

Turnover of State Tubewells to Farmer Co-Operatives: Assessment of Gujarat's Experience, India¹

Tushaar Shah
Vishwa Ballabh
Kusum Dobrial
Jayesh Talati

ABSTRACT

EXPLORING NEW INSTITUTIONAL alternatives to private ownership of irrigation assets becomes important when high capital cost and risk of well failure combine to deny the resource poor access to groundwater irrigation. In the Indian subcontinent, early governmental response to this challenge took the form of state tubewell programs managed by government bureaucracy. Four decades of experience in various Indian states has, however, finally shown public tubewell programs to be utterly unworkable.

The Government of Gujarat recognized this before others did and launched a program to turnover state tubewells to co-operatives of farmers with land in the command areas. In this paper, we review and assess the experience of this five-year-old turnover program. On the basis of the information compiled by the turnover agency as well as by small independent surveys, we compare key performance parameters of the same set of tubewells under corporation and co-operative management. We also compare performance of two alternative "designs" of farmer organizations, and show how the turnover program can work better by incorporating the lessons from robust irrigation organizations that have traditionally flourished in this region [1].

INTRODUCTION

In the field of groundwater development, one of the major policy concerns has been of ensuring equity in access. Because of the absence of clearly specified property rights and the chunky nature of investments needed in lifting mechanisms, the resource tends to be pre-empted by the rural elite (Shah 1993). The law has often abetted this iniquitous political economy through a plethora of barriers--licensing rules, conditionalities for provision of bank loans and electricity connections, etc.,--which keep the resource poor late entrants from securing access to this precious resource (see Chambers Saxena and Shah 1989). In the early decades of Indian planning, socialization of groundwater through state ownership and management of tubewells was widely seen as a major way out of this dilemma. In many states including Gujarat, however, public tubewell programs met with uniform and resounding failure not only in enhancing equity in access to irrigation but even in terms of efficient and viable operation (see Abbie et al. 1982).

A number of studies have probed various aspects of the malfunctioning of public tubewell programs. However, the consensus over the years has been that merely tinkering with public tubewell programs--or, trying technological fixes like UP's World Bank Tubewell Program--may not help much. Instead, only a radical surgery which gives water users strong stake and control in the management of the tubewell may make these programs efficient, viable and service oriented even though, turnover experience elsewhere in Asia does not suggest that farmer groups may be able to meet the full costs of tubewell operation (Johnson III and Reiss 1993). Turnover of public tubewells to farmer organizations is an approach in this direction. In this study, we analyze the five-year-old public tubewell turnover program of the Gujarat Groundwater Resources Development Corporation (GWRDC).

To begin with, we review the present state of the GWRDC; we then compare the performance of a sample of tubewells from Kheda District of Gujarat under corporation management and under management of farmer co-operatives. We review the process and terms of turnover and explore the reasons for the poor response to the turnover program. In the second half of the paper, we compare a sample of 27 co-operatives with 13 irrigation companies from north Gujarat focussing essentially on their internal organization, management and control. While we found member-owned irrigation companies uniformly more robust and productive compared to co-operatives, their equity impacts too were in no way inferior to co-operatives.

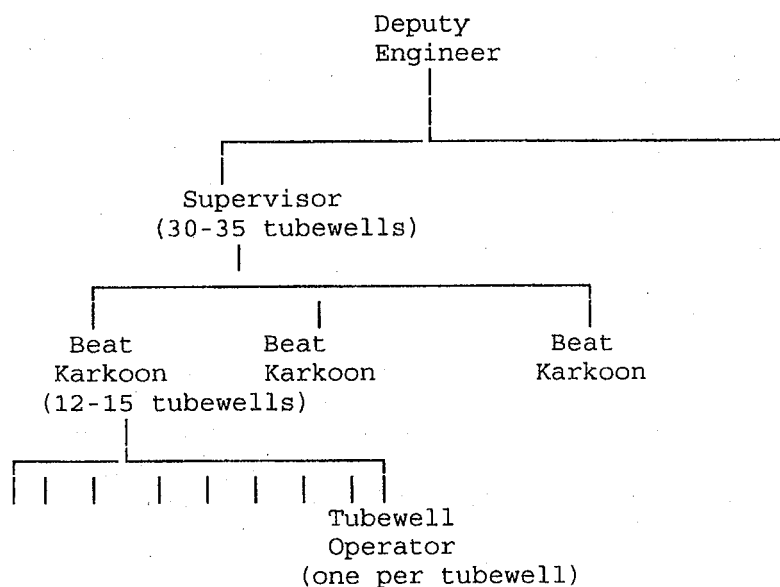
¹Institute of Rural Management Anand 388 001, Gujarat, India.

THE SETTING

The Gujarat Groundwater Resources Corporation (GWRDC) was established in 1975 as a state-owned company responsible for establishing and managing irrigation tubewells with resource support from the state government. Between 1975-94, the GWRDC set up 2,800 public tubewells of which some 200 have been non-functional and closed. In the early years, the state government--which insisted on a uniform and subsidized water price--made good all of the corporation's operating deficits on an annual basis; in recent years, however, as government has begun to restrict subsidies, the GWRDC has accumulated a loss of over Rs 700 million. Most of the Corporation's problems are those of any public sector bureaucracy. It has acquired a permanent staff of 6,400 imposing a staggering wage bill of Rs 220 million/year; as a result, its overheads were 31 percent of its total operating costs in 1993. Compared to this, the annual gross income of all its tubewells is a mere Rs 60 million which can barely meet a fourth of the salary bill, leave alone other costs inclusive of capital.

The organization structure and processes the GWRDC have evolved are hierarchical and control oriented. In a district, for instance, the GWRDC structure is somewhat like in Figure 1. One major source of GWRDC's problems is the employees, especially tubewell operators who are paid government salaries and subject to government work rules. As they have got unionized, they have made increasing demands upon the Corporation [2]; at the same time, because of the absence of accountability either to the demand system or to the control system of the Corporation itself, the tubewell operator emerged as the weakest link in the GWRDC's rather long chain of hierarchy. Although public tubewells are equipped with staff quarters for operators, rarely does one find the tubewell operator at the tubewell site. Most commonly, they reside in the nearest town and occasionally commute to the tubewell site leaving the tubewell either closed or in charge of some friendly farmer most of the time while they are away from it. We came across public tubewells which had not been visited by their operators for weeks or months. Like many other Indian public sector organizations, the GWRDC has been transformed by its employees into a complete "spoils system."

