Pro-Poor Access to ICTs - Exploring Appropriate Ownership Models for ICTD initiatives

Case Study of TeNeT - n-Logue - DHAN Foundation

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The Birth of an Appropriate Technology: Socio-economic Context of ICT R & D

In the mid nineties, as the world was being swept by new advances in information and communication technologies (ICTs), a group of technologists at the Indian Institute of Technology[1](IIT), Madras, saw great promise in the emergent opportunities for the developing world. They set out to find practical solutions in the power of new ICTs to extend telephony and Internet to those left out by the rapid market-led telecom expansion, especially in rural areas.

The Telecommunications and Computer Networking (TeNeT) Group[2] at IIT, Madras, went straight to the root of the problem. Existing telecom infrastructure equipment in India was imported from the west and based on foreign R&D. Obviously, technology R&D is situated in and appropriate for the business environment in which it takes place. Implants of technology into other contexts may not always produce the best results. As Prof. Ashok Jhunjhunwala, who leads the TeNeT team describes it,

> "…in the West, the cost of providing a telephone line is around USD 800. We use the same technology and it is not surprising that our numbers are similar. But this cost of USD 800 was reached in the West more than a decade back. There too, an operator needs between 35-40% of initial investment as yearly revenue to break even. However, this amounts to barely USD 30 per month and is affordable to over 90% of the homes. Therefore, homes in the West have been fully wired up quite some time back. Now, reducing the cost further no longer expands the market. Their R & D focus therefore naturally shifts to the replacement market, where more and more features and services need to be provided rather than lower cost products."[3]

The team calculated that in the Indian situation, on the basis of an average cost of around INR[4] 35,000 (USD 813) for laying one telephone line, the average monthly

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[1] A publicly funded technology institute in India, of world repute.

[2] Registered as a non-profit company. See http://www.tenet.res.in/wll/tenet.html.

[3] 'Making the Telecom and IT Revolution Work for Us' by Professor Jhunjhunwala, http://www.tenet.res.in/Papers/techolo.html

[4] Indian currency, Rupees; around 43 Rupees equals 1 USD

revenue required by a service provider was INR 1000 (USD 23.2). This was affordable only by 2 to 3% percent households in India. The team was clear that for situations obtaining in developing countries like India, a low cost telecom solution was necessary and could only come from local R&D, pursuing the objectives specific to the context, including of costs, usage, and operational constraints. For telephone connections to be made affordable to the vast majority of people, the cost per line needed to come down to around INR 10000 (USD 232) a line.

Since 70% of the telecom infrastructure costs were in the access systems, the team concentrated on this component. They developed a local access system based on a wireless technology called corDECT.

> "These small access systems (using corDECT technology) could be connected to a backbone telecom network. Such access systems would require low initial investment and could be operated very much like cable (as in cable TV) head-ends. A small entrepreneur could then serve a neighbourhood (either a few streets in an urban area or a few blocks in a rural area) and provide low-cost service in an accountable manner."[5]

Through corDECT, the average cost of reaching a phone line was brought down to around INR 11500 (USD 267). CorDECT enables simultaneous telephone and Internet connectivity.

> "With rugged design (that can work at 55 C), low power requirement of the central unit (at less than 1 KW) and a cost of only USD 250 per village, corDECT promises 35 to 70 Kbps (sustained or unshared connectivity). An upgrade in the near future could take this up to 100 or 200 Kbps (dedicated connectivity)."[6]

Taking a Technology to the Market - corDECT Meets Goliath

The TeNet group thought that since corDECT was much cheaper and suited to Indian conditions, the incumbent public sector telephony provider BSNL[7] would lap it up. But these committed technologists had just put their foot into the murky waters of telecom regulation and business. BSNL ignored corDECT, and preferred to import much more expensive systems, that were less suited to Indian requirements. In part, it was

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[5] Jhunjhunwala, op. cit

[6] ibid

[7] Bharat Sanchar Nigam Limited

ignorance fed by disinformation campaigns by telecom multi-nationals, and in part, plain bureaucratic ineptitude[8].

In the late 90's, as private telecom companies began expanding their networks rapidly in India, Professor Ashok Jhunjhunwala, became hopeful. He expected that private companies would go for the cheapest and most appropriate solution. Even as they struggled with the indifference of the public sector, the team soon realized that they were now up against bigger obstacles of the business world. For instance, vendor finance (advances offered by vendors to companies buying their equipment) played a big part in financing the telecom operators, and this made them lock themselves in to the technologies provided by big multi-national players.

All effort was made to kill or co-opt the corDECT technology, including significant buy-out offers. But the TeNeT scientists stood their ground[9]. Finally, they got their first acceptance in some other developing countries. Per force, BSNL also had to seriously take cognizance of the new technology option. Today, corDECT technology is used by BSNL and some other public and private telecom operators in India, as well as in many other developing countries.

