



IRRIGATION MANAGEMENT NETWORK

FARMER ORGANISATIONS FOR LIFT IRRIGATION: Irrigation Companies and Tubewell Cooperatives of Gujarat

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**Farmer Organisation for Lift Irrigation:
Irrigation Companies and Tubewell Co-operatives of Gujarat**

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**Farmer Organisation for Lift Irrigation:
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Introduction

Group ownership and management of lift irrigation becomes important where small and fragmented land holdings make individual ownership of wells unviable, and where tubewell installation entails high capital costs and is fraught with high risks of failure. In central and north Gujarat where both these situations co-exist, a range of institutional innovations have facilitated the rise of a plurality of contracts and regimes for collective ownership and management of irrigation assets. Prominent amongst these are: water markets, tubewell co-operatives and irrigation companies. This study reports results of interviews with 27 co-operatives and 13 companies focusing essentially on their internal organisation, management and control. While member-owned irrigation companies appear uniformly more robust and productive compared to co-operatives, their equity impacts too are not necessarily inferior to co-operatives.

'Design Concepts' for Irrigation Organisations

In the area of natural resource management, much attention in recent times has been paid to the question of equitable access and sustainable use. In the case of groundwater resources, for example, many scholars have argued that because of the absence of clearly specified property rights and on account of the chunky investments needed to lift groundwater, the resource has been pre-empted by the rural elite; and this disorderly process of pre-emption is governed by the rule of the jungle than by the rule of law. Indeed, the law has often abetted this iniquitous political economy. Arguments for sustainability and ecological prudence have been used to erect and justify a plethora of barriers, licensing rules, conditionalities for provision of bank loans and electricity connections, etc, which keep the

resource poor as late entrants in securing access to this precious resource (see Chambers, Saxena and Shah, 1989; Shah, 1992). In early decades of Indian planning, socialisation of groundwater through state ownership and management of tubewells was seen as a major way out of this dilemma. In many states including Gujarat, however, early public tubewell programmes 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, for example, Abbie *et al.* 1982).

Distrustful of private ownership and disenchanted with public programmes, many social workers and researchers therefore increasingly turned to group ownership and management as a potential solution to the question of equitable access. If the resource poor can somehow act collectively, they can not only overcome the capital and risk constraints but also avoid bureaucratic hassles through self-management and self-governance. The Indian search for an appropriate 'design concept' of a group organisation for lift irrigation has however been dominated by an idealistic - almost romantic - pursuit of equality and democracy, and a strong suspicion of anything remotely approaching the market process. Thus experiments with irrigation groups which incorporate concepts of equity, democracy, participative decision making etc. in their 'core norms and rules' received a great deal of attention in the past decade.

There have been eloquent descriptions of the '*pani panchayats*' established in Maharashtra by the Gram Gaurav Pratishthan, the group irrigation schemes of Deoria and Vaishali in east UP and Bihar, the Sukhomajari experiment in Haryana, the lift irrigation co-operatives of Aga Khan Rural Support Programme (AKRSP) and of the Sadguru Water and Land Development Trust in Gujarat. Each of these has incorporated into its 'design concept' some unique and noble value or principle, evolved and advocated typically by the promoting individual or NGO. Thus, Sukhomajari gave water-entitlement to the landless members located in the command; and Pani Panchayats allocated water rights amongst members in proportion to family size rather than irrigable land of members in the command. The AKRSP and Sadguru 'design concept's too incorporated many noble values and principles of cooperation, such as one-member-one-vote, group decision making, compulsory saving and equal base-level water rights rather than allocations based on irrigation needs.

Many of these normative principles fired the imagination of researchers, donors and government planners who, in turn, actively advocated the replication and scaling up of these experiments as a major institutional

approach to groundwater development. However, experience and studies have now begun to show that while all these experiments have important lessons to offer, never the less, they are little more than mere experiments. They certainly exemplify the art of the possible, but none of them has the qualities and features required in the *design concept* of a group organisation with a major possibility for up-scaling or replication on a sustainable basis.