Figure 1. Organization Structure of the GWRDC.



Many GWRDC senior officials suggested to us that the Corporation's losses were caused by subsidized water rates they were obliged to charge. Deeper scrutiny suggested that: (a) the Corporation's water rates--which ironically were uniform throughout the state regardless of pumping costs and hydro-geological conditions of each sub-region--were higher than what private sellers charged in districts like Kheda and Baroda and lower than economic as well as "ecological" rates in water-stress areas like Mehsana, Sabarkantha and Banaskantha [3]; (b) several studies have now suggested that irrigation demand is fairly price-inelastic; and (c) the real cause of the unviability of GWRDC tubewells is their very low capacity utilization combined with high overheads. Petty corruption, bureaucratic procedures, selectively favorable treatment to local bigwigs, frequent breakdowns and long delays in repairs are other problems commonly afflicting the program. To a greater or lesser extent, these problems have always

bewitched the Corporation; however, the emergence of private water markets--with aggressive customer orientation by private sellers--have hit the public tubewells hard.

All these factors together made the Corporation's financial position precarious. In 1992-93, of its total operating cost of Rs 390 m, it earned only Rs 63 m from the sale of water, and made a loss of Rs 130 m. After a thorough assessment of its performance, the Finance Commission appointed by the Government of Gujarat in 1994 included GWRDC as one of the 11 government corporations to be wound up.

Under increasing pressure from the state's political leadership, in the late 1980s, the corporation offered to turnover defunct tubewells to farmers in their commands provided they met certain conditions: (a) at least 11 farmers in the command had to approach the Corporation for a lease of the tubewell; (b) they had to form and register a lift irrigation co-operative under the Gujarat Co-operative Societies Act and accept the model by laws designed by the Corporation; (c) the promoters of the co-operative have to mobilize and supply a security deposit of Rs 5,000 to the Corporation; (d) the co-operative would manage the tubewell in the interest of its members with the help of a hired operator who will be accountable to the co-operatives management committee; (e) undertake such repairs and maintenance as may be needed to commission the tubewell and operate it; and (f) the co-operative will recover the sums owed by farmers to the Corporation for water sold before turnover. If these conditions were met, the Corporation offered to hand over the tubewell to the co-operative on lease at a rent of Re 1 per annum.

THE TURNOVER PROGRAM

On the face of it, this offer appeared highly attractive. However, the expectations that farmers would come forward wholesale to cash in on this new opportunity were largely belied. In much of north Gujarat (including the districts of Mehsana, Sabarkantha and Banaskantha)--where water depths and pumping costs are high--farmer response to the offer was lukewarm. This was understandable because farmers there realized that, even with good management, they could not supply water to members at the low rates as public tubewells are doing now. North Gujarat public tubewells use 60-75 hp motors which attract highest electricity tariff rates under Gujarat's progressive power tariff system; however, since the Corporation charges uniform water prices through out the state, there is heavy cross-subsidization from water abundant areas to water scarce areas such as north Gujarat. Elsewhere, the response was poor because of [condition (f)]. Like in canal systems, the GWRDC too had begun to face massive recovery problems. Quite often, these started when a tubewell with technical snag failed to get repaired for a long time causing losses to farmers dependent upon it. Then, due to political pressure, the Corporation tubewells kept supplying water to defaulting farmers thus perpetuating a "free-lunch" culture. Many tubewells have to recover overdues which exceed one or two year's total business volume. The turnover conditions require that the co-operative recovers all the dues before beginning to supply water to previously defaulting farmers.

By March 1994, 308 public tubewells were turned over; of these 66 have been reclaimed by the Corporation because of a variety of reasons including: the expiry of the lease, feuds within the co-operative, inability of the co-operative to recover past dues, failure to pay the electricity bills, etc. One aspect that undermined the program was the vacillating attitude of the Gujarat Electricity Board on subsidized tariff to these co-operatives in line with its policy. In recent cases, the GEB maintained that the tubewells belonged to the GWRDC and therefore were ineligible for subsidy [4]. As a result, some older co-operatives got the subsidy while others did not. Another setback has been the recent propensity of the GWRDC officials to give a tubewell lease for only one year which does not make sense to farmers.

In order to assess the overall experience with turnover, we carried out two quick analyses. First, we analyzed GWRDC data for Borsad and Petlad talukas of Kheda and developed a picture of the changes in performance of tubewells after they were turned over (Table 1); then, we conducted a quick survey of 15 private tubewells and 15 turnover co-operatives and compared their basic performance parameters; this is presented in Table 2.

Table 1 shows that turnover of public tubewells in Kheda was followed by two major changes: first, the price at which water was sold is slashed by 40 to 50 percent to bring it in line with the true (private) economic cost of pumping; then, beginning slowly, the hours of pumping as well as area irrigated increases. In Petlad, the increase in area irrigated was only 30 percent; but in Anand, the increase was four times. The bulk of this increase is the result of the removal of sloth that characterized the Corporation management; further scope to improve pumpage remains unexploited because of the uncertainty of lease continuation, difficulty in mobilizing capital for major repairs, and so on.

Table 2 is useful in that it suggests that even after turnover, co-operative tubewells still do not perform quite as efficiently as private tubewells do. A typical private tubewell charges marginally higher prices but pumped for 20 percent more hours and irrigated 45 percent more land. This gap suggests the outer limits of performance that turned-over tubewells can achieve if only the problems of the design of the turnover program and of the farmer organization can be overcome.

Table 1. Performance of tubewells before and after turnover in Petlad and Anand talukas of Kheda District.+

	Petlad	Anand
Number of tubewells covered	26	9
Before turnover		
Average water price charged (Rs/hour)	27.19	25.13
Average area irrigated (ha)		
Kharif	8.67	11.03
Rabi	9.36	12.68
Summer	13.51	8.45
Total	31.54	32.16
After turnover to farmer co-operatives		
Average water price charged (Rs/hour)	14.14	15.44
Average area irrigated (ha)		
First year after turnover		
Kharif	-	-
Rabi	-	-
Summer	6.70	18.33
Total	6.70	18.33
Second year after turnover		
Kharif	15.10	27.20
Rabi	16.55	42.90
Summer	12.63	24.23
Total	44.28	94.33
Third year (1990-91)		
Kharif	4.04	4.70
Rabi	26.72	30.33
Summer	19.49	23.97
Total	50.25	59.00
Fourth year (1991-92)*		
Kharif	11.25 (148)++	26.27 (323)
Rabi	26.45 (456)	27.56 (592)
Summer	20.42 (578)	18.37 (588)
Total	58.12 (1,182)	72.20 (1,503)
Fifth year (1992-93)**		
Kharif	10.82 (151)	23.27 (399)
Rabi	24.59 (644)	32.82 (532)
Summer	23.58 (553)	21.48 (585)
Total	58.99 (1,348)	77.57 (1,516)

+ Based on GWRDC records.