Enthused by the great commercial success of corDECT technology (it earns the group annual royalties of millions of US dollars), the TeNeT group has become a prolific incubator of ICT and ICT-related technologies that are suitable for rural Indian conditions. They have developed:

- DIAS – Digital Internet Access System – This product employs Digital Subscriber Loop (DSL) Technology to provide simultaneous telephony and always-on, high speed Internet connectivity on existing telephone cables.
- A video conferencing software that works on very low bandwidths
- Local language interfaces and software
- A remote medical diagnostic kit, with the aid of which a doctor can do basic diagnosis online, and make appointments if required
- An ATM suitable for villages at a cost 1/20th of normal ATMs[10]
- A simple SMS and email device appropriate for low cost telecentres.

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[8] Jhunjhunwala, op. cit

[9] Jhunjhunwala's paper, op, cit, gives an account of how innovative telecom technologies that are not backed by the muscle of big companies have fared.

[10] For INR 35, 000 (USD 814) as compared to cost of standard ATMs at INR 700, 000 (USD 16, 300)

Professor Jhunjhunwala also spearheads the 'Centre For excellence in Wireless Technology' set up in the campus of IIT-Madras. The centre works with all possible wireless solutions for telecom connectivity including WiFi, WiMax, and some offshoots of GSM and CDMA technologies. Professor Jhunjhunwala speaks with a lot of hope for the future but also believes that it is necessary to go beyond the hype and actually explore the new wireless possibilities in the context of the conditions of deployment. This may call for local R & D for appropriate innovations. For example, though basic wireless equipment, like of WiFi, may have become increasingly cheap, the largest component of the costs in rolling out last mile solutions are actually towards the towers that raise radio equipment to line of sight[11]. Innovations here therefore need to grapple with local issues of topography, density of population, bandwidth requirements, affordability etc. The R&D at the Centre is actively engaged in addressing these issues for appropriate local wireless systems[12].

Appropriate Technology to Appropriate Business Model for Rural Connectivity

The TeNeT group, in developing appropriate technologies, owes its success in a large measure to the organic linkage that their work has with ICT-based interventions in rural areas. This provides the group not only with the right feedback on the kind of technologies and equipment that is most needed, but also enables a short feedback loop on what worked and how.

Even with the success of corDECT and other technologies developed by it, TeNet has not been satisfied just with producing appropriate technologies for ICT expansion in rural India. They had deduced that the high cost of the existing means of providing rural connectivity was due not only to expensive imported technology (an aberration that their invention and deployment of corDECT and some other technologies corrected), but also because of the high organisational costs of delivery by big telecom companies. Here they took their cue from the unprecedented rapid expansion of cable TV[13] in India which went from zero to 50 million within a decade.

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[11] In a very good example of public money pitching in a timely manner at the right place, the state government of Tamil Nadu (IIT-Madras is in Tamil Nadu, as is Melur and Madurai, where we studied the field project employing corDECT technology) plans to put tall towers at key rural hubs, which can be used for free by any wireless connectivity provider.

[12] See www.tenet.res.in/presentation/wwrf_jun04.pdf

[13] The cable market in India is mostly non-corporatised, and is in hands of individual cable operators from the communities they serve.

"Cable TV operators are small entrepreneurs (at least when they start providing the service). They put up a dish antenna and string cables on poles and trees to provide service in a radius of 1 km. The operator goes to each house to sell the service and collects the bill every month. He/she is available even on Sunday evening if any repair is needed. This level of accountability has resulted in less-trained people providing better service using a far more complex technology, than that used by better-trained technicians (of incumbent telecom companies) handling relatively simple telephone wiring. However, what is even more important is that such a small-scale entrepreneur incurs manpower costs several times lower than that in the organised sector. Such lower costs have been passed on to subscribers making cable TV affordable."[14]

Since incumbent telecom companies, even those that used corDECT, stuck to high-cost business models of delivery, TeNet decided to complement their local access technology solution with a business model that would provide connectivity at the lowest possible cost. They planned to set up a Rural Service Provider (RSP) to cater only to rural areas, and provide cheap telephony and Internet by employing the distributed business model like that of small private cable operators. However, getting a Basic Service Operator (BSO) licence for telephony was very difficult for small players under current regulations. Fortunately, regulation changes made getting an ISP license easy[15]. The group launched the company n-Logue, which calls itself a 'Rural Internet Provider'[16]. N-Logue uses corDECT technology and works on a decentralised business model, where local entrepreneurs provide the last mile connectivity.

Since n-Logue doesn't have a telephony license, even with a complete infrastructure in place, they are not able to provide telephony services for which there is substantial matured demand. Professor Jhunjhunwala has been actively advocating with the government for allowing RSPs to provide telephony services in areas which are not served by big players[17] (which means no telephony service in these areas since the present regulations only allow limited number of players to provide telephony). Instead of an improvement in the regulatory environment, in 2003, the new telecom policy,

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[14] Jhunjhunwala, op.cit

[15] Anyone could become the ISP by paying a token licensee fee of INR 1. However recently, under pressure from the incumbent public sector telecom player, BSNL, GOI has reversed the decision and introduced substantial license fees (INR 100 million - USD 2.2 million - licence fees, apart from 8% revenue share).

