", "Planned Cause-Planned Effect" relationship exists.

[10]The success of Masagana's MIS to support the program's managers (as distinct from the success of the Masagana program *per se*) was determined by evaluating the MIS's attainment of fourteen (14) separate, predetermined, objectively verifiable, indicators.

[11]The major shortcoming of the Masagana MIS was in the area of Summative Program Evaluation. Furthermore, although the Monitoring and Formative Evaluation aspects of the program were handled dwell, no consideration was given to gathering data on the program environment--or on factors outside the program *per se* which might have affected the program's outcome--for future examination of possible "Alternate Hypotheses". Also, "Cost-Benefit/Effectiveness" analysis was neither required by management nor incorporated into the system by the MIS design team.

[12]Another plausible explanation (even though perhaps not as likely) is that presence of the hypothesized variables--while deliberate rather than coincidental--could have been spurious, and the successful outcome could have been the result of other indeterminate factors.

[13]One hundred eight "Successful" MISs were reported in the survey. However, 14 of these were different views of the Masagana system, and 4 others were "second opinions." Thus, there were only 90 different successful programs. Success was subjectively determined by each respondent as there was no single criterion or agreed-to set of criteria for "Success."

[14]Thirty-three other perceptions of development Program MISs were in the same environment as Masagana (i.e., various Philippine agricultural development programs).

[15]A caution here--the criterion for a "Successful MIS" is subjective--i.e., whatever is required to meet the needs of an individual manager. Thus, the presence or absence of a particular variable could have been seen in a different light by each individual. However, given the state-of-the-art of administrative management science, and the diversity of the programs/projects reviewed--after the fact--such ambiguity is unavoidable.

[16]Some systems, for instance, were deemed "Successful" even without leadership support, while others were failures despite its presence.

[17]The possibility always exists, of course, that participant-observers and practitioners only see what they are predisposed to see, accept what they recognize as appropriate, and even infer that it was there if it should have been. Human beings are notoriously poor observers, and have selective retentive faculties. If they are believers in "action-training," for instance, if any was conducted on their project, it will most likely be rated "Adequate"--regardless of its actual worth--particularly if the reporter was in some way responsible for, or involved in the training. Furthermore, by asking individuals "to what extent were appropriate incentives provided" in a particular instance, the respondent is immediately sensitized to the fact that someone thinks providing incentives is important, and they may not want to be left out. On the other hand, others may take umbrage at the concept. Consequently they either deny that it existed in the project; or, if it obviously did, use

the questionnaire as an opportunity to vent their spleen against the practice. Finally, respondents may either not understand the situation, but are reluctant to say so. Answering the question "to the best of their ability" does not necessarily provide the correct answer. Indeed, this appears to have occurred in the responses to the Masagana MIS with respect to "Evaluation"--namely "Alternate Hypotheses" and "Cost-Benefit/Effectiveness Analysis." Since I was intimately involved with the Masagana MIS design, I know that no provision was made for testing "Alternate Hypotheses" nor for gathering cost data during the period 1973 -1977 (although such evaluations may be possible from other collateral data of which I am unaware). Nevertheless, the reasoning goes, "it sounds like a good thing to do and we had a good system, so we must also have been able to do that."

[18]Since MIS development is largely the prerogative of the program manager--at least in the USAID--it cannot be "acquired" as a commodity; it is an integral aspect of the manager's operational style.

[19]More will be said about incentives later.

[20]This is not to say that the apprehensions of blueprint control systems critics are unwarranted, but rather that--at least in this instance--pragmatism triumphed. Whether mastery of the control-MIS by the program managers was due to the Filipino cultural environment (and hence might not be attainable in other situations) was beyond the scope of this study.

[21]i.e. 20% (22/108) for Performance Monitoring; 25% (27/108) for Basic Hypothesis Testing; 47% (51/108) for Alternate Hypothesis Testing; and 44% (47/108) for Cost-Benefit/Effectiveness Analysis.

[22]The topics were unsolicited, and the number of people commenting were few. Furthermore, perceptions of mismanagement, corruption, and managerial responsibility vary from one setting to another. Nevertheless, these are obviously important considerations in the design, development and effective utilization of a system in which data and information are vital commodities.

[23]Derived from the same data base.

[24]Based on the actual data reported.

[25]It is highly possible that more emphasis could be placed on periodic sample surveys to obtain data, rather than so-called "100% monthly reporting" by Production Technicians. Microcomputers could also considerably improve the speed for processing this data, as well as the quantity and quality of the analysis.

[26]MEGO - My Eyes Glaze Over .

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