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9. ABSTRACT
Some kind of Management Information System (MIS) is essential to any large-scale agricultural development program involving synchronized local, regional and national-level decisions. This does not necessarily require elaborate automatic data processing arrangements. The MIS may be built into field operations, with basic data obtained by agricultural technicians as part of their work. The key problem is likely to be the extent to which the data are actually used in top-level policymaking. In agricultural and rural development, reliable, timely information is usually hard to get. A Control MIS seems to be the most effective approach for this type of project. A few key data elements are selected for continuous observation, recording, statistical analysis and summarizing. When results fall outside established limits management is informed, investigates and takes appropriate action. The Masagana 99 MIS fits this category. The essential features of this model are described in detail. It has been in operation since May 1973 in the Philippines and is seen as an important step in building a permanent capacity within the National Food and Agriculture Council to monitor provincial level agricultural data. The Masagana 99 program has highlighted the need for decentralized decision making in Philippine agricultural development. Only the most basic activities can be programmed nationally, such as credit and fertilizer allocations and the assignments of key personnel. Short range decisions can be monitored nationally, but can be made effective only at intermediate or provincial levels. The Masagana 99 MIS demonstrates that a good system can be developed without elaborate computerization or specialist field data collectors.

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An Agricultural Management Information System: Lessons from Masagana 99

Some kind of Management Information System (MIS) is essential to any large-scale agricultural development program which involves synchronized local, regional, and national-level decisions.

An effective MIS for such a program does not necessarily require elaborate automatic data processing arrangements.

The MIS may *be built into field operations, with basic data obtained by agricultural technicians as part of their regular work.*

The analysis of that data may be quick and relatively simple (depending partly upon the kind of program).

The system can produce timely results—information useful for making operating decisions.

The key problem is likely to be the extent to which the data are actually used *in top-level policymaking.*

THE PROBLEM OF RURAL SECTOR INFORMATION

Any agricultural development program requires technical expertise and information about what is going on. Information is a crucial—and scarce—resource for effective project identification, operation, and evaluation.

When projects are too large for direct, on-the-scene planning and monitoring, management requires an information system. In agricultural and rural development, reliable, timely information is usually hard to get. Yet there has been little systematic study of management information systems for agricultural and/or rural development.*

**PASITAM Design Note* No. 3 describes one version of such a system, derived from the experience of the Vihiga Project in Kenya.

The reasons why conventional MIS theory and procedure must be adapted to fit agricultural projects include:

1. Links between information sources and decision points are often extremely loose and limited.

2. Causal factors are not always clearly known, making it difficult to determine what is *relevant* information.

NOTE: This Design Note is based upon material prepared by Kenneth F. Smith, of the U.S. Agency for International Development, who played a key role in the establishment of a management information system as part of the *Masagana 99* program to increase rice production in the Philippines. "Masagana" is "bountiful harvest" in Tagalog; "99" refers to the target production figure.

Each of these Design Notes states a lesson which may be useful to those engaged in planning, managing, or evaluating development efforts, such as technical assistance projects. A given note may describe a technique and discuss its use, may present and explain a useful concept, or report a functional relationship between some intervention and some outcome. Design Notes are backed by cited evidence from PASITAM studies, published literature, or the reports of development agencies. Comments and queries are invited, along with requests for additional copies and supplemental materials.

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3. Collecting data presents problems of cost, resistance, and tendencies to lie.

4. The diversity of information sources can threaten the coherence and reliability of an information system.

The MIS developed in the Philippine's *Masagana 99* program sought to overcome these constraints and to establish an "on line" information system for monitoring and managing a comprehensive effort to increase rice production.

CONCERNING MANAGEMENT INFORMATION SYSTEMS

Kenneth Smith identifies three kinds of management information systems:

1. *Comprehensive MIS.* All possible information is gathered in the belief that "it may be important." This usually involves a sophisticated computerized system, and it is often as bad as it is costly.

2. *Status MIS.* One or a few crucial indicators of program or project status are identified and monitored. Examples might be compliance with a time schedule or a cost projection. Techniques such as Program Evaluation and Review (PERT), Critical Path Method (CPM), or Line of Balance (LOB) may be used to plan the action and plot the progress. When significant variance from time, cost, or other indicators appear, management is alerted.

3. *Control MIS.* Somewhat more loosely than in a Status MIS, "a few key data elements are selected for continuous observation, recording, monitoring, statistical analysis, and summarizing for management." Performance standards are established for the data items. As long as accomplishments fall within acceptable limits, management does not intervene. When results fall outside established limits management is informed, investigates, and tries to take appropriate action. This approach is commonly known as "Management by Exception." The *Masagana 99* MIS fits this category.

THE MASAGANA 99 MIS

The objective is a fast, reliable information channel between rural target areas and central government analysts and decision markers. Essential features include:

1. *Baseline Data.* Smith notes the importance of not labeling baseline data collection as "research." *Rice Profiles of the Philippines* present baseline data for Masagana target areas, including the anticipated timing of planting. These data are developed by the provincial agriculturalist, his staff, other local personnel, and community leaders.

The information provides a measuring point for gauging results. It is used in planning and scheduling credit and other input requirements. The baseline surveys include social data and bring target groups into the planning process, minimizing tendencies toward errors and misunderstandings when the program is implemented.

2. *Standard Indicators.* Factors used in the Masagana scheme include input levels, timing of input delivery, area of coverage, unit production figures, and other items directly related to production.