[16] N-Logue has mandated itself to operate in only rural and small town areas. Putting such a limitation on itself of course may appear to go beyond business sense and represents the development orientation of the company promoters.

[17] There have been recent moves in policy in favour of niche service providers.

under the guise of making a unified license (for all kinds of voice and data services, whether through wireless or fixed wire technologies) did away with the obligation for rural connectivity on telecom companies. The business prospects of n-Logue, which was partnering with some telecom companies to provide telephony through their RSP and help the telecom companies fulfil their mandatory quota of providing connectivity in under-served rural areas, suffered a further setback.

TeneT's strategy about taking telephony to rural masses through cheaper access systems and a decentralized private franchisee based business model was essentially sound, and would have succeeded. However, it was scuttled by bad regulation, whereby n-Logue could not obtain a license for telephony, and its prospects for tie-up with the license holder were rendered more difficult since new regulation removed obligations on them for providing certain minimum rural telephony coverage. The task of rural telephony was left to the public sector provider BSNL, which still has the option to reduce its costs by relying on n-Logue's decentralized private franchisee based business model. However, it chooses not to take the option, even though it has adopted corDECT technology in many places. Similarly, even though at a few places n-Logue does still provides telephony, as a franchisee of private telephony licensees, the latter, in absence of regulatory obligations, have not shown much inclination to expand the tie-up. There are several kinds of vested interests involved in major telecom companies' disinterest in partnering with a lower cost last mile access provider. [18]

All in all, n-Logue was left with few avenues to take telephony to rural areas despite having the cheapest technology solution and an infrastructure based on a low cost business model in place. This has left them with the option of only providing Internet service to rural areas. Things have been very difficult here.

Internet for Rural Users – Is there a Business Model Here?

N-Logue describes its business model in this manner. "n-Logue employs a three-tiered business model based on the belief that delivery and management of Internet services should devolve to the level of the supply chain that comes closest to the user of the service". This decentralised model of operation draws, in large part, from the success of cable TV operations in India.

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[18] Recently the regulator, TRAI recommended unbundling of the last mile infrastructure of all telecom infrastructure owners. However, Government of India, under pressure from BSNL did not approve the proposal.

At the top level is n-Logue, which provides equipment, training and support to a local entrepreneur (also called a Local Service Provider or LSP) and to kiosks serviced by the LSP, and also takes care of regulatory and connectivity issues. At the second level, n-Logue identifies and partners with the LSP in every area it plans to operate. These LSPs find subscribers, provide services and collect payments. At the bottom level are the village kiosks, which provide services and information aimed at the rural market. With the help of n-Logue, the LSPs recruit the local entrepreneurs who set up the kiosks"[19] .

N-Logue began with a lot of optimism. In an article in the year 2001, when n-Logue started operations in Melur (in Madurai district of the state of Tamil Nadu) the project co-coordinator, Elizabeth Alexander, captured this optimism, quoting a local TV dealer. When he was asked how he would use the Internet, the dealer had said, "Give me the Internet and I'll tell you what I can do with it"[20]. After 3 years, the reality on the ground does not show that Internet connectivity turns so directly into value for most users[21].

Reaching relatively affordable Internet connectivity to the end user was a big step, but this wasn't enough. It soon became evident to n-Logue that unlike telephony, Internet is far from a mature market. There were not many takers for Internet services.

Indeed, it was imperative to develop usage and services, delivering a variety of values, around the Internet. For stimulating and supporting usage and value delivery over the connectivity, it was necessary to develop, incubate and support services and applications, which however, are not merely technology and business processes as reaching connectivity is, but are much more complex social and socio-technical processes.

Some facts about Melur, Madurai

Madurai district is situated in the South of Tamil Nadu state and has seven blocks (a sub-district administrative unit) spanning an area of 3741 square kilometres. It is primarily an agricultural district with a density of about 733 persons per square kilometre. The district has a literacy rate of 79%.

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[19] http://www.n-logue.com

[19] http://www.tenet.res.in/Press/15022001.html

[21] N-Logue today operates in 7 Indian states, of which it is has a major presence in Tamil Nadu, Maharashtra and Gujarat,. Our observation and analysis here comes from a field study done in Melur, in Madurai district of Tamil Nadu, which is the place that n-Logue first set up its operation.

The Melur block of Madurai district has a population of about 200 thousand in over 80 villages, with a population density of about 289 persons per square kilometre. Around 78 per cent of the total population depends on agriculture. Labour migration is a common phenomenon in Melur. Several surveys have revealed that agricultural labourers find employment only for 65 to 70 days in a year. This had resulted in migration of labour to urban areas. West Asia, South East Asia and Africa are the most common destinations where migrants from Melur seek work mostly as unskilled or low skill workers.

Most ICT expansion thinking extrapolates the spread of telephones to the possibilities connected with Internet expansion. Though there are obvious parallels here, the differences are as critical, if not more. The only service over telephony is voice messaging - generally synchronous. The service is known and understood, and easy to adapt to. It has been in use for a long time now leading to a high degree of familiarity with the technology and its use. And as the network effect[22] takes root, the value is firmly established. From here on, it is only a matter of affordability.

