Impact of ICTs in Rural Areas (India) Phase II – Information Village Research Project

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Terminal Report [2000-2004]

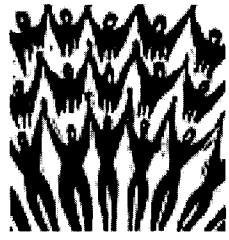
Box Items or Part of the Report [Annexure 44]

implemented by

M S Swaminathan Research Foundation

MAKING WAVES

STORIES OF PARTICIPATORY COMMUNICATION FOR SOCIAL CHANGE



A REPORT TO THE ROCKEFELLER FOUNDATION

BY ALFONSO GUMUCIO DAGRON

FORWARD BY DENISE GRAY-FELDER

The "information shops" have been established in four villages: Kizhur, Mangalam, Embalam and Veerampattinam. The shop at Embalam is located on the premises of the village temple, which is owned by the community through an informal trust. In each shop, a Pentium PC with multimedia and a deskjet printer have been installed in a specially designed box to prevent rodent attacks on the instruments. The computer can be connected to the wireless network through a modem and a specially designed interface. The shop volunteers, at their discretion, write in more news from the locality.

The four villages are linked to the foundation's hub at Villianur through an ingenious wireless system. V. Balaji, a graduate of the Indian Institute of Technology at Kanpur, who oversees the project for the foundation, dreamed it up. The value addition centre acts as an exchange point for a variety of local-specific information. Each shop has a board to display bulletins received from the value addition centre. A local area network based on Very High Frequency (VHF) radio has been established with the Villianur office serving as a hub, handling voice communication as well as data.

While the foundation's model is relatively costly and may prove difficult to replicate on a large scale, the government of Pondicherry nonetheless plans to expand the project to 50 more villages. The spread of this approach to more of India's 600,000 villages would ultimately require government money and manpower, with support from NGOs and philanthropies.

BACKGROUND & CONTEXT

Pondicherry, which was the administrative headquarters of the French territories in India, comprises 130 villages and the Pondicherry town, and is spread over an area of 1,100 square kilometres. Tamil is the language spoken with English and French as languages of the administration. More than 60 percent of the population of Pondicherry lives in the rural area. Dominant crops are rice and sugarcane. Approximately 20 percent of the rural families have been officially classified as living below the poverty line.

The Madras-based MSSRF was established in July 1988 as a nonprofit and nonpolitical trust committed to a mission of harnessing science and technology for environmentally sustainable and socially equitable development. MSSRF's research, training, communication, extension and networking programmes, in the fields of agriculture and rural development, seek to link ecological security to livelihood security in a mutually reinforcing manner. The Foundation projects include: *Coastal Systems Research* (CSR), *Biodiversity and Biotechnology*, *Ecotechnology and Sustainable Agriculture*, *Reaching the Unreached*, and *Education, Communication, Training and Capacity Building.*

biological absorption and utilisation. The Knowledge System aims to create conditions conducive to a healthy and productive life for all.

The project is based upon the understanding that *value addition*, by professionals or trained individuals, to networked information is a key step in enabling rural families to have accessibility. A small office in a centrally located village, Villianur, serves as the value addition centre, where the project staff scans the Internet, especially the World Wide Web, for useful contacts or technologies.

Each shop varies slightly in the way it is operated and supported. In Kizhur the volunteers were chosen by the Village Development Council, which also nominated a 23-member (14 men and 9 women) group to guide the shop's operations. At the shop in Embalam all the volunteers are women in the 21–27 year age group; each of them spends half-a-day at the shop, rotating the schedule.

CONSTRAINTS

The vast majority of Web sites are in English, a language that more than 95 percent of Indians do not speak. Nonetheless, the project has, since its inception, challenged this by translating and producing local contents in Tamil.

Poverty itself is a huge limitation. Only 12 public telephones and 27 private telephones exist in the project area, which covers 19 villages with a population of 22,000. Routine power failures and overloaded telephone lines make connecting to the Internet a frustrating proposition. There are serious questions about whether countries like India, weighed down by high rates of illiteracy and illness, should spend heavily to provide villages, that desperately need schools and health clinics, with what most would consider a luxury.

Project overseer Balaji notes that one immediate obstacle, is that local bureaucrats are often reluctant to give up their monopoly on information, which can be a source of power used to extract bribes.

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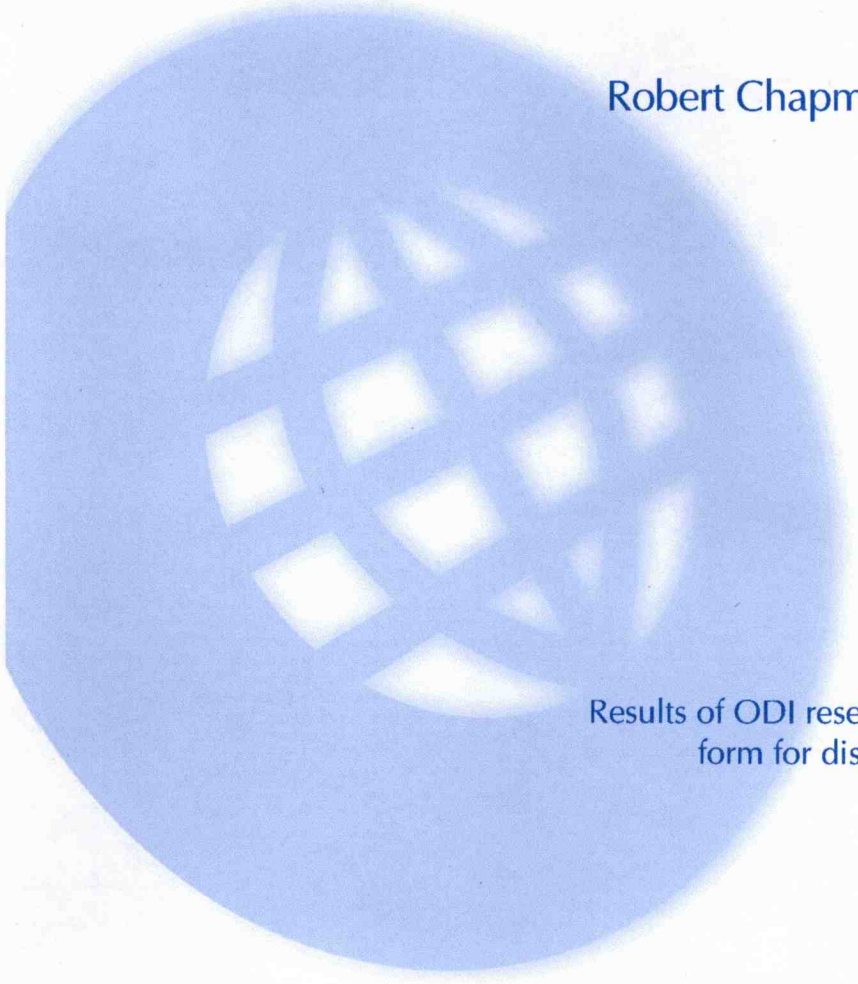
Overseas Development Institute

ICTs and Rural Development: Review of the Literature, Current Interventions and Opportunities for Action

Robert Chapman and Tom Slaymaker



Working Paper 192
Results of ODI research presented in preliminary form for discussion and critical comment

Working Paper 192

ICTs and Rural Development: Review of the Literature, Current Interventions and Opportunities for Action

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November 2002

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Box 2 ICTs and livelihood assets

ICTs impact on livelihood assets in a number of ways depending on the local context in which they are introduced. Assuming open-access, community models such as telecentres (IDRC: Acacia Initiative, UNESCO: MCTs) and 'knowledge centres' (MSSRF) can be expected to have an impact on livelihood assets in the following ways:

Human Capital: Improved *access* to education and training through distance learning programmes, and education tools in a wide range of different formats. The potential to transfer digital content to remote locations easily in the form of text, images, video and radio combined with the vast storage capacity of PCs, CDs and DVDs reduces many of the costs associated with barriers to broad-based information access. The impact of increased information flow on human capital development will depend equally on the effective *translation* of material into different languages and appropriate formats for the intended users and their local cultural context.

Natural Capital: Improved *access* to institutions dealing with different aspects of natural resource management including administrative and legal information such as land records. Communication channels can be enhanced with appropriate authorities, landowners, government ministries and local government officials. The experiences of other individuals and communities can also be shared and the information used to compare strategies and develop local solutions to problem and conflict situations.

Financial Capital: Support and strengthening of the local financial institutions including micro-credit organisations to improve information provision on services and facilities available such as loans and savings schemes. Extended access to financial information can also improve *transparency* and more equitable service provision such as through highlighting excessive rates of interest charged by moneylenders. Community-based financial management such as savings schemes can also be introduced together with extended communication among a wider community of financial institutions.

Social Capital: Improved 'networking' both at the community level with existing networks and potentially amongst a much wider community. The ability to build new social networks at a regional and national level can help to bring benefits to existing networks and institutions at a local level such as CBOs, FOs etc. The reduction in the cost and time taken to travel to pursue social networking goals can also have a positive impact at a household level with family members spending less time away and less money on transport. Expanded social networks may also result in increased opportunities for employment both locally and away (potentially increasing rural-urban migration).

Physical Capital: *Access* to markets and market information helps to improve choices for the sale of goods on local markets according to enhanced information on prices, comparative supply and demand for products. In the longer-term new markets, techniques and processes for production, processing and marketing of products, both farm and non-farm can be explored.

Source: Chapman et al., forthcoming

the poor actively participate in the generation of development knowledge in order that it reflects or at least takes into account local truths. The potential of ICTs to enable articulation, sharing and storage of local knowledge within and between groups and to facilitate improved mutual understanding between development practitioners and beneficiaries at the 'project interface' (Long and Long, 1992) is considerable (see Section 2.3).

The potential of using ICTs to promote rural development lies partly in increasing market efficiency through addressing information gaps and blockages. But also in informing and strengthening the decision-making capacity of the rural poor and institutions that represent them. In particular

requirements for its products and services globally are largely unknown. It is the acceptance of this fact that makes HP's approach stand out in the private sector as one that potentially frees HP designers to work by the ethos that 'we *will* design ICTs for the future needs of a global society that includes the 4bn low income users in developing countries. The alternative and perhaps prevalent approach amongst technology companies (and one that HP must also take to a certain extent) is that 'we *have* invented for the future needs of a global society, more specifically those who can afford it, and we *will* maximise our share of the market.' Perhaps HP's strategy is based on the belief that the market for ICTs is as big as they want it to be, and therefore rather than focusing on increasing their share of it they are looking to dominate in a vast new market in which they will be ahead of their competitors, if not on their own. They are not alone, however, in the perception that this is more than just a 'PR4PR' (poverty reduction for public relations) exercise and it has been called 'the most visionary step ever taken by an IT company.'[9]

2.4.3 Information catalysts

The MS Swaminathan Foundation (MSSRF) in Tamil Nadu, Southern India has been experimenting with ICTs as a means of facilitating development in poor rural communities. Funded by the IDRC, Swaminathan's *e-villages* have developed a novel approach to empowering people through increased access to information. Computer terminals (rather than telecentres) have been pre-loaded with a database of useful information relating to government services, such as agricultural extension, health and the police that contain the relevant contact details for each village. Ten villages have been requested to allocate a building with public access for the computer to be installed in and to identify a group of volunteers to run the village centre. In each case where the computers have been installed women have been encouraged to take control of the running of the centre, to provide information services to the village and to run training courses for other women. Support and daily information bulletins are provided by a central 'hub' located in the nearby town of Vilanur. The hub is staffed by trained IT personnel with support staff that are on hand to respond to requests for information and training from the villages. Training courses for up to 25 people can be held at the Vilanur hub and larger courses such as for making incense sticks and small scale paper production from banana leaves have been developed to facilitate livelihood diversification through small business activities. The daily information bulletins are sent by e-mail to the networked villages which receive a summary of the main news stories from the local news papers, the local weather report and prices, and are collected from local markets each morning. As the e-village experiment has developed, new approaches to the technology, such as solar power and spread spectrum masts, are being tested to establish the minimum running cost for the villages. Support is currently provided by the MSSRF through external funding, but it is expected that the villages will become self-supporting. Therefore if more villages can be connected their share of the cost of running the hub can be reduced. However, it is already a comparatively low cost approach to improving access to information for communities and individuals that are isolated not only geographically but also socially. Compared to telecenter models that can cost between $150-200,000 each to provide trained staff, multiple computer access points, printers, photocopiers, e-mail, telephone and web services and a purpose built centre in many cases, the e-villages provide a more localised and low-key service at a fraction of the cost.

The focus of the e-village concept is on enabling the villagers to access information that is useful to them for their daily lives and to discover opportunities for improving their income generation. The initial database and daily bulletins are intended only to act as catalysts, to reduce the sense of

[9] Kirkpatrick, D. (2001) 'Great Leap Forward: Looking for Profits in Poverty.' *Fortune magazine*. February 5th, 2001.

isolation, and to extend public information to those who need it most. The way information is then used and the benefits of improved access varies between villages and individuals, and requests for further information can be made to the hub or through the other channels that are opened up. The village database is, therefore, designed to be expanded to include a wide variety of information that has been collected and generated specifically for use within that community. The village centres are decentralised knowledge centres that can be developed to reflect local priorities and needs and perhaps more importantly, to integrate the ICTs and 'external' information sources at a pace that suits the specific local and cultural context. MSSRF has recognised that whilst there are obvious and immediate information gaps that can be filled (such as the daily news and market prices), using ICTs to their full potential in rural communities will require longer term integration into the communities themselves. This process of integration should not be considered as delaying the full benefits of the digital revolution, and therefore a constraint that needs to be overcome, but rather as a positive developmental process in itself that returns a sense of control to the community.

Villagers often discover uses for information that extend beyond what was originally intended. Agricultural prices, for example were collected and sent out to the villages based on the assumption that farmers would find it useful when dealing with middlemen that come to the villages to purchase their harvest. This information was also found to be useful to landless labourers, whose payment was often received in kind. The labourers were better able to determine whether the quantity of rice they received reflected the amount they could actually purchase according to the most recent market prices. MSSRF is therefore providing access to information as a catalyst for empowerment. The process of empowerment and the extent to which it occurs depends on the extent to which people can and do act on the information they have available. ICTs can make more information available but it is up to individuals to choose what is relevant to them and demand useful information. MSSRF is empowering people to make those demands. The most sophisticated technology in the most sophisticated markets are now wholeheartedly focused on one thing – giving the consumer choice. Digital television, for example, is transforming the most popular information medium to facilitate demand driven and consumer specific programming. The World Wide Web is an eclectic mix of information sources with some sites that are never visited and those that receive millions of hits a day, powered by search engines that guide people to the information that is relevant to them. The potential of ICTs in future rural development strategies is therefore not only to provide information that is relevant to developing communities but to empower them to choose and demand the information themselves.