By 'design concept', we refer to the vision of the concept of the organisation; of how it is to be created, structured, run and dissolved when redundant. It includes the goals that are stated and goals that are pursued, operative rules and norms that are written and unwritten (but operative, all the same), the authority structure on paper and in fact, the scale and the technology to be used, and the economic potential the organisation is created to exploit. In sum, the design concept of an organisation includes all *a priori* assumptions and judgements made about members, employees, technologies, opportunities, environment and all else that will determine the extent to which the organisation being envisaged will achieve the goals of its members. In the 'design concept' of an organisation thus, 'organisation design' of the mainstream management literature is but small and insignificant aspect. Instead it encompasses the entire gamut of questions that have to be addressed by a group of farmers between identifying a need worthy of organisation and the actual creation of an operating organisation.

For example, the 2500 *chikori* growers of Kheda, considering a marketing co-operative as an alternative to contract cultivation for Brooke Bond India Ltd. have first to produce satisfactory answers to an array of questions before having to decide whether the organisation structure will be 'tall or flat', whether the manager will follow the humanistic style or the machine model of management, or whether the structure will be hierarchical or 'matrix' type. Instead, they will have to decide on questions like: would the co-operative just pool members' *chikori* and market it to Brooke Bond, or will they pool and market it to other traders, or will they pool it, grind it and market it themselves in South India where coffee is blended with *chikori*, or will they manufacture coffee themselves? They will also have to decide whether village co-operatives should federate into a district union or whether farmers would directly become members of a district level co-operative. Whether each member should contribute Rs 10,000 as share capital (would he? under what conditions?) or should they raise debt with the co-operative bank? What will be each member's rights and obligations vis-a-vis the organisation? Under what law will we operate? Who will manage the day-to-day business and who will manage the people who manage the co-operative's business? How will losses be distributed if and

when they occur? How will capital be raised in the future? and so on. Getting answers to these and similar questions right is germane to building successful farmer organisations. More sequential answering "we will cross the bridge when we come to it" does not help. A *chikori* co-operative of a certain scale starting with a marketing-cum-value adding programme may come up and grow more rapidly than small village co-operatives pooling members' *chikori* and bargaining with Brooke Bond. If an organisation starts with some of these crucial answers wrong, chances are high that it will soon flounder and perish because its members will desert it. Few co-operatives in India have failed because they chose 'tall' organisation structure when 'flat' was called for, or followed machine models where a more humane approach would work better. In our view, most co-operatives that failed to succeed started off with a wrong 'design concept'.

On the other hand, when farmers hit upon the right 'design concept' of an organisation that serves a worthwhile purpose, it propagates and replicates fast. In a 'design concept' with the qualities of replicability and up-scaleability, we would expect to find:

- the internal energy to self create and self propagate;
- the energy to avert external threat to its survival either through confrontation or mutation; and
- propensity to self correct.

'Design concepts' high on these qualities tend to propagate like wildfire and survive against odds until changing contexts makes them redundant. None of the experiments listed above were high on these, for:

- many of these experiments began to decay in less than a decade;
- the core values and normative principles seemed to begin to erode rapidly as soon as the prime-mover of the experiment turned his back;
- because of the heavy emphasis on 'core values and normative principles', many groups did not invest sufficiently in establishing widely accepted operating rules and procedures;
- as a result, the operating efficiency of the group projects tended to decline rapidly; and
- finally, it is seldom that 'replicas' of these successes came up on their own, even in their neighbouring areas; with sufficient 'coaxing', they did come up, but without the presence of a 'conscience-keeper', fell short of the original.

Thus the Deoria and Vaishali groups crumbled at the first sign of competition from private water sellers (Ballabh, 1989); the replicas of Sukhomajari turned out far short of the original model; the number of Pani Panchayats in Purandhar taluka stagnated at 45 now for over a decade; and even in many of the old Panchayats, loss of operating efficiency and erosion of 'core norms and values' has been increasingly recognised. All these experiments will continue to embellish, for a long time, the oral and written history of Indian irrigation organisation as abortive efforts of outstanding individuals who gave a good part of their lives to creating these programmes. However, it would be naive to draw major lessons from them in finding general solutions to the question of assuring India's small holders access to groundwater irrigation.