On the other hand, the value delivery systems over the Internet, are yet to be established well, especially in the context of rural communities in developing countries. Though Internet offers a much greater range of value delivery compared to the telephone, these value deliveries, except for personal communication, and some means of information transfer, require the incubation and development of systems and institutional frameworks, which are essentially, social processes. The experience of n-Logue in Melur, bears out that since these processes take time, and conscious effort at a community level, a narrow profit mindedness may just not be the ideal atmosphere to incubate these social systems, and institutions.[23] [24]

N-Logue realized that to sell Internet in villages, it has to first sell Internet based services, and these services need to be developed and orchestrated by it. N-Logue entered into partnerships with service providers, for services like health, education and e-government. However, web based services even today generate little revenue at n-Logue centres, and Prof Jhunjhunwala agrees that these services have not picked up.

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[22] In case of telephony, the network effect simply implies that one has a certain number of other persons to relate to, who use telephones

[23] This is also borne out in the experiences of other profit-driven telecentre models in India.

[24] More importantly, the Internet's transformatory potential in most areas of human activity needs to be reached equitably to the poor and the disadvantaged, if we are to serve an inclusive rather than further an exclusionary agenda. These sections may just not be able to pay for the new services at market rates.

Most of the revenue to the private franchisee come from 'stand alone' computer-based services like education modules, job work, print outs, DTP, digital photography, and some from Internet use, chiefly for 'chatting', including voice chats (mostly negligible). These revenues have not been enough to cover the costs of these centre operators.

At Melur, n-Logue set up 29 kiosks through private franchisees. Our field interviews revealed that most of these private franchisees are incurring losses, and are unable to repay the loans they took. Most are not really operational at all. In fact, some franchises are extremely critical of n-Logue, and have gone to the police and courts alleging false promises. They had been assured that they would get business support including back-end linkages with many service providers, and that they would earn enough to sustain their family in the rural setting. But this has not happened and the franchisees do not know what to do[25].

It is important to place in context, the perceived failure of n-Logue in Melur. The bottom-line is that the Internet per se is a non-starter in these rural contexts. But then how has n-Logue been able to get so many people to invest their money and take its franchise? The reason for this is that telecentre businesses like n-Logue, when first announced, attract a lot of interest among rural and peri-urban youth since most of these appear like 'self-employment schemes' coming tied with opportunities for soft loans to buy equipment to set shop. Most of these interventions, including of n-Logue, have been designed in partnership with governments. There is a lot of educated unemployment in rural and peri-urban areas in the whole of India, and such easy possibilities of setting up a 'sunrise' business as promised are hard to resist, especially when the presence of the

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[25] n-Logue was not very forthcoming with actual data on how many centres were running successfully, and their bottomlines. The assessment here is based on field interviews in Melur. One good indicator of the number of operating private franchisee centres would be the number of the operators who turn up for the quarterly ICT centre operators' meeting in Melur. Only 1 to 4 of the n-logue operators have been turning up as compared to almost the all of 37 operators belonging to a local NGO also operating ICT centres in Melur (discussed later). n-Logue has also faced problems of private franchisees going to the police and the courts in the neighboring district of Erode. These experiences have been described by a centre operator in the 'India e-gov' discussion list dated October 5, 2004, and also catalogued by C. Umashankar, senior government bureaucrat and an e-governance expert (India egov list, October 8, 2004) (http://groups.yahoo.com/group/India-egov/).

government partner, directly and indirectly as a facilitator of bank loans, gives the offer much credibility[26].

The CEO of n-Logue offers other reasons for the situation at Melur. He told us that the places where they have moved recently have more "enthusiastic" franchisees (implying that the older ones, like in Melur, who may be incurring losses are not good entrepreneurs). But the actual reasons for the failure of the business lie neither in n-Logue's false assurances (as perceived by disgruntled franchisees), nor in the lack of entrepreneurial capabilities of old franchisees (as claimed by n-Logue). The truth of the matter is elsewhere – that the applications, network of services, and the social processes and habits that are needed to be built for the Internet to reach its great potential in rural areas cannot happen in the short-term profit, commercial-minded environment of a private enterprise, where the entrepreneur is guided only by profit, and a purely business outfit like n-Logue. Obviously, the older franchisees have waited long and nothing has happened, while the new ones still believe what they have been told.

Making Connectivity 'Valuable' to Rural Users

As described above, most of the current revenue of n-Logue franchisees is from stand-alone computer services. Much of this comes from village students willing to spend some money on learning basic computers. This market can level off fast after an initial spurt. However, other computer based education courses have greater scope. But in this much depends on the capabilities of the centre operator. Job work, print outs and some digital photography, together with revenues from education, often does not add up to pay back the loans taken to set up the centre.

Both for impact on the community, and for revenues, services that leverage the Internet are most crucial. A video-conferencing software, developed by the TeNeT group, which works on low bandwidth, is being seen as the likely killer application. Face to face interaction with service and information providers in areas of health, education, government, law and agriculture has found much favour with the villagers where video-conferencing has been tried out by n-Logue and others in Melur.