++ Figures in brackets are hours of operation.

* Data of 17 tubewells in Petlad and 9 in Anand.

** Data of 18 tubewells in Petlad and 8 in Anand.

Table 2. A comparison of private with turned-over tubewells in Mahemdavad Taluka+

	Turned-over tubewells	Private tubewells
Sample size	15	15
Hp of the motor (average)	19.96	16.66
Average length of the Underground pipelines (m)	2,468	2,670
Mean depth of the bore (m)	137	56
Average number of outlets (kundis)	24.33	20.87
Average area irrigated (season acres)*		
Kharif	26.93	38.23
Rabi	42.09	53.17
Summer	23.30	28.76
Total	92.22	120.16
Average price charged (Rs/hour)	22.36	23.13
Average hours of operation/year	1,336.32	1,608.25

+ Based on a rapid appraisal conducted specifically for this paper.

* Land under perennial crops such as banana is counted separately under each season.

DESIGN OF IRRIGATION ORGANIZATION

In an alternative exercise, we compared a sample of turnover co-operatives with tubewell companies popular in north Gujarat. All 26 co-operatives in our sample were from Kheda District; and all 13 companies were from Mehsana which has hardly any lift irrigation co-operatives. Kheda has irrigation companies too; however, most of these are small partnerships, partners usually drawn from the same extended family. The Mehsana companies can, on the other hand, have upto 50 partners often belonging to several caste and religious groupings. The Mehsana irrigation companies are thus more than mere kinship-based organizations.

Groundwater conditions differ vastly between the two districts. Mehsana has long suffered declining groundwater tables; current depths of tubewells range between 600 to 1,200 feet. Well yields are relatively low; and the risk of failure in new borings significant. Kheda, in contrast, is groundwater abundant. In many parts of Kheda near the head reaches of the Mahi Kadana Canal, high groundwater tables, and the prospects of rapidly rising water table, represent a clear ecological threat. Even so, for the dynamics above the ground, Mehsana has more in common with Kheda than, for example, with Panchmahals, another water scarce district of Gujarat [5]. Socio-economic setting of Kheda and Mehsana too are similar with their rural economies dominated by the sturdy, hard working Patidars with strong business sense. The two districts, likewise, have vigorous agricultural economies based on lightly irrigated cash crops such as tobacco, cotton, jira, raida, etc., and well developed dairying. Finally, compared to many other regions of Gujarat, Mehsana and Kheda have also led in institutional innovations of various types which have fueled rural economic upsurge during recent decades.

All of Kheda's tubewell co-operatives studied operated turned-over tubewells of the GWRDC. Even though response to the Corporation's turnover offer was poor in north Gujarat, in Kheda, some 60 applications were received during the 1988-92 period. Our sample includes 27 of the turned-over tubewells. The irrigation companies of Mehsana, in contrast, represent a completely indigenous form of irrigation organization. They are known to have been in existence for over four decades; new companies come up in sizable numbers every year. Indeed, in recent times, the bulk of the new private investments in tubewells take place through these informal companies. In our assessment, there are probably 5 to 7,000 such irrigation companies in Mehsana District alone. In the course of our fieldwork, we noted that as we move further north, companies become less popular and numerous; this is because in many areas of Banaskantha District, for example, landholdings are large and farmers afford and prefer individual tubewells.

Irrigation companies of Mehsana are informal organizations with membership ranging from 5 to 120 but with a modal size of 25 to 40 members. They are not registered under any act; as a result, in law, they are non-entities. The formation of a company is signified by the agreement on a Rs 10 non-judicial stamp paper entered into by all promoter partners of the company. Companies generally maintain bank accounts in the name of the manager (who is elected and the equivalent of the chairman of a co-operative) or in the name of the company itself. Other than the status of the agreement under the Contract Act, irrigation companies have no links with the state. All the resources for the start as well as for its continued operation are internally generated; and all the authority needed to ensure the smooth running of the company is provided by its member-partners to the managing committee or the manager. This complete independence and the "internal locus of control" that companies enjoy, in principle and in practice, are amongst the most important features of their design concept and something member-companies place a great value on, as we would be discussing later.

Farmer Co-Operatives and Companies: Preliminary Comparison

Table 3 provides a preliminary comparison of the companies and the co-operatives in our sample. In order to do this, we use average values as well as the range of values for the respective sample.

Table 3 presents some basic features of the two classes of organizations. We note the impact of the differences in groundwater conditions in the two districts: the depth of the bore in Mehsana's companies is significantly greater than in Kheda co-operatives; correspondingly, the average size of the motor too is larger in Mehsana. We note also that all Kheda co-operatives inherited tubewells which had already been established by the Corporation several years ago and therefore had to make no capital investment decision; in contrast, all of Mehsana companies began with a sizable capital investment from resources contributed by members. It is significant therefore that the investments made by companies in underground pipelines are substantially higher than those made by the Corporation not only per tubewell but, more importantly, per acre brought in the tubewell's command. It implies that companies have a denser network of pipelines; that a greater proportion of holdings are served directly by the pipeline. In contrast, in the co-operative tubewells, it is likely that water has to be conveyed through open field channels for a long distance before it reaches most holdings. Indirectly, it follows, somewhat counter-intuitively, that companies made larger capital investments to secure efficiencies in the use of power as well as water compared to the state-owned corporation. [6]

Table 3. Preliminary comparison of co-operatives and companies.

		Co-operatives (Kheda)	Companies (Mehsana)
Sample size		26	13
Age* (years)	Average	2.53	6.15
	Range	1-6	3-17
Member- ship	Average	24.3	15.84
	Range	11-115	6-26
Gross Command (acres)	Average	163	114.4
	Range	42-320	48-200
Hp of the motor	Average	25.13	27.23
	Range	15-38	22-40
Depth of the bore (feet)	Average	438.8	583.4
	Range	240-515	480-710
Length of underground pipeline (m)	Average	1,465.1	2,427.3
	Range	400-4,200	1,750-3,500
Capital cost (Rs)	Average	na	4.7 lakh
	Range	na	4.2-5.9 lakh

* We refer here to the age of the organizations and not of the asset.

