THESIS

APPLICATION OF OPERATION AND MAINTENANCE ACTIVITIES TO SUPPORT IN PARTICIPATORY IRRIGATION MANAGEMENT AT DISTRIBUTARY LEVEL

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ABSTRACT

APPLICATION OF OPERATION AND MAINTENANCE ACTIVITIES TO SUPPORT PARTICIPATORY IRRIGATION MANAGEMENT AT DISTRIBUTARY LEVEL

Over the past few decades, the performance of government-managed irrigation systems has been consistently declining all over the world. Different governments in developing countries, including Pakistan, are now introducing new institutional reforms with increased roles for farmers in operations and maintenance (O&M) activities. These are two important elements that play a vital role in managing a system. This research on **application of operations and maintenance activities** was undertaken at the Hakra 4-R Distributary Pilot Project **to support the Water Users Organizations** (WUOs). In this research, the subject has been investigated from many sides. There were four methodological steps to implement this research effort: 1) System-wide diagnosis and introspection; 2) opinionated concerns; 3) Inference for remedial interventions,;and 4) maintenance feedback.

After detailed descriptions of the physical facilities and its existing maintenance conditions, the research identifies several factors that affect structural maintenance deficiencies. Continuous neglect of minor repairs, pilferage of funds and non-involvement of farmers in the planning and implementation of O&M activities, are the most important factors influencing structural deficiencies.

Before implementing maintenance activities, the pattern of spending levels for repair and maintenance was studied. For this purpose, the data on repair and maintenance spending for the last 41 years was investigated. This analysis indicates that the PID staff have in depth knowledge of system weaknesses. This analysis will be useful for: 1) prioritizing civil and non-civil maintenance work; and 2) determining maintenance needs, in view of current, and past, PID maintenance practices.

A walk-thru survey was conducted from the head to the tail of the distributary. The walk-thru

survey emerged as an effective tool to assess maintenance deficiencies. A conclusion is that the findings of technical surveys can be further strengthened through a walk-thru survey. The research has identified five maintenance issues. Among these, widened x-sections and damaged banks are the major issues. Maintenance activities under the PID are not timely, adequate and need-based, which is another conclusion. Results of the technical survey were used to implement the self-help maintenance activities of the Water Users Federation of the Hakra 4-R Distributary.

To assess the operational aspects of this research, water supply data were collected and analyzed for two complete seasons. A high variability of the discharges is found in the Hakra 4-R Distributary. The results show that, for only 16 percent of the time, the distributary received water in the discharge range of 95.1 to 110.1 percent. In the remaining time, the discharges were below this range. This research has identified various operational issues; disorganized rotational irrigation among the distributaries, unreliability of irrigation supplies and outlet closure, are among the few major issues. In the final chapter , the research suggests, how O&M activities can be used to strengthen the WUOs. Specifically, the means of providing technical assistance to provide support in the application of O&M activities are discusses which , highlights the ways and means that can affect O&M improvements, and how will this technical assistance can benefit farmers by focussing on the impact of technical activities, such as flow measurement training courses , walk-thru surveys and maintenance activities..

Finally, the research draws many conclusions on technical and institutional, issues related to application of operations and maintenance activities to strengthening farmer organization.

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