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[26] Private telecentre businesses built on such promises and hopes, that do not get supported by services orchestrated by a suitably strong and otherwise capable agency, have been crashing all over India. See the story 'Systems error at Bengal cyber kiosks' carried in the 'The Financial Express' (23-12-04) about one such 'scheme' where private franchisees have been left suffering huge losses after setting up telecentres on promise of services support of an Indian state government that did not come through. (http://www.financialexpress.com/fe_full_story.php?content_id=77669)

However, n-Logue is facing difficulties in promoting these video-conferencing based services and developing revenue models around them. There is an incubation period for the development and maturing of such services, and in the interim, villagers cannot easily be expected to pay money to sit through a chat with an agriculture expert, or a government official, informative as that may be. Even in the case of health consultations and school curriculum based remote-tuition - areas where value delivery is relatively straight forward, services are taking time to pick up. And in the interim, they may need to be provided free. (It is another issue that the poorer sections may just not be able to afford fees for such services even when they have matured.) And the private operator is not very keen on having his place run as a laboratory to mature social processes, when no cash is flowing in.

Another area, apart from video-conferencing, where e-services have the potential to achieve some success is in e-governance. And the general experience in all ICT initiatives is that a fruitful delivery of these services also requires a pro-active, community-oriented role to be played by the centre operator.

When n-Logue began its operation in Melur in 2001, with 29 private operators, it also partnered with DHAN Foundation, a local NGO, to run some centres. In fact, both n-Logue and DHAN centres were part of a pilot project, named SARI (Sustainable Access in Rural India), which was a partnership also involving the government. DHAN is a grassroots NGO, which has been working for decades in the rural areas of Madurai district on issues of rural development through self-help groups (SHGs) at the village level. It works closely with the community, in a participative manner, on a range of issues like micro-finance, agriculture development etc. DHAN set up 37 ICT centres to bring the gains of the new ICTs to the excluded rural people, and especially use ICT opportunities in the areas DHAN already works in. Additionally, DHAN also installed Internet-enabled computers in 2 colleges, 8 high schools and two SHG offices in the community.

Though DHAN centres at present still take connectivity from n-Logue, relations between n-Logue and the Foundation are under strain. The management of n-Logue believes that NGOs in general do not make good partners in pushing the 'business', and that centre operators set up by NGOs like DHAN, do not have the initiative and drive because they are supported by the Foundation, and not completely dependent on the revenues to stay afloat.

DHAN Foundation, on the other hand, believes that n-Logue is a connectivity provider, and should stick to this job, and that it is not competent to develop community-oriented services in the rural areas. It feels that the company interferes unnecessarily in services development, which is a very localized and community oriented activity, and that DHAN is best left to do this on its own. And since DHAN doesn't take services support from n-Logue, and only takes the connectivity solution, they would like to get a discount (on the general connectivity plus services package for centre operators) on the cost incurred, which n-Logue doesn't give.

In fact, Seenivasan, of DHAN Foundation says:

"We are ready to buy the local access system equipment and run the local Intranet, as well as directly buy Internet connectivity from the backbone. N-Logue can provide vendor support on its technology and equipment. We cannot understand what else their role is. As for maintenance, basic technical expertise comes cheap in our area, and we can recruit some people to maintain the system."

DHAN Foundation operates its centres on a model different from n-Logue's private franchisee model. This approach, which is community oriented, lays limited emphasis on profits. The equipment at every centre is provided by the Foundation. DHAN also pays the operator INR 1000 (USD 22) a month, which supplements the revenues that the operators earn from providing services through the centre. DHAN has identified this amount as the sum needed to subsidize the operator in the period when services and the market for them are being developed. DHAN provides regular training and orientation to the centre operators, and also all kinds of support, which may be needed, including of maintenance.

While we found that the n-Logue office in Melur concerned itself mainly with attending to technical issues of providing connectivity, and collecting charges, the DHAN office which is in charge of running IT centres (DHAN calls it the "Resource Centre") acts as the hub for organising varied activities at the centres. It not only develops and supports various services, and help the centre operators market them effectively, it also develops local content for these centres and provides regular capacity building to the centre operators. The DHAN Resource Centre also organises DHAN staff and centre operators to go to colleges and schools where DHAN has installed computers to help with computer based education. In some villages, panchayats (village self-government bodies) also use DHAN centres for job work , and DHAN also encourages its SHGs to use the computer facilities at the village centres, and trains them for this purpose.

Many centre operators are daughters of the members of various self help groups that DHAN has facilitated, or are otherwise connected to DHAN's work, and belong to poorer and disadvantaged sections of the community. Obviously, this approach is different from the way n-Logue selects operators. For the latter, capacity to invest in setting up and sustaining business is a fundamental criterion in the selection, and this often means someone from the elite sections of the community. For DHAN, on the other hand, promoting equitable access to ICTs and the integration of ICTs with their basic organizational strategies and activities are the priority areas. Providing an opportunity to someone who is disadvantaged, to run the centre, is only a step to this larger objective.

