
TAKING INTERNET TO VILLAGE

A CASE STUDY OF PROJECT AT

MADURAI REGION

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TABLE OF CONTENTS

GLOSSARY AND CONVERSIONS	1
1.0 INTRODUCTION	2
1.1 Connectivity in Rural India	3
1.2 The n-Logue Business Model	4
1.3 SARI Project	6
2.0 OVERVIEW OF THE MELUR PROJECT	8
2.1 Melur — Socio-economic Profile	9
2.2 Launch of the Project	9
2.3 Expansion of the Project	10
2.4 Kiosk Operations	14
3.0 CASE STUDIES FROM MELUR	15
3.1 Padinettankudi – The Digital Teashop.....	15
3.2 Keelavalavu – The Information Quarry	19
3.3 Vellalur – A Costly Mistake	23
3.4 When do kiosks work?	25
4.0 APPLICATIONS AND SERVICES.....	26
4.1 Melur – Specific Applications and Services.....	27
4.1.1. E-Government Applications	27
4.1.2 Agricultural Extension Services	30
4.1.3 Veterinary Services.....	31
4.1.4 Eye care	32
4.1.5 Other Services.....	34
4.2 Implementing Applications.....	35
5.0 OPERATIONAL EXPERIENCE	36
5.1 Applications drive revenues.....	37
5.2 Who are these kiosk operators?.....	39

6.0	SOCIAL CONSIDERATIONS	40
6.1	Initial observations about who is using the kiosk today	40
6.2	Impacts on Poverty Alleviation	41
7.0	CONCLUSION.....	43

Glossary and Conversions

District = Sub-division of a State

Taluk = Revenue Sub-division of a District

Tahsildar = Administrative Head of a Taluk

Pacca House = a house built of brick walls and a tiled roof

Kaccha House = a house built of mud walls and a thatch roof

Chullah = a cooking device that uses kerosene or firewood

Conversions

1 crore = 10 million

1 lakh = 0.1 million

1 million = 10 lakhs

1 billion = 100 crores

US \$1 = Rs. 50 approx.

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1.0 Introduction

It is increasingly getting recognised that the Internet is not just a means of communication but is POWER. It is an enabling technology – it can enable people and communities. It can become a powerful tool in the hands of the deprived. By the same token, denial of Internet access could push communities further behind; in this fast changing and competitive global economy, those without Internet access would not stand a chance of protecting their rights.

While the developed world has some pockets of have-nots, it is by and large connected. This is not so for the developing economies. For example, a country like India with 1 billion people, hardly has 40 million telephones and just over a couple of million Internet connections. The key to this lack of connectivity has been the high cost of infrastructure (in the order of \$1000 per telephone line), which is affordable only to a few percent of people in countries like India. Fortunately, it is increasingly getting recognised that infrastructure cost per line has to come down to around \$200 for reasonable affordability. Further, developments in technology coupled with certain focused efforts in India and China are indeed bringing down the cost towards this target, even though much more remains to be done over the next few years. China's teledensity has grown considerably and India and other developing countries will significantly increase their teledensity in the next few years.

However, it is likely that this increase in teledensity may largely be confined to urban areas of these developing economies. Telecom operators in these countries continue to believe that rural areas have too dispersed a population and rural people have too little money for rural communication to be a viable and profitable business. As a result, their business focus, choice of technology, operational model as well as hearts and minds are focussed only on urban areas. If regulators force them, they dump the minimum required in rural areas – rural connectivity is definitely not a business proposition.

This belief becomes especially problematic as the Internet develops into more and more of an enabling technology. The Telecommunications and Computer Networking (TeNeT) Group at IIT Madras (India) believes that it is not just important to provide Internet in rural areas of developing economies, but it is possible to make it a **profitable** business venture. After all, not only do most of the populations of these countries live in rural areas, but rural areas also contribute a significant percent of the Gross Domestic Product. However, it is

clear that to make rural connectivity a profitable venture, one has to **think and act** RURAL. Armed with this belief, the TeNeT group has incubated a company, n-Logue Communications Pvt. Ltd., with the sole aim of providing telephone and Internet in villages of India. By charter, n-Logue will not operate in urban areas, but will focus entirely on rural areas.

1.1 Connectivity in Rural India

India has 650,000 villages and a few small towns. Villages are defined in India as those habitations where nearly two-thirds of the population is engaged in agriculture-related activities and where the population is below 5000 people (according to the 1991 census). The total GDP of rural areas is about Rs. 600,000 crores (US\$120 billion). Unlike many other countries, the rural population density in India is high with the average being 250 people per sq. km. Fig. 1 provides the rural population density of major states of India. While several states have density over 400 persons / sq. km., even the five lowest populated states (Gujarat, MP, Rajasthan, North East and Himachal Pradesh) have a population density between 120 to 200 persons / sq km.

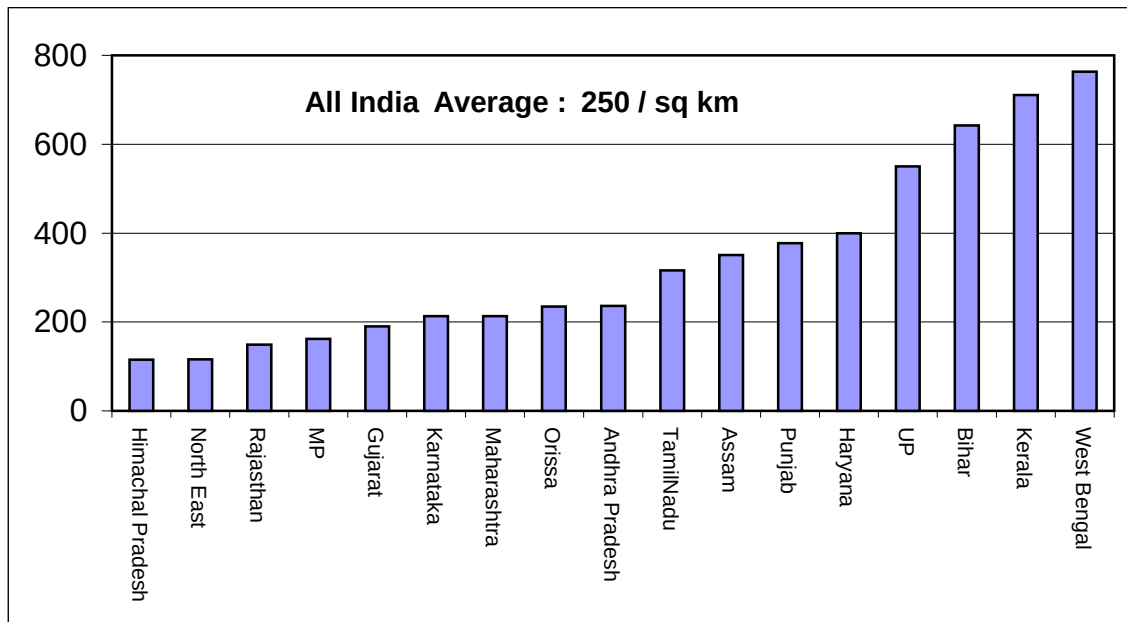


Fig. 1 Rural Population Density in India is High

Further, Indian rural areas have fairly good fibre connectivity. Bharat Sanchar Nigam Limited (BSNL), the incumbent state owned telecom operator, has 25000 exchanges, which it classifies as rural. 70% of these exchanges are connected on fibre. As the rural area of India is about 2761 thousand sq km, there is on average **a fibre connected rural exchange for every 150 sq km of rural India**. Thus, a wireless system with 10 km range, if installed at existing fibre-connected exchanges would cover 80-85% of the villages of India. Also, if one separates the

sparsely populated rural areas, the 10 km radius around the exchange would have 80,000 persons. If a net connection were to serve 500 persons on the average, 150 connections would be required in this 10 km radius. The key is to design a telecom wireless system, which would provide as low as 150 connections within a 10 km radius and still be economically viable.

The 15-20% of India, where density of population is less and fibre connectivity may not be available in the neighborhood, requires a different type of telecom connectivity solution. The TeNeT group is involved in the development of what is known as Sparse Area Communication System (SACS) for such areas. This, however, will not be discussed further in this report.

1.2 The n-Logue Business Model

n-Logue Communications (Pvt.) Ltd. is a telecom operations company with the aim of providing telephone and Internet services to rural areas in India. It leverages the fact that fibre reaches over 85% of **taluka** headquarters in India. It uses corDECT Wireless in Local Loop System developed by IIT Madras and Midas Communications Tech. (Pvt.) Ltd., Chennai, India. CorDECT can connect the fibrised taluka headquarters to villages around a radius of 25 kms. The corDECT system can provide simultaneous telephony and 35 kbps dedicated Internet (70 kbps premier service) to each connection in the area.

n-Logue's business model is based on two of the biggest entrepreneurship successes in the recent past in India. One of them is the operation of STD-PCO booths (operator assisted public call offices). Today, there are 950,000 such PCOs run by small entrepreneurs. These PCOs contribute to almost 25% of telecom revenue in India and about 30% of the Indian population regularly uses them. n-Logue's kiosk model is based on this PCO business. The second entrepreneurship success in India is that of cable TV operators, where a small business provides cable service to 100-300 households at a very low cost. n-Logue uses a similar kind of business unit, called Local Service Provider (LSP) to provide services to kiosks in a service area.

More specifically, n-Logue's business model is based on a decentralised model of operations where the delivery and management of the Internet service devolves to the level of the supply chain that comes closest to the user of the service. Thus, there are three business entities involved in the operation - *n-Logue*, an *LSP* or *Local Service Provider* and a *Kiosk Operator* and all three must thrive for this endeavour to succeed.

In every place it wishes to operate (called a service area), n-Logue identifies and partners with a local entrepreneur (LSP). It is the LSP who carries out operations by maintaining computer and communication systems and establishing

connectivity in the villages. Based on the cable TV operator model, these entrepreneurs make the business of spreading Internet awareness much faster, and a more fleet-footed operation because they belong to the local area. n-Logue and the LSP set up an Access Centre with corDECT equipment in a small town and provide Internet connectivity to every village in a 25 km radius around the area. An Internet kiosk (community-based access point) is established in collaboration with a local village entrepreneur in each village. The kiosk runs like the widespread PCO booth. These kiosks are the actual interface between n-Logue and most of its customers.

Kiosks are run by self-employed small entrepreneurs who buy a complete kit for Rs. 50,000 consisting of the following: a computer, a Wall Set and accessories to connect to the Internet, a telephone and a PCO meter, a printer, an Uninterrupted Power Supply (UPS), local language software, web camera, a CD drive, speakers and microphone. n-Logue facilitates loans for the purchase of equipment and the operator has to find a centrally located place in the village with an electricity connection and some furniture. Each month the kiosk pays n-Logue and the LSP for using Internet time and in turn sells Internet based services to villagers. The kiosk operator also provides telephone service and stand-alone computer services in the village.

□ **Fig. 2 Roles of the Various Players in the n-Logue Business Model**



Some Internet connections are also provided to private institutions and individuals, government offices, public health centers, schools and other organizations in the local service area. Users pay for Internet time on an hourly basis and this is the second main source of revenue for the LSP and n-Logue.

n-Logue has an all India Internet Service Provider (ISP) license to carry out this Internet business. Further, it ties up with a Basic Service (telephone) Operator to provide telephone connectivity. The Access Center is connected to the telephone network and the Internet network using a leased line.