The significantly smaller membership and command area of companies relative to co-operatives can be explained by a combination of the following reasons: (1) In designing commands and enrolling partners, companies are driven primarily by the aim to provide "good" irrigation services to members; in contrast, the Corporation was guided by the aim to reach the largest possible membership and command area even if it required making some sacrifice in the "quality" of irrigation service; (2) Securing membership of the co-operative entails an insignificant one-time cost (of Rs 51); partnership in a company requires contributing to initial and subsequent investment costs in proportion to one's "stake" in the company; for most partners, this would involve a major personal capital investment decision necessitating careful cost-benefit calculations; (3) Partly as a consequence of the costless entry into a co-operative, most co-operatives we interviewed had a sizable number of "nominal" members who have enrolled either as dummy members or in the hope of future benefits. Thus, it is certain that in no tubewell co-operative is it the case that all members are users of the co-operative's service; in contrast, it is certain that there is no company which has partners who are not active users of the services of the company. In case of both the classes, however, it would be largely true that there are several non-members who are active users.

Operating Efficiency

Instead of technical efficiency in tubewell operation, energy use and water use, we focussed our investigation on overall operating efficiency as an important element of organizational effectiveness. Several criteria can be used to assess and compare the operating efficiency of a tubewell co-operative or a company. The critical dimension these criteria need to capture is the actual activity level of the organization relative to the highest possible. We have used three criteria which seem important and on which data were easily available. The first is the number of acre waterings in different seasons. These will naturally depend upon a number of factors; demand for irrigation itself would be an important factor; but the quality and reliability of irrigation service too would be important. If alternative irrigation sources are available within the command, that may also affect the extent of irrigation service provided by the tubewell. Acre waterings would thus indicate a sum total of all the impacts of all these factors.

However, the irrigation organization has no control over many of these factors; what it can control is its own tubewell, the quality of service it provides and the competitiveness of its terms of business vis-a-vis competitors. If one class of irrigation organizations manage their facilities more efficiently than another, we would expect that their facility would be used more intensively than would be the case in the latter class. Thus we would expect that the capacity utilization of the former class of organizations would be better relative to the latter class. We tried to capture this by computing the average hours of operation of co-operative and company tubewells in different seasons. We also computed the average of the total hours of operation per year.

However, the overriding constraint that limits the hours of operation of an electric tubewell is hours of power supply available which, in effect, fixes its upper limit. To incorporate this, we computed a third index, namely, hours of operation as a proportion of the average hours for which electricity was available in the respective area during different seasons. Since demand for irrigation is high during rabi and summer and since power supply tends to be scarcest and least reliable during summer, we would pose that the proportion of power hours that a tubewell used for irrigation especially in summer would be a good indicator of its overall operating efficiency. Table 4 compares co-operatives and member-companies on these three criteria.

Table 4 shows that member companies perform significantly better compared to co-operatives in terms of operating efficiency as we have defined it. True, in terms of acre waterings, they fare poorly compared with the Kheda's tubewell co-operatives in rabi and summer; but this does not seem to have much to do with the tubewell and its management. For, there is clear evidence, that compared to co-operatives, companies are able to operate their tubewells for longer hours per day in all the three seasons. More, member-companies optimize better--uniformly and significantly--against the binding constraint of limited power hours per day in all the three seasons. As a result, a company-managed tubewell operates for 50 percent more hours per year than a co-operative-managed tubewell. This has dramatic impact on the economics of the tubewells managed by co-operatives and member-companies.

Table 4. Comparison of irrigation performance.

Irrigation performance	Co-operatives (Kheda)			Companies (Mehsana)		
	Acre waterings*	average per tubewell Hours/day	% of power** hours used	Acre waterings	average per tubewell Hours/day	% of power hours used
Rabi 1991-92	289.7 (13)+	7.09 (26)++	43% (18)*+	314.2	9.59	64.3% (9)**
Summer 1991-92	349.8 (13)+	6.31 (26)++	34.8% (18)*+	273.1	7.31	48.56% (9)**
Kharif 1991-92	98.2 (13)+	1.56 (26)++	8.7% (18)	65.4	2.56	16.22% (9)
Annual Avge pumpage Range (hours)	1,843.9 (17) 1,260-2,450			2784.7 2,000-3,400		

* We have used acre waterings as a rough measure of the area irrigated. The number of hours of pumping taken for giving one acre watering may differ from crop to crop and area to area; however, within a given command, there is likely to be much uniformity in crops grown as well as time taken per watering.

** Average number of hours of operation per day has been divided into average number hours for which electricity was available during a given season.

Economic Performance

In absolute terms, companies charged higher average water price to their members than co-operatives charged to theirs. A part of the difference is explained by the higher lifting costs as well as higher scarcity value of water in Mehsana. However, even relative to their respective competitors' price, companies charged higher than co-operatives. The average price charged by tubewell co-operatives was 15 percent less compared to the average price charged by private tubewell owners in their commands; in comparison, companies charged only an average of 4 percent less to their members than what private tubewell owners would have charged them. Even so, an average member of a company depended far more heavily on the company's tubewell for his irrigation needs than an average co-operative member depended on the co-operative's. We take up this somewhat paradoxical situation for discussion in a latter section. We note here, however, that hours of operation have a bigger impact on the economics of tubewells than prices whose differences within a region, in any case, are not very significant. We also note that contrary to popular understanding, companies do not depend very much on water sales to non-members though they certainly sell more to non-members than co-operatives seem to do.

Companies incur significantly higher operating costs because of differential electricity charges; in the progressive flat power tariff structure, companies come in the penal rate-slab of Rs 360/hp/year; that is, a 30 hp tubewell would have to find Rs 10,800 for electricity bill per year; a co-operative falling in the lowest bracket of Rs 192/hp/year would have to pay only Rs 5,700. Even with higher electricity bills and higher repair and maintenance costs, companies in general posted superior financial results; all 13 have run in profit; and all systematically set aside earnings for depreciation and future investments. In contrast, 6 out of 18 co-operatives which gave us all financial figures were in loss in 1991-92. In the past, some tubewells leased to co-operatives have had to be returned to the Corporation because they could not be run viably. Thus an average company earns twice what an average co-operative earns in gross income but its impact on profit and reserves is manifold. Significantly, an average company undertakes considerable amount of capital accumulation which seems enough to keep it going in perpetuity. In contrast, co-operatives always seem to run short of capital.