The DHAN operators are directly dependent on the Foundation, and thereby obliged to it and to the general community to have a community service attitude. Often, the Foundation gets the operators to go from house to house, to develop community data bases, and organize other community services like information dissemination. During the house visit, the operator is also able to explain the nature of services available at the centre and encourage the villagers to come over and avail of some of these services. Since the operator is visibly engaged in community service that is evidently not self-serving, and also carries DHAN's credibility in the community, it is relatively easier for her to get the villagers over to the centre.

The Foundation also arranges with service providers for video-conferencing with villagers every day of the week, on a pre-advertised timetable, (a doctor one day, an agriculture expert the next, a government official on the third, and so on). And the DHAN centre operators are obligated to provide free video-conferencing service[27] to groups that turn up. Usually, the service provider at the video-conferencing also provides the service pro bono. It is obviously easier for DHAN, with its credibility and long record of community service in the area to get these service providers, than it is for n-Logue to come and deliver such free services. DHAN also keeps close track of pressing community needs in shaping the services at the centres, something which comes naturally to DHAN since its functioning is based on self-group groups involving themselves in a range of community activity. In 2004, the area received abundant rainfall after many years of drought and there was a lot of demand for agriculture related information. DHAN arranged frequent video-conferences with agriculture experts to meet this demand.

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[27]Since the service provider for video-conferencing is often connecting from within Melur itself, the video-conferencing can proceed without use of Internet bandwidth, from within the n-Logue's corDECT wireless Intranet connecting all the Melur centres.

In Melur many men work abroad, chiefly in West Asia, leaving their families behind. International calls are expensive, and it is easier to 'chat' over computers. However, most women folk in these families are from poor backgrounds and it not easy for them to begin using chat facility on computers. DHAN centre operators have been giving free training and trials to these women for chatting, including through video mode. Though this video mode of communication is richer than mere telephony, it is new, and villagers are still taking time to adapt to it. Ironically, a soft, community oriented approach gives better marketing results in the typical rural personal interactions-based community conditions, rather than the kind of hard-sell on a commercial pitch that n-Logue's private franchisees are encouraged to do. It is also not easy for a relatively well-to-do operator, as most franchisees of n-Logue are, to go house to house in the village to explain the services, and given the evidently self-serving motive, neither is the context very conducive to sell new propositions and services.

DHAN Foundation, while supporting community objectives, is also able to harness the entrepreneurial energy of the operators because it has created proper incentive structures to capture such enterprise (since the operator retains the revenues from the services offered). The Foundation keeps a close eye on the revenue flow, as well as the working of the operator. DHAN centres also provide other services available at n-Logue centres such as job work, DTP, computer education, browsing etc, which are sources of some revenue to the operators. Centre operators are encouraged to be innovative to increase their revenues, and DHAN provides all support in this regard. It is planned that when the revenue has risen sufficiently for the operator to support herself, the INR 1,000 (USD 22) subsidy will be phased out. Already, 4 centres operator have been identified as approaching this stage.

A comparative picture of n-Logue- private franchisee ICT centres and DHAN ICT centres in Melur

	n-Logue– Private Operator	**DHAN Foundation**
Connectivity	Provided by n-Logue through wireless (corDECT), using low cost decentralised business model, and is affordable	Provided by n-Logue through wireless (corDECT), using low cost decentralised business model, and is affordable
Initial investment in equipment at the centre	By the private operator, through bank loans	Put in by DHAN Foundation

Choice of centre operator	On basis of financial strength	Made by DHAN from among those with linkages with its community development programs
	Mostly from stronger sections of the community	Mostly women from weaker sections of the society
Incentive for centre operative	Revenue from centre operation	Revenue plus stipend from DHAN
	Revenue are insufficient to cover costs	Stipend bridges the revenue - cost gap
Development of services	By n-Logue	By DHAN
	n-Logue not very successful, because most services need development and incubation periods in which revenues models may not exist.	DHAN is able to invest conscious efforts to develop and incubate useful services
	Not found efficient since linking with public service providers not easy for a business organisation	DHAN has community credibility and is able to get service providers to cooperate in the development and provision of services
Marketing of services in the community	By n-Logue and private operator	By DHAN and the centre operator
	Not very successful because of a short-term profit oriented approach, often inappropriate in rural community contexts	Successful – DHAN has community credibility, and the operator undertakes home visits and also does community work like building databases for village resource mapping, disseminating useful information etc.
Orientation and objective of activity	To get enough revenues to sustain self, pay back loans and pay for connectivity to sustain other levels in the n-Logue value chain	To provide services useful to the community, and as far as possible also to increase revenues for improved sustainability
Services offered	Those which have clear revenue models –computer education, job work, print-outs, digital photography, browsing etc	Apart from all revenue based services, community services like video-conferencing with service providers, useful local content, useful information dissemination, computer education in schools, community

		database building, supporting SHG and village self-government activity etc
Present Status of ICT centres	Since revenues are not enough to cover costs, only a few (less than 10 out of 29) centres are still operating	Almost all the 37 centres are operating and serving the community and developing new services, though revenues are still not enough to cover costs. DHAN plans to phase out monthly stipend as and when revenues are sufficient.

