

Chapter 9 - Review of the Original Project Hypotheses

The proposal for this research project presented 11 hypotheses. The findings related to each hypothesis are summarized here.

Hypothesis 1. Reliable service at field turnouts will only be found if levels of service are clearly defined and understood by operators and management at all layers within the system.

This statement was not always true. The most obvious examples of contradiction can be found in Seyhan, Cupatitzio, Saldaña, Coello, Rio Yaqui Alto, and Office du Niger. Certain physical, design, and management factors allowed reasonably good service (for present day crude field irrigation standards) at the field turnouts. *The major factor was an abundant water supply.* Because water was almost always available in the submain canals, it was relatively easy to provide water when it was needed. The second factor was the relatively high density of turnouts at the field level. The operators of the main canal in Rio Yaqui Alto, clearly did not understand the concept of service, whereas the "tecnicos" who distributed water to farm turnouts had a clear sense of service. In the Office du Niger, the long conveyance canal was operated with questionable control logic and fairly constant flow rates, but the extremely wide canals which serviced the field turnouts provided tremendous flexibility at the field level. Cupatitzio, Saldaña, and Coello had low project efficiencies because of high spillage in canals and poor on-farm efficiency, but the farmers were relatively content.

This hypothesis is true if the project is to supply a high degree of flexibility at the field turnouts, plus operate at a high project irrigation efficiency. Rio Mayo came closest to this type of mentality, where operators at all levels were working together to provide a good level of service even though they had serious hardware limitations.

Hypothesis 2. Certain institutional frameworks are always present in projects that provide a high level of water delivery service to individual fields.

This hypothesis is true. At the very least, a program of reasonable maintenance must be in place or else the tailenders will not receive water. Furthermore, turnouts must be in relatively decent condition or else there will be no ability to allocate water supplies, even somewhat equitably.

A key word in this hypothesis is "high" level of water delivery service. As with Hypothesis 1, it can be noted that with conditions of limited water supplies, the institutional frameworks must be stronger than if there is a very abundant water supply. Those institutional frameworks are quite complex, and must provide pragmatic training and instruction, excellent designs, proper installation of equipment, and reasonable maintenance. The institutional frameworks must also provide an operation strategy which is efficient and service-oriented. Finally, certain social and political frameworks must be in place to collect the funds necessary to pay for these services and resolve conflicts.

Hypothesis 3. Inappropriate hardware or inappropriate instructions for using appropriate hardware will be found in the majority of the projects.

This hypothesis was definitely true in every project visited. The only difference was in the extent to which inappropriate hardware and instructions were found. An example is the use of weirs on canal cross regulators. Most projects did not utilize this simple design concept for the maintenance of water levels in the canals. Those projects that did have the weirs in place did not allow the water level to be maintained above the weir. Another example is the use of CHOs. A majority of the projects used these structures which can be effectively utilized given the correct mix of appropriate hardware on the canal. However, it was nearly impossible to find operators who knew how to correctly operate the gate.

Hypothesis 4. Inappropriate hardware will be accompanied by chaos (inability to provide the prescribed level of service) unless there are extremely strong institutional frameworks.

This hypothesis was not written very well. In most cases, the actual level of service at the field, point of differentiation, and main/submain connections were fairly close to the stated level of service - indicating that what was promised was often realistic, even if less than desirable. The hypothesis should have addressed the inability to provide a high level of service, rather than the "prescribed level of service", because a good manager will adjust the promised level of service depending on the hardware limitations in the project.

There were serious discrepancies in Lam Pao, Dez, Bhakra, Beni Amir, and Rio Yaqui Alto - all of which had major hardware problems. Beni Amir has a strong institutional framework which prevented more serious problems from developing. But the most pertinent factor for this hypothesis is that the managers of these projects were simply not as aware of the field conditions as they should have been.

Hypothesis 5. Failure to provide a promised and clearly defined level of service to farmer fields will be associated with problems as water stealing, destruction of structures, lack of farmer discipline, and failure to pay for water.