Table 5. Comparison of economic performance, 1991-92.

	Co-operatives (Kheda)	Companies (Mehsana)
Average hours of pumpage/year	1,844	2,785
Pumpage supplied to members (%)	82%	76.9%
Simple average of price/hour (Rs)	18.37	25.23
Price charged by private tubewell owners (Rs/hour)	21.67	26.23
Gross income average/year (Rs)	~33,874	~70,266
Operating expenses (Rs/year)	~22,928	~33,719
salary costs (Rs/year)	~7,034	~7,590
Replacement or new investment**	~2,779	~21,614
Profits (Rs/year)	~1,133	~7,343
Accumulated reserves (Rs)	4,890 (12) *	26,000 (13) *

* Figures in brackets represent the number of organizations which reported accumulated reserves. While only 50 percent of co-operatives had accumulated reserves, all companies reported reserves.

** This is derived as a residual figure. Respondents told us figures on profits, on salary costs, on electricity and maintenance costs; but these did not reconcile. Upon questioning, items of expenditure were cited--such a rewinding of motors, deepening of bore, replacement of pumps or foot valves, repair or extension of pipelines and/or kundis, many of which were in the nature of capital costs. Since this figure is derived as a residual, it may also contain aggregated measurement errors in other figures.

EXPLORING THE SOURCES OF PERFORMANCE DIFFERENCES

In comparing the performance of co-operatives with member-companies, primacy should be accorded to the purpose for which these organizations were created, for if the design concept of a member organization assures its members services they value in a manner that is consistent with member values and expectations, then (a) it would come up on its own or with limited external effort; (b) it will perpetuate itself by generating its own resources; and (c) it will sacrifice, confront or mutate for self-preservation. An organization which has these characteristics provides the proof of its usefulness to its members by the very fact that it exists and perpetuates.

Tubewell companies of Mehsana manifest all these three characteristics; and the tubewell co-operatives of Kheda, none. Tubewell companies came up on their own, as *swayambhoo* organizations; no agency went to create them by offering incentives, managerial and capital subsidies, technical guidance and political support, etc. They multiply and propagate themselves; new companies come up by the day; and all these are organized on the same lines as the earlier ones with few, minor variations. Tubewell companies are seldom known to fail or become defunct in the sense in which co-operatives fail or become defunct. There are well established mechanisms to cover all manner

of contingencies and problems; tubewells owned by companies may fail, but Companies themselves seldom fail except when they have outlived their purpose. Finally, tubewell companies have actively sought to protect their "design-sanctity." Being in no way connected with the government system which, for all practical purposes, treats them as individual tubewell owners, these member-companies have not had to face any major onslaught of adverse change in macro-environment. However, companies could easily change their design and register as co-operatives to obtain the concession in electricity tariff; this has not been an insubstantial amount especially at the post-1987 tariff rate of Rs 660/hp/year. However, we heard of no company which has shown inclination to change their character; when probed, one farmer blurted: "what is that saving worth if we lose all our independence and *sarakari sahib* will breath down on our neck night and day!...We are fine the way we are...we make our own rules...and when we do not like them, we change them...no hassle.."

In contrast to this, all the co-operatives in our study were nurtured by the Corporation on "special food" of zero capital costs, nominal lease rent and subsidized electricity. Indeed, whether these organizations came up for the same purpose as member-companies of Mehsana did is always in doubt; for, very likely, the primary motivation in co-operative formation is to secure the subsidies; worse, in each case, it is possible that a large farmer mobilized 10 others to join with him to acquire lease on a valuable asset at extraordinarily low cost and to effectively privatize it. Indeed, this is exactly what we found in one of the villages where the chairman and a few of his stooges forced some members to withdraw their membership fees and used the tubewell acquired as a phony co-operative to establish a lucrative private business in water sale.

As farmer organizations, thus the tubewell co-operatives of Kheda are fragile and weak in comparison to the member companies of Mehsana. Probing the reasons for this is important. After all, the technology available to both the classes of organizations is the same. The people involved too are similar; if member companies of Mehsana are dominated by Patidars with exceptional entrepreneurial abilities, so too, are the tubewell co-operatives of Kheda; indeed, more companies in our sample were mixed caste-mixed-religion groupings than Kheda's co-operatives. If anything, the member-companies face far more adverse groundwater conditions than the co-operatives of Kheda; the companies also do not have the advantage of zero capital cost, of nominal rent, and of subsidized electricity that the Kheda co-operatives enjoy. It is clear that what failed the co-operatives is not the technology nor the economic possibility but the organization and its design concept which refers, in essence, to the assumptions and hypotheses which explain why the turnover arrangement as conceived will succeed in the normal course. The problem must be traced back to the birth conditions, the by laws, the de jure and de facto rules, norms and authority structure, and the all the rest that constitute their design concept. Perhaps the organizations to whom the tubewells are turned over are not designed to provide their members the services they valued in a manner consistent with their (members') values and preferences; but member companies of Mehsana are.

Consider how and why a new tubewell co-operative comes into being. It is clear that if conditions were ripe for a group of farmers to come together to jointly own and manage an irrigation asset, it would have come up already without external stimulus. That it did not suggests either of two things: (a) existing institutions--individual ownership, public tubewell, water markets--were widely considered satisfactory; or (b) though the need is felt, farmers were not aware of a method of organizing that which was readily acceptable to all potential members.