MSPs – the Crucial Community Control is Important

The TeNeT-n-Logue-DHAN story gives us important and interesting lessons in the matter of reaching the benefits of ICTs to rural areas, that may be under-served, and to the poor and the disadvantaged in these areas.

- Appropriate technologies may need to be developed and incubated locally in developing countries, because those imported from the developed nations may not be suitable to local conditions and also not cost effective enough.
- Developing these technologies is best achieved when the technology R&D keeps close organic contacts with ICT efforts in the field.
- Wireless local access solutions may be the best way to reach connectivity relatively inexpensively to widely dispersed/ far-flung rural areas.
- Apart from appropriate telecom technology, especially of local access systems, an open, competitive and un-regulated last mile 'business model' of connectivity needs to be encouraged by the regulatory bodies. This will lower costs of connectivity.
- Just providing Internet in most rural communities does not automatically convert into value for the community. It appears that most ICT-enabled value deliveries, even if their transformatory potential is immense, will need to be mediated through development of new systems and institutional structures, as well as personal habits, which are social and socio-technical processes. These processes take great commitment, time and effort to be built.
- The interests of the poor and disadvantaged need to be protected, as well as actively promoted, through pro-active strategies in all stages – from developing appropriate technology and devising services to ensuring equitable access.

As we have seen above, there are a series of important steps in any sustainable and large-scale effort for reaching the benefits of the ICTs to excluded or marginalized communities. And there are important considerations to be kept in mind at each step. The case study also tells us how institutions and stakeholders interplay at each stage or link of the value chain (appropriate technologies – local access connectivity – services development – community interface), and these interactions can throw up a variety of results.

While the optimal institutional and ownership structure for each link or stage in an initiative for extending the benefits of ICTs to disadvantaged sections and communities may vary contextually, a few general lessons do get established here.

It may often be necessary to pool the competencies of more than one institution and stakeholder across the spectrum of private, public, NGO and community bodies. While it is often necessary to capture the enterprise and resources of the private sector for its virtues of innovation and accountability to parameters of efficiency through appropriate partnership structures, it is almost invariably necessary that the crucial control of the partnership structure lie with a body that is accountable to the community. Such a structured involvement of the community is a necessary condition for ensuring the interest of the poor and the under-privileged.

The TeNeT- n-Logue - DHAN Story: Ownership Issues at Each Link of the Chain

The need for a community oriented ownership, that ensures accountability to the community, at each link of the value chain involved in carrying the benefits of ICTs to rural areas and to disadvantaged sections is borne out at all stages of the TeNeT – n-Logue - DHAN story. The impulse and drive for creating appropriate technologies that could reach connectivity cheaply to rural India came from a publicly funded academic institute and not from any of the multi-million dollar telecom R&D centres of private telecom companies, even after regulation had thrown the Indian market wide open to the private sector. And not only that, even when the TeneT group came up with corDECT, private companies did everything possible, to undermine the technology by lobbying governments, through disinformation campaigns, and even buy-out attempts.

These telecom companies, in the face of weak regulation, also preferred to default on their rural connectivity obligations and pay penalties to regulators (which are very low compared to the 'losses' they would incur in connecting rural areas), rather than fulfil

their obligations. And, later, when changes in the regulatory regime freed them of such obligations, they have shown little interest in partnering with n-Logue to use their telephone licenses for cheaper rural connectivity. In doing so they are ready to forego profits that n-Logue will have shared with them just for using their licenses, in areas that they are anyway not interested in. In fact, with the advent of the new regime, they have even scaled back existing partnership commitments with n-Logue. Cheaper service models, which rely on last mile competition, do not suit these vertically integrated telecom companies, who prefer to make their money from oligopolic privileges. Unfortunately, the public sector provider (BSNL) often looks to protecting its turf, in a similar fashion as these companies, rather than focus on public interest objectives. These objectives will be better served with lowering costs of delivery through a distributed last mile or local access business model, at least in under-served rural areas where in any case the BSNL does not make much revenue.

Even though n-Logue strongly asserts its private sector identity in its operations, it is important to remember that the company was born out of the concern of the   TeNeT group, a group of public spirited academicians, to reach benefits of the new ICTs to rural areas. The company is still owned and controlled by TeNeT. This background is visible in the fact that n-Logue forbids itself from doing Internet business in big towns and cities.

But when the profit motive becomes the sole driving force, as in the case of n-Logue-private franchisee attempts in developing ICT-based services, the failure to serve long term community interests, especially of the poor and the excluded, begins to become clear. Under such conditions, when the markets for a service may be immature, and crucial community interests may be involved, public/community-based bodies are more appropriate to play a central role[28].

The experience at Melur shows that the centres and services networks[29] owned and run by community based bodies that co-opt private enterprise through institutional mechanisms, succeed much better than private services networks supporting private operators not only in providing equitable access to these services, but also for;

1. incubating social and socio-technical processes and systems for developing Internet based services and community habits, and

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[28] Currently n-Logue is concentrating a lot on the state of Gujarat, where its activities have a very strong government role and participation.