2.4.4 Remote access

Worldspace Corporation has launched a digital Satellite radio service capable of broadcasting to over 4 bn people in Africa, Asia, the Middle East and Europe. The service includes a number of channels unique to Worldspace that are intended for regional listeners. The service provides rural areas with a far greater choice of channels than is usually available and there is a range of receivers available for both indoor and outdoor use. Worldspace is also developing a number of services aimed at addressing some of the developmental goals of the areas it covers. A distance education channel broadcasts education programmes and a mobile telekiosk is travelling throughout Africa to assess the demand for a range of services using information and communication technologies, including Worldspace radio, Internet telephone calls, VSAT telephony, web browsing and local broadcasting. Worldspace receivers can be connected to PCs and digital content from the Internet can be delivered directly without the need for a telephone line. Worldspace offers data downloads on a daily basis from a wide range of sources from the British Medical Journal to Africaonline news. Distance learning programmes can also use this facility to download course materials and

The MSSRF catalyst model specifically aims to address the issues of content and control in order to empower the most marginalised groups directly by giving them access to the ICTs. In fact, in recognising the potential for 'modern' equipment to raise an individual's status the women who have been selected to run the information centres in their villages have been those who had the most to gain from the increased status. The Grameen phone similarly targets marginalised women (e.g. widows) in rural areas to run the mobile phone service and found that they were very quick to learn how to use the mobile phone and charging equipment. Much of the underlying difficulties of running the mobile phone service require numeracy which is much less of a problem than the level of literacy required to run an information centre. The telephone ladies also receive support from the local Grameen Bank office that helps to ensure the telephone charges are fully covered. MSSRF has also *centralised* the provision of much of the external information that requires skills in searching and liaising with national and international information sources. The support to the users is isolated from control of both the ICTs and the information that they are used to provide. The devolved control of both the technology and the information exchanged is a clear element of these two approaches that are designed specifically to maximise the potential of ICTs to empower the poorest within rural communities.

3.2 Encouraging participation and demand-driven ICT use

In order to integrate ICT use into local knowledge and information systems the underlying control and local ownership discussed above needs to be developed by encouraging active participation. Local radio stations for example recognise that their popularity stems from engendering a sense of proximity with the listening community that other media cannot achieve. The most significant way to achieve this is through the use of local languages and dialects that are for some the only language that they understand and for others their preferred language for discussions on local issues. Simli (Friendship) Radio operating in Northern Ghana[12] also actively promotes community involvement in its programme content and develops its schedule according to the priorities established through a close relationship with its listeners. The programme schedule consists of basic education, health and agriculture. The programme producers use a range of resources for the agricultural programme such as the local University Department and Animal Research Institute, extension officers and NGOs. However, the producers spend at least 12 days a month recording in the villages to ensure the programmes are both appropriate to local communities and topical for the kinds of activities and problems that are occurring at that particular time of year. The cross-cutting nature of the local radio programmes aims to address different groups in the community at different times, when they are most able to find the time to listen and arrange to listen in groups. Group listening helps both to stimulate discussion and to maximise the use of the radios available. Educational programmes therefore, target children, through 'schools for life' classes for 8–12 year olds in the afternoon and adult learning programmes are broadcast in the evenings. The schools for life classes also specifically target those falling outside the formal education system that are often working as farm-hands and baby sitters. The radio station has built over 200 schools for classes of up to 25 children, with a minimum of 50% girls in each class, and a further 200 official schools are used in the afternoons for these radio based classes. 50 officers are employed to mobilise teachers and local communities and encourage students to join the classes which last 9 months and provide basic literacy skills, often at a faster rate than standard classes.

The station also produces tailor made courses on income generating and diversifying activities or subjects of special interest. Programmes on a range of subjects such as bee-keeping, compost

[12] As part of the Ghanaian Danish Community Programme funded by Danida.

of many ICTs and in providing increased flexibility for alternative user choices has already catered for the alternative epistemologies that co-exist in developing countries. This process now needs to incorporate an even greater range of user requirements, some similar and some different from those already identified and it needs to continue to assess ICTs in the context of alternative epistemic requirements and adapt them accordingly. In recognising that the World's poor are not one homogenous group it is evident that the 'digital divide' cannot be bridged by a single 'universal' application for the poor especially when the digital revolution itself has been fuelled by the increasing flexibility of the technologies to suit the user's way of life.

3.4 Community knowledge partnerships

In the short term, strategies for integrating ICTs into rural development need to focus on widespread, cross-sectoral local adoption. ICTs remain relatively new in many rural areas and there is a fundamental issue of increasing access to potentially useful technologies. As discussed above this will require a plethora of approaches to correspond to the complex multi-dimensional livelihoods of the poor in rural areas. To promote knowledge as a catalyst for development, ICTs could be used as flexible tools for supporting and capacity building across a wide range of innovative institutional partnerships. There have been a number of experiments by international organisations such as the FAO, UNESCO and IDRC and national governments (India, Brazil) and NGOs such as M.S.Swaminathan Foundation that aim to improve information provision through the use of ICTs. The approach advocated by the authors is to build on these through the development of community knowledge partnerships (CKPs) that can extend existing information networks such as by connecting local radio to the Internet, and make new linkages such as by providing audio-visual and radio programmes to community centres and schools for adult learning. The partnerships approach emphasises the potential to share the responsibility for the provision of information widely through innovative and decentralised institutional relationships. These will necessarily include a broad range of user groups and partners, as indicated in Box 7. The process of developing CKPs can be locally driven based on local choices and priorities and to reflect the local context in which information flows. However, rather than develop according to historic institutional barriers to information flows, a range of ICTs must be made available to ensure that even the most marginalised groups can find a way of improving their access to and choice of information relevant to their livelihoods. Both public and private sector partnerships can be developed to this end with government, academic, mass media, and market based information sources. The range of information sources available should be used strategically to support those partnerships that promote information access and use amongst the most marginalised groups. ICTs therefore need to be presented as options, alternative means for increased communication and information exchange that correspond to local priorities.

PAN GLOBAL NETWORKING

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE (IDRC)

TELECENTRE EVALUATION

A GLOBAL PERSPECTIVE

Report of an International Meeting on Telecentre Evaluation

Edited by Ricardo Gómez and Patrik Hunt, IDRC

FAR HILLS INN, QUÉBEC, CANADA

SEPTEMBER 28-30, 1999

Knowledge System for Sustainable Food Security (V. BALAJI)

M.S. Swaminathan Research Foundation, Chennai, INDIA

The information villages research programme has now been renamed "Knowledge System for Sustainable Food Security" to reflect the growing international and national interest (e.g. the Systems Review Process in the CGIAR; the NATP in India) in the role modern information and communication technologies can play in promoting sustainable agriculture. Organised as an experiment, the project aims at building a model for the use of ICT in meeting the knowledge and information requirements of rural families taking into account the socio-economic context and the gender dimension. The model would further enable the understanding of the extent to which effort should be made to transform generic knowledge into locale-specific knowledge that can be acted upon. The project has established a hub at Villianur village where value-addition activity is carried out, so that generic knowledge is transformed to become relevant or useful in the local context.

The value-addition centre at Villianur has access to the Internet through two dial-up accounts. This also functions as the hub of a local area network for data and voice transmission covering the project villages. An EPABX, similar to the ones used in offices for providing intercom facility, is the key instrument in this hub. Every location on the network, including the office at Villianur, is a node in this "intercom" network, which functions with VHF radio (full duplex) rather than copper wires as the medium of signal transmission. With the help of regular modems, PCs can be connected to this network.

As of June '99, village knowledge centres (earlier termed "information shops") have been set up in four places other than Villianur. The locations are Kizhur (21 km west of Pondicherry) Embalam, (19 km southwest), Veerampattinam (13 km south) and Pillayarkuppam (13 km northwest). Prior to setting up these Village Knowledge Centres, participatory rural appraisal was carried out in 14 hamlets.

In each case, the community has identified and provided an accessible place and 2 – 4 volunteers. A gender expert, supported by the Gender Matters Award of IDRC, was invited to participate in the inception stages to ensure that gender sensitivity was built into all the operations. All the identified volunteers and the project staff were also given orientation to the importance of incorporating gender sensitivity, through a workshop. The gender composition of volunteers is as follows: Kizhur – 1M : 1F; Embalam – 4F (all); Veerampattinam – 2F:1M.

During the first phase, the volunteers have been trained in all the basic operations of using a PC running MS WINDOWS 95. They are also familiar with despatch/receipt of messages using MS-EXCHANGE which was found to be the optimal protocol for use on the analog wireless network. In addition, they have been trained in composing documents on MS-WORD 97 (using I-LEAP

Tamil fonts and the keyboard layout developed by C-DAC, Pune). Training in elementary maintenance, such as defragmentation of hard disk, has also been provided. It was found that a period of two weeks is necessary to train a volunteer in all these operations, given that he/she has not seen a PC before and that the level of education is limited to 10 years in school. A small number of volunteers, on their own, have picked up the use of HTML; the techniques of recording voice in *.WAV format and the compression of *.WAV files using REALAUDIO for ease of transmission of voice as an e-mail attachment. The trainers were the project staff with occasional help provided by the staff of the Informatics Centre.

Content creation to suit local needs is the key element in this project. Prior to commencing content-building activity, extensive consultations were held with the participating village communities, through small groups. It emerged that provision of dynamic information on prices and availability of inputs for cultivation – seeds, fertiliser or pesticides – was important to all farmers, especially the medium and small farmers. Knowledge of grain sale prices in various markets in and around Pondicherry is critical to farmers during the harvest season. The agricultural labourers, especially women, whose wages are partly in grains, are also anxious to know the sale prices. Detailed surveys revealed that women in rural families are interested in obtaining health-related information, particularly concerning disorders in the reproductive tract, and in child health. The village centres, according to them, should provide such information in a substantial way. Also emphasised by them is the need for information on opportunities to augment income, such as training in new skills in manufacture (e.g. incense sticks). There is near consensus that the village centres should provide all information on public schemes for rural welfare and the government's list of eligible families living below the poverty line.

The value-addition centre in Villianur has generated a number of databases to fulfil at least some of these requirements. These are:

- Entitlements to Rural Families
  This database provides details of about 130 schemes which are operational in Pondicherry UT during the current Plan (up to 2002).

- Families Below Poverty Line
  The details of families in the communes of Ariyankuppam, Villianur and Nettapakkam have been provided in this database which has been compiled from the UT Administration and updated till April '99. Approximately 22,000 families are listed.

- Grain prices in Pondicherry region
- Input prices (quality seeds/fertilisers) in Pondicherry region
- Directory of general and crop insurance schemes
- Integrated Pest Management in rice crop
- Pest management in sugarcane crop
- Directory of hospitals and medical practitioners in Pondicherry–Grouped with specialisations such as orthopaedics, paediatrics etc.
- Bus/train timetables–Covering Pondicherry region and two nearby towns.

These databases in Tamil (except the families below poverty line data, which is an official document in English) are available in all the village centres. Updates are transferred using the wireless network. In addition, interactive CD-ROMs for health-related issues have been developed, where FAQs (frequently asked questions) are posed to medical practitioners, whose replies are videographed and converted to REALVIDEO format for retrieval using a PC. Topics related to general hygiene, dental and oral hygiene, and eye have been covered. (Videography was conducted in health camps organised by the village communities). Veerampattinam is a coastal village with 98% of the families involved in fishing. The information requirements in this village are different and more focused on the safety of fishermen while at sea, on fish/shoal occurrence near shore, and on techniques for post-harvest processing.

In addition to such defined content, daily transactions take place covering important public events and government announcements (of significance to rural families). Cricket information is much sought after through well known Web sites. One important service provided is the announcement of results of 10th and 12th standard examinations during June '99. The results and the marksheets were available on the WEB, and these were made available to a total of 931 students resident in and near the project sites, cutting short the time of waiting by at least one week.

An analysis of users' registers maintained in the village centres reveals that the proportion of women users varies from 34% (Kizhur) to 50% (Embalam). The proportion of users who are below the poverty line is 16% on the average (the average proportion of rural families living below poverty line is about 21%). Just over 60% of the use is for voice telephony, indicating that voice is still the important medium for transactions in rural areas. It is found that there is increasing differentiation in the information sought over a period of six months (e.g. not only input prices but their availability ex-stock in a specific period; the differences between committee-fixed sale prices and those offered by commission agents, etc.).

This programme has benefited by the visits of eminent individuals. Prof. Bruce Alberts, President of the US National Academy of Sciences, and Dr. R.A. Mashelkar, Director General of CSIR, jointly launched the Knowledge System for Food Security programme, while inaugurating the Embalam centre. The Hon. Dr. Maurice Strong inaugurated the centre at Veerampattinam along with Sir John Maddox, editor Emeritus of *Nature* magazine in April '99. On these occasions, the Lt. Governor and the Chief Minister of Pondicherry presided over the events. This project received mention both in India and abroad, in detail in the 136th Presidential Address at the US National Academy of Sciences (April '99) by Prof. Alberts. It has also been noticed in the *Communications of the ACM* (November 98), *On the Internet* (January '99), and in *Science* (11 June '99). The *Human Development Report 1999* of UNDP cites this as an example of a creative project in addressing the global information divide.

Recently, a significant new dimension was added with the commissioning of solar-mains hybrid power systems in all the five centres. MSSRF has seven years experience in operating the Informatics Centre with solar photovoltaic system as the primary source of power. Based on this,

VILLAGE KNOWLEDGE CENTRES

1998 India

BASIC FACTS

TITLE:	Village Knowledge Centres
COUNTRY:	India
FOCUS:	Rural development
PLACE:	Chennai
BENEFICIARIES:	Rural population
PARTNERS:	M.S. Swaminathan Research Foundation, India (MSSRF)
FUNDING:	IDRC
MEDIA:	Information technologies, computers, Internet

SNAPSHOT

In this village at the southern tip of India, the century-old temple has two doors. Through one lies tradition. People from the lowest castes and menstruating women cannot pass its threshold. Inside, the devout perform daily pujas, offering prayers. Through the second door lies the Information Age, and anyone may enter.

In a rare social experiment, the village elders have allowed one side of the temple to house two solar-powered computers that give this poor village a wealth of data, from the price of rice to the day's most auspicious hours. ...

Some months back, Subrayan Panjaili, a round-faced woman who cannot read or write, sat in the courtyard of her small home in the village of Kizhur, in Pondicherry, with the family's only milk cow, Jayalakshmi. For five days and nights, the cow moaned while in labor. Something had gone wrong and she was unable to deliver her calf. Mrs. Panjaili grew ever more fearful that the cow would die.

"This is the only good income we have," she said, explaining that the four gallons of milk the cow produced each day paid the bills.

Word of Mrs. Panjaili's woebegone cow soon spread to Govindaswami, a public-spirited farmer who uses one name. The village's computer, obtained through the Swaminathan Foundation, is in the anteroom of his home. The computer is operated full-time and for no pay by his 23-year-old, college-educated daughter, Azhalarasi, who used it to call up a list of area veterinarians.

the village knowledge centres were also provided with solar-hybrid system as the primary source of power. This is the first time that such systems have been installed in the country. They have been designed and supplied by the Bharat Electronics Limited (BEL). The BEL and MSSRF are jointly involved in monitoring the performance of these devices which provide backup power for a PC with a wireless transceiver and inkjet printer for up to 5 hours.