The Setting

For finding general solutions, we need to skip the sublime and look closely at the commonplace; underplay the values and norms that outsiders like NGOs enforce on local communities and instead study the rules and procedures people evolve on their own; avoid concluding from early successes of novel experiments and stick to analysing 'design concept's which have stood the test of time. This is what we attempt in this paper. We compare two alternative forms of lift irrigation organisations that have a significant presence in Gujarat. The first is lift irrigation co-operatives, which operate under direct and indirect patronage of the state and incorporate into their 'design concept's core values and normative principles that the state machinery supports for whatever reasons. The other are tubewell companies which operate in large numbers completely outside the state's influence and whose 'design concept' is evolved entirely by groups themselves without any external input. One purpose in doing so is to explore whether the two forms of organisations display significant differences in their organisational performance; and if they do, the other purpose is to probe into the reasons that might explain them.

Our sample includes 26 tubewell co-operatives and 13 irrigation companies. All co-operatives are from Kheda district; and all companies are from Mehsana. This was an unfortunate though unavoidable sampling problem since Mehsana 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 up to 50 partners often belonging

to several caste and religious groupings. The Mehsana irrigation companies are thus more than mere kinship-based organisations.

Groundwater conditions differ vastly between the two districts. Mehsana has long suffered declining groundwater tables; current depths of tubewells range between 180-375 metres. 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. 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. The socio-economic settings of Kheda and Mehsana too are similar with their rural economies dominated by the sturdy, hard working Patidars with a strong business sense. The two districts, likewise, have vigorous agricultural economies base on lightly irrigated cash crops such as tobacco, cotton, cumin, *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 fuelled rural economic upsurge during recent decades.

The Sample

A majority of Kheda's tubewell co-operatives are the legacy of the 30-year long abortive effort by the Gujarat Groundwater Resources Development Corporation to manage tubewells under the public sector. While in relative terms, Gujarat's experience in public tubewell programmes has been somewhat less abject than in states like Bihar and Gujarat, in absolute terms, the internal contradictions of the programme have increasingly come to the fore. The Corporation has been looking for ways to salvage the resources sunk to establish some 3500 such tubewells throughout the state, most of which operate at less than 10-15% of their capacity, irrigate less than a fourth of their design commands and incur heavy cash losses year after year.

The key problem with the public tubewell programme has been with its 'design concept'. In operational terms, the problems are similar to those

that have afflicted public tubewell programmes in other states. Maintenance and repair suffer heavy delays; operators remain absent for long periods; pipelines are not maintained; farmers can not get adequate service without offering 'illegal rents'; the operators cannot be insulated from local power games. Operator salaries at government rates are already far above the surpluses the tubewells can produce, but operators' unions have demanded overtime for night irrigation thereby further reducing the viability of tubewells. None of these is an outcome that could not have been predicted. All of them could be traced to flaws in the basic assumptions made in the 'design concept' of the programme.

In its strategy to salvage its investments, the Corporation hit precisely at these flaws. It offered to turn over numerous defunct tubewells to farmers in their commands provided they meet certain conditions:

- at least 11 farmers in the command had to approach the Corporation for a lease of the tubewell;
- 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;
- the promoters of the co-operative have to mobilise and supply a security deposit of Rs 5000 to the Corporation;
- the co-operative would manage the tubewell in the interest of its members with the help of hired operator who will be accountable to the Co-operatives management committee; and
- undertake such repairs and maintenance as may be needed to commission the tubewell and operate it.

If these conditions were met, the Corporation would hand over the tubewell to the co-operative on lease at a rent of 1 Rupee per annum.

The Corporation turned over a total of some 40 public tubewells in Kheda district and 150 in the state as a whole during the 1988-92 period. If there were expectations that farmers would come forward wholesale to cash in on this new opportunity, they were largely belied. In much of north-Gujarat (including the districts of Mehsana, Sabarkantha and Basnaskantha), farmer response to the offer was lukewarm. This was understandable because farmers there realised that, even with good management, they could not supply water to members at the low rates that public tubewells are doing now. North Gujarat public tubewells use 60-75 hp motors which attract the

highest electricity tariff rates under Gujarat's progressive flat tariff structure². However, since the Corporation charges uniform water prices throughout the state, there is heavy cross-subsidisation from water abundant areas to water scarce areas such as north Gujarat. In Kheda, the response to the Corporation's open offer was better. A total of 30 public tubewells were handed over to tubewell co-operatives; our sample includes 26 of these. Some of the tubewells so turned over ran into various problems and either became defunct or were taken back by the corporation.