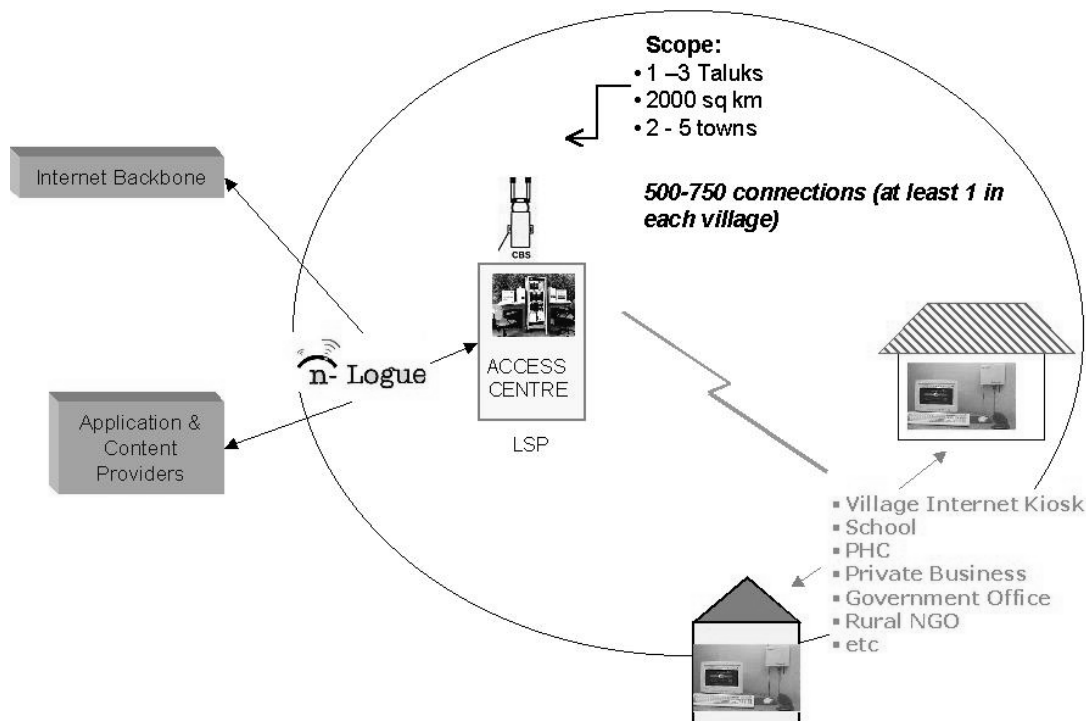


Fig. 3: The n-Logue Revenue Model

1.3 SARI Project

The TeNeT group of IIT Madras, Media Lab (MIT, USA), Media Lab Asia, Centre for International Development (CID) at Harvard and I-Gyan Foundation joined hands and tied up with n-Logue Communications to set up a project called Sustainable Access in Rural India (SARI). With an objective similar to that of n-Logue, the group decided to sponsor a project in Madurai District of Tamil Nadu, India (see Fig.4), through which each and every village would be provided Internet connectivity through a kiosk in a commercial manner. The project seeks to show that viable market exists for information and communication services in rural areas by inventing and deploying innovative technologies and business

models. The ultimate goal is to link these activities to sustainable human development objectives.

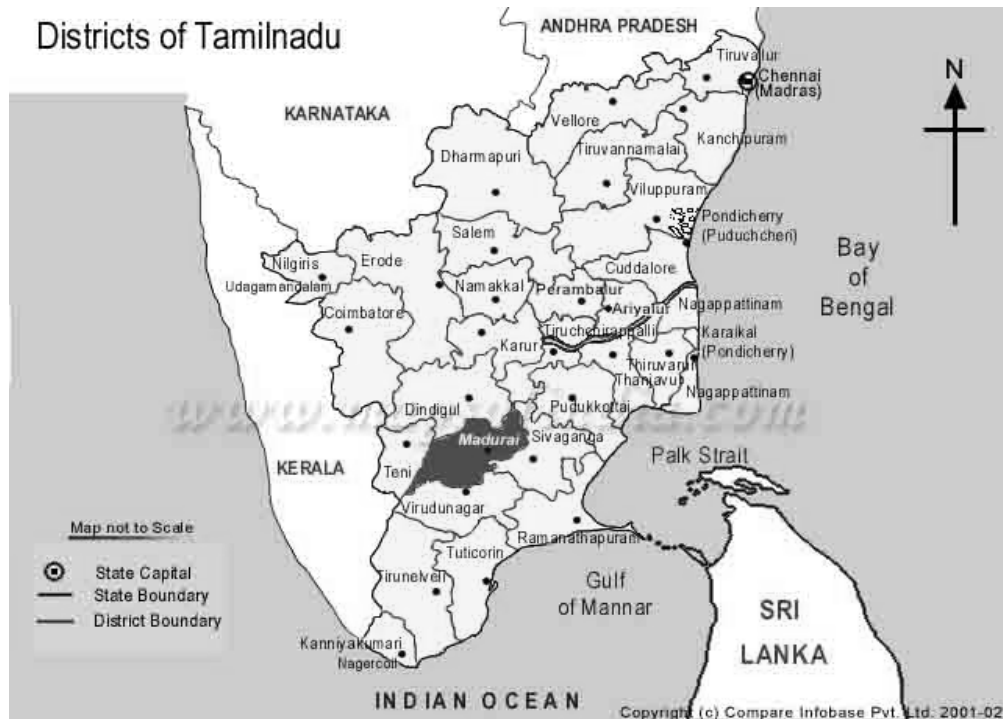


Fig.4: Tamil Nadu State of South India - Highlighted Area is Madurai District

Through the development and introduction of appropriate and enabling technologies and applications, SARI wishes to foster economic development and improve health and learning. It would do so in a financially sustainable way, even as it reaches into the poorest and most disadvantaged communities.

The project of connecting one thousand neighboring rural villages in Madurai would allow the benefit from the **Network Effect**, which would be far more empowering than a few connections placed only in more urban areas. The large number of users would help in supporting financial viability by aggregating demand, developing richer content and community by integrating people, and providing a powerful environment for research.

The SARI project counts on a collaborative and interactive research agenda drawing on the expertise of universities, non-profit organisations and the private sector. The key research areas include a) Technology, applications and content, b) Assessing social and economic impacts, and c) Business models for financially viable and self-sustaining access.

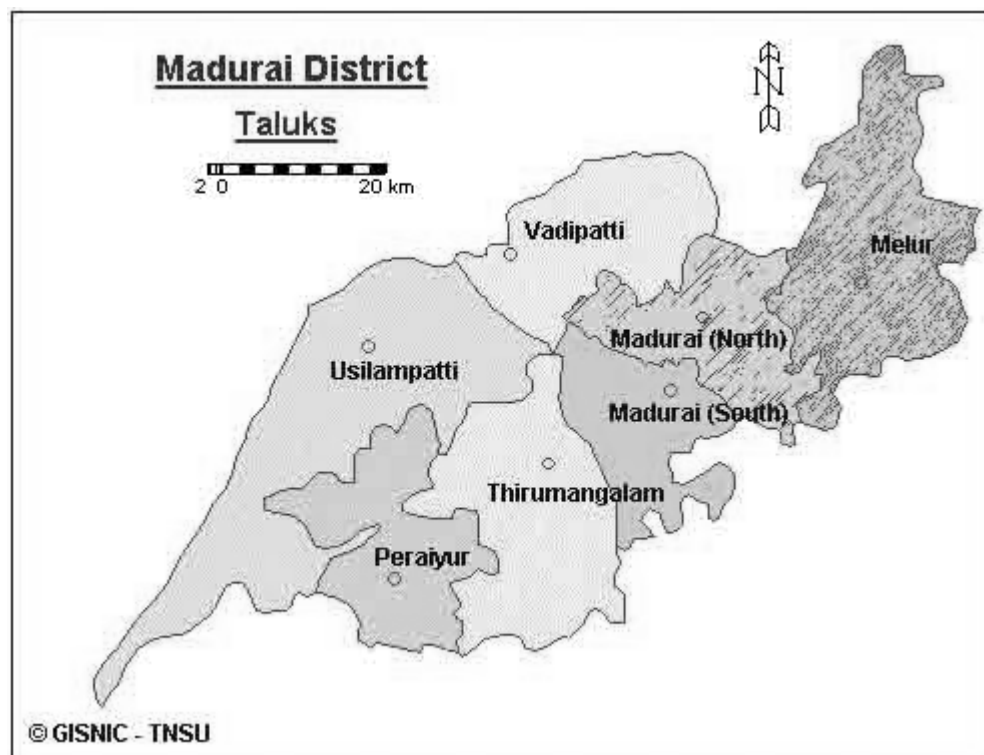
The SARI project was envisioned in early 2001 and field deployment started with the eastern-most part of Madurai district from Melur Taluk. The following section gives an overview of the project area and the current status of field level implementation.

2.0 Overview of the Melur Project

Melur taluk is the eastern-most part of Madurai district, the heartland of Tamil Nadu, one of the most developed states in southern India (See Fig.4 and Fig.5). The region is rich in ancient history with the reign of mighty kings like the Pandyas and the Cholas but today, it is one of the poorer parts of the state.

The Melur project was envisioned in early 2001 by the SARI sponsors, and initial surveys on socioeconomic needs of the people were conducted by Harvard University and MIT. This gave information on the communication habits of villagers and brought to light the growing demand for communication facilities. n-Logue's own interactions with villagers in the course of establishing the first kiosks in and around Melur shed light on the various problems faced by them in various areas such as livelihood, interactions with the government, education opportunities, lack of health facilities and many more.

Fig.5: The Sub-Divisions of Madurai District – Highlighted Areas are Melur Taluk and Madurai North Taluk



2.1 Melur — Socio-economic Profile

The main occupation of people here is agriculture and, like most of India, Melur relies on the monsoons for its crops. Water from the Periyar Dam on the Vaigai river flows through canals criss-crossing the taluk but the river itself flows fully only during the monsoon time and the canal waters are only opened in the winter season. Consequently, there is only one cropping season.

Paddy is the most important crop in this region, though some larger farmers also grow sugarcane, cotton and ground nut. While there is no other major economic activity, Melur is one of India's largest producers of agricultural ploughs. Moreover, when granite was found in one part of the district, the export market opened up and funds started flowing in from abroad. Farmers in these villages started selling their cultivable land for about 10 times more than the regular price to granite quarry owners. This was one of the primary reasons why Melur grew to be a larger town.

The need for communication services is very high in this area (about 20 villages) with 30% of people from some villages living abroad. The Middle East, South East Asia and Africa are the most common destinations where migrants work on construction sites or restaurants, drive taxis, teach, or have small businesses. They send money and letters home but with the mushrooming of STD-PCO booths, telephone calls have become more common. In fact, villagers come and pay phone booth operators for allowing them to receive international calls at a fixed time on a weekly basis. The charge is 5 rupees a minute or more.

The literacy rate in Melur, as per the 1991 census, is 42 percent but today, almost 100 percent of children go to school. The dropout rate after primary school is high but people understand the value of education here. At several villages, there is a rush of students to join computer classes at these Internet kiosks and some of them even request for help with their regular coursework. There is also a great demand for government services. For people in the villages, the government is everything to them and for any request big or small, they knock on the doors of the Village Panchayat or the Taluk office.

2.2 Launch of the Project

n-Logue and the SARI sponsors chose Melur because it has fibre available for connecting the local wireless network to the international gateway of the Internet. Also, its geographical location is strategic such that repeaters can be used to cover a significant part of Madurai district without extra investment in another Access Centre. Moreover, if the Internet business works in Melur, which has comparatively less economic activity than other parts of Tamil Nadu and is a

relatively poorer place, then there is a greater chance that it will succeed in other areas.