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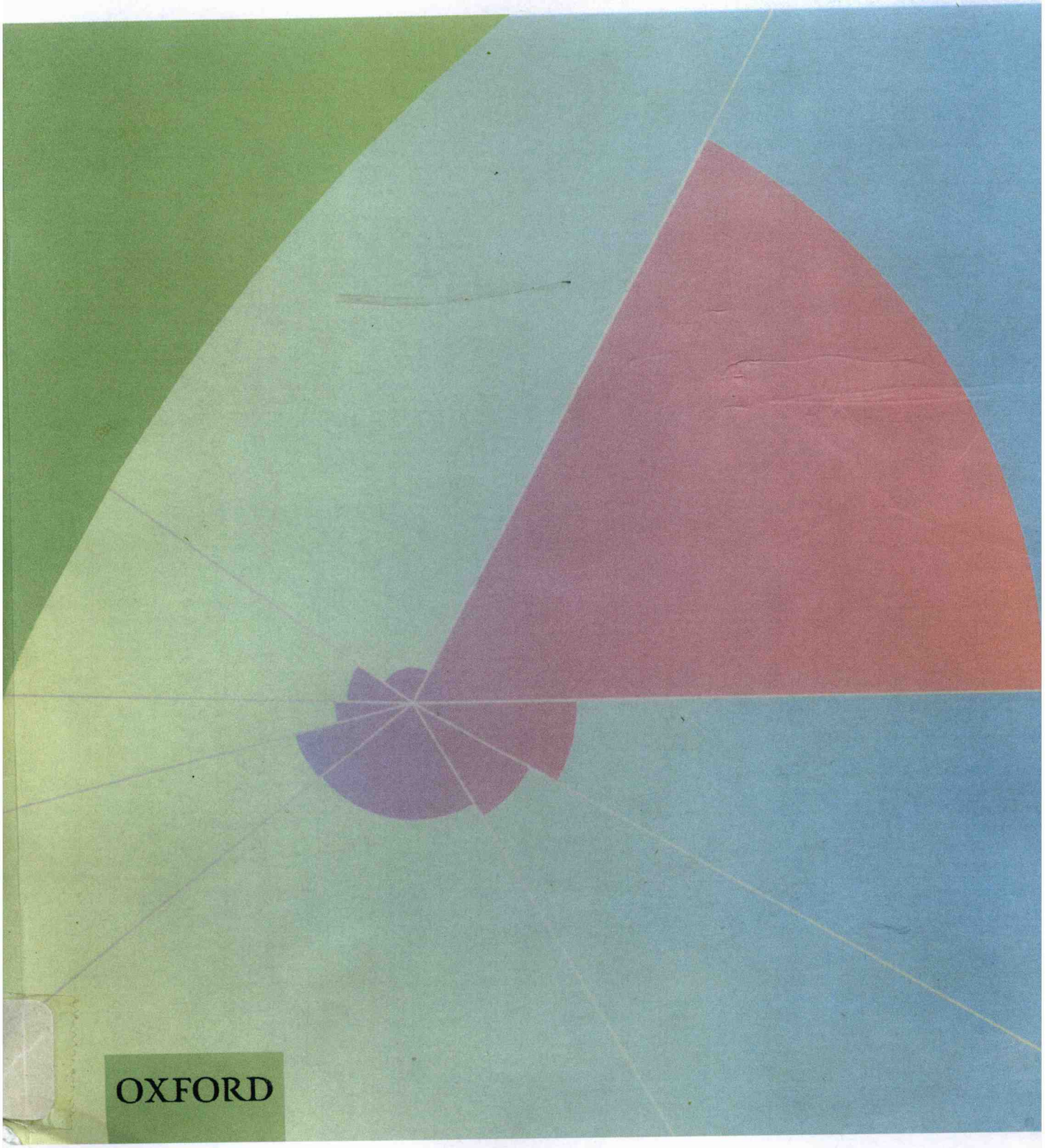
HUMAN DEVELOPMENT REPORT 1999



OXFORD

CHAPTER 2

New technologies and the global race for knowledge

The recent great strides in technology present tremendous opportunities for human development—but achieving that potential depends on how technology is used. What is technology's impact on globalization—and globalization's impact on technology?

The race for knowledge

With the knowledge economy at the forefront of global interaction, much attention has become focused on new technologies: on information and communications technologies and on biotechnology. Why do these stand out?

For both, there have been fundamental leaps in innovation—not just better ways of doing old things but radically new ways of doing previously unimagined things. The fusion of computing and communications—especially through the Internet—has broken the bounds of cost, time and distance, launching an era of global information networking. In biotechnology the ability to identify and move genetic materials across species types has broken the bounds of nature, creating totally new organisms with enormous but unknown implications.

Both technologies are fuelling globalization, opening new markets and giving rise to new actors. Communications change economic competition, empowerment and culture, inspiring global conversation. Genetic engineering leads to complex links between farmers and indigenous people in biorich countries and the multinational pharmaceutical and agricultural industries.

And both technologies are being shaped by globalization. Writing computer programmes and revealing genetic codes have replaced the search for gold, the conquest of land and the command of machinery as the path to economic power. Knowledge is the new asset: more than half of the GDP in the major OECD countries is now knowledge-based. With such importance placed on these technologies, the new rules of globalization—liberalization, privatization and tighter intellectual property rights—are shaping their control and use, with many consequences for human development.

The global gap between haves and have-nots, between know and know-nots, is widening

Globalization's rules have set off a race to lay claim to knowledge. A global map for the new technologies is being drawn up faster than most people are able to understand the implications—let alone respond to them—and faster than anyone's certainty of the ethical and developmental impacts. The global gap between haves and have-nots, between know and know-nots, is widening:

- In private research agendas money talks louder than need.
- Tightened intellectual property rights keep developing countries out of the knowledge sector.
- Patent laws do not recognize traditional knowledge and systems of ownership.
- The rush and push of commercial interests protect profits, not people, despite the risks in the new technologies.

The new technologies—drivers of globalization

Communications technology sets this era of globalization apart from any other. The Internet, mobile phones and satellite networks have shrunk space and time. Bringing together computers and communications unleashed an unprecedented explosion of ways to communicate at the start of the 1990s. Since then tremendous productivity gains, ever-falling costs and rapidly growing networks of computers have

more than 3,000 people by 2000. In the Philippines new mobile phone operators—usually serving an elite market—are also required to install 400,000 landlines—serving poor communities—within five years. Computing hardware and software are needed to transform telephone lines into Internet connections, and policies are needed to promote this. To encourage computer ownership, the governments of Bangladesh and Mauritius, for example, eliminated tariffs and taxes on personal computers.

The satellite revolution promises greater connectivity, since every point on the globe can be reached instantly without a need for expensive land-based infrastructure. User costs are still very high, but with several major satellite networks due to be launched before 2001, competition could bring rapidly falling prices in the future.

Competition is hard to ensure in the telecommunications industry—especially for local calls, as even the most developed countries have seen. Strong regulation and antitrust laws, well implemented, are needed to ensure that private markets are competitive markets and that public needs are met. This will be a challenge for all countries.

Community access. To bring connectivity to people, community access is key, not individual ownership. The concept of one household, one phone is unrealistic in many developing countries, especially in rural areas and among poor communities everywhere. A

BOX 2.5

Innovating with the Internet

The Internet is an evolving tool and can be creatively used in many ways. Some countries are at the forefront of innovating to make this technology work for their needs.

Egypt—enriching telecentres

At the end of 1998 there was less than one Internet user for every 1,600 people in Egypt. Connections are increasing daily, but mainly among the wealthy and well educated in urban areas. To reach out to people in poor and remote areas, UNDP has launched three pilot Technology Access Community Centres (TACCs) in the governorate of Sharkeya.

Each TACC telecentre, equipped with Internet connection and many computers, is located in a public building or a local chamber of commerce to ensure that it is accessible to all—individuals, civil society groups, small businesses, low-income communities. But the centres provide far more than walk-in access. They offer training in computer literacy, email and Web searches, Webpage creation, desktop publishing, computer maintenance and technical support. These skills can be used for distance learning, telemedicine, networking and electronic commerce. Future plans include integrating women's health centres into the TACCs. Internet access is initially free to encourage people to explore the potential. Later, low fees will be supplemented by charges on other services: fax, photocopies and training programmes. This is the way forward for telecentres.

Estonia—raising the roof

Estonia, among the first of Eastern Europe's transition economies expected to enter the European Union, is wasting no time catching up. Along with economic reform, the country has made great efforts to promote access to the Internet for its 1.4 million citizens. Small countries, often disadvantaged by their size in other areas, can be among the first to create an information society. As President Lennart Meri of Estonia has said, "The Internet is the roof of the world for a small nation."

Public Internet access points are provided throughout the country, even on remote islands in the Baltic Sea. In schools the Tiger Leap Programme, launched in 1996, provides information-based learning systems for all pupils, rapidly modernizing education and creating strong conditions for an open learning environment. Its scope has widened, aiming to create an open and democratic society by providing access to modern communications for all, not just school pupils, city dwellers and the well-off. With few natural resources, Estonia has realized that its wealth is its people and is investing in them for the 21st century.

The country has indeed tiger-leaped ahead of other transition economies in integrating into the information society. More than one in 10 Estonians are now on-line—using the Internet—and Estonia ranks among the top 15 countries in Europe in computers per capita, ahead of France and Italy. Surveys of users show that they use the World Wide Web mainly to find information for work, for school and for leisure—spending little time playing games or watching videos. Clearly, in Estonia the Internet is becoming a learning tool, not an entertainment centre.

India—reaching the villages

Some of the remotest villages in the world have modern communication. Ironically, it usually brings only satellite television full of images of distant lives, irrelevant to local issues.

The M.S. Swaminathan Research Foundation in South India is trying to change this—to tackle local problems. The Village Information Project in Pondicherry began with an in-depth study of village needs—and only when this was complete did it turn to technology. Reconditioned second-hand computers were donated by Byte by Byte, a Tokyo-based organization that collects discarded equipment from companies such as Reuters and Ford Motors and sends them off for second lives around the world.

Even in villages without telephones, the Village Information Project brings people the knowledge they need. Free-standing, solar-powered computers are updated daily with information relayed through radio handsets and cell phones from a regional centre with direct Internet access. The village computer acts as a bulletin board for the availability of medicine in health centres and credit in microfinance schemes, for market prices, transport services and input costs, for warnings of pest, weather and water risks and for educational materials for schoolchildren.

Source: M.S. Swaminathan Research Foundation 1998; Mehta 1999; UNDP 1998b; BMF Gallup Media 1999.

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Comparing Approaches: Telecentre Evaluation Experiences in Asia and Latin Americal

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Abstract

IDRC has telecentre evaluation initiatives in Africa, Asia and Latin America. Each of these is in the process of establishing evaluation frameworks and each is adopting very different approaches. The current paper seeks to build on the outputs of IDRC's Far Hills Workshop on Telecentre Evaluation (September 1999) to explore the experiences in the two regions. These explorations will in turn contribute to IDRC's current initiative to develop a framework for ICTs evaluation.

The Far Hills Workshop, and the resulting report entitled Telecentre Evaluation: A Global Perspective, *had as objectives to explore challenges and opportunities for telecentre evaluation; understand and compare emerging evaluation frameworks and methodologies; assess needs and resources available; identify salient issues affecting telecentre performance; and provide an opportunity to exchange experiences and lessons across regions.*

Understanding Telecentres

Telecentres are a new trend in international development. Loosely defined, telecentres are a physical space that provides public access to information and communication technologies, notably the Internet, for educational, personal, social, and economic development (for a more detailed discussion on telecentre definition see Gomez, 1999). When it comes to evaluating what kind of benefit or development telecentres bring to a community, we are only beginning to scrape the surface. About six months ago IDRC's PAN and Acacia Networking initiatives organised an international meeting in Quebec, Canada, to discuss telecentre evaluation methodologies. At the meeting we established a list of criteria for telecentre evaluation (Gómez, 1999). Based on this work, we suggest the following guidelines to assess ICT evaluation that is useful, financially responsible, builds local capacity, and enables shared learning:

Guiding Principles for sound Telecentre Evaluation

Building from discussions at Global Telecentre Evaluation Meeting, Far Hills Inn, September 1999
Guiding principles to help evaluation be USEFUL, FINANCIALLY RESPONSIBLE, BUILDS

1 A draft of this paper was presented at the 50th Annual International Communication Association ICA Conference June 1-5, Acapulco, Mexico

Because stories must be told to an evaluator, and because a major criterion for evaluation as determined by the Far Hills workshop is participation, the group also expbred the idea of having the telecentres evaluate each other. Thus, neighbouring telecentres would exchange, compare and document their experiences, providing an opportunity for both primary learning in the form of telecentre capacity building, and for secondary learning in the form of evaluation capacity building. The approach has been dubbed a 'learning evaluation.'

A first exploration of this methodology has been carried out by PANTLEG. In November 1999, the group realised a mission to study the projects of two IDRC partner organisations in India. Two IDRC representatives accompanied Roger Harris of Malaysia, Merlita Opena of the Philippines and Narangerel Dander of Mongolia to visit V. Balaji of the MS Swaminathan Research Centre (MSSRF) and Loyola Joseph of the Foundation of Occupational Development (FOOD), both in Madras. This entire group of project co-ordinators visited six village telecentres, one of which acts as an information hub for three others administered by MSSRF, and one centre of operations hooked to one telecentre administered by FOOD. The group had discussions with telecentre users and operators to, "discover a range of typical stories that described instances of telecentre use which were perceived by the users to have led to successful outcomes," and to, "discover any success stories concerning operational problems, and the means that were used to overcome them" (PANTLEG, 1999). Story collection typically started with village leaders (mostly male), then users (first male and then female users) and finally operators (in one case the operators were part of a woman's co-operative). In all, the group uncovered 24 success stories, each of which, "owes its outcome to the sensitive and timely delivery of useful information that contributed to local knowledge which facilitated something desirable for the recipient" (PANTLEG, 1999).

The evaluation group summarised their thoughts for the 2 project organisers of FOOD and MSSRF. They then reviewed the impact assessment section of an MSSRF project proposal. MSSRF had proposed regular surveys of key indicators throughout their projects in order to measure improvements attributable to the telecentres. An important lesson of the exercise for the PANTLEG group was that evaluation of a telecentre project is not straightforward. They suggested that the proposal be changed so that baseline surveys were followed by story gathering and the collection of fresh empirical data, a process more akin to action research. This approach recognises that the implementation of the telecentre projects can shift the focus of the research question and generate new avenues for inquiry. Furthermore, the mix of approaches would provide a much richer picture than could come from a uniquely survey approach. Another recommendation was that MSSRF focus less on specific project outcomes which may be hard to quantify and measure. Instead, the evaluation group suggested that, "it might be beneficial to acknowledge ... uncertainty of outcomes at the outset and to demonstrate the capability of the project to tease out unpredictable benefits through the skilful and sensitive application of appropriate methods such as Action Research, Participatory Rural Appraisal, Rapid Rural Appraisal and Outcome Mapping" (PANTLEG, 1999).