This hypothesis is true and might be better restated to revolve around the issue of *uncertainty*. In only two projects was there a high level of uncertainty - in Lam Pao and Bhakra. In Lam Pao, farmers do not pay for water, and are not extremely interested in cooperating to provide canal maintenance. In Bhakra, there is a large amount of vandalism and water stealing. Farmers in other projects, essentially from the same educational and income levels, were more enthusiastic and cooperative.

Hypothesis 6. The level of service to the field in the majority of projects will be insufficient to allow for modern irrigation scheduling and modern on-farm irrigation management.

This is definitely true. Figure 7-40 (Internal Process Indicator I-26) shows that only one of the projects (the modernized areas of Office du Niger having large canals supplying the field turnouts) could easily adapt to modern techniques. Figure 7-41 clearly shows the gap between present and needed hardware and management capabilities.

Hypothesis 7. Declared levels of service in some projects will be impossible to achieve; they will not match hydrologic or physical constraints.

Most of the project authorities were fairly realistic regarding the annual water supplies available to farmers. Perhaps the most impossible conditions were in Bhakra and Lam Pao, where computations made in the office were supposed to ensure excellent service to the fields. The signs which were posted in the fields, declaring the type of service meant to be provided, were clearly incorrect. In both projects, and in the other projects to varying degrees, the physical design of the system would need some fundamental changes in order to be able to provide the desired level of service (which would still be insufficient for modern field irrigation).

Hypothesis 8. Operational office staff will often have an incorrect perception of how water is delivered by operational field staff.

This hypothesis was true in most projects, but was definitely not the case in Seyhan, Dantiwada, Coello, Saldaña, or Rio Mayo

Hypothesis 9. One or two simple errors or gaps in institutional framework or hydraulic design will be sufficient to drastically offset the actual level of service provided from the declared level of service.

This is definitely true. One example is the new area of Office du Niger, which uses small canal cross sections. The poor instructions and use of WASAM for determining main canal gate positions in Lam Pao is another example. The lack of regulating reservoirs and the small canal capacities in Beni Amir are key points for that project. As mentioned in previous sections, it is almost impossible to achieve decent water delivery service to fields if a large number of farmers must cooperate, as in Bhakra.

Nevertheless, it would be an oversimplification to assume that the correction of just one or two errors would turn a project around. Figure 2-2 shows that numerous factors impact the level of service which is available in an irrigation project. Perhaps good training and the development of a sense of service by project authorities are the most important factors - good design and operation will flow from that base.

Hypothesis 10. Functional Water User Associations will only exist if the actual level of service matches the declared level of service at the point of ownership transfer between project authorities and the WUA.

This is true, with some qualifications. In projects with an abundance of water, some deviations from the prescribed level of service are barely felt by the Water User Association, as the WUA can pass those problems (in the form of excess flow) right through its zone of operations.

Perhaps this question should have been reworded to include something about the level of service to the fields themselves. The level of service provided to the beginning of the WUA is important, but rather useless to a farmer who could still not receive water with a good degree of service at his individual field. And, since the farmers must be enthusiastic in order to form a WUA, this is a key point. The most noticeable factor which must accompany a reliable supply to the WUA is a high density of manageable turnouts (requiring very little or no inter-farmer cooperation) within the WUA itself.

Hypothesis 11. The concept of treating water deliveries as a service to users will be new in many projects.

Although this statement is true (the concept is new), the concept already exists in most of the projects visited. Even in Lam Pao, which has received numerous negative comments in this report, it appeared that the project authorities were genuinely interested in providing good service throughout the project. Because this is a new concept, some of the details of service (reliability; equity; flexibility in frequency, rate, and duration) and details of the service concept implementation (each layer must provide service to the next lower level) are not understood. Project authorities (and the consultants) definitely need help on understanding the details of *how* to provide better service.