Technical deployment of the Access Centre and wireless intranet in Melur began in the summer of 2001. The leased line from the Melur Telephone Exchange to the Satyam node in Madurai for Internet connectivity was provided by Bharat Sanchar Nigam Limited in October 2001. The Melur project was officially launched on November 1, 2001 with the initiation of the first e-government services from the village of Padinettankudi. Within one month, four more village Internet kiosks were established. The computer operators in all five places were trained on basic computer usage and on how to send e-government applications to various local offices using email. All technical support for their hardware and connectivity along with marketing support was provided by n-Logue to these five pilot kiosks. The operators sent feedback to n-Logue on the kind of people visiting the kiosk and the services that were being used. E-government services became instantly popular and many people started coming in for birth and death certificates and pension applications.

2.3 Expansion of the Project

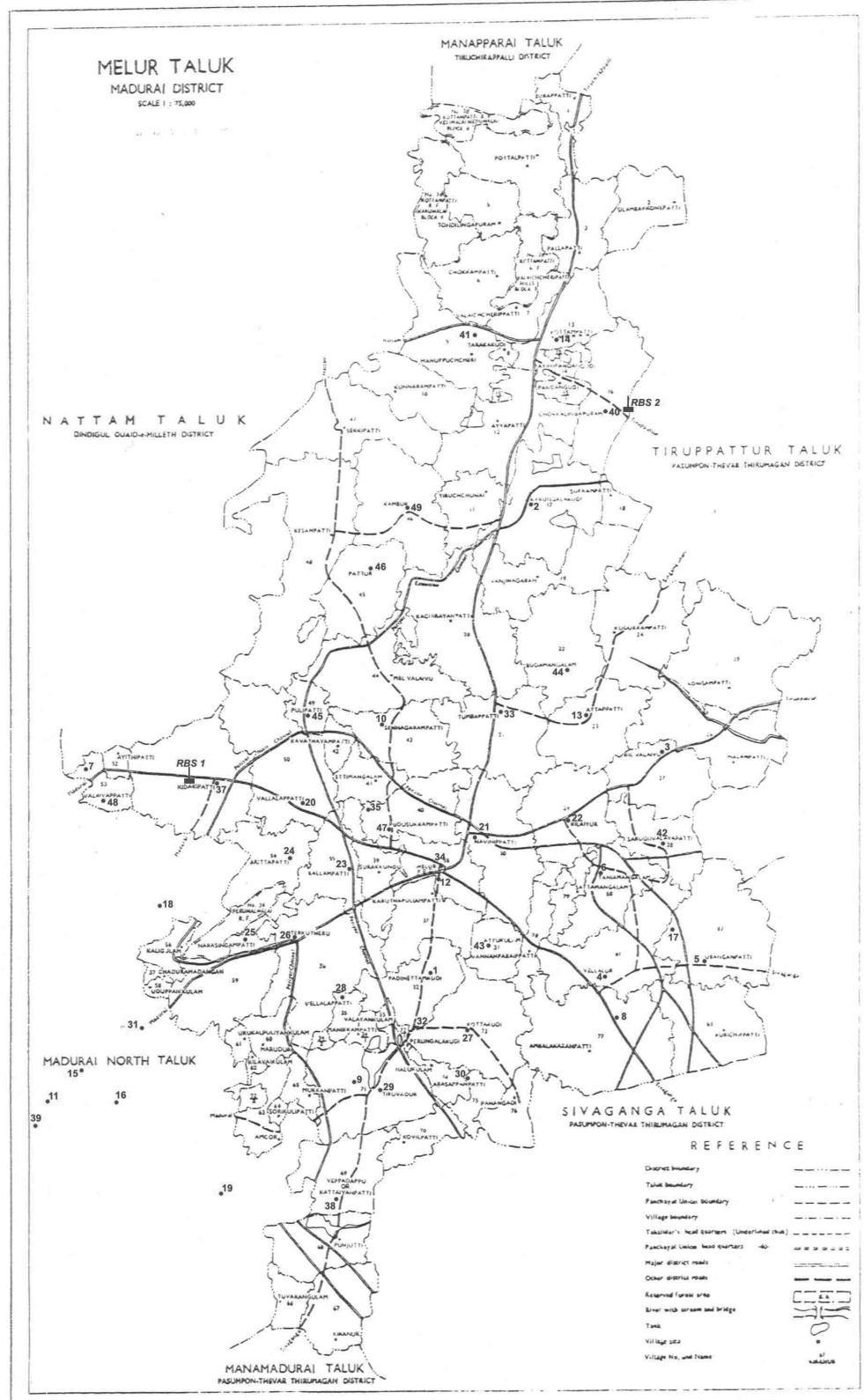
Since this was amongst the first projects undertaken by n-Logue, the company decided that it would itself play the role of the LSP. Learning from the establishment of these five centres, n-Logue then started a systematic expansion of the project in Melur. Slowly, along with support from the District Collectorate, services like applications for income, community and nativity certificates along with water complaints were added. Today, villagers can apply online for encumbrance certificates and welfare schemes for women. Tie-ups have been established with an eye hospital to set up online appointments for problems, and with the agricultural and veterinary colleges for online consultancy. A web-based travel agent also books bus and train tickets online.

Adding about 5 kiosks a month on average, n-Logue has a total of 64 village Internet centres (including 11 being installed now) in both Melur and Madurai North taluks as shown in Table 1. Many of the kiosks are in villages with no public telephones, and for these places Internet access has opened a new mode of communication with the outside world. Fig. 6 shows the locations of the various village Internet centers.

Table1: Total Connections of n-Logue in Madurai District

No.	Installation Location	Owner	Gender	Age	Operator	Gender	Age	Month of Installation
KIOSKS								
1	Padinetankudi	Mandeyan	M	38	Rosy	F	21	November
2	Karungalakudi	Ravi - Radha	M – F	39 - 34	N/A	N/A	N/A	November
3	Keelavalavu	Abdul Razak	M	28	Indumathi	F	22	November
4	Vellalur	Navineedhan	M	48	Anitha	F	24	November
5	Urranganpatti	Manohar	M	35	Priya	F	21	February
6	Thianiamangalam	Rajaraman	M	25	Bharathi	M	22	January
7	Alagarkovil	Satyaprakash	M	26	N/A	N/A	N/A	April
8	Neaythanpatti	Arunachalam	M	29	Rathi Devi	F	22	April
9	T.Ulagpitchanpatti	Suganya	F	18	N/A	N/A	N/A	April
10	Sengarampatti	Abdul Salam	M	28	N/A	N/A	N/A	April
11	Othakadai	Suresh Kumar	M	27	Mehraj	F	24	April
12	Mukil Computers - Melur	Paandiselvam	M	26	N/A	N/A	N/A	December
13	Attapatti	Senthil Kumar - Nather Ali	M – M	28 -28	N/A	N/A	N/A	May
14	Kottampatti	Ganesh - Jinnah	M – M	26 - 25	N/A	N/A	N/A	May
15	Chittampatti	Palani Kumar	M	23	N/A	N/A	N/A	June
16	Pudhutamarapatti	Dr.Kadhiresan	M	45	Dr. Gyanalakhmi	F	29	June
17	Pulimalaipatti	Kanimozhi	F	24	N/A	N/A	N/A	May
18	Mankulam	Hariharan	M	23	N/A	N/A	N/A	June
19	Karpupooravahini	Saravanan	M	30	N/A	N/A	N/A	July
20	A.Vellalapatti	Dhan	N/A	N/A	Selvi	F	23	December
21	Navinipatti	Dhan	N/A	N/A	Sukuntala Devi	F	20	April
22	Kelaiyur	Dhan	N/A	N/A	Sathish	M	20	December
23	Kallampatti	Dhan	N/A	N/A	Sudhakar	M	24	April
24	Arittampatti	Dhan	N/A	N/A	Kalyani	F	21	March
25	Narasingampatti	Dhan	N/A	N/A	Jayalakshmi	F	22	April
26	Therkutheru	Dhan	N/A	N/A	Malaiyayee	F	34	December
27	Kottakudi	Dhan	N/A	N/A	Radha	F	19	April
28	T.Vellalapatti	Dhan	N/A	N/A	Rajathi	F	38	December
29	Thiruvadhavur	Dhan	N/A	N/A	Parvathi	F	30	December
30	Arasappanpatti	Dhan	N/A	N/A	Astalakshmi	F	18	April
31	Vellaripatti	Dhan	N/A	N/A	Amudha	F	23	December
32	Andipattipudur	Dhan	N/A	N/A	Mahalakshmi	F	23	April
33	Thumbaipatti	Dhan	N/A	N/A	Palani	M	29	December
34	Melur- Kalanjiam Tr Centre	Dhan	N/A	N/A	Jaya	F	21	December

No.	Installation Location	Owner	Gender	Age	Operator	Gender	Age	Month of Installation
35	Palayasukkampatti	Dhan	N/A	N/A	Sudhaharan	M	25	March
36	Kuthappanpatti	Dhan	N/A	N/A	Ladha Devi	F	21	December
37	Kidaripatti	Dhan	N/A	N/A	-	-	-	July
38	Kattayampatti	Dhan	N/A	N/A	-	-	-	July
39	Uthankudi	Ragunathan R	M	-	-	-	-	August
40	Chokkalingapuram	Nallaiah	M	27	-	-	-	August
41	M.Vellalapatti	Mrs.Alagusundaram	F	-	-	-	-	August
42	Sarguvalayapatti	Dharmalingam	M	-	-	-	-	August
43	Ulaganathapuram	Dhan	N/A	N/A	-	-	-	August
44	Boothamangalam	GnanaJothi	M	-	-	-	-	August
45	Pullipatti	Meenakshi Sundaram	M	-	-	-	-	August
46	Pattur	Senthil Kumar	M	-	-	-	-	August
47	Pudu Sukampatti	Senthil arasu	M	-	-	-	-	August
48	A.Valaiyapatti	Thyagarajan	M	-	-	-	-	August
49	Kambur	-	-	-	-	-	-	August
PRIVATE								
50	Latha Madhavan - Alagarkoil	Sethupathy	N/A	N/A	N/A	N/A	N/A	December
51	Mahatma School - Alagarkiol	Shabana	N/A	N/A	N/A	N/A	N/A	January
52	MAVMM Polytechnic – Kallampatti	Suryamoorthi	N/A	N/A	N/A	N/A	N/A	March
53	TVS Tyres	Sridharan	N/A	N/A	N/A	N/A	N/A	June
54	Agricultural College	Selavaraj.Dr	N/A	N/A	N/A	N/A	N/A	March
55	Sact Computers	C.T.Saravanan	N/A	N/A	N/A	N/A	N/A	July
56	Dr. Radhakrishnan	N/A	N/A	N/A	N/A	N/A	N/A	July
57	Girls High School, Melur	N/A	N/A	N/A	N/A	N/A	N/A	July
58	Boys High School, Karugalakudi	N/A	N/A	N/A	N/A	N/A	N/A	July
59	Boys High School, Melur	N/A	N/A	N/A	N/A	N/A	N/A	July
60	High School, Kottampatti	N/A	N/A	N/A	N/A	N/A	N/A	July
61	Melur Access centre	N/A	N/A	N/A	N/A	N/A	N/A	October
62	TVS Interconnect	Mr. Varadharajan	N/A	N/A	N/A	N/A	N/A	July
GOVERNMENT								
63	Tashildar Office-Melur	Kalimuthu	M	-	Sriraj	M	24	October
64	BDO- Melur	Ramachandran	M	-	Ramachand	M	39	December
65	SRO-Melur	Kannan	M	-	-	-	-	November



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Fig. 6 Map showing the installations of n-Logue in Melur Taluk

At two locations on Fig. 6 marked as RBS, Relay Base Stations have been established to increase the coverage area of the wireless network to a 25 km radius. The Access Centre in Melur can provide direct wireless connectivity to any location within a radius of 18-20 km as long as there is line of sight. The RBS in the north is at approximately 19 km and connects villages that are within a 10 km aerial distance of its location. The RBS in the western part of the map, even though only 9 km away, connects villages that fall in the shadow of the large Alagar Koil hills in the west. From this RBS we can also extend coverage to Vadipatti Taluk of Madurai (see Fig. 5).