The mission to Asia gathered several stories indicating the positive impact that telecentres can have in underdeveloped communities. For example, in one instance, a farmer discovered late at night that if a cow didn't receive treatment within a few hours, it would likely die. PANTLEG's report explains that, "The farmer was able to summon help from the telecentre staff who searched their networked information sources for a veterinary surgeon who would was close enough to apply treatment within a short time. The surgeon was contacted by telephone and he arrived in time to save the cow"

from each other. It would have been interesting to foster evaluation through exchanges at the telecentre level. This would allow telecentre operators and users to exchange information on service provision and uses. Furthermore, it would make evaluations more participatory, strategic and reflective of the local vision of the telecentre community.

Before these groups can be expected to carry out effective evaluations, training will be required. Story telling requires facilitation and interviewing skills. The evaluator would not simply listen and record stories, but would also need to effectively manage the information that is uncovered. In such an open-ended process, the stories told could unearth some difficult questions for the stakeholders. In this case, the evaluator may be called on to suggest solutions to the problem or moderate disputes. The approach also requires that evaluation results be used in an appropriate manner. Stories are sometimes personal, so there should be some discussion of the ethical aspects ofhow the information is used. Closely related to this is the imperative that the purposes and results of the study be made public in a manner appropriate to all stakeholders.

Training on the approach would also help to overcome another potential pitfall. When two telecentres or two project co-ordination teams are brought together there is a risk that successes will be emphasised over failures, as was seen in the initial PANTLEG experiment. This particular project was operating successfully at the time of the evaluation, and as a result, the evaluation produced a list of positive outcomes. However, it should be noted that the language of the PANTLEG report on the mission to India (PANTLEG, 1999) does emphasise successes. Furthermore, two telecentres established by MSSRF had been closed and replaced by two alternative centres prior to the mission. The reasons for these closures should have been examined to bring out lessons for use in other centres. While the PANTLEG group wanted to focus on how telecentres can positively impact development, ignoring failures can lead to problems with program implementation and the sustainability of telecentres. Closely related to this experience is the concern that learning evaluations may be at risk of emphasising successes over failures because of inter-group competition, a desire to show hospitality, or incentives to gain funding or other support. An emphasis must be placed on honest sharing of information for the sake of learning.

The PANTLEG group continues to develop its approach to evaluation (PANTLEG, 2000). Since their visit to India, PANTLEG has recognised five common causes of concern in telecentre operation and use including: standards for telecentre operation, policy environments for telecentre propagation, cultural context of telecentre deployment, sharing of knowledge between PANTLEG partners, and extending capabilities to non-PANTLEG individual and organisations. In order to address these points, PANTLEG has adopted comparative evaluation and exchange of participants, among other things, as crosscutting objectives for their work. A study mission to Sarawak has been proposed to evaluate the IDRC-supported remote community telecentre research project being carried out by the Universiti Malaysia Sarawak. A goal of the mission will be to further develop the evaluation methodology and to "define a pilot implementation of evaluation methodologies and techniques suitable for the Sarawak project and capable of enhancing the Group's capacity for evaluating telecentre activities" (PANTLEG, 2000). They are also working towards developing adaptable and replicable learning evaluation methods that could eventually become part of a training program.

PANTLEG in Light of the Guiding Principles for Telecentre Evaluation

Telecentres in Rural Asia: Towards a Success Model

Roger Harris, Ph.D.

Abstract

The global digital divide threatens to deprive millions of people of the benefits that are attainable from having access to Information and Communication Technologies (ICTs). Most of these people live in rural parts of developing countries and they are unlikely ever to own their own computers. However, international aid agencies, governments and NGOs are becoming increasingly enthusiastic about the potential for generating rural development from community based telecentres. This report describes five telecentre projects that are concerned with bringing about social and economic development in rural communities in Asia. Existing success models from the field of Information Systems that relate to similar ICT based innovations in organisations, namely the Information Centre and End User Computing, are examined to establish how they might be adapted to the community based innovations represented by telecentres. A success model for telecentres is derived and applied to the five Asian projects. Results indicate that earlier research offers promise in understanding what leads to a successful community telecentre. In particular, the characteristics of communities emerge as the most potent influence on the success of community telecentres, yet are probably the least manageable. Suggestions for future research and implications for practice are drawn.

Introduction

The uneven global distribution of access to the internet has highlighted a digital divide that separates individuals who are able to gain access to computers and the internet from those who have no opportunity of doing so. The United Nations has noted in its Statement on Universal Access to Basic Communication and Information Services:

> "The information and technology gap and related inequities between industrialised and developing nations are widening: a new type of poverty – information poverty – looms. Most developing countries, especially the least developed countries are not sharing in the communications revolution". (UN, 1998)

A few statistics serve to highlight the alarming differences at either ends of the digital divide:

- All the developing countries of the world own a mere 4% of the world's computers,
- 75% of the world's 700 million telephone sets can be found in the nine richest countries,
- There are more web hosts in New York than in continental Africa; more hosts in Finland than in Latin America and the Caribbean combined,
- Tokyo alone has more telephones than the entire African continent,
- There were only 1 million internet subscribers on the entire African continent in 1999 compared with 15 million in the UK (World Bank, 1999).

Table 1 shows the gap in Internet access between the industrialised and developing worlds. More than 85 per cent of the world's internet users are in developed countries, which account for only about 22 per cent of the world's population.

Table 1. Internet access by region, selected regions, June 1999			
	People connected (millions)	Global percentage of people connected	Percentage of global population
Canada and USA	97.0	56.6	5.1
Europe	40.1	23.4	13.7
Asia and the Pacific*	27.0	15.8	56.2
Latin America	5.3	3.1	8.4
Africa	1.1	0.6	12.9
Middle East	0.9	0.5	3.6
	171.4	100	100
*Including Japan and Australia			
(Henry et. al, 1999)			

Drilling down into the access statistics reveals further levels of inequality within the developing countries that are least served. Typically, a high percentage of developing country residents live in rural areas. The proportion can rise to as much as 80 per cent of the population in the least developed countries and is estimated at 75% overall in Asia. Rural access to communication networks in developing countries is much more limited than in urban areas. Table 2 depicts teledensity levels across a range of countries based on comparative income levels. The data overestimates rural access because the "rest of country" includes everything except the largest city.

Table 2. Access to telecommunications, countries of different income categories, 1999			
Country classification	Teledensity (Telephone lines/100)		
	National	Urban	Rest of country
High income	46.0	52.9	43.8
Upper middle	13.7	25.7	11.5
Lower middle	9.7	22.1	7.2
Low income	2.5	6.5	2.3
(ITU, 1999)			

Unsurprisingly, the digital divide mirrors divides in other resources that have a more insidious effect, for example, access to education, health care, capital, shelter, employment, clean water and food. In the sense that the digital divide can be seen more as an absence of access to information than as an absence of access to technology, these other divides can arguably be seen as more of the result of an imbalance in access to information than as its cause. Information is critical to the social and economic activities that comprise the development process. If information is critical to development, then ICTs, as a means of sharing information, are a link in the chain of the development process itself (ILO, 2001).

The 2000 summit of the Group of Eight (G8) countries in Japan acknowledged the digital divide with its declaration of the "Okinawa Charter on the Global Information Society". The Group established an international task force to assist developing countries to embrace the IT revolution (Japan Times, July 23 2000). The Group also declared that "bridging the digital divide in and among countries has assumed a critical importance on our respective national agendas" and it agreed to establish a Digital Opportunity Taskforce (dot force), whose task will include promoting improved connectivity, increasing access and lower costs. Japan's own initiative announced at the same time was to extend $US15 billion to developing countries over the coming five years to help narrow the digital divide

However, eliminating the problems that the digital divide represents requires more than the provision of access to technologies. According to the ILO, ICTs can contribute significantly to socio-economic development, but investments in them alone are not sufficient for development to occur (ILO, 2001). Put simply, telecommunications is a necessary but not sufficient condition for economic development (Schmandt et. al, 1990). Martin and McKeown suggest that the application of ICTs is not sufficient to address problems of rural areas without adherence to principles of integrated rural development. Unless there is minimal infrastructure development in transport, education, health, and social and cultural facilities, it is unlikely that investments from ICTs alone will enable rural areas to cross the threshold from decline to growth (Martin and McKeown, 1993).

One approach to the problems of the digital divide has been the community telecentre. Telecentres come with a variety of names, such as telecottages, or information shops, and no single definition serves to satisfy all of them. However, a common characteristic is a physical space that provides public community based access to ICTs for educational, personal, social and economic development. Telecentres are usually designed to provide a combination of ICT services, ranging from e-mail to full internet and World Wide Web connectivity (Harris et. al, 2001). Colle (2000) says there is great diversity in what is called a telecentre, and provides a set of key bi-polar variables associated with telecentres, summarised in table 3.

Table 3. Key Variables Associated with Telecentres

Narrow focus	***Multipurpose***
Provides access to technology only	Provides services, e.g. training, development information
Community-based	***Establishment***
Represents a broad constituency	Top-down government or business organisation based
Stand alone	***Attached***
Not associated with another institution	Operates as part of another institution, e.g. school, government units
Thematic	***Universal***
Specific to theme, e.g. education, health.	Whole community needs
Independent	***Networked***
Operates alone	Works with other telecentres
Public sector	***Private sector***
Operated by a public body	Operated by a private body
Profit oriented	***Service oriented***

Operates as a business	Operates as a service
Public funded	***Privately funded***
Funded by public funds	Obtains funds privately
Commercial	***Free***
Charges clients for its services	Provides services for free
Urban	***Rural***
(From Colle, 2000)	

Telecentres provide an alternative to the model of one-to-one individual access to a computer that predominates in the developed world. As community resources, telecentres offer opportunities for development that are predicated on improved access to information for whole communities. The study of Community Informatics (CI) is emerging in part in response to the challenge of achieving economic and social development for communities through the use of ICTs. CI pays attention to physical communities and the design and implementation of technologies and applications, which enhance and promote their objectives. Studies in CI show how ICTs can help communities achieve their social, economic, political, or cultural goals (Gurstein, 2000).

Telecentres have been introduced to many communities throughout the developing world. Significant examples include the Acacia project that aims to empower sub-Saharan African communities with the ability to apply information and communication technologies to their own social and economic development. Acacia works in Mozambique, Senegal, South Africa, and Uganda, mainly with rural and disadvantaged communities, which often find themselves isolated from the ICT networks to which their urban counterparts increasingly have access (IDRC, http://www.idrc.ca/research/xacacia_e.html). The Pan Asia Networking Program (PAN) focuses on information-poor communities to determine how the least-developed countries and communities can best achieve sustainable and adequate national and local connectivity, participate in global network resources (internet), and develop local expertise in computer networking. Activities address community-level access to internet-remote areas in Asia and Latin America and incorporate questions of impact and sustainability of services in the context of communities that have minimal resources. PAN explores how the internet can help empower local populations, indigenous groups, and other communities (IDRC, http://www.idrc.ca/pan/projects_e.htm)

The introduction of a telecentre into a typical rural community in a developing country represents a substantial innovation for that community. For many rural dwellers, a community telecentre will be their first encounter with a computer. In one case of a telecentre introduced into a rural community in Malaysia, of 140 households surveyed, only one contained anybody who had even heard of the internet (Harris et. al, 2001). Moreover, telecentres that seek to overcome the barriers to access to ICTs in rural areas of developing countries are mostly experimental. Currently, there is very little experience of the impact of such centres in the context of rural and remote areas in developing countries and there are many questions to be answered before embarking on ambitious and costly programmes at a national level (Ernberg, 1998). Given the novelty of access to ICTs and the shortage of guidelines for establishing and operating community telecentres, many research questions remain open as to how this type of innovation can bring about equitable access to information resources that

will lead to sustainable development among the most disadvantaged sections of the world's population.

The research reported here addresses such questions. Against the background of the digital divide and the impact of its effects among rural populations in developing countries, the report considers the rural telecentre as a particular kind of innovation in order to understand the extent to which existing theories in Information Systems (IS) can be applied to its adoption. By examining five case studies of rural telecentres in Asia, we will consider similar kinds of innovation from IS theory, namely the Information Centre and End User Computing, in order to advance the theory building that will be required to support and explain telecentre adoption and success in rural developing country settings. The analysis will attempt to scale up existing theories from the organisational level to the societal level. Table 4 suggests why this might be worthwhile and valid by suggesting that community-based access to ICTs is part of a continuum that includes IS as a discipline with an evolving field of theory closely aligned to the technology that its members promote.

Table 4. Information Systems as an Evolving Discipline

Dominant Technology	Information Systems Locus	Work Group Focus	Dominant Referent Discipline	Scope
1960-70 MAINFRAME COMPUTERS	Electronic Data Processing	Clerical staff	Computer Science	THE ORGANISATION
1970-80 MINI COMPUTERS	Management Information Systems	Managers	Management	
1980-90 PERSONAL COMPUTERS	End-User Computing	Knowledge workers	Organisational Behaviour	
1990-2000 NETWORKS	Strategic Information Systems	Shareholders	Economics Marketing	
2000- THE INTERNET	Community Informatics	Citizens	Social Science	SOCIETY

Harris, 2001

Table 4 models the evolving IS discipline by mapping its historical trajectory against that of ICTs. As Information Technology (IT) evolved over the period of time since it came into common use, the IS profession emerged as a forum for understanding the impact of IT upon the structures and communities who were its most prevalent users, as well as developing an understanding of how to optimise the effects of that use. In the process, IS relied upon varying referent disciplines from which it adapted its theoretical foundations and practices. At the turn of the millennium, IT has evolved into ICT and the scope of its use has stretched far beyond the original purposes of organisational data processing into a society-wide phenomenon whose full impact is still unfolding. Nevertheless, even though ICTs have consistently spread into new

categories of use and user, it is reasonable to suppose that certain underlying themes of adoption may have endured from one phase to the next.

In attempting to relate past theoretical frameworks to contemporary events, it is evident that some similarities exist and that they might be capable of pointing towards new or adapted theories for understand and guiding the newer trends. In the case of the community telecentre, there would seem to be a parallel with the Information Centre (IC), as an organisational innovation of the 1980s which was concerned with the promotion of End User Computing (EUC). Just as the IC was designed to foster organisational improvement though the adoption of EUC, telecentres encourage and promote the use of ICT among their communities in order to cultivate community development. Accordingly, theories of IC and EUC adoption that were meant to explain how they could contribute towards organisational development might be useful for understanding how telecentre adoption can contribute towards community development.