The irrigation companies of Mehsana, on the other hand, represent a completely indigenous form of irrigation organisation. They are known to have been in existence for over four decades; new companies come up in sizeable 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 5-7,000 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, land holdings are large and farmers can afford, and prefer, individual tubewells.

Irrigation companies of Mehsana are informal organisations with membership ranging from 5 to 120, but with modal size of 25-40 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. 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

² In Gujarat, the power rates are linked to hp of motors as follows:
Rs 192/hp/year for all tubewells of less than 10hp
Rs 330/hp/year for tubewells between 10 and 20 hp
Rs 660/hp/year for tubewells over 20 hp.

This is progressive flat tariff because that rate per hp itself rises as the motor gets bigger. Before 1987, Gujarat had progressive pro-rata tariff, under that regime use of power up to a limit was charged at lower rate/kWH.

the 'internal locus of control' that companies enjoy - in principle and in practice - is amongst the most important features of their 'design concept' and something member-companies place a great value on, as we discuss later.

Preliminary Comparison

Table 1 presents some basic features of the two classes of organisation in our sample. In order to do this, we use average values as well as the range of values for the respective sample. 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. In reviewing the rest of the information, we need to keep in mind the fact that all Kheda co-operatives inherited tubewells which had already been established by the Corporation several years ago, and therefore had to make

		Co-operatives (Kheda)	Companies (Mehsana)
Sample size		26	13
Age* (years)	Average	2.53	6.15
	Range	1-6	3-17
Membership	Average	24.3	15.0
	Range	11-115	6-20
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	1465.1	2427.3
	Range	400-4200	1750-3500
Capital cost (Rs)	Average	n.a.	4.7 lakh
	Range	n.a.	4.2-5.9 lakh

* We refer here to the age of the organisations and not of the asset

no capital investment decision. In contrast, all of Mehsana companies began with a sizeable 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, and 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.³

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 a good irrigation service 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 insignificant one-time cost (of Rs 51); partnership in the 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 cost-less entry into a co-operative, most co-operatives we interviewed had a sizeable number of 'nominal' members who have enrolled either as a dummy member or in the

³ 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 delivered to higher lands thus unduly restricting effective command. Underground pipelines made the location of tubewell irrelevant, equalised effective irrigation cost regardless of location and made topographical variations immaterial.

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 the 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, in energy use and in water use, we focused our investigation on overall operating efficiency as an important element of organisational 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 organisation relative to the highest possible. We have used three criteria which seem important and on which data was easily available. The first is the number of acre⁴ waterings in different season. 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 organisation has no control over many of these - 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 organisations manage their facilities more efficiently than another, we would expect that their facility would be used more intensively. Thus we would expect that the capacity utilisation of the former class of organisations 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 over-riding 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

⁴ 1 acre = 0.4 hectares

Table 2: Comparison of irrigation performance

Irrigation performance	Co-operatives (Kheda) average per tubewell			Companies (Mehsana) average per tubewell		
	acre waterings*	hours per day	% of power** hours used	acre waterings	hours per day	% of power** hours used
rabi 1991-92	289.7 (13)	7.09 (26)	43% (18)	314.2	9.59	48.56%
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 pumpage (hours)		1843.9 (17) 1260-2450			2784.7 2000-3400	

* We have used acre waterings as a rough measure of the area irrigated. The number of hours of pumping taken for giving one acre water 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 of hours for which electricity was available during a given season.

The figures in parenthesis indicate the number of tubewells for which data was available on each item for analysis.

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 summer⁵ and since power supply tends to be scarcest and least reliable during summer, we suggest that the proportion of power hours that a tubewell used for irrigation would be a good indicator of its overall operating efficiency especially in summer. Table 2 compares co-operatives and member-companies on these three criteria.