[29] Network of ICT-based services that develop and deliver a variety of services, sharing some common infrastructure, management and linkages to service providers.

2. providing a complete range of ICT-based services useful for and needed by the community (even those with immature or non-existent revenue models).

A central role for a public or community body therefore appears to be very important in developing ICT-based services that meet crucial community needs, while also addressing issues of equitable access.

Role of Private Enterprise

The case study also shows that private enterprise almost always has some important contribution in ICT initiatives. The TeNeT group, though essentially controlled by the public spirited technologists, works much of its R & D today through companies set up in the IIT-M campus on venture capital. (Though it would be pertinent to say here that most of this venture capital is contributed by the alumini of IIT, Madras, working abroad, and this funding has some public service orientation).

N-Logue's experience with a distributed business model involving community based entrepreneurs also indicates that given a good mature market for connectivity, i.e. if there is sufficient established demand (as there is for telephony), the local community based entrepreneur can be very useful for providing connectivity at a relatively affordable price. It is a different issue that n-Logue found that such matured demand for the Internet, even at relatively affordable prices, just does not exist in most rural areas.

The model used by DHAN Foundation for its ICT centres show that even as crucial community control of ICT initiatives is essential for fulfilling community objectives, appropriate structures that capture the energies of private enterprise are very useful.

The typical flip side about the role of public institutions, non- government organisations, and other community representative organisations is that there can be significant problems of accountability and of promoting and handling innovation. Professor Jhunjhunwala is sore about the strings that come tied with government funding of R&D. He says categorically, "our real work started only in 1995, when we stopped taking government funds for research, and began to rely solely on venture capital for incubating commercially viable technologies". The disenchantment with government funding for technology incubation projects comes from the experience of inept interference by the bureaucracy which constraints sustained effort.

The role of the regulatory bodies as well as of the public sector telecom company, both meant to protect public interest, has also been very unhelpful in the case of n-Logue, which has sought to extend connectivity at affordable prices to rural areas, which is clearly a public cause. And many NGO and government-run telecentres, in various ICT initiatives all over the world, are known to be very un-enterprising in developing services and promoting their use in the community. E-governance is often the key service that can provide a lot of initial support for telecentre activity in rural areas, but due to absence of accountability frameworks, many government officials are un-cooperative in extending and supporting these services.

In such cases, enterprising private capital, working in structured partnerships with public and community bodies, exerts pressure for extracting accountability from its partners, because the private player has to keep his profits going, and profits may depend on every partner doing their bit for the ICT initiative to work. Such a cross-sectoral accountability framework is especially useful to ensure that the various branches of the partnering government keep playing their crucial role in ICT services extension to rural areas with sufficient effectiveness.

Role of Government as the Major Development Agency in Rural Areas

The pull of accountability from private partners in an MSP for the effective involvement of government agencies will however work only if senior government officials have considerable stake in the ICT initiative, and believe in its vision. When the ICT initiative at Melur was launched in 2001, as the SARI project, the district government was very enthusiastic in supporting n-Logue and DHAN, and it not only provided backend support to e-governance services, but also put in much effort to make the initiative a success. However, with change in officials the support has faltered. At present, while DHAN (and to some extent n-Logue) is very active in developing the centres and the services network with the resources at its command, the local government at the district level appears to have all but withdrawn itself from the project. We found hardly any evidence of government support. There is very little support for e-governance services, and there is no formal or informal mechanism at the district office level for nurturing the ICT initiative.

Real and sustained value delivery over an ICT infrastructure first and foremost requires institution building over new ICT possibilities, whether it be in the area of governance, health, education, livelihood support, or even access to markets. It is unlikely that an NGO like DHAN can do much more than it already has in this direction, without greater

support from the government. DHAN is playing its role well on the community side, making the community aware of ICT possibilities, developing the community's capacities and stimulating other bottom-up processes. However, it is now imperative that the government, as the largest development agency, gets its act together to build necessary ICT-based institutional interventions in key areas of development.

Unfortunately, the state government in Tamil Nadu, at present, seems to be taking a ''hands off" attitude - trusting that reaching connectivity to various parts of the state, together with some private or community enterprise working for developing services, will be sufficient to get the benefits of the new ICTs to all. The government through a government order has declared the SARI project a success and is rolling it out in all districts. But if the SARI experience at Melur, which was the pilot project, is anything to go by, the implication is that the government expects private entrepreneurs or some other non-government bodies to do all the hard work of institution-building, required for sustainable rural ICT initiatives. The government does not seem to believe that it will need to actively involve itself in developing services and institutions for this purpose. However, the experience of other states in India, where rural ICT initiatives have been much more successful[30] seem to suggest that a sustained effort by the government is very important, perhaps irreplaceable, for this purpose.

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[30] In Kerala and Andhra Pradesh; the rural initiative of these states are presented in two other case studies, accompanying this one.