Theoretical Background

Information Technology Diffusion

This section presents some important outcomes of IT adoption research that are considered relevant to the theme of community adoption of telecentre services. We start with a broad perspective of IT diffusion and then focus more closely onto research outcomes relating to the success of Information Centres and End User Computing, as these areas are considered to have potential for informing an understanding of telecentre adoption.

Cooper and Zmud (1990) present a stage model of IT implementation, which they define as an organisational effort directed toward diffusing appropriate information technology within a user community. The model has six stages, each with a process and a product, as follows:

Stage	Process	Product
Initiation	Active and/or passive scanning of organisational problems / opportunities and IT solutions are undertaken. Pressure to change evolves from either organisational need (pull) technological innovation (push), or both	A match is found between an IT solution and its application in the organisation
Adoption	Rational and political negotiations ensue to get organisational backing for implementation of the IT application.	A decision is reached to invest resources necessary to accommodate the implementation effort.
Adaptation	The IT application is developed, installed and maintained. Organisational procedures are revised and developed.	The IT application is available for use in the organisation

	Organisational members are trained both in the new procedures and in the application.	
Acceptance	Organisational members are induced to commit to IT application usage.	The IT application is employed in organisational work.
Routinisation	Usage of the IT application is encouraged as a normal activity	The organisation's governance systems are adjusted to account for the IT application; the IT application is no longer perceived as something out of the ordinary.
Infusion	Increased organisational effectiveness is obtained by using the IT application in amore comprehensive and integrative manner to support higher aspects of organisational work.	The IT application is used within the organisation to its fullest potential.

A comprehensive research model such as this provides a basis for recognising research questions which build upon prior research and which have a good probability of significantly enhancing an understanding of the implementation process as well as facilitating the interpretation of empirical results (Cooper and Zmud, 1990). The model can be used to assess the extent to which telecentre services have been taken up by a community and to gauge the level of maturity of a telecentre. In turn this can guide decision-making with regard to the actions that might be needed to ensure a telecentre reaches its optimum level of contribution towards community development.

Information Centre Success

In the specific cases of the innovations represented by the IC, previous research has highlighted a number of factors that have influenced their adoption. The IC emerged in the 1980s as the principal organisational response to the growth of EUC. The introduction of the IC as an organisational mechanism for the support of EUC was to ensure an appropriate response to EUC, by way of its voluntary adoption. Gunton (1986) contended that the role of the IC was to facilitate, co-ordinate, support, and control EUC, and to enable business professionals to increase their productivity and improve their decision-making capability. Gerrity and Rockart (1986) described the IC as a centrally located group of personnel to whom users can come for guidance concerning the selection and use of appropriate hardware, software and data. Christy and White (1987) categorised the role of the IC as promoting and encouraging EUC, and classified services provided to end-users into; training, problem-solving, hot-lines for rapid response to user problems and administrative/technical support for extraction of production data from databases.

Saarinen, Heikkila and Saaksjarvi (1988) pointed out that ICs that adopted strategies for accelerating the growth of EUC within their host organisations were more likely to be judged successful by their users than those that did not. The IC should aggressively pursue opportunities for EUC, and should adopt a perspective of creating

business value, more towards the transformation of business processes, helping users to perform completely different tasks than before through the use of computers, and providing benefit to the organisation at the rate of many orders of magnitude in excess of previous practices (Arnoudse and Whalen, 1989).

Bergeron, Rivard and De Serre (1990) examined some aspects of the role of the IC, which were thought to influence users' satisfaction with its services. Both the proximity and variety of services to users were found to be positively correlated with dimensions of end-user satisfaction, indicating the value of quick responses to requests for help. Users also seemed to prefer the more personalised service obtainable from ICs with fewer staff. The importance of the service approach was further highlighted by Franz (1991), who found that the display of helpful and caring attitudes by IC staff during their inter-actions with users significantly influenced those users' acceptance of the IC function. One finding was that end-users accept and use their ICs because of the quality interface they experience with the IC specialist. Although end-users expect IC personnel to possess expertise, their primary reason for changing over to the IC is the availability of a person at the IC site to consult with the end-user (Franz, 1991).

Magal (1991) further testifies to quality of services as a good predictor of IC success. His study listed three dimensions of users' satisfaction with their IC. These were; quality of user-developed applications, quality of service and user self-sufficiency. Magal (1991) concludes that an IC must provide services aimed at making end-users self-sufficient in developing quality applications. The means of achieving this emphasise the personal nature of IC services. As Gunton (1988) pointed out, IC personnel must have interpersonal skills; their business skills are generally more important than technical skills. Rainer and Carr's (1992) catalogue of services offered by ICs ranked the most frequently offered as consulting on user problems. They concluded that there was evidence that the focus of end-users appeared to be changing from how to *use* automation to how to *apply* computers and software to their business problems (original emphasis).

The study by Bergeron, Rivard and De Serre (1990) proposed a research model of user satisfaction with the IC, depicted in figure 1.

End User Computing Adoption

Apart from the support function of the IC, several other factors have been identified in relation to the diffusion, adoption and success of EUC in contributing towards organisational development. Many studies placed an emphasis on the influence of users' characteristics on user satisfaction with EUC, with satisfaction acting as a surrogate for success. These characteristics include demographic variables, attitudes, training and education, involvement with systems development, expectations for EUC and computer anxiety. The influence of individual characteristics on EUC adoption and success was noted by Yaverbaum (1988) who discovered that anxiety and fear are often associated with the introduction of new technology. Her prescription for overcoming this barrier was the provision of user support centres and computer education. Igbaria (1990) also found that computer anxiety affected attitudes toward

EUC, which in turn influenced satisfaction with EUC.

Additionally, research reported by Doll and Torkzadeh (1988) Torkzadeh and Doll (1991) and Etezadi-Amoli and Farhoomand (1996) emphasise the influence of application characteristics on user satisfaction with EUC. These characteristics include content, accuracy, format, ease of use, timeliness, security, quality of output, functionality and documentation. EUC satisfaction is again presented as a surrogate measure for EUC success. The underlying perspective of user satisfaction in these studies is that it is derived from the users' judgement of certain attributes of an individual system.

Rivard and Huff (1988), Amoroso and Cheney (1991) and Mirani and King (1994) highlight the influence of organisation characteristics on user satisfaction with EUC. These characteristics include the Data Processing (DP) department's readiness for change, degree of DP push (promotion of EUC), and goodness of fit between concepts which were labelled user pull (demand for EUC) and DP push. In addition, user satisfaction with independence from DP is included as well as user satisfaction with the environmental set-up. Perceived application backlog (of DP) is also examined and perceived helpfulness of EUC policies, EUC support and perceived organisational support of EUC application development. Mirani and King (1994) pointed out that providing end-users with appropriate types and level of support considerably enhances satisfaction with EUC. Therefore, the provision of EUC support appears to be critical to overall information systems and organisational effectiveness (Mirani and King, 1994).

A further group of research into EUC adoption can be traced to the theoretical perspectives provided by attitude theorists for explaining the psychological causes of social behaviour (Fishbein and Ajzen, 1975; Ajzen, 1985). The study by Igbaria (1990) is based directly on the Technology Acceptance Model (TAM) derived from Davis, Bagozzi and Warshaw (1989). The TAM is a specific derivation of the theories of reasoned action and planned behaviour by attitude theorists (Fishbein and Ajzen, 1975; Ajzen, 1985) as applied to the adoption of new technologies by their users. TAM research places less emphasis on EUC satisfaction as a surrogate measure for EUC success. Instead, acceptance or usage of the technology (microcomputers) by users becomes the dependent variable, and is used an indicator of EUC success. Harris (1999) found that attitudes toward microcomputers were the most immediate determinant of microcomputer usage. The study by Igbaria, Guimares and Davis (1995) confirmed the effects of external variables in the TAM on users' beliefs. Individual characteristics, organisational and system characteristics, were all found to influence the users' perceptions of the ease of use of microcomputers as well as their perceived usefulness.

Harris (2000) proposed a model of EUC success derived from a meta-analysis of earlier studies, and this is depicted in figure 2. The model synthesises a range of factors said to lead to positive outcomes as a result of deploying EUC technology. They are suggested to arise from a combination of factors relating to the individual user's characteristics, the application system in use and the organisation in which it is being used.

The IC can be seen as the mechanism used by organisations to adapt to the changes taking place in IT throughout the 1980s, as desktop personal computing became ubiquitous and EUC became the predominant form of computing. The concept of the knowledge worker gained common currency, whereby office work was characterised by the need to deal with information in a variety of different forms; within non-repetitive and unpredictable tasks; where there is a need to interact with individuals in a flexible manner and where outputs are judged by the timeliness and correctness of decisions (Gunton, 1988). The IC provided services that promoted the adoption of the EUC innovation, which targeted organisational development through the empowerment of knowledge workers making effective use of desktop computing.

Applying Theories of IC and EUC Adoption to Rural Telecentres

This section explores the opportunities for relating the theoretical perspectives of the innovations of IC and EUC adoption to the newer type of innovation represented by telecentres. Table 5 summarises some characteristics of the theories examined so far, and compares them to the corresponding characteristics of a theory for telecentre success.

Table 5. Characteristics of IT, IC and EUC Theories

Theory	Scope	Focus	Outcome Variable	Unit of Analysis
Information Technology Diffusion	Organisation	Generic Information Technology	IT infusion, where the application is used to fullest potential	IT application
Information Centre Success	Organisation	Specific to IC services	User satisfaction with IC services in the promotion of EUC	The IC
End User Computing Adoption	Organisation	Specific to EUC	EUC success in terms of organisational effectiveness	EUC
Telecentre Success	Community	Specific to telecentre services	Telecentre success in terms of community development	The telecentre

Table 5 suggests the areas where the theories of IC and EUC success might be applicable to a theory of telecentre success and it also indicates where important differences exist between such theories. The following observations can be made and implications drawn:

1. The scope of a new theory of telecentre success needs to be extended beyond the organisation to that of the community. Community development is a new field for

IS practitioners and academics, who have traditionally been concerned with the organisational use of ICTs. An intimate understanding of organisations underlies the IS discipline, especially with regard to the design and application of methodologies for systems development and for the planning of activities necessary to exploit the strategic opportunities of ICTs. In the case of the IC and EUC, outcomes were often predicted in terms of the flatter organisation, with fewer levels of decision making, which was now pushed down organisational hierarchies towards ICT-empowered knowledge workers. Telecentres are designed to help communities achieve desirable developmental outcomes from the use of ICTs and if the IS profession is to participate in this application of ICTs, then it will be required to understand processes of community development as opposed to being familiar with organisational behaviour, management and marketing. The social complexities that exist even within relatively well-structured organisations are hugely magnified within much less formally structured communities.

2. The focus of the existing IC and EUC theories corresponds closely to that of telecentres, in that they represent innovations that are concerned with the adoption and diffusion of ICTs and that they were intended to promote the use of computers within their target audience. Telecentres do this by providing a range of services to community members, who are encouraged to use computers, perhaps not their own, but those that are provided in the centre. The services that the IC provided are similar to the services that telecentres provide, ranging from training in the use of the technology to assistance in finding and accessing useful information. However, whereas the IC was able to focus on the use of computers to manipulate information that was mostly internal to the organisation, telecentres address information that is mostly external to the community, i.e. that which can be found on the internet or which is specifically provided via the internet to the community from an outside agency. Moreover, whilst organisational EUC is concerned mainly with a restricted range of financial, marketing and operational data, telecentres potentially engage with information that is related to a much wider range of human activity; e.g. health, education, commerce and cultural activities.

3. The outcome variable for a telecentre is also the fullest use of its technology, as well as the satisfaction of its users, but these factors are now directed towards community development. Telecentre services are optionally utilised by community members, just as organisational members optionally used IC services. One difference though, is that telecentres may charge for their services, making it more critical that they are truly useful, otherwise they would not be used. The key aspect that remains common though is the optimal use of ICTs by a specific group of people towards a defined goal.

4. The unit of analysis becomes the telecentre, which is the IT application. In the structural conditions of rural telecentres in developing countries, the telecentre is the means through which the community engages with ICTs, as in the most common situation, users will be highly unlikely to possess their own computers. So EUC merges conceptually, and physically, with the services of the telecentre.

In addition to the above four observations with regard to the opportunities for relating the theoretical perspectives of previous innovations to telecentres, Colle (2000)

suggests some issues surrounding the diffusion of what he calls communication centres, which are worthy of inclusion in a discussion of a general theory of telecentre success. Some of the issues relate to what Markus and Soh (2001) describe as structural conditions, which impact how IT innovations are implemented in different countries or regions. Structural conditions differ from country to country, and even from location to location within country, but they are not necessarily related to dimensions of national culture. Therefore, valid explanations of differences in IT implementation activity require a careful assessment of relevant structural factors. For example, in the case of telecentres, the role of government policy and political leadership needs to be incorporated in order to account for the crucial impact that they have on a country's development activities, including appropriate regulatory environments. Also, the role that partnerships can play appears to be critical; particularly international agency partners and local champions Colle (2000). Colle also emphasises the need for participation by local communities in order to make telecentres understood, as, he says, the concept of participation in telecentre development is not absolutely clear. Additional issues relate to the planning of telecentre activities; their product mix; the localisation of knowledge and information resources; the nature of their start-up; the extent to which telecentres are networked among themselves; telecentre financing and evaluation (Colle, 2000).

Arising from the discussion of the role of the telecentre in bridging the digital divide, and from a review of previous theories relating to IT innovations, the following section describes research that proposes a research model of telecentre success. This is then tested against a description of five rural telecentre projects in Asia.

The Proposed Research Model

The Community Informatics literature reveals a variety of outcomes from CI projects. O'Neil (2001) summarises five outcomes that CI projects have targeted; enhancing strong democracy, increasing social capital, empowering individuals, revitalising sense of community, and providing economic development opportunities. In defining the dependent variable for rural telecentres in developing countries, these all have merit, but some are facilitating goals, e.g. democracy, empowerment, social capital and sense of community are valuable if they lead to something else. It is proposed here that the dependent variable should be relate more closely to what a community wants to achieve, or can be motivated to achieve, from its use of a telecentre, and that success outcomes should therefore be defined by the user community. The dependent variable of a model of telecentre success is proposed here as desirable development outcomes at the community level.

This is not the same as the user satisfaction construct in the models of IC and EUC success, which was used as a surrogate for other success related constructs. As McNamara puts it, access to communications is essential for the development of rural areas (McNamara, 1998). Focussing on developmental outcomes as the dependent variable unambiguously targets the prime purpose of telecentres. Although telecentres will target intermediary goals, and user satisfaction may be considered as such, as long as development does not occur then the telecentre is not fulfilling its primary purpose. Satisfaction may emerge from some aspect of the encounter with a telecentre service, but it has to lead to developmental outcomes for it be of lasting value.

Additionally, projects exist that are concerned with rural ICTs as demonstrator projects or awareness raising exercises, which have their value and which are often useful precursors to development-inducing telecentre implementations, but they are not to be confused with the true developmental goal of full bodied telecentres. As the World Bank points out, countries should ensure that (new ICTs) are extended to remote and rural areas (in order to) upgrade education systems, improve policy formation and execution and widen the range of new opportunities for businesses (World Bank, 1999). Richardson (1998) sees the internet in support of rural development in developing countries falling into five main areas; economic development for agricultural producers, community development, research/education, SME development and news media networks. The proposed model is shown in figure 3.