Table 2 shows that, at least in our sample, member companies perform significantly better compared to co-operatives in terms of 'operating

⁵ *rabi* is the post monsoon season; 'summer' is the hot dry period, February to May.

efficiency' as we have defined it. True, in terms of acre-waterings, they fare poorly compared to 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 optimise 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% 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.

Economic Performance

In absolute terms, companies charged higher average water prices 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 Mehana. However, even relative to their respective competitors' price, companies charged higher than cooperatives. The average price charged by tubewell co-operatives was 15% less compared to the average price charged by private tubewell owners in their commands. In comparison, companies charged only an average of 4% less to their members than 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, although they certainly sell more to non-members than co-operatives seem to do.

Companies incur significantly higher operating costs than co-operatives. The prime reason is differential electricity charges. In the progressive flat power tariff structure, companies come in the penal rate-slab of Rs 360/hp/year. For example, a 30 hp tubewell would have to find Rs 10,800 for its electricity bill per year. A co-operative falling in the lowest bracket of Rs

192/hp/year would have to pay only Rs 5700⁶. 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 a 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.

Organisational Performance

In comparing the performance of co-operatives with member companies, we believe that primacy should be accorded to the purpose for which these organisations were created. It is reasonable to think that when a group of farmers come together to collectively create and manage an irrigation asset, their prime objective is to secure high quality irrigation service at a reasonable cost on a perpetual basis. We further propose that if the 'design concept' of a member organisation assures its members services they value in a manner that is consistent with member values and expectations, then

- it would come up on its own or with limited external effort;
- it will perpetuate itself by generating its own resources; and
- it will sacrifice, confront or mutate for self-preservation.

An organisation which has these characteristics provides the proof of its usefulness to its members by the very fact that it exists and perpetuates. In comparing the organisational performance of different classes of organisations thus the presence or absence of some or all of these can be indicative of their vigour and vitality.

⁶ In 1987, when 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 tubewells, 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 cooperatives which were made subject to the lowest tariff slab applicable to tubewells with 7.5 hp motors.

Table 3: Comparison of economic performance 1991-92

	Co-operatives (Kheda)	Companies (Mehsana)
Average hours of pumpage/year	1844	2785
% of pumpage supplied to members	82%	76.9%
Simple average of price/hours (Rs)	18.37	25.23
Price charged by private tubewell owners (Rs/hour)	21.67	26.23
Gross income Average/year (Rs)	~33,844	~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 organisations which reported accumulated reserves. While only 50% 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 as 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.

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' (self-created) organisations. No agency went to create them by offering incentives, managerial and capital subsidies, technical guidance and political support. They multiply and propagate themselves. New companies come up by the day, and all these are organised along the same lines as the earlier ones with few, minor variations. Tubewell companies are seldom known to 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 their 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 breathe 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...".

Several tubewell co-operatives in Gujarat have come up without an official agency playing 'parent' to them. Each of these, however, is a special case because of the presence of some resourceful individual playing 'parent'. Often this individual is one of the co-operatives potential member-users but stretching himself considerably beyond the call of duty as a potential member. Sometimes it is a local politician, an NGO or even people experimenting with broader collective ideals that plays 'parent'. Member-companies of Mehsana had no 'parents'; they were *swayambhoo* (self-created), and therefore more robust in their 'design concept'.

All co-operatives in our study were 'nurtured' by the Corporation. They were nurtured on 'special food' of zero capital costs, nominal lease rent and subsidised electricity. Indeed, one can legitimately raise doubts about whether these organisations came up for the same purpose as member-companies of Mehsana did. It is plausible, indeed very likely, that the primary motivation in co-operative formation is to secure the subsidies. Worse, in each case, it is possible that a large farmer mobilised 10 others to join him to acquire the lease on a valuable asset at extraordinarily low cost and effectively to privatise it to establish a lucrative private business in water sale.