Now, the Corporation's offer provided a stimulus which was likely to be perceived differently by different groups. As we mentioned earlier, a large farmer can perceive it as an opportunity to privatize a public tubewell at low cost by creating a facade of a co-operative. At the other extreme, a group genuinely interested in co-operative self-governance and self-management of a member organization for tubewell irrigation is likely to find the "conditionalities" attached by the Corporation oppressive and unworkable. According to the by laws developed by the Corporation for a tubewell co-operative, for example: (a) registration of the co-operative under the Gujarat Co-operative Act is compulsory; (b) share capital cannot be raised except within the framework stipulated by the by laws which offer no incentive to a member to supply more than the minimum required share capital; (c) borrowings cannot exceed eight times the share capital; (d) funds have to be invested according to the provisions of the co-operative act; (e) the chairman and the management committee cannot appoint, remove, punish or dismiss the manager without prior approval of the district registrar of co-operatives; (f) members will have to put at least 50 percent of their land under food and vegetable crops (the violation of this will entail a penalty of Rs 25 per acre); (g) net profit of the co-operative shall be applied in the manner prescribed by the by laws; these require that 25 percent goes to reserve fund, that dividend cannot exceed 12 percent and that compulsory contribution to the education fund is an increasing function of the dividend declared; that a member cannot get more than 5 percent of the value of water purchased by him during the year as patronage bonus; that 20 percent of the surplus from profit must be assigned to the irrigation development fund which cannot be used except with the prior permission from the district registrar of co-operatives; that the bonus to the operator cannot exceed one month's salary; and so on; (h) the reserve fund cannot be invested or used except with the prior approval of the district registrar; and (g) a member can withdraw his membership by settling all his dues with the co-operative (and then refuse right of passage to convey water to distant

fields). Above all these, there is the most binding constraint that the co-operative must recover the Corporation's past dues from farmers, that which the Corporation itself could not do with its massive bureaucracy and statutory powers.

To a group of farmers contemplating the formation of a co-operative, this sample of design-features of the new scheme poses a difficult set of operational questions which are immediate, and of the here-and-now kind. The registration of the co-operative would, for instance, require anywhere between 5 to 12 visits to the district registrar's office in Nadiad. At least one co-operative we interviewed confessed that a bribe of Rs 1,200 alone could do the trick. Who will make these visits? who will bear the cost of these visits and the *chai-pani* involved? The same hassle gets repeated with the Corporation and the insurance company and so on.

Even after going through all this hassle, there is hardly anything that the chairman and the management committee can do without getting the prior approval of the district registrar and/or the Corporation. True, if the Chairman or secretary has struck a good relationship with the registrar's office, a lot of the hassle can be avoided. However, even in these cases, the locus of control still rests outside the co-operative. All in all, the design concept of a farmer organization that is being offered by the Corporation to farmers makes it difficult for them to first create the organization and then manage it in consonance with their goals, values and priorities.

At the conceptual level, this design concept ensures that except for an exceedingly high level of altruism, trust and solidarity within the group, the effort and resources needed to smoothly manage the operations do not come about. It does not even encourage, leave alone stipulate, that capital contributions by different members match their land in command. Thus in the Agas Irrigation Co-operative, the chairman and the secretary together control a fourth of the command; but like each of the 40 members, they too contributed only Rs 300 by way of share capital. This is clearly inequitable because the small holders in the command end up providing capital subsidy to the large farmers.

A variety of stipulations, some described above, which circumscribe the application of surpluses depresses capital formation and generates powerful incentives to pass on all surpluses to farmers in the form of low water price. Declaring dividends is costlier than building reserves since dividends divert surpluses to education and other funds; but building reserves too is unattractive because using them for repair and replacement is full of hassles. Raising new capital in times of need is difficult because methods provided by laws are inequitable to members with small holdings in the command. Finally, at the level of the group, incentives are low for undertaking major long-term investment plans--extension of pipelines, replacing kundis, replacing motors, etc.,--since there is no guarantee that the Corporation will give another lease after the first five-year lease expires. In reality, it is not uncommon for the Corporation to take back a tubewell even before the lease expires on one pretext or the other. Worse, in recent times, turnover is done only for one year subject to extension on an year-to-year basis. This last, in our view, is the death-knell of the turnover program since no group would be seriously interested in such a one-sided offer.

Naturally, therefore, one of the principal operating problems that co-operatives face is of capital shortage. Many of them look up to the Corporation to provide them capital grants and to undertake repairs and maintenance. Those few which do not face any of these problems fall in to either of two categories: (a) they are backed by a resourceful leader/NGO; or (b) the capital, time, effort and other resources needed to create and operate the co-operatives are provided mostly by a few members with large holdings in the command who will have a strong temptation to acquire complete control over decision making. Both these categories are co-operatives in name, oligarchies in fact.

The member-companies of Mehsana, in contrast, are oligarchies in name and co-operatives in fact and spirit. They come up with the sole purpose of serving its members' needs in perpetuity. They are completely self-financed with members contributing capital in proportion to the use they make of the company's services. All who are members are invariably users as well; some who are users but are not members have a strong incentive to enroll as members at the first opportunity. They are democratic in the sense that they are completely self-governed; and the distribution of voting rights is proportional to use when not equal. Membership to companies is as voluntary as it can be, given the peculiar characteristics of its business. Obviously, companies do not accept as partners farmers way outside the potential command; nor is it likely that such farmers would want membership of companies which cannot benefit them; but there is evidence that companies make substantial effort to persuade every farmer within the command to join, not out of any sense of altruism, but for the simple reason that it makes sound business sense. Finally, as a good co-operative, all benefits produced by member-companies are distributed in proportion to the use of the company' services by different members, as stipulated by the equity principle of co-operation.

The organizational structure and processes of a member company too are strikingly similar to an idealized co-operative. The general body meets once a year or in times of an emergency. A Managing Committee of 7-9 members meets once a month or once in two months. It is the (honorary) Manager, the equivalent of the co-operative's chairman, who runs the show and wields all the power of the general body and the managing committee while they are not in session. He keeps the accounts, supervises the operator, makes instant decisions about repairs, replacements, selling water to non-members, scheduling water deliveries, resolving conflicts amongst

members, sacking a recalcitrant, corrupt or careless operators. For slightly weightier issues requiring quick decisions, he quickly consults two or three large stake holders, arrives at and executes a decision. Keeping the tubewell pumping is the mandate of the manager; and the members back him up to the hilt in doing so.

All companies we met claimed that in the general body and managing committee elections and meetings, the principle of one-man-one-vote is followed. Instances were cited of noisy general body meetings and occasional instance of the replacement of the manager on one ground or another. Invariably, however, the manager in every company was a large stake holder. Examples of companies having managers with very small stake were as rare as those of companies having elected non-members as chairmen just because of the prestige and respect these individuals commanded. Where the manager was very busy with his own business, it was common for the company to maintain a paid assistant who would help the manager with the accounts and supervision work. There was much evidence, however, that at all times when decisions were needed, the buck stopped at the manager; and the survival of this apparently non-participative system seems to suggest its acceptability.