The proposed model of telecentre success incorporates the following independent variables:

Telecentre Characteristics
These variables are the equivalent of the IC characteristics in the Bergeron, Rivard and de Serre (1990) model of user satisfaction with the IC, though with appropriate modifications for the telecentre. The circumstances of project start up appears to influence the adoption process, depending on whether the project is instigated by an NGO, a government agency or a research institution. Adoption seems to be facilitated when a level of local ownership is established early in the life of the telecentre. The level and quality of services and the product mix that is offered by the telecentre is likely to influence its adoption by the host community. Just as with the IC, service and product delivery should be sensitive to community requirements. The closer the software tools match the needs of the community, the more likely they will be used. The use of suitable language has an impact. Telecentre financing is critical to viability and sustainability. The quality and responsiveness of management planning for maintaining suitable levels of service is important as well as the extent to which a telecentre is able to effectively network with other centres in order to share experiences, cross-fertilise ideas and promote joint learning.

In fulfilling the support role of the telecentre, staff provide training and assistance to community users. In addition, the role of the *infomediary* has been identified as an individual working in a telecentre and drawn from the community that the telecentre serves, who is capable of using computer and internet technologies in order to respond to requests from members of the community for information or for help in solving some problems that might yield to an internet enquiry. The term is drawn from the phrase *information mediator* and is sometimes characterised as a *knowledge broker.* In some instances, the infomediary will pro-actively seek information from the internet that he/she knows will be useful from their personal knowledge of the community, and will then broadcast or otherwise publicise that information throughout the community. In addition to the infomediary role, the style and mechanics of telecentre management are seen to be crucial factors in influencing telecentre outcomes.

Community Characteristics
These substitute for the organisation characteristics of the EUC success model. Telecentres serve communities as opposed to organisations. From observation during the research reported here, it has been realised that a variety of social factors influence the extent to which communities engage with and ultimately embrace telecentres as community resources (PANTLEG, 2000). Avgerou and Walsham (2000) have also pointed to the influence of contextual social factors on information systems in developing countries. It appears that the technology that is introduced is quickly embedded within these social factors and outcomes are a result of their interactions. Some of the social factors that have been observed to define outcomes of telecentres are:

- Community Aspirations
  Experience suggests that technology cannot function successfully in the absence of some form of community ambition for a better life. Moreover, aspirations often need to be ignited, sometimes by an outside influence, and they need to be

kindled and re-kindled over time. The source of inspiration that sets off aspirations often changes during the adoption of the technology, sometimes to unexpected sources e.g. school children, and there are usually many different sources at any one time.

- Learning
  The communities that have been observed in this research are all capable of learning new things, skills, ideas, and roles. They blend new information with pre-existing knowledge and build it into something of lasting, perhaps growing, value to themselves. Learning seems to take place at all levels of the community, and its impact is accelerated by the rapid spread of new and useful knowledge within the community. The pace of learning seems to accelerate as technology unfolds its capability and potential, further feeding the desire for new knowledge. People discover new knowledge and they teach each other. The learning that then occurs is usually deeper and more focused on real needs than the learning that is introduced from outside.

- Capacities
  Learning often leads to expanded capacity, but this is of little value without the aspiration to take advantage of the extra capacity. The research has observed the pride that individuals take in the new roles and accomplishments that they have been able to achieve as a result of having their capacities expanded and their aspirations realised. It has also been noticed that the processes that are specifically designed to achieve it, e.g. training, do not always trigger capacity building. People seem to act as a result of a combination of circumstances, and if the right combination does not exist, any single factor in isolation may not be optimally effective. While it is probably a question of timing, the challenge is to be able to recognise the right time to engage with community capacities, i.e. when to trigger aspirations, or when to conduct training.

- Organisation
  The extent to which a community is and remains organised seems to influence the use it can make of a telecentre. Community organisation in this context relates to the role of co-ordinating the dynamics of many social processes that occur simultaneously, towards a desirable result. Telecentre activities impact all sections of a community and they participate in many of the social processes that define its identity. Organisation then, is a function of harnessing the social dynamics of a community towards its own betterment, with, in our case, the introduction of new information. This usually requires some locus of community influence, but when new technologies are introduced this is often not the one occupied by the traditional leadership.

- Unity
  Some of the stories derived from research experience depict a sense of unity of purpose within the community that transcends the many differences that usually exist within any body of people. Desirable results emerge from, and contribute to, the unity of those affected, engendering a camaraderie that further acts on aspirations, capacity building and organisation.

- Participation

Participation refers not only to the researcher-community relationships and the adoption of equality between them, but also to the inclusion of all sections of the community. Descriptions of the most desirable telecentre outcomes indicate a will to include rather than to exclude sections of the community. Relative advantage is a less appealing benefit than is the greater good. Pride and its spin-offs (aspirations and capacity expansion) are nearly always evident when outcomes have a wide, inclusive, impact. Individuals who achieve community-wide solutions earn respect and status. Those who exploit technology for selfish purposes lose it.

- Relationships
  Research observations nearly always reveal one or more relationships that were important contributors to a beneficial outcome. Sometimes it appears within the researcher-community relationships, but more often (and more potently) it is a factor of the relationships that exist or which emerge within the community itself. Moreover, relationships seem to amplify the effects of the other factors mentioned here and the influence is recursive, so that good relationships breed aspirations and accomplishment, which in turn generate further good relationships.

- Personalities
  Many stories of desirable telecentre outcomes indicate the presence of an individual within the community whose personality seemed to have an important role in the outcome. The IS literature refers to "champions" as opinion leaders in IT implementation and adoption (McConnell, 2000). Stories of positive developments from telecentre adoption often feature an individual's action as a trigger to community adoption. Ernberg (1998) stated that "the need to find local champions who are motivated and able to drive the project, cannot be overstated".

Information Characteristics

This variable recognises the application characteristics in the EUC success stream of research. Information should be useful and useable (Davis, Bagozzi and Warshaw (1989) as well as being local and relevant, according to Colle (2000) who argues that a telecentre that is designed to support community development should be aggressive and creative in localising its knowledge and information resources (Colle, 2000).

Structural Conditions

Developing country governments should formulate national strategies to narrow knowledge gaps, including those for technology acquisition and distribution, education and training and expanding access to technologies by de-regulation and privatisation (World Bank, 1999). The Bank goes on to say that societies require policies and institutions to facilitate the acquisition adaptation and dissemination of knowledge, saying that the appropriate course of action for any country will vary depending on the circumstances. Government policies and political leadership will determine the success of such policies. The participation of the major international donor and aid agencies such as the United Nations Development Programme (UNDP) or the Canadian Government's International research Development Centre (IDRC) can heavily influence telecentre pilot projects and hence nation-wide roll-out programmes.

Individual Characteristics

The characteristics of individual telecentre users as an independent variable represent the individuals' characteristics in the EUC success stream of research. Their inclusion allows the model to take account of variables that have been demonstrated to influence the adoption of computer usage behaviour. They include; personality, demographics, computer anxiety, involvement with application development, expectations, training and education.

IT Implementation Stages

The stage model of IT implementation by Cooper and Zmud (1990) indicates a temporal dimension for the research model of telecentre success. Accordingly, it is included here to add a dimension within which the other independent variables operate over time. The stage model suggests that an IT innovation will take time to become fully integrated into the natural life of its user community. It is conjectured therefore that as a telecentre innovation proceeds through the various stages towards maturity, the factors that characterise the other independent variables will adjust accordingly.

Research Questions

The model proposes that the ability of telecentres to induce desirable community development will be a function of the telecentre characteristics; the characteristics of the community in which the telecentre is located; the characteristics of the information that the telecentre obtains and distributes; a variety of structural conditions relating to telecentres in the country or region in which the community is located; and the characteristics of the individuals who use the services of the telecentre.

The model allows the compilation of more detailed research questions that can help to explain how telecentre outcomes lead to desirable community development. A number of possible enquiries will serve this purpose, for example, by hypothesising the following:

Telecentre Characteristics:

- Telecentres that are started by community-based actors will achieve greater development outcomes than those started by outsiders;
- Telecentres with staff who pro-actively seek and disseminate useful information for the community will achieve greater development outcomes than passive staff who do not;
- Telecentres that actively network with other telecentres will achieve greater development outcomes than those that do not.

Community Characteristics:

- Communities with high development aspirations will achieve more desirable outcomes from their telecentres than communities with low development aspirations;
- Communities with greater capacity for learning will achieve more desirable outcomes from their telecentres than communities with low capacity for learning;
- Communities that foster harmonious internal relationships will achieve more desirable outcomes from their telecentres than communities that do not foster harmonious internal relationships.

Information Characteristics:

- Telecentres that distribute local information to their communities will induce more desirable development outcomes than telecentres that do not;
- Telecentres that distribute relevant information to their communities will induce more desirable development outcomes than telecentres that do not;
- Telecentres that distribute information that is usable by their communities will induce more desirable development outcomes than telecentres that do not.

Structural Conditions

- Government policies will influence the ability of telecentres to induce desirable development outcomes;
- Political leadership will influence the ability of telecentres to induce desirable development outcomes;
- Partnerships between telecentre implementation organisations and outside agencies influence the ability of telecentres to induce desirable development outcomes.

Individual Characteristics

- The personalities of telecentre users will influence their ability to achieve desirable development outcomes from their telecentre;
- The expectations of telecentre users will influence their ability to achieve desirable development outcomes from their telecentre;
- The training of telecentre users will influence their ability to achieve desirable development outcomes from their telecentre.

Method

The Case Studies

Cases are drawn from an initiative by the IDRC, the PANAsia Telecentre Learning and Evaluation Group (PANTLEG) consisting of five Asian telecentre projects that have received funding from the IDRC. The objective was to join the projects together in a closer partnership for mutual benefit (PANTLEG, 1999). The projects are as follows:

- e-Bario, Malaysia
- MS Swaminathan Research Foundation (MSSRF) Village Information Shops, India
- Foundation of Occupational Development (FOOD) Chennai, India
- Multipurpose Community Telecentres, Philippines
- Internet Information Centres, Mongolia

Case descriptions are drawn from evaluations that were conducted by PANTLEG members, i.e. the project leaders, plus an additional project member. This section provides a brief description of each project. Data collection took the form of interviews of project staff, telecentre operators and users.

e-Bario[1]

This is a telecentre in Sarawak, which is one of the two Malaysian states on the island of Borneo. The State is characterised by its diffused population spread across hilly and forested terrain with an under-developed infrastructure. The research project's

[1] The author initiated this project.

objective is to understand how ICTs can be used to achieve sustainable human development in a remote area. A telecentre has been established which will serve as a community resource for the members of the community to use computers, connect to the internet, and use a variety of associated services that will affect sustainable social development of the community (Songan et al., 2000).

The settlement of Bario with a population of around 1,000 people is inaccessible by road, and is normally reached by a 20-seat aircraft operated by the Malaysian Airline Rural Air Service from the coastal town of Miri. The community is predominantly made up by people of the Kelabit ethnic group, one of Sarawak's smallest among its 26 or so identifiable ethnic minorities. Forested mountains surround the plain in which the residents cultivate wet rice. People in the older part of the settlement live in a traditional longhouse, containing two communal areas that run the length of the building. One contains a kitchen space for each household whereas the other is used for formal occasions involving the whole community. In between, each household has its own private living apartments. Longhouses are the traditional form of dwelling on Borneo island.

An initial survey indicated that the community placed most importance on information relating to agricultural, medical and religious practices. Information technology, job opportunities, government policies and family matters rated slightly less important. Current patterns of information actually received were dominated by religious information, with agricultural and family matters ranking next. Most information that is sent outside of the community concerned families, with religious information ranking closely behind. Relatives were the major source of information. In this respect, face-to-face contacts outweigh all others as channels of incoming information, with the radio, church congregation and community meetings ranking about equally next. (Harris et. al, 2001)

Initially, a computer laboratory of 10 PCs was set up in the junior secondary school and a teaching programme for IT literacy installed. This has been extended to interested community members after school hours. Subsequently, a temporary telecentre was established in the local lodge, which is a common meeting house for the community, pending the construction of a custom-designed building to house the telecentre. The telecentre was equipped with four PCs and two printers. Bario is off-grid for electricity supply and in both the school and the telecentre, additional electricity generators were provided to augment existing supplies. All equipment had to be flown in by chartered aircraft. Telekom Malaysia has partnered with the research project and has installed VSAT (Very Small Aperture Terminal) satellite equipment to connect the computers in the telecentre to the internet. The researchers organised a symposium for community members and other Kelabit people in order to identify and prioritise suitable information systems for use the Bario people.

E-Bario has attracted considerable public attention, mainly because of the remoteness of Bario and the unique nature of the community's culture. Although the community has been sensitised to the value of ICTS, significant development outcomes are yet to be achieved. At the time of writing, it is probably too early to expect any major impact on the community, who need more time to mobilise local resources into development-inducing activities that make full use of the telecentre.

MS Swaminathan Research Foundation (MSSRF) Village Information Shops, India

MSSRF operates an extensive programme introducing the benefits of emerging technologies to the rural poor. The project takes the view that to be of use to farm families, the generic information found in the internet should be rendered into locality-specific knowledge that rural people can act on. The Foundation's approach to the dissemination of new technologies in rural areas is premised on the statement of its founder, Professor M.S.Swaminathan: "whatever a poor family can gain benefit from, the rich can also gain benefit; but the reverse does not happen" (personal communication). Thus, involvement of the ultra-poor in rural areas (there are over 300 million of them in South Asia) in managing the use of ICTs was considered essential for the success of this project.

The project was started in 1998 in Pondicherry in South India. The level of poverty is high in rural areas there, where about 21% of the resident families have less than US$1 per day as family income. The objectives of the project are:

- To set up of villages information shops that enable rural families to access a basket of modern information and communication technologies
- To train educated youth and women in rural areas in operating information shops
- To train rural youth in the organisation and maintenance of a system that generates locally relevant information from generic information
- To maintain update and disseminate information on entitlements to rural families using an appropriate blend of modern and existing channels of communication
- To conduct impact assessments based on surveys, participatory rural appraisal, and other appropriate methods of data gathering
- To build a model of information dissemination and exchange in rural areas that uses advanced information and communication technologies.

A value addition centre was set up as an information hub in the village of Villianur, located in the western part of the Pondicherry region. A wireless hub was placed here and dial-up accounts to the Internet were also established. This became the project headquarters, as well as an interface for the public and the government offices in the locality. Additional village centres were then set up in places where the community offered secure space, free of cost. A total of five such village centres were set up during the initial project period. One of these is a village on the coast with 98% of the population involved in fishing. The total population of the 5 villages is approximately 13,400 with about 47% illiteracy.