Likewise, there appears no sign that the 'design concept' of tubewell co-operatives that the corporation has evolved by the corporation has begun to self-propagate. After four years of open offer, no more than 50 of the 3500 public tubewells under the corporation management have been turned-over. There is no evidence of any substantial interest amongst farmer groups to bring these assets under collective self-management. If anything, several efforts at takeover have failed and the lease been terminated. Finally, tubewell co-operatives in general have shown high propensity to

either fail outright - in which case the lease is terminated - or become defunct or near defunct because the original group has not been able to evolve effective mechanisms for problem solving and conflict resolution. As organisations, thus the tubewell co-operatives of Kheda are fragile and weak in comparison to the member companies of Mehsana.

The 'Design concept' of irrigation companies and tubewell co-operatives

Why should the tubewell co-operatives of Kheda perform poorly as member organisations compared to the member companies of Mehsana? After all, the technology available to both the classes of organisations is the same. The people too are the same. If member companies of Mehsana are dominated by the 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 in 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 subsidised electricity that the Kheda co-operatives enjoy. It is clear that what failed the co-operative is not the technology nor the economic possibility but the organisation and its 'design concept'. The problem must be traced back to the birth conditions, the bye laws, the *de jure* and *de facto* rules, norms and authority structure, and all the rest that constitute their 'design concept'. Perhaps the organisations to whom the tubewells are turned over are not designed to "provide their members with 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 two things:

1. existing institutions - individual ownership, public tubewell, water markets - were widely considered satisfactory; or
2. although the need is felt, farmers were not aware of a 'method' of organising that 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 privatise 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 organisation for tubewell irrigation is likely to find the 'conditionalities' attached by the Corporation oppressive and unworkable. According to the byelaws developed by the Corporation for a tubewell co-operative for example:

- registration of the co-operative under the Gujarat Co-operative Act is compulsory;
- share capital can not be raised except within the framework stipulated by the bye-laws which offer no incentive to a member to supply more than the minimum required share capital;
- borrowings cannot exceed eight times the share capital;
- funds have to be invested according to the provisions of the co-operative act;
- the chairman and the management committee cannot appoint, remove, punish or dismiss the manager without prior approval of the district registrar of co-operatives;
- members will have to put at least 50% of their land under food and vegetable crops (the violation of this will entail a penalty of Rs 25 per acre);
- net profit of the co-operative shall be applied in the manner prescribed by the bye laws, these require that 25% goes to a reserve fund, that dividend cannot exceed 12% and that compulsory contribution to the education fund is an increasing function of the dividend declared; that a member cannot get more than 5% of the value of water purchased by him during the year as a patronage bonus; that 20% of the surplus from profit must be assigned to an irrigation development fund which cannot be used except with the prior permission of the district registrar of co-operatives; that the bonus to the operator can not exceed on month's salary; and so on;
- the reserve fund can not be invested or used except with the prior approval of the district registrar; and
- 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).

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 conceptual as well as operational questions. The latter are the immediate,

'here-and-now' kind, and therefore more relevant. The registration of the co-operative would, for instance, require anywhere between 5-12 visits to the District Registrar's office in Nadiad. At least one co-operative we interviewed confessed that a bribe of Rs 1200 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. In 'nurtured' co-operatives, either an NGO or a resourceful, well connected promoter provides this invaluable service by taking over this process to complete which no ordinary farmer would have either the resources, time, energy or incentive to do.

But the hassle does not end there. In fact, this is the beginning. For 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 organisation that is being offered by the Corporation to farmers makes it difficult for them to first create the organisation 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. The 'design concept' does not even encourage, leave alone stipulate, that capital contributions by different members match their land in command. In one irrigation co-operative, the chairman and the secretary together control a fourth of the command; but like all other 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 number of stipulations (some described above) circumscribe the application of surpluses which depresses capital formulation and generates powerful incentives to pass on all surpluses to farmers in the form of low water prices. Declaring dividends is costlier than building reserves since dividends divert surpluses to education and other funds. However, 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 bye 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 - such as 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.

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 into either of two categories:

1. they are backed by a resourceful leader/NGO; or
2. 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 enrol 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. However, there is evidence that companies make substantial efforts 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's services by different members as stipulated by the equity principle of cooperation.

