ABSTRACT

Need for new technology, with better management practices arose with the realisation that the irrigation system throughout the world have not performed to their maximum. Good and adequate information is a prerequisite for improving the operational efficiency of the system. Information is crucial for providing a reliable, predictable and equitable delivery of water and for responding to the feedback information on a real time basis. Only limited efforts have been on the cards, until, making the present thesis a seminal effort, relating a system performance with an information perspective.

Management Information System (MIS) for an irrigation system establishes formalised procedures to provide managers at various levels with relevant information to take timely and effective decisions for planning, operating, controlling and subsequently upgrading the operational plans. The main objective of the MIS is to refine and improve the system operational plans year after year.

The operational level MIS developed in the study concentrates on the performance of the irrigation system in general and operational performance of the water delivery system in particular with emphasis on the management of water from the reservoir to the outlet, beyond which it is managed by the farmers.
Sathanur Irrigation System in Tamil Nadu, India has been taken as the case for this research. It is a water shortage system, irrigating about 18,000 ha of land for four months from December to March of the agricultural year. It has been found that there is a great need for efficient use of water in this system.

The present study has been organised with three objectives. The first objective aims at a diagnosis of the system towards understanding the existing level of performance of the system and identify the critical activities. The second objective is the development of a methodology for improving the operational performance. The third objective aims at demonstrating the potential of the methodology in achieving improved performance.

The diagnosis has revealed that there are constraints and deficiencies in planning, operation and management of the system. The water distribution analysis has shown that there is the problem of inequity in water distribution, both at the macro level (distributary level) and micro level (outlet level). The reasons for inequity were (a) No due consideration for the losses occurring in the canal network, (b) Lack of technical expertise and guidance for planning and operation of the rotational water distribution and (c) Absence of an in-built mechanism for monitoring and evaluation with a feedback approach. The diagnostic study has further revealed that water scheduling, operation of the system for rotational water distribution and monitoring and evaluation are the three critical activities to be focussed on to improve the performance.
The MIS has been developed to overcome the deficiencies. Accordingly, the MIS has been developed with three functional modules, namely, Planning, Monitoring and Evaluation modules.

The planning module helps the system manager in preparing the seasonal operational plan and making changes in the plan in a systematic manner during the season. Various options such as equity, productivity and priority based and to include/exclude the groundwater contribution are provided for planning, allocation and distribution of the water during the season. The monitoring module helps with the provision of timely response suiting to the field conditions. The evaluation module computes the water delivery performance indicators at the distributary level such as Delivery Performance Ratio, Inter Quartile and Modified Inter Quartile Ratios, Reliability, Depth of water supplied per unit land, farmers’ views on the seasonal performance and their net income. In addition, it suggests a few system level indicators such as productivity of water and land, percentage of area irrigated against the area planned and income-expenditure associated with the water delivery. Thus, it provides for a synoptic view of the seasonal performance and guidelines for the irrigation personnel to upgrade the system operation, subsequently.

Results of the MIS has shown that the inequity in water distribution has been reduced from 76 per cent to 19 per cent among the distributaries of the Left Bank Canal and 50 per cent to 17 per cent among the distributaries of the Right Bank Canal. The reliability in water delivery and timeliness of meeting the crops’ needs could be improved with the MIS.
Water delivery performance analysis along with the farmers' response helps to make a comparison between different parts of the command. Also, it helps to identify the causes for deviation and to take corrective measures. The field demonstration of the MIS could not be performed for want of infrastructural facilities and support at the agency level. This would help to refine the parameters used and the databases further.

The MIS has the potential to enhance the quality of water delivery services provided by the staff and the resource use efficiency.

The research on MIS has amply demonstrated that it has a wider scope for applications in the irrigation sector at different levels of management, towards improving the performance. This study serves as a stepping stone in the application of the MIS for irrigation systems, utilising the existing technological innovations and facilities available in the developing countries.