In each village centre, a group of individuals identified by the community took charge of daily operations. They function as volunteers without receiving regular payments from the project. The village centre volunteers were trained in PC operations and in using the data/voice network. The project staff have implemented many locally useful databases. Much of the information is accessed from local sources, on the web or otherwise. All of them are transformed into locally useful material, in various formats (voice/digital audio, in some cases) and in the local language, Tamil, spoken by 98% of the population.

The centres receive an average of 12 visitors per day. The asset-less, ultra-poor families are among the major users. About 18% of the users are women. The pattern of usage indicates that educational purposes (such as use of CD-ROMs) and accessing government data are the two most important uses of this system. There have been

many instances where local residents have derived benefits from the use of data and information derived from this network. E.g.:

- Price information related to grain sales: this is the most important benefit according to every farmer as it helps him/her with better negotiating position in dealing with price-fixing middlemen.
- A fishing hamlet receives information on wave heights downloaded twice daily from the US Naval Oceanographic laboratory satellite. This is considered by the fishermen to be life-saving information.

(MSSREF, 2000)

In many ways, this project is exemplary for rural telecentres. The technological implementations are innovative and the communities have been fully mobilised towards making good use of it. Project staff are also committed.

Foundation of Occupational Development (FOOD) Chennai, India

This project is concerned with the lack of communications in rural India, in which the majority of the population live, and the lack of opportunity for NGOs and other development agencies to make effective use of contemporary ICTs. Due to the lack of exposure to developments in the field of social & sustainable development and cost-effective appropriate technologies, development organisations working in rural areas are conducting their activities through conventional practices with little or no technology input.

The project is based in Chennai, south India, with the goal of increasing the capability of NGOs and Community Based Organisations (CBOs) through electronic media as one of the options to spread development into remote areas. The project established a remote area electronic networking capability using packet radio modems in 10 remote sites, one of which is featured in this research. This was to enable NGOs, CBOs, and other development organisations working in remote, rural and tribal areas to network with other organisations within the region and with national and international NGOs and partner organisations. The technology used consists of wireless radios coupled with packet radio modems connected to a sub-host computer running TCP/IP host software. The packet radio network is used for accessing external databases, sharing data, electronic mail, bulletin board services, and newsgroups by interconnecting a series of packet radio sub-hosts to the Internet gateway host in Chennai.

Specific objectives included:

- To provide electronic networking capability in remote areas without access to information, thus strengthening the role of local NGOs as a knowledge-broker
- To offer e-mail, bulletin board and conferencing services
- To establish internet services and act as an Internet Service Provider
- To promote original and innovative networking solutions to specific development problems in the region
- To pilot practical networking activities that could create replicable results and have potential for application throughout the region.

The most significant characteristic of this project was its innovative adaptation of technologies that could provide information and networking capability to relatively remote communities in southern India. The wireless radio modem technologies that

were utilised achieved a cost-effective means of communication and internet access. This has helped NGOs and CBOs working in these rural and remote areas to develop community based applications that are contributing to their social and economic development. The community featured in this research used the facilities to establish a herbal cultivation business, obtaining the information they needed from the internet and using it to market their products. The community had previously been engaged in catching snakes, but was encouraged to switch to a more sustainable occupation. (FOOD)

This project has achieved a focused and stable outcome, with sound technology and capable and committed community members to maintain it.

Multipurpose Community Telecentres, Philippines[2]

This project is being run in four farming and fishing villages in northern Mindanao, southern Philippines. The purpose is to develop and test a pilot information and communication system encompassing people, organisation, infrastructure and processes that will support rural communities in achieving sustainable development. Activities are as follows:

- To identify specific information and communication needs of the people in rural villages where ICTs can facilitate in obtaining solutions to these identified needs
- To establish the availability of local resources and local commitment to serve rural communication needs by encouraging the local population to participate in developing a conceptual framework of, developing operating, and maintaining a MCT
- To design, establish and experiment with the operation of four MCTs in four villages (in Agusan Norte and Lanao del Norte provinces) in Mindanao by building on the physical infrastructure (village public calling office) established by the Department of Transportation and Communication through its Municipal Telephone Project
- To develop the needed content and information services through the collaboration of public, private and civil society organisations which have information and/or expertise in health, agriculture, education, livelihood and rural enterprises
- To develop the capability of the local population and partners in developing indigenous information applications, and in operating, managing and maintaining a MCT
- To determine the enabling factors (ownership, legal, financial, operational, and technical issues) that relate to the sustainable operation of a MCT
- To determine the impact of MCTs in the village life and in neighbouring villages
- To document the process of setting up a MCT, including the concerns which relate to its sustainable operations, to deliver practical guidelines for expanding MCT site coverage in Mindanao, in particular, and in the country, in general.

The project aims to develop and harness people's capability to use ICTs to create and use information for rural development. Implementation is by the Philippine Council for Health Research and Development of the Department of Science and Technology. UNESCO and the IDRC provide support. The villages provide space for the MCT, staff, utilities and other supplies. Partner information providers from government and

[2] The author conducted a paid evaluation of this project for the IDRC.

other institutions deliver information to the MCTs. Each MCT is staffed by at least 10 volunteers, trained in computing, the internet and web development. MCT services include word-processing, printing, training and coaching, and information referral services. Each MCT is expected to serve a cluster of five or more other villages.

The primary output of this project is a model of operation for MCTs, in the form of guidelines, how-to materials, technical specifications and a sustainability plan, that will guide the local people and programme managers in expanding MCT operation to the rest of the country. The other outputs are information services that will be provided by the MCTs to enable the local people to have access to information resources and people with the right information thus mobilising them into positive action. It is also expected that local capability is developed in terms of co-operative organisation, technical expertise on important subject matters as health, agriculture, education, rural enterprises, information and communication technology. (Project documentation).

This project has achieved considerable levels of co-ordination between various government agencies and other institutions to establish telecentres that are operable and adequately supported. The communities are yet to be fully mobilised to make effective use of them, yet all indicators are that this will happen.

Internet Information Centres, Mongolia

The purpose of this project is to deliver Internet access to rural areas in Mongolia. Mongolia has about 1.57 million square kilometres of territory and only 2.4 million inhabitants. Nearly one-fourth of the population lives in the capital city Ulaanbaatar. Most of the remainder are engaged in a nomadic life-style, herding livestock across the grasslands. The telecommunications infrastructure is under developed, especially in rural areas, and the telephone network is based mostly on obsolete Russian technology. The project covers 4 provinces; Erdenet, Khovd, Dornod and Umnugovi representing the north, west, east and south part of Mongolia respectively. At the time of the research, telecentres had been established in Erdenet and Dornod provinces. They are connected to the Internet via VSAT satellite system at a speed of up to 64Kbps.

The main sponsors of this project are the Open Society Institute (OSI) in Mongolia, sponsored by the Soros Foundation, and Datacom Co.Ltd. of Mongolia. The IDRC are also in support. The project has established telecentres, known as Public Internet Centers (PICs), which provide free internet connections to secondary schools, local government offices and NGOs. These are requirements are stipulated by the project sponsors. The PICs serve their members, who can be NGOs, such as local women's group. The local library is one of the members of the PIC 's Board of Management.

Whilst NGOs enjoy subsidised usage, business users are charged for internet access. Secondary schools and local government offices are being connected through radio modems. The PIC works closely with local government offices as they provide support by way of accommodation for the PIC. The PICs provides the following facilities and services to their members and customers:

- internet room with 6 PCs, modems and related equipment

- Dial-up access with 6 ports
- Internet access
- Email
- Fax service
- Web hosting and design
- Local telephone service

The price for these services varies according to the type of service and to the users. Several problems have been encountered:

- The electricity in rural areas is not stable and power outages occur frequently, requiring installation of a generator.
- The rural telephone network is still based on the old Russian technology. The telephone connection is unreliable and its speed is low.
- Language is a problem as most documents on the Internet are in English
- The PC penetration is very low in rural areas, so computer literacy is also very low compared to the urban population.

This project has achieved reliable and well-managed telecentre implementations that have alerted their communities to the potential of the internet. There is some evidence that they are being used to achieve desirable community-based developmental outcomes, but most use at the time of writing was for lower level achievements of literacy training and communications.

Table 6 summarises the salient features of the case projects.

Table 6. Background Information on the Telecentre Cases					
	e-Bario – Malaysia	**MS Swaminathan Research Foundation, (MSSRF) Village Information Shops**	**Foundation of Occupational Development, (FOOD) Chennai, India**	**Multipurpose Community Telecentres, Philippines.**	**Internet Information Centres, Mongolia.**
Location	Central Northern Highlands in the East Malaysian State of Sarawak, on the Island of Borneo.	The Union Territory of Pondicherry, in southern India. The MSSRF in Chennai, Tamil Nadu.		Four villages along the northern coast of the island of Mindanao, southern Philippines.	Three centres in northern Mongolia, in Choibolsan, Dornod and Ulan Baatar.
Project sponsors*	Malaysian Institute of Micrelectronics (MIMOS)	MSSRF	FOOD	Philippine Government	Mongolian Government, SOROS Foundation
Project description	A research project involving a school computer laboratory and community telecentre for social and economic development.	Research into community telecentres in six rural villages.	A rural village community telecentre.	Pilot community telecentres for social and economic development in rural communities.	Internet centres in two small towns supported by one in the capital.
Distinguishing characteristics	Bario is a remote community of around 1,000 people who make up the traditional home of one of the smaller ethnic groups in Sarawak. Access is practical by air only as no roads lead in from the outside.	A hub and spoke model of information delivery, between one "value addition centre" and satellite community telecentres. All locations are rural.	One telecentre in a rural tribal community in a relatively remote location in Tamil Nadu.	Typical small rural Philippine communities, include a coastal location. Information provided mostly by government agencies, with training and other support by local institutions.	Mixed models of telecentre design, one in mining town which is supported by the mine, another sponsored by the Soros Foundation in a remote town, and the centre in the capital supporting NGOs and providing public internet access.
Technology	Ten computers in the school laboratory, four in the telecentre. VSAT internet access. Locally generated electricity.	Three to four computers in the telecentres, linked by wireless and land line communications.	Land line telephone and four computers.	Three to four computers per centre, landline telephone dial connection to the internet.	Four to six computers in the outstation centres, more in the capital. VSAT connections to the internet.
* All projects are funded by the Canadian Government's International Development Research Centre (IDRC)					

Findings

Table 7 summarises the telecentre projects in terms of the developmental outcomes that have been achieved so far, along with an evaluation of each project against the independent variables in the research model. However, the individual characteristics of telecentre users have not been assessed as yet, so there is no data to report against these variables. For most of the projects some such data is available community-wide and for the MSSRF project, some demographics are known for telecentre users.

Table 7. Project Outcomes					
	e-Bario, Malaysia	**MS Swaminathan Research Foundation, (MSSRF) Village Information Shops, India**	**Foundation of Occupational Development, (FOOD) Chennai, India**	**Multipurpose Community Telecentres, Philippines.**	**Internet Information Centres, Mongolia.**
PROJECT OUTCOMES	At an early stage still, so development outcomes are limited to higher levels of IT literacy within the school and among some of the community plus improved social communications via e-mail, which are important for this isolated community.	Communities are enjoying considerable benefits associated with a range of commercial, employment, educational and health gains as well as social well being.	The community has re-focused its commercial livelihood from unsustainable snake catching to more sustainable herb cultivation utilising the telecentre for product development and marketing activities.	Significant developmental gains are yet to emerge, but the conditions are ripe for this to happen.	Mostly confined to improved communications, although there is evidence that community members are beginning to exploit the telecentres for higher-level benefits.
INDEPENDENT VARIABLES					
Telecentre Characteristics					
Start-up	Research organisation	Research organisation	NGO	Government	NGO/Private organisation
Staff	Local recruit	Locally recruited volunteers	Locally recruited volunteers	Local school pupil volunteers	Local paid management and volunteer staff
Location	Central community lodging house (temporary)	Central, provided by the community	Central, provided by the community	Central, provided by the community	Central, shared with government establishment
Services / Product mix	Development oriented communications and information provision planned in conjunction with the community.	Development oriented, devised by the community and project staff. Communications and information provision.	Communications and commercial information concerned with a single activity, herb cultivation, that the community specialises in.	Development oriented information provision, supplied by government and other agencies in a help desk arrangement that responds to community requests.	Mostly communications and web site development.
Software tools	e-mail, internet, word-processing	E-mail, internet. spreadsheets, databases, word-processing, graphics, audio.	E-mail, internet, databases.	E-mail, internet, word-processing.	E-mail, internet, word-processing.
Budget / Financing	Research funding and government grant.	Research funding and government grant.	Research funding and income generating	Research funding.	Donor agency and income generation
Planning	Research based with community participation	Research based with community participation.	Locally by a community based NGO	Research based with community co-operation	By the NGO/Private organisation partnership
Networking	Minimal as yet.	Between themselves, within the five telecentres.	Focuses on their prime commercial activity.	Within the project's four telecentres.	Minimal as yet.

Community Characteristics					
Aspirations	High	High	High	Low, as yet un-ignited	Low to medium, to be ignited
Learning	Willing and anxious to learn, taking place rapidly	Advanced. Pioneering with local script, multimedia and wireless and solar technology.	Capable. Focused on specific needs.	Slow but willing.	Willing but restricted to small groups.
Capacities	High, with diaspora support.	Highly motivated.	Proficient at what they need to know for their specialised need.	Latent but probably high.	Not fully exploited but probably high.
Organisation	Loose but locally focused.	Considerable.	Sufficient.	Burgeoning.	Proficient but with potential.
Unity	Traditionally tight but emphasises consensus finding.	Sufficient, maintained with help of project staff.	Sufficiently for tight focus on specific requirements.	Considerable.	Diverse across various stakeholders.
Participation	Community has equal rights with project.	Shared responsibilities, but transiting towards the communities.	Self-governing.	Began as collaborative more than participatory, but changing.	Consultative and rather passive.
Relationships	Close and deep, based on common ethnic background and extensive extended family relationships.	Complex, with a variety of social strata, including those based on caste.	Tight and focussed. Based on common ethnic affiliation, locally differentiated as "tribal" peoples.	Close and co-operative, based around community belonging.	Varied and scattered throughout a range of stakeholders.
Personalities	Influential champions within the community have consistently supported the project, adding to its community aceptance.	Influence of young, capable volunteers is based on their achievements with the technology and the community contribution they make.	Individuals specialists with particular roles that support community use of the telecentre.	Influential local leadership support plays a positive role in community acceptance.	Local management and volunteers encourage usage.
Information Characteristics					
Local	Not much yet, but there is a community-generated development agenda that focuses on local information.	Extensive local and regional information databases.	Almost entirely local, relating to the cultivation and marketing of local herbal products.	Not much yet, information provision began much as a top-down programme, with some local consultation.	Little, but developing as local web sites get under way.
Relevant	Not yet, but expected.	Highly relevant to local needs and with varied topics.	Highly relevant to local needs, but limited in range of topics.	Not much of local relevance.	Not much of local relevance.
Useable	Not provided yet, but targeted to be so. Language will be an issue.	Distributed in local Tamil script, some available in sound files for those who cannot read. Also visual.	Local script and tightly focussed on the needs of the main commercial activity.	Some, but not much.	Language is an issue, and there is not much available anyway.