2.4 Kiosk Operations

Table 1 also provides a profile of the kiosk owners and operators running the village Internet centres. The kiosk owner has invested money in the business and has put up the kiosk. The owner may or may not know how to use a computer but it is essential that he or she understand the business. In case the owner does not know how to operate a computer, he/she may hire an operator. The kiosk operator is a computer literate person who has been employed to run the computer at the owner's premises. Some of the kiosks have been installed using SARI funding and the operators are currently not expected to pay the equipment cost, though they pay for all operational costs.

A 7-day training program was held by n-Logue in April to train the operators in the various Internet based applications and services. Today, the three best kiosk operators train new recruits on how to use the services and build the business. Every month all operators get together for a workshop to exchange information on the kinds of services they are offering and the problems they are facing in their respective villages. These are discussed in detail in Section 4.

n-Logue has conducted rural marketing campaigns consisting of auto-rounds, posters, leaflets, bus-panels, lucky draws and free coupons, wall paintings, and a local cable TV show. This has generated interest in the services offered by these kiosks and people walk into the n-Logue office in Melur today asking for setting up of an Internet kiosk in their village.

The next section presents case studies of three Internet kiosks – Padinettankudi, a relatively poor village and Keelavalavu, a relatively well-to-do village both with successful Internet kiosks, and Vellalur, a village with high potential but a failed internet center.

3.0 Case Studies from Melur

3.1 *Padinettankudi – The Digital Teashop*

Located 35 km from Madurai city, Padinettankudi village flagged off the march towards a digital revolution in the state of Tamil Nadu, when the first village Internet kiosk was established by n-Logue Communications and IIT Madras using corDECT technology. Run by Mandeyan, a teashop owner and his wife Kamalam, who is the treasurer of a local self-help group, this kiosk is an example of tangible benefits of information and communication technologies for poor, rural people.

The kiosk owner, Mandeyan, was born in Padinettankudi and completed his primary education in the village school. He then studied in Melur (the nearest town about 4 km away) until the 9th standard when financial constraints forced him to join his father on the field. During the lean season he would lift gunny bags in paddy shops in Melur to make extra money. He was married at the age of 19 and his father gave him one and a half acres of land. His wife Kamalam was only 16 years old at the time and had studied only till the 5th standard. Her first child, a boy, was physically and mentally challenged whereupon Mandeyan decided to try his luck to go abroad for work.

Unfortunately, the agent tricked him into selling all the land and assets he owned. Penniless, both husband and wife started working as coolie labourers. They got into the grip of moneylenders who charge 10% interest per day. Nonetheless, Kamalam had a strong business sense and she joined a local self-help group. Slowly she built her own savings and then started helping other women with self-employment business opportunities. Within 10-12 years, she had rescued 80% of the villagers from the clutches of the daily moneylenders. Mandeyan had also saved enough money to buy the lease for his own teashop. In the village, their family is respected by all castes for rising out of poverty on their own. Mandeyan also treats everyone equally and people from all walks of life come for a cup of tea to his shop.

When Mandeyan came to know about this new Internet business in Melur, he discussed it with his family. His second son Palani, who is in the 7th standard and goes to an English medium school in Melur, knew about computers from his school. He had also learnt a little typing and use of the paintbrush program on his own. His teacher had said that in the next generation, computers would replace all other modes of communication and would become a requirement for jobs. Looking at the services offered to the villagers like sending online applications for birth-death certificates and pensions, Mandeyan got a little more understanding of what this was about and decided to start an internet centre.

He built a ***pacca*** room to house the computer just at the back of his teashop. n-Logue facilitated a loan for the PC and Internet connection and supported him with basic training and marketing. On November 1, 2001 the Secretary to the government of Tamil Nadu, Information Technology department came to inaugurate the project at Padinettankudi. Subsequent visits by the District Collector motivated Mandeyan and the villagers to start sending applications for e-government services. The fact that a person need not travel all the way to Melur to get an application form nor run around government offices to see when the certificate is ready seemed to be almost a miracle for the villagers. Mandeyan says, “people need to travel to the office only once to pick up the certificate after they get the acknowledgement informing them of the date. Otherwise they would have to go two to three times at least for one birth certificate. This way they don’t lose wages of 2-3 days and save the travelling money also.”

Moreover, email applications are processed in less than 2 days while ordinarily it may take one month or more. A house tax problem plaguing a villager for almost 4-5 years in the small hamlet of Attukulam (1 km from Padinettankudi) was resolved through the email system in just a few days time. A handicapped boy received his disability certificate and a pension, for which his family had been running around nearly 7 years. Villagers have been quite willing to pay the Rs. 10 cost for sending such applications through email because this mode ensures a response from the respective government office. More than 80-90 applications for certificates and welfare schemes have been sent from Padinettankudi alone along with complaints and petitions to the District Collectorate and even the Chief Minister’s Grievance Cell.

Padinettankudi is quite a small and poor village with a total of 800 households or approximately 3000 people. The village has no public phone (though there are 10 private phones without long distance calling facility) and today, Yahoo Messenger seems to be the only source of communication other than physical travel! Most of the villagers are farmers who own a few acres of land. The main crop is paddy through some larger farmers also grow banana and sugarcane. Lady’s finger, brinjal, cotton, mango and guava are also grown here. But due to lack of water, there is only one cropping season – when the canal gates are opened during winter to bring in water from the Periyar Dam. Thus, agricultural income per family is just about Rs.10,000 to 12,000 per year. In other months, these people try to find work in shops and businesses in Melur or other construction areas. About 300-400 households are extremely poor despite owning livestock and half an acre or sometimes even one acre of land. Most of these men and women work as day labourers earning a meagre Rs.20 to 30 per day.

These people have been coming to the kiosk for three of the most critical livelihood services offered through this network – agricultural consultancy, veterinary advice and an appointment to check their eyes at Aravind Eye Hospital. Emails along with photographs have been sent for brinjal, cotton, coconut and other crops without farmers having to leave their village and hunt around for a remedy. The fees is Rs.10, which even poor farmers are willing to give when they see the remedy working on their crop and saving thousands of rupees of investment in seeds, fertiliser and other inputs for them.

The computer is not operated by either Mandeyan or Kamalam. They have employed Rosy, an enthusiastic young girl from a nearby village to be the kiosk operator. She is currently studying for B.A. in English by correspondence and has also completed a diploma in computer applications from Melur.

Though initially the people of this village were unknown to her, Rosy made a beginning by speaking to the villagers who came for a cup of tea at Mandeyan's shop. She explained to them about e-government and agriculture services. As they started becoming curious about the various offerings of the Internet, Rosy discovered a new source of revenue – astrology from the web. People from all sections of the village come for this service and many of them are a daily fixture at the kiosk. Costing them only 2-3 rupees many women want to know about the marriage of their young daughters. This is cheaper than going to the village astrologer and people can even get a printout if they want.

Soon Rosy gained more confidence and ventured out, door-to-door in the village. She walked through low caste colonies and upper caste houses and spoke to everyone she could, about what they could get at "Chiraag Internet Illam", the name for all of n-Logue's internet centres. Being a Christian, it was easier for people of all castes to accept her. At first she only concentrated on getting students for computer classes. After a few weeks she started explaining about email, government applications, Aravind and all the other services available.

She takes tuitions for small children teaching them computers and helping them with their daily homework. They come in by 5:30 every evening asking "Rosy miss, can I come in?" She has been teaching them English also! For students in 10th–12th standard, she teaches a basic computer course on Office and Fox Pro at a rate of Rs. 100 per month.

The service that is bringing in most revenue is email. One family sends voicemails and video mails to their son in Eritrea every 2 days. He returned to Melur last month to look for a bride and Rosy has posted his details in the matrimonials section of the n-Logue website in Melur.

Today, the 7-8 college students in the village come to check email frequently and they are browsing for jobs and looking for other career opportunities through the Internet. One young man wanted to apply to the Indian Air Force and Rosy downloaded the application for him. For another, she downloaded a form to get an Auto Loan, which she filled up and emailed to the District Industries Centre. Students in 11th and 12th standard do their practical homework in C++ at the kiosk. Rosy charges them Rs. 20 an hour. Desktop publishing work has also been generating income since one need not go to Melur for getting posters, greeting cards or invitations made.

In November 2001, Padinettankudi made Rs. 500. Since then, about 300 households have come and used a service at the centre. Almost 200 households from the neighboring hamlets have also travelled, to use the Internet at Padinettankudi. Today, Rosy chooses Tamil names for new born babies from the internet, makes online reservations for train and bus tickets and even sets up appointments for the mobile soil testing van to come to her village and take the samples for a group of farmers. The results are emailed back to her within one week.

In June 2002, Rosy made Rs. 4310 for the kiosk. In July this went up to Rs. 5328. She started out with a salary of Rs. 800 per month from Mandeyan and also got Rs. 10 a day for bus fare. There was a monetary incentive for her to do well, which materialised into a hike in salary to Rs. 1500 a month from July. Rosy's confidence in the future of this business has strengthened and she is excited about all the possibilities the Internet can offer her village.

Mandeyan, for his part, takes keen interest in the kiosk even though he is not comfortable operating the PC. He "talks business" to visitors who come and see the kiosk, proudly explaining how he is not just breaking even but making money from Chiraag today. He says, "I will not be able to make money unless the villagers get something useful from their visit to the kiosk. With the many different services we are giving them today, I know surely that this kiosk will survive."

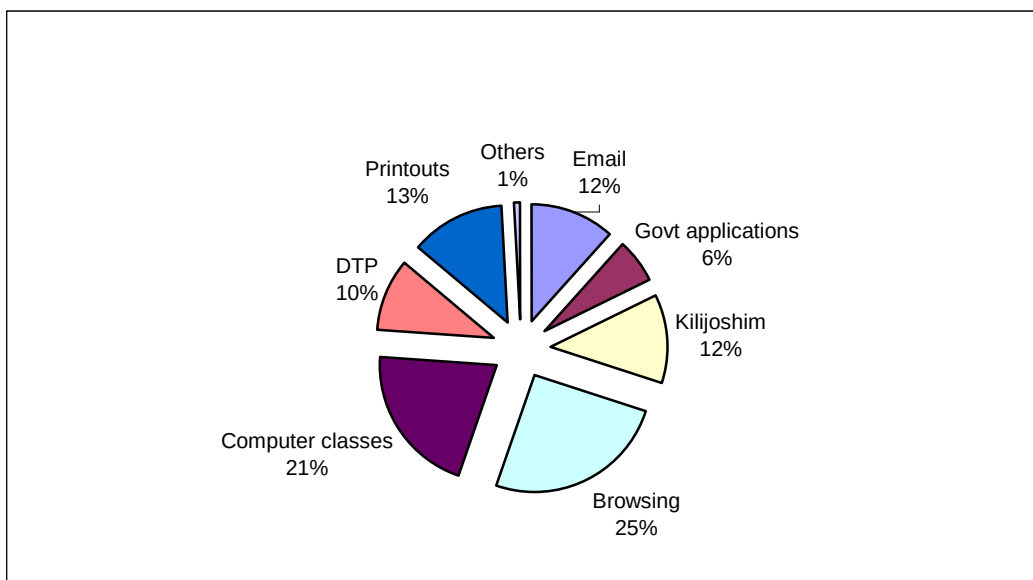


Fig. 7 Revenue Streams for Padinettankudi in July 2002

3.2 Keelavalavu – The Information Quarry

Abdul Razzak, a young businessman who wanted to set up a computer centre for his village, started the Internet kiosk in Keelavalavu. Keelavalavu is a large, prosperous village with a population of more than 8000 people with approximately 5000 people in the voter's list. Granite quarries line the region and most people are granite workers and lorry transporters. Razzak was born here and studied here till the 12th standard.