The organisational structure and processes of a member company too are strikingly similar to an idealised 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 or corrupt or careless operator. 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 to the hilt in doing so.

All companies we met claimed that in 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 instances 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 stakes 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 (Phansalkar and Srinivasan, 1992). 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 losses 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. This is smooth, trouble free management. 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 a 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 enrol 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 utilised to viable levels. However, conditions would become ripe for the birth of a member company where even large farmers are too small to:

- mobilise the capital needed to establish a tubewell;
- command enough of their own land to utilise the tubewell to viable levels; and
- 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' land holding in the command. The initial capital 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, subsidising 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, stabilised 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.

Management and Leadership

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' or exceptional managerial and leadership capabilities. Companies seem to need and utilise ordinary capabilities of farmers who are interested. People who end up doing the managing are interested because managing the

⁷ 'Extension motive' is loosely defined as the empathy for and motivation to help others

company's affairs is nearly like managing their own business. The coalescence of incentives and motives that this brings about seems widely recognised 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 stakeholder should be the manager.

Table 4: Profile of land holdings in the command

Land holdings 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	7.49	8.23
	range	2.5-16.0	4.0-14.0
secretary	average	6.37	
	range	3.5-15.3	
operator	average		3.25
	range		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 3 of the 26 co-operatives, for example, the chairman's landholding was less than twice the smallest holding in the command and each of these 3 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 whereas the operator in both cases operates the tubewell and distributes water.

Interestingly, in the case of Kheda's co-operatives, this scale bias in the choice of chairmen and secretaries was even stronger; as Table 4 shows, the average land holding of the chairmen of the 26 co-operatives was very nearly the highest amongst their respective groups. In fact, barring a few co-operatives, in the remainder the chairmen were the largest farmers in the command. The secretaries were also large farmers, and between the two the chairmen and secretaries of most co-operatives accounted for over a third

of the tubewell's command areas. These features 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 fanner groups of complex 'agency-type' problems that the Corporation's 'design concept' singularly lacked.

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 a short lease period, account for low propensity to save amongst co-operatives. 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 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-operative, for instance, sells water at an unheard of rate of Rs 4/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.

Conclusion

In this paper we have been concerned with understanding the conditions under which farmers create their own organisations for lift irrigation and manage their irrigation assets on a self-sustaining basis. We have been so interested in such spontaneous experiments in Mehshana and Kheda that we are not looking yet to see what is actually working in riskier conditions, and how these have developed independently or evolved from well-known projects.

Member-companies of Mehshana which serve the same purpose as the tubewell co-operatives of Kheda are superior farmer organisations from the viewpoint of their farmer members. They are more efficient in operational and economic terms. They are more robust and vigorous as organisations because:

- they self-create and self-propagate;
- they actively guard their design sanctity; and
- they adapt and self-correct.

Water companies are driven by their members' individual goals of appropriating and using groundwater for irrigation. They make groundwater development possible where it would not be if left to individuals. Hence, they may exacerbate the problem of over-development and make its monitoring relatively more difficult.

The primary features of their 'design concept' that account for their superior performance include:

- complete autonomy and self-governance;
- acceptance of the proportionality principle in capital contribution, land holding within the command, patronage, share in profits and in risk;
- implicit recognition of the agency problem vis-a-vis honorary manager as well as paid operator;
- vesting of all powers of the general body in the manager and the managing committee;
- costly exit.

Aspects of the 'design concept' that make tubewell co-operatives fragile and inferior farmer organisations include:

- limited autonomy;
- compulsion to get approval from district registrar and/or corporation officials for most financial and administrative decisions;
- violation of the proportionality principle so that small land holders are required to subsidise large holdings in capital supply;
- externally imposed rules of surplus application which strongly discourage capital accumulation and encourage unduly low water prices;
- myopia induced by the conditions of lease;
- low exit cost.

Will the turn-over scheme operate better if the Corporation agreed to consider companies with a 'design concept' similar to the Mehsana member-

companies? In our judgement it will, especially if it saves the members the hassles of getting the registrar's permission to do anything. The companies will perform even better if the Corporation raises the lease rent to Rs 10,000/month for example, 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 from 5 to 10 years.

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