Perhaps, an important reason behind their smooth, trouble free management is the proportionality principle which is the hall mark of the design concept of member companies. Since only large stake holders end up as managers and key decision makers, other members know that costs of decision errors will be borne by the manager in proportion to his stake. If the tubewell remains out of order for a long time, the manager will suffer larger loss than most other members; as a result, it is not uncommon that even when companies have no savings, the manager and two or three other large stake holders cough up money to get a burnt motor replaced or other major repairs carried out in as short a time as possible; these are then split amongst members in proportion to their shares. Since smooth, trouble free management and absence of conflicts of interests are widely associated with the design concept of member-companies, when new tubewell investments are planned, people instinctively think in terms of this design concept. Differences in the basic design across companies are thus minimal and inconsequential. Thus some companies are strong on distributing profits, saving less, and raising capital every time there is need. Others never distribute profits and save all profits. Some keep bank accounts; others do not; some pay the operator a fixed wage and also enroll him as a member; others pay him on a per-hour-of-operation basis. Other than these minor variations in operating procedures, the design concept of member-companies is the same throughout north Gujarat and is distinctly different from the design concept of lift irrigation co operatives elsewhere.

How does a member company come into existence? Usually it is a large farmer who takes the initiative. If he needs to develop an irrigation source, his first preference would be a captive tubewell. Where this is feasible, as in parts of Banaskantha, private tubewells come up. Even with somewhat smaller holdings, private tubewells would still come up in areas like Kheda and Baroda where risk of well failure is not very high and where presence of active water markets increases the chances of the tubewell being utilized to viable levels. However, conditions would become ripe for the birth of a member company where even large farmers are too small to: (a) mobilize the capital needed to establish a tubewell; (b) command enough of their own land to utilize the tubewell to viable levels; and (c) absorb the risk of a failed well. The member-company is thus primarily a social device for spreading the risk of immediate or future well failure which may be too much for even a wealthy farmer to easily absorb. And members agree easily to participate in this device because they can determine in precise terms the extent to which they would be willing to share the risk.

The basic design concept of a member company is simple. Anyone with land in the command area of a proposed tubewell can become a partner. The stake of a partner is determined by how many *paisa* (or, percent) share he owns in the company. No one would be normally allowed more than 45 *paisa* share; but in general, in most companies, there will be 2-4 partners with 10-12 *paisa* share each and a large number owning 1-5 *paisa* share. The share holding would generally have close correspondence with members' landholding in the command. The initial capital is raised in proportional terms; subsequent capital too is raised in proportional terms; profits and losses are borne in proportional terms. However, water shares have no strict correspondence with member stakes except in times of extreme shortages. Leaving a company is not as easy as leaving a co-operative; many companies stipulate, in the initial agreement that if a member withdraws from his membership, he cannot withdraw his capital before 10 years; however, transfer of shares is informally permitted if the transferee belongs to the company's original command.

One reason why member-companies set their water prices close to market rates is to ensure that members do not grow water intensive crops which are not consistent with the water output of the tubewell; only rarely is group pressure used to discourage a member from growing a certain crop. The other reason is that larger farmers who generally manage companies do not have the undue incentive to keep water prices low which large farmers managing co-operatives would have; in companies, we note, subsidizing water cannot benefit large holders; in co-operatives, it can. Finally, the primary reason why a farmer becomes a member of a tubewell company is to obtain secure access to an irrigation source; profit share is an insignificant consideration. Most companies never distribute profits; instead, surpluses are retained for future contingencies.

Over years, as member-companies have become popular, even ordinary farmers are able to easily describe how to form and operate new companies. But when the first few such groupings had come up decades ago, there must have been experimentation with a variety of rules, norms, operating procedures; these must have over time stabilized in to a design concept that is known to work well and in consonance with the community's accepted notion of what is a just and proper way of arranging things. New companies continue to come up almost by the day; but these use the same standard design concept that has kept several thousand tubewell companies going for decades.

Do member-companies need and use exceptional talent and leadership resources to perform so well? No; will and active interest in managing the company well appears far more important than unusually strong "extension motive" [4] or exceptional managerial and leadership capabilities. Companies seem to need and utilize ordinary capabilities of farmers who are interested; and people who end up doing the managing are interested because managing the company's affairs is nearly like managing their own business. The coalescence of incentives and motives that this brings about seems widely recognized as the prime reason for good management. It was therefore not surprising that there appeared no sign of tension about who should be the manager of the company's affairs; it seemed natural that only a sizeable stake holder should be the manager.

Interestingly, in the case of Kheda's co-operatives, this scale bias in the choice of chairmen and secretaries was even stronger; as Table 6 shows, the average landholding of the chairmen of the 26 co-operatives was very nearly the highest amongst their respective groups; in fact, barring few co-operatives, in the remainder, the chairmen were the largest farmers in the command. In fact, the secretaries too were large farmers; and between the two, the chairmen and secretaries of most co-operatives accounted for over a third of the tubewells' command areas. These combined with the widespread evidence of hourly payments to tubewell operators and encouraging them to use the tubewell's services as members (on leased land if they did not have their own) suggest a deep understanding amongst farmer groups of complex agency-type problems that the Corporation's design concept singularly lacked.

Table 6. Profile of landholdings in the command.

Landholdings in the command		Co-operatives (Kheda)	Companies (Mehsana)
Smallest	Average	2.13	2.65
	range	0.5-3.5	1.5- 6.0
Largest	Average	9.13	9.85
	range	4.0-16.0	6.0-18.5
Chairman/ manager	Average range *	7.49 2.5-16.0	8.23 4.0-14.0
Secretary	Average range	6.37 3.5-15.3	
Operator	Average range		3.25 1.5-4.5**

* In 18 out of the 26 co-operatives sampled, the chairman was the largest land holder in the command; in the rest, the chairman usually had a large landholding; in no more than three of the 26 co-operations, for example, the chairman's landholding was less than twice the smallest holding in the command; and each of these three represented an exceptional situation.

** Co-operatives typically have an elected chairman, an honorary secretary and a paid operator. The secretary is effectively the executive officer and looks after the day-to-day operations. In companies, the elected manager combines the role of both the chairman and secretary of a co-operative where as the operator in both cases operates the tubewell and distributes water.