After completing a Diploma in Mechanical Engineering and a Post Diploma in Automobile Engineering Razzak got into computers. He learnt AutoCAD, MCAD and ProECAD in a part-time course and started teaching at an Aptech computer centre for an year. But he always had a mind for business. Even in school, he used to sell sweets during village festivals through a lottery. 10 people would buy a 25 paise ticket each and he would give the sweet to the winner, making a profit of 1 rupee.

He took up an Aptech franchisee of his own in the town of Nattham, about 40 km from his village because he felt Keelavalavu was too small. This was the village of Mr. Selveraj, an STD-PCO operator who told him about the Internet business with n-Logue and suggested that Razzak start one in Keelavalavu. Razzak always wanted to set up a computer centre in his village and he also knew about the Internet. He set up the Chiraag Internet Centre in January 2002 with the confidence that the Internet based business would be an added advantage apart from computer classes and would make the kiosk viable in his village.

At the beginning, e-government certificates and petitions were the applications which generated most income for the centre in the first few months of operations – almost 10% of total income. Moreover, the visit of the District Collector and Secretary to the Government of Tamil Nadu, Department of Information Technology made a huge impact on the village in terms of bringing recognition and credibility to the centre. Razzak says people trust them because of e-government services and that is also an important reason why the other services bring in money. Though, now he fears that the numbers are coming down because people get the same response for every petition that is sent to the District Collector and Chief Minister's Grievance Cell, he believes the demand for encumbrance certificates is expected to grow because people face a lot of problems getting this from the government. Birth certificates are now being given by the local hospital in Melur and since only 2-3 percent of the babies are born in the village, demand for that service is also reducing.

Email picked up in this village after a massive campaign by Razzak to create free email IDs for people. He held seminars for school children, teachers and staff in the 5 schools in the village, for women from self-help groups and many other people encouraging them to come and try out email once. Razzak forced his friend, one Mr. Murugesan, to create an email ID. In late July, this person received the confirmation of his job appointment from Dubai via email! They also sent a form in pdf format to be printed, signed and faxed back to them. The kiosk made 100 rupees for this service. Today, 10-15 women come to the kiosk regularly to get printouts of mails from their husbands living abroad. Another 10-12 people come and check their own Yahoo mail almost on a daily basis. There are also 3-4 people browsing to find jobs through the web.

Livelihood services like Agricultural consultancy, Aravind Eye Hospital appointments and Veterinary services are not generating much interest in the village. Only a small percentage of the people are in agriculture because this area is on a bed of granite and quarrying is the largest business. The major crops are coconut, banana, groundnut, paddy, cotton and mango but since the only source of water is the canal from the Vaigai dam, cropping is usually for one season alone. The yields of farmers are also very low and marketing to a farmer is a difficult task, especially since it involves changing age-old mindsets and prescriptions. In fact, most people are selling their land to granite quarries because they perceive much more money in that.

The village is also located on the main highway and has a government health centre, veterinary dispensary, a maternity clinic with a 24 hour nurse on duty, a branch of ICICI bank, and a cooperative society bank. Thus, there is no value-added by the Internet in bringing people any of the remote health and veterinary

services. However, Razzak conducted a free eye-screening camp along with Aravind Eye Hospital that was very well received and nearly 210 villagers were given prescriptions or taken for surgery.

The centre started paid services in February and by March, Razzak bought a second PC dedicated to teaching computers alone. There are almost 1500 students in this village that form the largest group of Razzak's customers using offline services like computer education and games. Demand grew quickly so a third computer was recently added in June. The computer courses that are offered include a 2-month Office course, CCA (Certificate in Computer Applications) that has Office plus Access, a DCA (Diploma in Computer Applications), which includes Java. The HDCA (Higher Diploma in Computer Applications) course includes FrontPage, Visual Basic and a 2-month project apart from the earlier package and the cost is only Rs. 300 per month, for one year. Comparatively, this course costs a minimum of Rs. 10,000 a year in Melur. Interestingly, Keelavalavu also offers a 3-month course in AutoCAD 2000 at a cost of Rs. 4000 per student. This is again many times cheaper than going to a regular institute for the same. Razzak teaches this himself and has employed two other teachers for the rest of the courses.

One walks in today to find AutoCAD being done on one computer by a student, 3-4 young women learning power point presentation on another PC and video-conferencing going on with another village on the third. The centre seems to have stabilised much faster than Razzak's initial projections but he believes they need to constantly keep doing new things to get more business. The newly started travel services and VOIP chat are going to be the next big revenue generators. Razzak is also looking very keenly at how he can carry out services for urban areas, such as AutoCAD design and offshore DTP work, to bring in revenue from outside the village – for him and the students who would do this work. This will be a large contributor to the sustainability of such village kiosks, he says. In fact, older computer centre franchisees like NIIT, Aptech and CSC are expressing concern over many students from villages shifting to Chiraaag. With an Internet kiosk in every village, these places will start losing business, especially of girl students who would prefer not to travel. For learning the Office package alone people spend up to Rs. 2000 to go to Melur and study. Here in the village, one hardly spends Rs.300 to 400 and also saves on travelling costs.

Month	Internet	Computer Classes	DTP	Total Revenue
March	-	-	-	8000 approx.
April	1968	7100	150	9218
May	3775	7250	320	11345
June	2212	4750	300	7262
Monthly Avg.	2652	6367	257	8956 Rs.

Table. 2 Revenue of the Keelavalavu Internet Centre

The investment made by Razzak totals up to Rs. 175,000 for the kiosk (from n-Logue), building advance, making a classroom, marketing expenses, other startup costs and two extra computers. Moreover, 4 persons staff the kiosk – one for marketing, one student counsellor and two teachers. All are graduates from the village.

Though he has a 3-year break-even plan, Razzak believes he is not making enough money for the standard of Keelavalavu. He should be making at least Rs. 20,000 per month. Even a quarry worker's family earns between 5000 and 10,000 rupees per month while a middle class family would earn somewhere between Rs.15,000 to 20,000 a month. Compared to Padinettankudi, incomes are much higher here. Consequently, Razzak's revenue should also be significantly greater.

One reason is that he is not sitting in the kiosk all day because he needs to take care of his centre at Nattham also. Second, this is a new business and Razzak outlines the difficulties they face in expanding. "Even with all these services available, and despite doing an auto campaign, posters, a big launch where we had loud speakers, very few people have come on their own to ask about the services. We have to literally walk around the village and force people to come." In fact, he says, even if you get just 10 people in the centre it is an achievement for the day.

Every month at least one new service is provided to all the kiosks by n-Logue, but it is quite obvious that unless it is marketed well, the revenue will not come in. "When you give us a new service," says Razzak, "even if we go around the village talking to people and convincing them to come, we still don't get enough demand generation. One continuously needs posters, handbills and other kind of

marketing, especially in a big place like Keelavalavu. And this costs money. Every month I spend between 500 to 1000 rupees on marketing alone.”

He would like to develop the next generation in his village – kids who know about computers and can use them, not only for programming but also for email, chat and all other internet applications. Today, he has children who come to the centre and send an email to their friend in the same village. That friend comes in the next session and checks the same email in the same computer! Practically, it is very difficult to convince the older generation so Razzak is concentrating on the children in the village and people who are already educated. Almost 50 percent of the village is educated but in the new generation – 100% of the children go to school.

Finally Razzak says, “Technology is all fine. But ultimately you need to make a business out of it.” He is looking for a way by which this kiosk could provide CAD design services for companies in Chennai. He is convinced that computers are written in the future of rural India; and he wants to be part of the group that is driving the rural digital revolution.

3.3 Vellalur – A Costly Mistake

The Internet kiosk in Vellalur was started in November 2001 when Mr. Navineedhan, a Public Works Department engineer in Madurai decided to set up a centre in his native village. His niece, Anitha, who is from the village and studied there till the 12th standard was quite excited about this. She had just completed a one-year course in computers learning Office, Fox Pro, DOS, Windows, Oracle and Visual Basic, apart from her B.Sc. degree in Biochemistry and one year of work in a pathology lab in Melur. She sent her bio-data to Mr. Navineedhan who gladly recruited her to become the kiosk operator since she was so qualified.

Vellalur is a big, rich village with almost 2000 households (counting neighbouring hamlets the size goes to more than 2500 households). 6700 people are in the voter’s list from a total population of almost 9000-10,000 people. About 35% of the village has relatives living abroad and these families get at least Rs.5-10,000. a month. The rest of the village’s main occupation is agriculture where income ranges from Rs.7,000-8,000 per acre if it is paddy or Rs.10,000-15,000 if it is sugarcane. This particular area has excellent ground water so people commonly cultivate in two seasons. Only 10% of the village consists of coolie labourers who make between Rs.1500 - 2000 a month. There are 3 private nursery schools and 2 government primary and secondary schools. There is a primary health centre, a branch of ICICI bank, a post office, veterinary centre and a cooperative bank.

The main square is lined with petty shops selling camera film and audio cassettes, along with other knick-knacks.

After reading the case studies of Keelavalavu and Padinettankudi, one could safely conclude that Vellalur would be an excellent village for setting up an Internet kiosk. Email itself would have great demand here with so many people settled abroad from this village. However, this centre has had the weakest performance amongst all the kiosks put up by n-Logue.

The revenue, even after four months of operation from November to February remained below Rs.1000 per month.

Month	Rupees	Source of Revenue
March	245	Computer classes - 2 students
April	471	Printing and browsing
May	825	10 th and 12 th std. results declared online
June	300	Computer classes - 2 students

Table 3. Vellalur's Revenue over the months of March to June

The only service that is bringing in some steady income is browsing by a few college students who regularly come to check Yahoo mail. These same students have been looking for jobs on the Internet and Anitha has been helping them with google search. Only four people have used the voicemail facility to contact their relatives in Dubai. Yahoo chat is also used only for reporting problems to n-Logue's office. Anitha had sent 17 requests for government certificates until April 2002, but in the last 2 months she has not sent anymore. Moreover, the villagers are not aware of any of the livelihood services like agriculture and veterinary consultancy and the new travel booking facility.

n-Logue has conducted quite a few marketing sessions in this village including an auto campaign, door to door leaflet distribution, bringing in student volunteers to do marketing and also putting up posters, gift coupons and lucky draws. Nevertheless, it is absolutely essential that a kiosk operator understand how to make the kiosk run as a business – canvassing door to door, explaining various services to the villagers and most importantly understanding how villagers are benefitted by using the internet are the critical components necessary for bringing in customers. Unfortunately, Anitha is an extremely shy person and has

not been able to speak to people about the services much less convince them to try it out.

3.4 When do kiosks work?

The potential use of Internet services in Vellalur is quite large compared to a place like Padinettankudi where the population is half, water is scarce and income levels are low. One may wonder why email/voicemail/video mail has not worked despite such a huge migratory population and the obvious cost savings it entails. First, email as a concept needs to be explained to people; they need to come and try it out and experience it themselves before they can be hooked onto it. Second, the person at the other end (relative living abroad) needs to have access to email and needs to know how to use it. Third, the cost savings need to be spelled out very clearly to the customer before they start becoming regular users.

Awareness about email as a new mode of communication can be achieved by mass marketing. Even initial trials of people coming to test it out can be done using freebies and gift coupons. But ultimately it is only the kiosk operator who needs to demonstrate and explain the concept. Knowledge about computers is important to do this. But knowledge about how to sell an idea and how to explain benefits to customers is more important. In Padinettankudi, even though Rosy goes around doing door-to-door marketing informing people about the services, Mandeyan is the one who empathises with the people of the village and explains the benefits to them. Like Razzak in Keelavalavu, Mandeyan is involved in the business and guides Rosy on a day-to-day business.