3. *Performance Standards.* When possible, the standard indicators become the basis for setting targets.* Times are set for the achievement of targets. The acceptable range of variance from target times and figures is determined.

For some indicators it is not possible to set clear standards or acceptable degrees of variance. The *Masagana 99* program is carried on simultaneously in many different areas so that, in the absence of more precise standards, top and bottom performers (provinces) on particular indicators are singled out as "exceptions" for management scrutiny.

4. *Standardized Formats for Reporting and Analysis.* Different formats are used for worksheets (for recording data) and reports (for transmitting data). As Smith notes, a traditional MIS problem lies in sending too much unanalyzed data to management.

5. *"On-Line" Data Collection.* Field data are collected by the provincial agricultural technicians as part of supervising and assisting farmers. Monthly data on each farmer's operation are recorded on standardized worksheets. Each month the technician aggregates the information for all of his farmers and sends it to the provincial program officer, along with a standardized form noting any problems and asking for any assistance.

The provincial supervisor and his staff summarize this information and send cumulative provincial totals to the national MIS office by the fastest available means—telephone, radio, telegram, personal dispatch, or other.

6. *Data Analysis.* At the national level separate tables are prepared for each key indicator. Data for every province are compared with the target for the indicator, and provinces are rank-ordered according to performance. Provinces falling above or below pre-set tolerance limits become objects of central staff attention.

Rank-ordering makes it possible to identify extreme cases when there is no performance standard for a particular indicator.

No efforts are made to correct obvious errors or misrepresentations in raw data. By using exactly what is

*See *PASITAM Design Note* No. 4.

reported, Smith argues, technicians and provincial supervisors know that their inputs are being accepted and used. Obvious errors are handled in "flying visits" to the provinces.

The need for reliability is reinforced by selective checks of the validity of field data.

The central office prepares a short summary and comment on the monthly tables for *Masagana 99* Management Committee, highlighting problems and other important items.

7. *Feedback.* Each province receives copies of the monthly report comparing provincial standings for verification and local management use.

8. *Evaluation.* Monthly visits by the central staff are made to "exceptional" field sites. Periodic intensive surveys and reviews are also mounted by the central MIS staff, by the Agricultural Program Evaluation Service (APES), and by another Special Studies Group from the Department of Agriculture. These latter organizations, independent of the MIS staff, are in close contact with it. The MIS staff also takes random field samples of production. The other organizations investigate problems of input availability, managerial effectiveness, marketing, and other conditions inhibiting target accomplishment.

As a further check on MIS reliability, the Bureau of Agricultural Economics (BAECON) performs quarterly provincial sample surveys of rice production. BAECON is experimenting with new techniques of sampling to determine yields. When fully operative, these data should provide a reliable check on MIS data.

9. *Causal Analysis.* The *Masagana 99* program is based on certain assumptions about what causes increased rice production. For example, a correlation between intense supervision and increased yield is assumed. It is assumed that credit availability correlates with yield, and that low yields are linked with low repayment rates.

Rank-order correlations between the various indicators used in the MIS should contribute to the analysis of these operating assumptions. But conclusive findings are not yet in.

10. *Decision Making.* Any MIS is only an instrument for making better decisions. A key area for inquiry is the way in which *Masagana 99* MIS aids top management in the Philippine rice production program. The evidence is not clear, and more extensive study would be needed to determine this. But as a *model,* this MIS offers one example of an important management tool for agricultural development efforts.

The *Masagana 99* MIS has been in operation since May 1973. The data it has produced are far from perfectly reliable, but they are available in a systematic form, on a timely basis, and can be used in operational decision making. The *Masagana 99* MIS is seen as an important step in building "a permanent capacity within the National Food and Agriculture Council (NFAC) and BAECON to monitor provincial level agricultural data" in the Philippines.

The *Masagana 99* program has highlighted the need for decentralized decision making in Philippine agricultural development. The MIS offers possibilities for strengthening provincial management within a national developmental scheme.

Two years' experience have proved that fully centralized management is impossible. The time-lag between problem and response is too great, with a rice-growing season of four months or less. Only the most basic activities can be programmed nationally, such as credit and fertilizer allocations and the assignments of key personnel. Short range decisions can be *monitored* nationally, but they can be made effective only at intermediate or provincial levels, e.g., reallocating fertilizer when one area exceeds a planting target and another fails to meet it.

In principle, the *Masagana 99* MIS would enable—or facilitate—such decentralization of decision making. In practice, the Masagana program is now trying to build MIS-based analysis capacity into regional program offices and selected provinces. Lack of competent staff is a major constraint.

Poor data quality is a continuing—and inevitable problem. Farmers may "poor mouth" yields out of the fear of taxes. Technicians have a vested interest in reporting achievements. Earnest and well-publicized checks are an important part of the program.

Adequate staff resources are crucial to this MIS. Analysis requires skilled and experienced personnel. The entire MIS must be sustained by incentives to report accurately, quickly, and usefully. The key incentive for making this system work is evidence that good information is really used in making sound, timely, practical decisions.

In extensive programs like *Masagana 99,* an MIS is no cheap, casual undertaking. But intelligent decision making requires reliable, relevant information, and large-scale agricultural development programs cannot be sensibly managed without such information.

ystems select, gather, synthesize, analyze, and report . But the question is whether the results are used in ing decisions. The *Masagana 99* MIS demonstrates a good system can be developed without elaborate puterization or a swarm of specialist field data col- ors. Whether the products of that system are to be l effectively remains to be seen.

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This Design Note was prepared by Russell Stout, Jr.

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