This dominance of large farmers among the decision-making bodies of co-operatives further elucidate why co-operatives set their water prices low. We examined earlier that the snapping of the proportionality principle accompanied by the hassles in getting district registrar's approvals for even minor investment decisions and the myopia caused by short lease period account for low propensity to save amongst co-operatives. Since setting prices low (rather than first making surpluses and then paying dividends and patronage bonus) is an easier, superior and

hassle-free method of ensuring that the co-operative's benefits are distributed in proportion to use, co-operatives demonstrate a strong tendency to charge low prices. This is analogous to dairy co-operatives' propensity to pay high procurement prices for milk (except for a small tax dimension). Indeed, low water prices are widely regarded as the best indicator of the tubewell co-operative's performance just as high milk procurement price is the most popular indicator of the performance of dairy co-operatives. The Narsanda Co-operatives for instance, sells water at an unheard rate of Rs 4 per hour; but because it has been managed well over decades, it does not face the kind of capital crunch many lesser co-operatives routinely face.

CONCLUSIONS AND IMPLICATIONS

The main conclusions of our study are three: (a) the public tubewell program operated by GWRDC is unlikely to become economically and organizationally viable under any condition, and that the only way of salvaging this huge investment is a successful turnover program; (b) the turnover program which the GWRDC has experimented within the last five years has failed to succeed because the GWRDC decision makers--especially, at lower levels--have not wanted it to succeed; in other words, the terms for and the hassles of getting a lease, the reduction of lease period to one year, insistence on co-operatives to recover dues which even the GWRDC itself could not do, divesting the co-operative of the tubewell even before the expiry of the lease at the slightest pretext--all these beg the question as to whether there is will in the GWRDC to make the turnover work; (c) finally, as and when the GWRDC does muster enough will to make the program work--and it has no alternative but to do this--tubewell companies of north Gujarat offer a better, more robust model of farmer organization for tubewell irrigation than the type of co-operatives it has been insisting upon so far.

Member-companies of Mehsana which serve the same purpose as the tubewell co-operatives of Kheda are more robust and vigorous as organizations because: (a) they self create and self propagate; (b) they actively guard their design sanctity; and (c) they adapt and self correct. The primary features of their design concept that account for their superior performance include: (a) complete autonomy and self-governance; (b) acceptance of the proportionality principle in capital contribution, landholding within the command, patronage, share in profits and in risk; (c) implicit recognition of the agency problem vis-a-vis honorary manager as well as paid operator; (d) vesting of all powers of the general body in the manager and the managing committee; (e) costly exit.

Aspects of the design concept that make tubewell co-operatives fragile and inferior farmer organizations include: (a) limited autonomy; (b) compulsion to get approval from district registrar and/or corporation officials for most financial and administrative decisions; (c) violation of the proportionality principle so that small land holders are required to subsidize large holders in capital supply; (d) externally imposed rules of surplus application which strongly discourage capital accumulation and encourage unduly low water prices; (e) myopia induced by the conditions of lease; (f) low exit cost.

In our understanding, the turnover scheme will operate better if the Corporation agreed to consider farmer organizations with a design concept similar to the Mehsana member-companies, especially if it saves the members the hassles of getting the registrar's and the Corporation clerk's permission to do everything. The companies will perform even better if the Corporation raises the lease rent to say Rs 10,000/month, but in return provides the members complete autonomy and self governance. Better still, the companies will tend to invest more if the lease period were increased to 10 years.

Notes:

- [1] This paper is an extension of an earlier paper done by Shah and Bhattacharya (1993). We draw heavily upon the earlier analysis since the comparisons and analysis included in that paper are relevant to the central question addressed by us in this paper as also in the Conference.
- [2] Recently, for example, the operators' union took the GWRDC to court on payment of overtime for working outside "regular" working hours of the government. If the court grants their plea, the Corporation will be pushed further in the red, since operators will always be working overtime as electricity supplies to rural areas seldom, if ever, coincide with government's regular working hours.
- [3] We have still not been able to figure out the logic underlying this curious and retrograde pricing policy which encourages over-exploitation in fragile groundwater ecologies and make public tubewells uncompetitive in areas like Kheda and Baroda with abundant groundwater and strong private water markets.

- [4] In 1987, when the Gujarat Electricity Board changed to flat tariff system from metered tariff system, the tariff slabs were more progressive than they are now. For 30+ hp tubewell, the original tariff was Rs 660/hp/year; a company at that time had to pay Rs 19,800 per year for power alone. At the behest of some NGO leaders, special concessions were given to lift irrigation co-operatives which were made subject to lowest tariff slab applicable to tubewells with 7.5 hp motors.
- [5] Thus, tubewell investments in Kheda as well as Mehsana are high compared to the borewells and filter points widely in use in Panchmahals. Electric tubewells dominate both Mehsana and Kheda; diesel engines are widely used in Panchmahals where shallow aquifers yield low water output in shallow borewells mounted with oil engines.
- [6] Companies show a strikingly fine sense of pure economic rationality. The heavy investments made by companies in underground pipelines reflected not so much a desire to save water as the urge to cut electricity costs under the high pro-rata electricity tariff that the Gujarat Electricity Board charged until 1987. More importantly, heavy conveyance losses in open field channels raised dramatically the effective cost of irrigation to holdings away from the well-head. Further, with open field channels, water could not be reached to up-lying lands thus unduly restricting effective command. Underground pipelines made the location of tubewell irrelevant, equalized effective irrigation cost regardless of location and made topographical variations immaterial.

References

- Abbie, H.; Leslie, J.Q.; and Wall, J.W. 1982. Economic return on investment in irrigation in India, World Bank Staff Working Paper No. 536. Washington: The World Bank.
- Chambers, R.; Saxena, N.C.; and Shah, Tushaar. 1989. To the hands of the poor: Water and trees. New Delhi: Oxford-IBH.
- Johnson III; Sam, H.; and Reiss, Peter. 1993. Can farmers afford to use the wells after turnover? A study of pump irrigation turnover in Indonesia. Short Report Series On Irrigation Management Transfer, No. 1. Program on Local Management, International Irrigation Management Institute. April.
- Tushaar, Shah. 1993. Water markets and irrigation development, Bombay: Oxford University Press.
- Shah, Tushaar; and Bhattacharya, Saumindra. 1993. Farmer organization for lift irrigation: Irrigation companies and tubewell co-operatives of Gujarat. ODI Irrigation Management Network Paper No. 26. June.