In Vellalur, the owner Mr. Navineedhan has simply bought the PC and left the kiosk to Anitha. Without any guidance or support, she is unable to do much. She has simply never looked at the centre from the business point of view and is unable to define the benefit of these services to villagers. Her idea of the entire set up was that she would just be a computer operator who would be given guidelines on what to do sitting at the PC. Even after 8 months, she believes the only thing that villagers can use it for is to get certificates and do browsing. This despite attending three training sessions organised by n-Logue on the various services available and going through special modules on marketing and revenue generation.

Instead of being an assistant, here the operator has to run the kiosk in place of an absentee owner, especially without understanding any financial implications of failure. Without having invested her own money into buying the equipment, any kiosk operator will not have the drive and motivation to earn revenue and make the business sustainable in the long run. Moreover, Anitha even gets a fixed

salary with no relation to the revenue she earns and no profit share. Thus, she has no incentive to generate more business or encourage the villagers to utilise the services at the kiosk. Today, Vellalur is only losing money – repayment of loan for the PC is Rs. 5000 every month. Apart from that electricity, paper, ink and other consumable costs round up to between 500-800 rupees a month. Such a state cannot continue for long and n-Logue has already made a decision to close down this kiosk.

4.0 Applications and Services

n-Logue is an infrastructure provider that uses corDECT based wireless networks to establish Internet centres in villages. Partnering with a Local Service Provider (LSP) who brings in entrepreneurs to set up Internet kiosks, n-Logue's revenue model is based upon the paid usage of Internet by villagers. Kiosk operators have to pay n-Logue and the LSP for every hour of Internet used.

The immediate question arising out of this is what will villagers use the Internet for? Most available internet-based applications today are urban-oriented. They are not designed for the rural audience. The main reason why content providers have not capitalised on the potential rural market is that there is hardly any connectivity to the Internet for villagers. Unfortunately, rural Internet projects are stuck in the bind -- even after one sets up an Internet kiosk and inaugurates it, there is very little that people can do with it.

The question then becomes, should rural Internet kiosks and connectivity come first or should rural-oriented applications and services be developed first?

n-Logue is not a content developer. But when n-Logue started setting up its first few projects in rural areas, it became very clear that simply providing internet access and setting up computers in villages would not be enough to make the entire model work sustainably in the long run. Mr. P. G. Ponnappa, the CEO of n-Logue came up with a formulation to drive content and application development - without that the business would never take shape.

There are two aspects to applications and services for rural areas:

1. **Platform:** This is the technical application/ software/ program that is required for building any kind of relevant information exchange. For example: email, video conferencing, chat, messenger, imaging software, video mail, local language typing software, web-based databases and other communication platforms.
2. **Content:** This is the information that will flow from various information providers to villagers and vice versa using the various platforms developed above. For example, video mail of diseased crops to

agricultural experts, video conferencing for telemedicine, messenger to bring different kiosk operators together so they can seek help on technical and business issues.

Most of the platforms are common between urban and rural areas, but the content is vastly different. Nonetheless, even certain platforms need to be created especially for kiosk businesses – for example, local language interfaces or video mail that works on extremely low bandwidth.

n-Logue has support from the Telecommunications and Computer Networking Group (TeNeT) of IIT Madras for development of most of the platforms and applications:

- ❖ Email (in local language)
- ❖ Voice email (for people who cannot read, where the person's voice is recorded and sent as an email attachment)
- ❖ Photo Mail / Video Mail (photos/video clips sent as emails)
- ❖ Chat (text and voice)
- ❖ Video Conferencing across the local network at low bit rate

For content and services, n-Logue's main aim is to find partners who can provide relevant information and consultancy in various areas. Some of the partnerships developed in Melur are discussed below.

4.1 Melur – Specific Applications and Services

4.1.1. E-Government Applications

The first service in Melur was MIN-ARASU, a Government-to-Citizen application developed through the collaborative efforts of the Madurai District Administration, the Officials of Melur Taluk, the Madurai Division of the National Informatics Centre (NIC) and n-Logue Communications. MIN-ARASU literally means Electronic Government in Tamil and ARASU is an acronym for Application for Rural Access to Services and Utilities. It is intended for the people who live in the villages and small towns of the various Taluks in Tamil Nadu. It leverages the Taluk Computerisation initiatives of the Tamil Nadu Government to provide services to the people that live in these Taluks.



Basic Features of MIN-ARASU

Currently, the website offers the following:

- ❖ Facility to send emails to your Government – Your Chief Minister, Collector, etc.
- ❖ Information on all relevant Government Departments
 - The schemes they provide to the citizens with details of how to avail them. e.g. eligibility for OAP Schemes, Loan from DIC, TAHDCO, procedure to apply for driving license, the eligibility to join courses in various colleges, etc.
 - Forms for making all applications. These are documents that can be downloaded and filled out before printing
 - Facility to send the application to the concerned officer as a simple email attachment
- ❖ Applications for Certificates:
 - From the Taluk Office – Birth, Death, Income, Community, Nativity, Legal Heir-ship
 - From the Sub-Registrar's Office – Guideline Valuation of Property, Encumbrance, Certified Copies
 - From the Block Development Office – Complaints regarding Repair of Street Lamps and Drinking Water
- ❖ Applications for Pensions – Old-age, Widow, Handicapped, Destitute Women
- ❖ Application for Loans against schemes like PMRY
- ❖ Applications for Welfare schemes – Widow's marriage, girl-child support, building latrines, **kaccha** houses and **chullahs**
- ❖ Market prices on a daily basis
- ❖ Canal Timings and Amount of Rainfall on a weekly basis

Villagers come to the kiosk to send an online application. They pay a fee of Rs. 10 for sending such requests and Rs. 5 for receiving the reply, which informs them of the date and time to come to the office and collect the certificate. The villager need not travel to get a copy of the application form, nor to go and submit it to the taluk headquarters. Not only is time and money saved in travelling but even wages of the day are not lost.

This has required the setting up of a backend process for the local government departments such as Taluk Office, Block Development Office, Municipality and Sub-Registrar Office. There is a trained computer operator who receives all email applications and sends them to the correct sub-sections within the office. Upon completion of the required processing, the operator sends an email reply requesting the applicant to come and pick up the certificate.

Some Process Changes that have been made to support the Services

- ❖ Modifying the applications so that they are easier to read and understand. For example, incorporating check boxes for eligibility criteria, etc.
- ❖ Making payments for certificates post-paid rather than pre-paid
- ❖ Eliminating stamp papers and issuing receipts against cash payments
- ❖ Making the format of application forms at Taluk and Municipality Offices uniform
- ❖ Converting to the Government recommended fonts for typing in Tamil
- ❖ Making all certificates bi-lingual

Almost 500 applications have been sent to various Government offices through this process. This list below excludes petitions sent to the Chief Minister's Grievance Cell, the Collector, the Tahsildar and various other Government officials.

Data as on 31st July 2002

TYPE OF APPLICATION	NUMBER
Birth	201
Death	41
Pensions	70
Income	56
Community	63
Nativity	3
Complaints	27
Others (Welfare Schemes)	30
TOTAL	493

Table 4. Break-up of E-government Applications sent Online in Melur

One of the most heart-warming successes of this service was the saving of an entire village from the outbreak of chicken pox disease. Almost 200 people in Pulimalaipatti village had been suffering for a month.

The kiosk operator sent a mail to the Taluk Office, Block Development Office and Health Department. The very next day a team of doctors and nurses came and inspected every house in the village, medicines were given and everyone was immunised.

The villagers, helpless till now, were completely amazed at the response of the government and praised the kiosk for saving their village. The Block officials also gave a severe reprimand to the Village President for not informing health officials earlier since this could have spread to other villages and become a huge epidemic.



Fig. 8 Dr. Sridhar checking a patient at Pulimalaipatti

4.1.2 Agricultural Extension Services

A partnership with the Tamil Nadu Agricultural College and Research Institute in Melur has resulted in consultancy services being offered to farmers through email & online chat between farmers and faculty of the university.

A computer operator at the College directs all mails to the respective departments (horticulture, plant pathology, entomology etc.). Once professors have given their recommendation, the operator types it out in the local language and sends it back to the kiosk.

One of the first success stories of this consultation was in lady's finger. Yellow mosaic disease in lady's finger which does not have any pesticide cure, hit all the farms of T. Ulagapitchanpatti village. When consulted, the Agricultural College recommended spraying a boron and nitrogen solution to increase the inner nutrient reserve of the plant, thus, enabling it to fight the disease. This saved

crops worth one hundred and fifty thousand rupees (Rs. 150,000) for that village! More than 40 requests for help have gone to the College over the past 2-3 months for various crops (Fig.9).

Based on requests from farmers, soil-testing services have been started where farmers can schedule soil sample pickups from their village. Earlier they had to travel to the city 32 km away to get the results but today, results are emailed to the respective village kiosks.

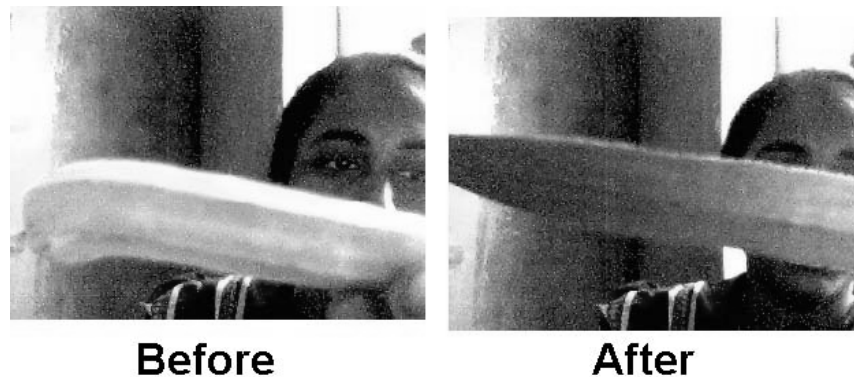


Fig. 9 Lady's finger before and after following the recommendation of the scientists

4.1.3 Veterinary Services

The collaboration with Tamil Nadu University of Veterinary and Animal Sciences (TANUVAS) has resulted in services in this area being extended to the people in Melur. Now villagers can send email/voicemail/ video mail of problems regarding their domestic animals – cows, sheep, goats, chickens, etc.

Previously, most villagers had to travel to the veterinary doctor's clinic and bring him to their village for consultancy at a minimum cost of Rs. 150-200. Many times a qualified doctor would not come and his medical assistant would be sent instead. Now, through the Internet, help is received without having to leave the village and that too from qualified professionals.

An example of such a benefit – in the photographs of the chicken below (Fig.10), the disease was identified as ***“curled toe paralysis”*** caused by B-complex deficiency. The suggested cure consists of medical drops along with homemade remedies such as feeding rice polish and husk to the hen.



Fig. 10 Chicken with “curled toe paralysis” from Attapatti village

Other Services Offered

- ❖ List of dispensaries, insemination centres, private clinics in Melur available on the web
- ❖ Advice on commercial animal husbandry activities like rearing animals, animal feed etc.
- ❖ Online registration for upcoming training programmes
- ❖ Directing animal health related queries to unemployed veterinary doctors in Melur who can attend to the same by going to the village - charged service
- ❖ First aid information for surgical and delivery problems through email

4.1.4 Eye care

One of the most promising partnerships is with the **Aravind Eye Hospital** in Madurai, which helps villagers to get a preliminary diagnosis of their eye problem and be directed to the hospital or nearest free eye camp if further treatment is required.

A photograph of the diseased eye is sent via web camera (if available). Further, a questionnaire available on the n-Logue web site provides a list of questions for which answers are required to be sent via a voice email.

This is sent to a senior doctor in the hospital who responds to the problem as required. He sends a response directing the patient appropriately. If a visit to the hospital is required, a letter is sent back which the kiosk operator prints out and hands over to the patient, who carries this with him or her.



அரவிந்த் கண் மருத்துவமனை, மதுரை

தோயாளிகளின் விபரம்

பெயர் : _____ வயது : _____ ஆண் / பெண்

த.பெ. ம.பெ க.பெ : _____

வீட்டு விலாசம் : _____

அரசாங்கம் : _____

மாவட்டம் : _____ பிள் தெ : _____ பேரன் : _____

யின் அலுவல் / ஈமெயில் : _____

தேதி : 6.4.2002

அன்புள்ள பழனியம்மாள் அவர்களுக்கு,

உங்க இரண்டு கண்களும் கண் மயக்கம் இருக்குள்ளது சொல்றீங்க. தூரத்து பார்வை மயக்கமயிரு'து இல்லையா? உங்க கண்ணுல சைத வளர்த்திருக்கிறதையும் பேரட்டோஷம் பார்ப்போம்.

உங்க கண்கள் புரையிருக்கலாம். அதுக்கு நீங்க திங்கட்கிழமை தனிர மற்ற நாட்கள் பிற்பகல் தோறும் நீங்க அரவிந்த் இலவச பிரிவுக்கு வந்து தரம் இத்திராணியை பார்க்கவும்.

இப்படிக்கு.

பூக்கா இளங்கோ

இந்த படிவத்தை திரப்பி. மருத்துவமனைக்கு வரும்போது கண்டிப்பாக கொண்டுவரவும்.

அரவிந்த் கண் மருத்துவமனைக்கு செல்லும் வழி
மாட்டுத்தொடர்பு பல் உடனடிவிடுத்து அண்ணா பல் உடனடி செல்வத்தொடர்பு பேருத்துகள்
77, 19A, 3, R5, 16
அண்ணா பல் உடனடிவிடுத்து பத்து திமிட அடையில் அரவிந்த் கண் மருத்துவமனை
இலவசப்பிரிவை அடைவதாம்

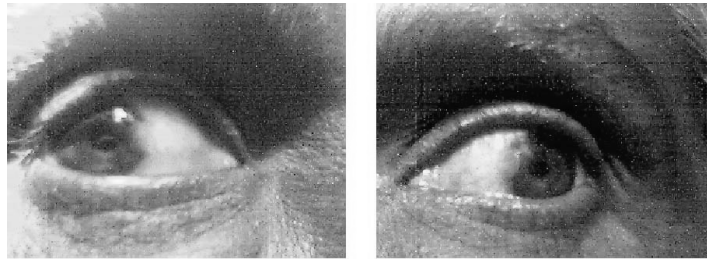
அரவிந்த் இலவசப்பிரிவில் நீங்கள் சந்திக்க வேண்டிய தபர் :
தாஸ் இத்திராணி

Fig. 11 Reply sent by doctors at Aravind Eye Hospital to patients

The ability to send an application from the security of their own village goes a long way in convincing people to use the facility. Since all it entails is Rs. 10 to send an application, they are willing to try. When the response comes back,

most of them are emboldened by the letter and the mention of a specific person whom they can meet. The results have been encouraging.

In the case below, Palaniammal was told that her problem was not serious and could wait a while longer. This not only saved her a trip to the hospital, but also alerted her to the need to seek treatment after a few months.



□ Fig. 12 Eye Photographs of Palaniammal taken using a web camera from Keelavalavu

4.1.5 Other Services

- ❖ Communication: Inter-village Postal Service, VoIP to call abroad
- ❖ Online Travel Bookings for Bus and Train
- ❖ Education: Model Question Papers, Education CDs
- ❖ Value Web Services: Insurance, Matrimonials, Classifieds, Job Search

A website has been hosted on the local server that provides local information (www.melur.n-logue.net.in). This allows access to all of the above services as well as the facility to post classifieds, register for eye camps etc. However, access to the Internet is still the most promising service of all. Through this, villagers are able to do so much more than what one organisation can facilitate.

- ❖ Exam results (Plus Two, Class 10, TNPCEE, Teacher Recruitment Board, etc)
- ❖ Information on where to apply for education after school
- ❖ Astrology, movies, music
- ❖ Search for any and every piece of information that they may need

This will continue to grow as more content providers realise this whole new market that has been opened up to them.

4.2 Implementing Applications

It has not been an easy task developing these partnerships for providing the various services listed above. The backend requires a computer with an Internet connection and trained staff to operate the system. The service provider must also be willing to receive and answer enquiries from villagers in a specific time frame and provide information through the network.

After ensuring that the backend is ready, kiosk operators need to be trained on the process so that they are able to utilise it and market it to the villagers. Today, only 50 people need to be trained every time when a new service is added. Once there are 100-200 kiosks, the training process itself will become expensive and resource intensive.

Once the operators are trained, one assumes that there will be a flood of emails from villagers for all the services. This is usually not the case. Even if there is a direct benefit to villagers from any service, there is always an initial reluctance to use the computer and send a query – be it for agricultural consultancy, travel booking or even an eye photograph to the doctor. Thus, there is a necessity to drive each new application on the field.

To start off the service in a few villages, n-Logue's team assists the kiosk operator in marketing the new service to villagers and bringing people to the kiosk for "trial" of the service. For instance, free mails are sent to Aravind Eye Hospital for people with eye problems or a ticket is booked for someone travelling without taking the service charge. This helps initiate people into the online system and once they have a positive experience, word of mouth is one of the strongest forces to bring more people to the kiosk. In fact, positive testimonials from other people help to build the faith of villagers in services through the kiosk. This is extremely critical to the success of any application that is initiated.

The next step is the most difficult part of any application process. The respective service provider must respond to all the queries sent by villagers within a couple of days. ***Not only has the villager paid money for this but also the credibility of the kiosk is at stake here.*** If replies do not come, people will lose interest and go back to their regular lifestyle. In cases where the service provider is the government or a government-related institution, prompt response is a bit difficult.

For e-government applications, it has been a constant effort to motivate local officials to respond to emails within a given time frame. Today there is no server-based application running that can track the various mails sent and whether they have been responded to. It is the kiosk operator's responsibility to ensure that

he/she receives replies for all mails sent. Wherever there is a delay, n-Logue steps in to follow-up with the local and district level government officials.

The District Collector conducts a review of the entire process once a month and this keeps the pressure on lower level officials to respond. Since there is extensive support from the government at the State level, even frequently changing local government officials has not been a major deterrent to the continuation of these services so far.

Even with private institutions like Aravind Eye Hospital, it took almost one month of several small modifications and various trials at the backend to create a stable process. The senior doctor had to get an assistant to type out responses in the local language for the villagers and to ensure that patients were being taken care of when they arrived at the hospital. This system was only put into place after a few rounds of follow up when patients did not get replies on time or got replies in English.

In the agricultural college, since no single professor is an expert in all areas, one has to rely on various departments to answer emails. In case a professor is on leave, queries related to his or her department remain pending, sometimes for a week or even longer.

n-Logue's main task today is ensuring that the backend process for all these applications works seamlessly and that kiosks receive replies within a maximum time frame of two or three days. Already 40 queries have been sent to the Agricultural College over the past month and a half, and nearly 70 have been sent to Aravind Eye Hospital over the last two months.

5.0 Operational Experience

As mentioned earlier, a kiosk operator needs Rs.50,000 plus a space with electricity connection and some minimum furniture to get started. Typically the entrepreneur invests around Rs. 15,000 of his/her money and takes a bank loan of Rs. 40,000 at an interest rate of around 12%. The bank loan repayment starts in six months and is about Rs.1000 per month. As the operator needs to personally earn at least around Rs.1000 per month for his/her services as kiosk operator (considered a decent earning in rural India), the kiosk needs revenue of around Rs.3000 per month to start breaking even. As the kiosk reaches revenue of Rs.4000, the bank loans can be returned faster.

Our experience in Madurai district is that almost all commercial kiosks reach break-even point in 4 months time. The revenue in kiosks (which are at least four months old) varies from Rs.3000 to as much as Rs.14,000 per month. These kiosks are currently serving villages with a population of 2000 or more. It is not

clear how much longer it would take the kiosks to reach a break-even point if the village population was smaller, say 1500 or 750. There were only a few kiosks where the revenue has failed to reach the break-even point. More on this later.

Even though the provision to connect a telephone and operate as a PCO exists in all the kiosks, the telephone connection was not provided because n-Logue has so far not been able to work out a relationship with any of the Basic Services Operators (telephone operators) in the Madurai area¹. Therefore kiosks can offer only two services, a stand-alone computer service and Internet based service. The computer is used by kiosk operators to take classes teaching basic typing, word-processing, spreadsheet, database, presentation and some computer aided drawing skills. The students are charged typically Rs.100-300 per month and class duration is 8-12 hours. The computer is also used in stand-alone mode to occasionally show a movie / cartoon to 5-10 persons (each paying Rs.3 to 10 for the show). Some DTP work is also undertaken. Recently the computers with photo-studio software have also been used to take photographs. The operators are now requesting n-Logue that the Access Center makes arrangements to print and deliver the photographs at kiosks.

Usage of Internet for emails and browsing picks up fairly soon as some youngsters are ready to pay even Rs.5-10 everyday for about half hour usage for a month. Voice mail and video mail have added immensely to email usage even by people who cannot read or write. But the services that have generated first revenue have invariably been e-government services. Gradually use of Internet for eye-care as well as agricultural and veterinary services have started generating revenues after a few months of operation.

5.1 Applications drive revenues

It is obvious from the operations so far that it is the applications that would drive up kiosk revenue. If a suite of applications relevant to people in rural areas is available and if people are willing to pay for these applications, revenue for the kiosk would rise quickly. In the absence of this, kiosks will find it difficult to survive. Unfortunately, there are not many ready-made applications for rural people. The probable reason is that an application developer has in the past not found sufficient number of rural connections to earn from the application provided. This is a catch-22 situation, as sufficient number of rural connections

¹ n-Logue is a franchisee of telephone service with Bharati Telecom, Shyam Telecom and Hughes Telecom in M.P., Rajasthan and Maharashtra for projects in those areas. n-Logue is in dialogue with BSNL and Bharati for similar arrangements in Tamil Nadu.

cannot come up unless relevant application exists. n-Logue and SARI therefore have the tough task of getting the kiosks going despite having only a few applications to earn money from.

Fortunately, widely available email service coupled with attachment of voice and video mail became the first platform, which could be used to provide various services. At the same time net-meeting (video-conferencing) became a powerful tool, which created immense confidence in rural folks, as they could see the District Collector / doctor / agricultural scientists live while interacting with them. These tools became instant hits. The key then was to complete the loop and provide back-end services. It was imperative that the government offices worked to provide the certificates that were requested through the net by the rural people. It was also important that doctors at Aravind Eye Hospital were ready to provide the service on mail and video conferencing. Agricultural and veterinary scientists had to answer the questions promptly and correctly. To begin with, most of these services were provided voluntarily. n-Logue did the running around and ensured closing of the loop. Eventually private consultants and firms have to step in. They would do so as the number of kiosks increase. But till then, it will be n-Logue's task to keep things going.

The applications available have increased immensely over the last six months. Yet this number has to grow significantly more. Each application requires a lot of technical skills to make it work well. The kiosk operators need to be trained to operate these services. They also need to be trained to market these services to the people. At the backend, scientists, doctors and government officials need to be motivated. Also, since the exchange of information has to take place in the local language, most applications become language specific. Moreover, each application partner caters to a specific geographical location (government offices cater to populations within their taluk or block, the agricultural college caters to the population of the district). To expand coverage to the next taluk, an entirely new set of government offices and officials will have to be inducted into the project and trained on the process. Follow-up increases to multiple offices, albeit for the same process of birth certificate.

All this requires an extraordinary effort from the dedicated n-Logue SARI team at Madurai. It is unclear whether all this would have happened if a less committed and capable team existed on the ground. It is also unclear how much effort would be required to replicate this from one district to another district in this region and from one region to another (where regional variations may require significant changes in applications).

One of the most interesting applications that has helped immensely is Yahoo Messenger Service. The operators always have this application open on their

desktop informing them of which other kiosk operators are up on the net. They contact another operator immediately when they require some information or when they do not know how to operate an application. In fact, this ability to contact other kiosk operators in an instant and discuss problems/experiences has created a lot confidence amongst operators. Collectively this group of people along with n-Logue is learning fast. When needed they connect to each other on net meeting to discuss how to handle some peculiar problems posed by customers. One also finds some operators visiting other kiosk operators and spending time to learn something new. Inter-village communication in the region is picking up and creating a new community, which appears all set to conquer the world of technology.

5.2 Who are these kiosk operators?

It is interesting to note that many of the kiosk operators in the region are very young women. They are the most energetic persons in the field. It was also found that only a few of the young (20-25 years of age) men do well as kiosk operators. The ones who drive the business best are older men – between the ages 30 to 45. Many of them have been entrepreneurs even earlier, running a teashop in the village or attempting to run some business. These people very quickly pick up the business aspect of these new services and are able to drive it hard, even though some may not even know how to operate a computer (they often take the help of a young woman to be the operator).

It is also noted that it is the whole family, which quickly gets involved in running the kiosk. Young people (from 10 years onwards) are able to learn computer operation in less than a month. Lack of training has not been an issue in operating the kiosk. Training is, however, required to drive business. As mentioned earlier, here the older men/women do better.

What kind of kiosks fail to generate revenue? It has been found that when a village kiosk is owned by someone who does not directly participate in driving the business, the kiosk does not do well. When it is left to salaried employees for operation, the kiosks have failed to drive revenue. Similar has been the case when kiosks have been given free with the objective of it better serving the community. These kiosks have failed to drive revenues and the revenue is under Rs.1500 per month even after six months. It is not clear whether part of the reason for this is due to inadequate technical or business training provided to these operators by n-Logue. It is also unclear whether these kiosks have in any way better served the community.

It must be pointed out that these observations are very preliminary as too little a time has elapsed since the kiosks have started operating commercially.

6.0 Social Considerations

Right from the beginning of this project, a question that was raised by many was, “who, in rural areas, would this connectivity and kiosk benefit?” There were discussions about whether such technological intervention would benefit primarily certain upper sections in the village, and whether within the village deprived sections would be left further behind. The n-Logue project is too young to come to any conclusion, even if preliminary, in this regard. This section therefore merely presents some reflections on this issue based on the experience in Madurai so far.

We raised this issue several times with kiosk operators in the village, especially with the older operators. Most of the time the reaction was that of a surprise that such a question was being put. The zest of the answer was that these are not issues in commercial establishments. They cited that PCOs are used by all communities widely and the operator goes out of the way to woo all customers. They also told us that the case was same when it came to shops selling something. According to them, these issues come up only when something was not set up commercially, and was instead obtained as some kind of Government or private grants. They told us that the kiosk should be set up in a public place (near the market) and must be run commercially for it to be freely accessible to all.

6.1 *Initial observations about who is using the kiosk today*

We found that the usage depends on the kind of applications available. For example, use of email and browsing is primarily done by the economically middle and upper sections* of the village. But as voice mail and video mail got introduced, the lower section of population occasionally started using it. The use of government applications was, however, primarily by the lower and middle section of the population. The pension and welfare schemes applications were only from the poor. Similarly the use of the kiosks for eye-care with Aravind Eye Hospital was made more by the lower section of the population. The use of agricultural services was made primarily by middle level farmers and that of veterinary services by small farmers having animals. The use of the education facility was primarily by youngsters from the upper and middle sections.

While too preliminary to come to any conclusion, it is obvious that one has to drive applications, which would benefit various sections of people in rural areas. This would be the challenge of n-Logue in partnership with various service providers and NGOs.

* the upper sections of rural areas in Melur would compare only with the middle sections in urban areas

6.2 Impacts on Poverty Alleviation

We comment on certain important social issues in the form of answers to some often asked questions.

Have there been increases in income among the users as a result of the ICT services? Has the introduction of ICTs increased opportunities for income generation and employment? Has the introduction of ICTs increased income on existing activities through improved access to markets and information?

It is too early to comment on increase of income through either employment generation opportunities or access to markets. One person in each village as kiosk operator has been given an opportunity for self-employment. Jobs postings have only just begun and this needs time to build up. At least one of the kiosks is keen to carry out CAD / CAM services for people in cities. Efforts are required to make this successful. Use of market prices have not picked up significantly in this area – one of the reasons could be because the main crop is a low variety of paddy that does not have much price fluctuation. Also, in particular villages where ground water is good and sugarcane, peanut and other such crops are grown, traders come to the doorstep of farmers to buy the crop and pay Rs 5-10 per kilo more than the rate in Madurai. In basic vegetables, the price in Madurai is sometimes less than the price in Melur and even if the price is higher, transportation costs far exceed the benefit.

Is there increased awareness of and access to entitlements? Is there improved access to public programmes for poverty alleviation and service delivery?

The MinARASU website built by n-Logue with information from the District Collectorate is a storehouse of all public welfare schemes and entitlements. So far, people have been using it to download application forms for various certificates and loan schemes. They are also able to contact officials from various local level government departments via email. Recently welfare schemes for widows and young girls have been highlighted, which most people were unaware of – this has generated interest amongst some villagers who have sent applications for these schemes.

Is their improved access to health facilities? Have education levels increased?

The tie-up with Aravind Eye Hospital has created a direct link between villagers and an important health provider, which conducts free eye camps in the area and also treats more than 60 percent of its patients for free. In other areas of health, n-Logue has yet to create any significant partnerships. Increase in education level cannot be judged since the project is only 8 months old. However, a number of children are getting computer literate.

Are there any special measures to encourage those belonging to the economically weakest, women-headed or backward class households to access ICTs for their development?

SARI has earmarked funds to help women entrepreneurs in self-help groups to set up these kiosks in their village. Nineteen such centres have been set up so far. n-Logue is also ensuring that kiosks are not set up inside people's houses but in a centrally located place that is designated as a shop. This is to try and minimise the effect of caste on access to the Internet facilities.

Have interactions between communities and local government officials increased with introduction of ICTs?

There has been a steady increase of such interactions ever since the project was set up because of the introduction of e-government services. Government officials have to answer emails on a daily basis. The number of applications for various certificates and services has gone up considerably and village level officials today have to spend more time meeting with villagers for various verification procedures. Earlier, villagers were not even sure of the acceptance or rejection of their application upon submission. Sometimes they would have to pay money just so that their application can enter the system. Today that is not the case.

Has interaction between different types of communities increased with the introduction of ICTs?

Significant interaction is taking place between kiosk operators in different villages. This inter village communication can have significant impact on the region in the future.

Has dependence on specific persons in a community reduced with increased and wider access to information? Has this led to changes in the local community organization and power structure?

Too early to comment.

Is the relation between the genders changing as women have increased access to ICTs and thereby to services and economic activities?

This cannot be judged for Melur since the project is only 8 months old.

Is increased access to information causing changes in lifestyle?

It has been quite a paradigm shift for people to start using email instead of STD phones or sending emails to the agricultural college instead of travelling to Melur to the pesticide shop for help. The attitude of villagers is changing when they see

opportunities available such as contacting Aravind Eye Hospital. Today, instead of waiting in the village for help to come, old people are seeking help by sending their voicemails across and then visiting the hospital to get their sight back. They are realizing that they have a choice to lead a better life.

7.0 Conclusion

The Madurai/Melur experiment has been a fascinating experience. Even in a very short time, it has shown that

- ❖ Low-cost affordable technology and kiosks are the key to sustainable connectivity in rural areas.
- ❖ The commercial model of an entrepreneur in the village owning and operating a kiosk would definitely work.
- ❖ The rural Indian entrepreneurs/operators are not afraid of new technologies. They see that the Internet can benefit them and are quickly finding creative and innovative ways of using Internet.

The key issue is whether we can reflect upon the how replicable is n-Logue's model. Is it possible to use this to connect rural areas all over India in a short time? n-Logue's operational model (Access Centre) is modular and should be replicable. But can we comment further on it based on our experience in Madurai?

While it is clear that technology is solid, the Madurai experiment has also shown that it is the driving of applications, which would make the business work. In Madurai, n-Logue did not use an LSP. n-Logue's personnel carried out the tasks normally assigned to an LSP. It is therefore unclear whether an LSP would do equally well. This is important, because it is the LSP who plays a key role in quickly expanding the experiment all over India. n-Logue cannot have the resources and management talent to do this quickly. In this sense, the absence of an LSP in this experiment is the biggest bottleneck in our coming to any conclusions about replicability and scalability.

Further, while most of n-Logue/SARI investment in Madurai was as per plan, it was the investment in driving applications that was not fully understood at the start of the project; and as mentioned earlier, it is driving applications, which is key to success. It may well be that driving applications will be the largest obstacle to the scalability of rural Internet projects. In fact, it is too early to say whether applications will be replicable at all across regions or languages. Not only is cost an issue but, the time required and the **quality** of manpower needed to conduct this process is also an important question.

But then there is another side of this. Today, there are no commercial rural Internet application providers. With the small number of kiosks and low penetration of rural connectivity, they do not see any immediate return for their investment in creating applications. What if the number of kiosks grows to 10,000 or say 50,000? Can the revenue generated from kiosks create a business interest in relevant applications? For example, even a modest sum of Rs. 100 per year from each kiosk would imply a revenue of Rs. 1 million (with 10,000 kiosks) to Rs. 5 million (with 50,000 kiosks) for an application. Would this not bring in entrepreneurs? If this happens, n-Logue's task will become easier. Otherwise, the initiative has to come from n-Logue and its founders, the TeNeT group of IIT Madras; but with their limited resources, the development of relevant application would move only slowly.

An equally important question is to what extent the Internet kiosk benefits rural people and whether it benefits only certain sections of rural people. The Madurai experiment leaves no doubt that Internet could change rural India and that with care, it could benefit most sectors of rural people. The key, however, is to remain focussed on the final customer – the rural villager.

Finally, what is the size of the investment in this model and whether such investment is available? It is here that n-Logue's model scores very high. The investment is required from three partners. The kiosk operator uses a bank loan, coupled with some government rural entrepreneur promotion scheme, to invest in the kiosk. It is clear that this investment is available and can be recuperated easily. The second investment in n-Logue's model comes from the LSP. With Madurai operations being conducted without an LSP, no further insight can be obtained on this count from the project. The third investment is from n-Logue itself, in establishing and driving each Access Centre. It is estimated that n-Logue needs to invest upward of Rs. 2.5 million (25 lakhs) per Access Centre. Most of rural India would be connected with about 1000 Access Centres. This amounts to a total investment of Rs. 2.5 billion (Rs. 250 crores). The payback does not appear to be too long and therefore, part of this investment can come from revenues. The amount is, indeed, too small for connecting Rural India. If one can use this to increase the rural GDP by 10%, this would amount to an increase of Rs. 60,000 crores (\$12 billion).

It is clear that one must move on. n-Logue is planning at least 50 Access Centres in the next year. It would help if n-Logue ties up with Bharat Sanchar Nigam Ltd. (BSNL) to provide telephony services too. It would also be desirable that government agencies/rural development departments invest some resources in creating relevant rural applications. Internet is POWER – now the task is to

take it to the 700 million people in rural India who would benefit from being connected.