Useful	Expected to contribute to key areas of community concern: commerce, culture, education, and health.	Extremely useful, making significant contributions to community well-being in education, health, and commerce.	Extremely useful, making significant contributions to community well being in the form of commerce.	Not to a great extent yet.	Not much yet.
Structural Conditions					
Government policies	Supportive. Malaysia is pursuing ICTs aggressively for its national development.	Initially a hindrance, but lately coming round to the extent of the project forming a partnership with local government to extend its activities to new areas.	Neutral.	Supportive and instrumental to project inception, but telecommunications problems arose due to the transition in the regulatory environment.	Newly supportive in the telecommunications regulatory environment.
Political leadership	Substantive support for ICTs in general and also for rural ICTs, from the top.	Not a significant feature at the pilot stage.	Not a significant feature.	Important for the project as government is anxious to develop Mindanao.	Not a significant feature.
Partnerships	Instrumental with the IDRC for inception, later with quasi-government institution for extended support.	Funding and learning with IDRC project partners, also other source of external funding for MSSRF.	Not so important, as mostly self-sufficient.	Important funding and learning from the IDRC.	Significant funding from the Soros Foundation, plus learning from the IDRC.
Individual Characteristics					
Personality **Demographics** **Computer Anxiety** **Involvement** **Expectations** **Training** **Education**	Most of these factors have not been systematically measured at the individual level among the telecentre users. Some demographic data is available for some of the communities.				
IT Implementation Stages					
	Adoption	Routinisation	Routinisation	Adaptation	Adaptation

Discussion

Research Outcomes

The research has set out to achieve greater understanding of the factors that influence telecentre success with reference to examples in rural Asia, where success is indicated by positive and desirable developmental outcomes for the communities that are served by the telecentres.

We begin with the projects that have achieved the latest stage on the IT implementation model (in this instance, routinisation), and which have probably the most significant development outcomes, the MSSRF project and the FOOD project. The following observations can be made. Firstly, it is important to keep in mind that the projects have been running for different times and at different paces, so that additional outcomes for the later projects might be expected in the fullness of time. However, examination of table 7 suggests that some community characteristics and some information characteristics might differentiate the better achieving projects from the others and that those characteristics could be argued to have been instrumental in achieving this result.

In both the MSSRF and FOOD telecentre projects the aspirations of the communities seem to have been harnessed in a positive way, propelling them towards positive outcomes with their telecentres. Observations of the telecentre volunteer staff indicate a deep sense of motivation and pride in what they are able to achieve and the enthusiasm of the community is evident in the manner in which they describe the operation of their telecentres. Such encounters also testify to the rate of learning that the communities have displayed through, for example, the ease with which the semi-literate volunteers are able to work with a western keyboard in entering Tamil script. Community capacities are clearly elevated and are sustained by the capability of the communities to organise and operate effective services from their telecentres. The other important contributor is the characteristics of the information that the telecentres provide to the communities. Examples include local databases of families that live below the government's poverty line, which entitles them to certain government support schemes. The centres have sought this information from the local government, made it available to the communities and the staff seek out those families who are entitled to benefit and help them to claim it. Information is useable by the local population as much of it is distributed in hard copy, or posted on notice-boards in visible locations and is mostly presented in the local Tamil script.

The projects that have the achieved the next latest stage on the IT implementation model (adaptation), the Philippines Multipurpose Community telecentres and the Mongolian Internet Centres, depict strengths in the government policies variable, compared to the other projects. The Philippine project is operated by a government agency and therefore enjoys access to high government officers. The Mongolian project is closely allied to government offices at the local level, even providing subsidised services to them at one stage. It seems likely that this close affiliation will lead to additional support to compensate for external funding drying up.

The final project, e-Bario, is strong on the community factors, but is held back by the structural conditions relating to its isolation. All equipment has to be flown in,

communications are difficult, individual households and government offices generate their own electricity, and technical support is distant. Nevertheless, the community is motivated, united and highly resourceful (a pre-condition for survival) and there are grounds for optimism in supposing that the telecentre will make a substantial contribution to community well being.

Overall, the findings indicate some promise for the model of telecentre success to be able to account for the outcomes of telecentre innovations. Insofar as all the centres provide public e-mail, there is a minimum achievable level of success associated with that, which may or may not translate into desirable development outcomes. All the communities taking part in the research are rural, some are remote and isolated, but all are with rudimentary communications, so any improvement in communications will represent a desirable outcome. Whilst such outcomes can be praised, they are insufficient testimony to the full promise of ICTs for rural development that is being held out by the promoters of such innovations. The model will be useful when it can be shown to be capable of differentiating between those telecentres that only provide improvements in communications from those that precipitate more profound developmental outcomes, as in the MSSRF and FOOD projects. That the other three projects have yet to demonstrate such outcomes is not a criticism, as the time scales are different, but the model may be helpful in indicating the variables that they need to address in order to progress to higher orders of developmental outcome.

Conclusion

Theory Building

A general theory of telecentre success is urgently required. International aid agencies, governments and NGOs the world over are becoming more enthusiastic about the perceived potential for inducing social and economic development at community level through the deployment of ICTs. As the technology becomes more approachable, cheaper and powerful, so this enthusiasm is further fed. Moreover, as stories begin to emerge of the successes that some pilot projects have experienced, there is a danger that more institutions and individuals begin to accept that hitherto marginalised communities need only be given access to technology in order to share in the benefits of a wired society and the information age. The time is now right to stake stock of the experience obtained from such pilot projects and begin to make sense of what is working and why it is working. Furthermore, there is also a danger in assuming that the lessons learned from pilot projects that exist under intense scrutiny and lavish resources can be easily extrapolated into wider implementations without a full understanding of the difference between pilots and live roll-outs.

It is contended that earlier research in IS can inform the newer styles of ICT use that telecentres represent. It is not necessary for the development community to climb the same learning curve that organisational computing climbed as practitioners can see where previous experiences can guide their own ICT-promoting activities. The opportunity exists for development professionals to short cut the learning that they will have to make for ICTs to be applied successfully to the problems of the poor. Similarly, IS professionals should recognise a new constituency for their expertise, development practice, in which admittedly the context is vastly different from the

traditional organisational context, but where many of the principals might be applicable.

In the absence of more detailed research, it is only possible to conjecture at this early stage of theory building in telecentre success issues, but the findings so far might seem to suggest that the community characteristic variables are the most potent in predicting telecentre success in terms of desirable development outcomes for communities. In many ways, the variables that have been identified so far point to the concept of social capital, which refers to the quality and depth of relationships between people in a community (Coleman, 1988). According to Putnam (1995), in a community with a substantial stock of social capital, networks of civic engagement foster sturdy norms of generalised reciprocity and encourage the emergence of social trust. Such networks facilitate co-ordination and communication, amplify reputations, and thus allow dilemmas of collective action to be resolved. Networks of civic engagement embody past success at collaboration, which can serve as a cultural template for future collaboration. Additionally, dense networks of interaction broaden the participants' sense of self, converting an individualistic perspective into a community perspective that fosters collective benefits. The relationship between community telecentres and the social capital of the community needs further research in order to understand the interactions and their impact on each other.

Much of the experience from implementing information systems in organisational settings indicates that whilst technology is necessary for the transformational opportunities that are available, of itself, technology is insufficient. A model of innovation success must reveal what else is required for technology to achieve its potential within the circumstances that it is being applied. The IC and EUC theories of success addressed the multiple variables that are involved in achieving success with these innovations. A first step towards such a model for telecentres is proposed here. Further research will illuminate its limitations and strengthen its potential.

Limitations of the Research

Most of the data in the findings section is derived from short evaluation visits of four to five days to the project sites. However, these were conducted by a group of between 7 to 12 experienced individuals with a common purpose and with no vested interests. Detailed reports of each evaluation were recorded and they included quantified data where available. The research is limited to the five telecentre projects, involving 14 communities, a small sample and selected for the research only as they all receive funding from the IDRC.

Implications for Practice

The findings suggest some practical lessons that might be of use by development professionals, donor agencies and governments involved with development-oriented telecentres as innovations within communities. The lessons relate to how project managers engage with each of the postulated independent variables. To a certain extent, telecentre characteristics and information characteristics are relatively mechanical in nature in that a telecentre has to be well managed and it has to provide information to its community that will be put to good use. Mechanisms for accomplishing these outcomes are reasonably prescriptive. Suitable methods for

telecentre management are relatively simple and universally applicable. Techniques for eliciting information needs may be a little more demanding, as this requires intimate knowledge of the user community. Nevertheless, there is a wealth of practical experience in the Social Sciences and Information Systems fields to guide this task. The structural conditions surrounding telecentre innovations are likely to be less tractable, being subject to external influences and agencies. The individual characteristics of the user community are only partially likely to yield to the actions of telecentre staff or promoters. Computer anxiety is known to be diminished by training and user involvement and expectations can be managed to a degree.

However, the characteristics of the community that uses the telecentre are much less likely to be subject to influence by the activities of telecentre staff, management or project promoters. Various techniques of community development have demonstrated their capacity for igniting community aspirations, e.g. Future Search Conferences (Weisbord and Janoff, 2000) and Appreciative Inquiry (Hammond, 1996) but it is not known that such techniques have been utilised to induce development aspirations in connection with the promotion of telecentre services. As it appears that community characteristics might be the most potent factor in influencing telecentre success and are simultaneously the least manageable, practitioners face a considerable challenge in achieving success with their telecentres innovations. Moreover, due to their structural conditions, all the projects described here required a variety of innovation technical solutions involving wireless internet access, including satellite and radio and electricity provision, requiring diesel generators, solar panels and battery power. The challenges of putting this technology together in less than perfect surroundings, whilst wholly necessary, tends to divert project officers from other critical path factors such as the community characteristics highlighted here.

It is expected that continuing research will generate the knowledge that is required to assist ICT innovations in development and that more communities who might not otherwise dream of being able to use computers and the internet can begin to share in the benefits that are now taken for granted by the fortunate minority for whom this is a regular daily activity. Previous research into the adoption ICT innovations that resemble those that are now taking place in a few rural communities throughout the developing world appears to be capable of guiding such activities towards fruitful outcomes.

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Prometheus riding a Cadillac?
Telecentres as the promised flame of knowledge

By Alfonso GUMUCIO DAGRON

It as become a common place to talk about the infamous "digital divide", the gap between those that have access to new information and communication technologies, and those that are excluded. The digital gap is clear between countries in the North and in the South, but even more dramatically explicit within Third World countries (the politically correct name is "developing countries", though some are actually going backwards). The gap between urban areas and rural areas and the divide between rich and poor are the main causes for the imbalance between those that have access to new ICTs and those that haven't. However, it would be tricky to isolate the question and reduce the imbalance to only a matter of technology. Unfortunately, this is what is happening most of the time, specially when ICTs are perceived as the "solution" for poverty and underdevelopment, as if social injustice, discrimination, corruption, unfair trade agreements, lack of services, poor education and health systems, etc., were only mere marginal factors.

ICTs entered the development world with enormous strength; suddenly during the eighties and early nineties there was a big push to "provide access" to new information technologies in poverty areas of the world. This push was obviously supported by the emerging computer and Internet industry, in need of rapidly expanding its markets.

Development agencies, who seldom in the past supported community radio or other peoples' centred communication initiatives, suddenly came up with a whole new theory about how ICTs could bring poor rural communities out of their marginalisation. In their "letter from the field"[i] from India, P. Thamizoli and K. Balasubramanian remind us all that, according to the IDRC, "*such a perspective has categorized the rural community as a user of telecentres rather than a manager of knowledge*".

Suddenly, some governments in developing countries placed in the top of their agenda to provide "universal access to telecommunication services", often forgetting their own incapability to provide national access to basic services (let alone "universal"). At least, on the sunny side of this trend, telephone lines are expanding to remote areas.

The word "access" became the synonym of bringing the light of knowledge to those that are desperately poor and excluded because they are ignorant. That is what was and still is in the minds of many of those that push ICTs over developing countries: "if poor people could know more of what we already know, their lives could get better". A paternalistic assumption that

An additional issue to be considered along with the language issue is computer literacy, which is more than learning to hit a keyboard or to move the mouse. There is a whole cultural background necessary to understand the logic of digital technologies, and the usually short skills training courses that are offered in telecentres may not be enough for a factory worker in Pakistan or a peasant in Ecuador to fully take advantage of the possibilities of a computer and of Internet. In plain words: even us who sit in front of our computers for several hours every day do not utilize the 10% of the capacity of our hardware and software. In spite of this we have seen many telecentres equipped with state-of-the-art expensive computers, which in four or five years will need to be replaced.

Next to language, the most important issue is the generation of local contents. It may not be enough to translate what is already in the World Wide Web, because the content of the web is, once more, 90% irrelevant to the needs of 90% of the people in poor communities of the world. If a rural woman in Brazil or a shepherd in Mali has the opportunity (and the ability) to navigate the World Wide Web, how much could they get from it that is useful for their daily lives?

"Who is telling the stories?"[iii]... The question that George Gerbner raised to analyse the contents in television programmes in the US could be extended to the contents of the World Wide Web. "Who is telling the stories in the web"? Whose voice are we all subject to? It is amazing that while we have been during decades so critical about the polarization of information generated mainly in the US and some European countries, we are fascinated by the same trend now happening within the World Wide Web. When during the seventies UNESCO proposed a New Information Order in the world, which would allow developing countries to contribute with their own perspective in the international flow of information, the United States boycotted the international organization and suspended its contributions. Shouldn't we all in the Third World be worried about the fact that we haven't been able until now to contribute in terms of contents to the growth of the web? Actually, this question goes also for powerful countries in Europe, which in terms of contents and language are very marginal in the web.

The generation of local contents should be essential in any ICT project that aims to benefit rural or marginalized urban communities, and it should be built-in since the very inception of the project, not as a complement that may (or, more likely, may not) be implemented as the telecentre develops. A good example of telecentres that really care about providing appropriate information to their constituency is the network known as Village Knowledge Centres[iv], set up by the Swaminathan Research Foundation in Chennai (India). The concept is articulated around community needs, not the opposite. "Information shops" have been placed in various villages, and a "value addition centre" is in charge of building web pages with information that is relevant to local needs, such as market prices or local weather reports.

The core concept is to build a "local web" that specifically caters the needs of local communities, in terms of contents, culture and language.

The issue of technology, which has actually been the focus for most of the institutional projects, should be also taken into consideration. Critics have said that often telecentres are like Cadillacs in rural areas. The image is meant to symbolize the fact that sophisticated hardware and software is planted in places where no other basic services are available. Is Prometheus riding a Cadillac instead of a bicycle? Haven't we learn anything from the barefoot doctors or the Green Revolution"? It seems that appropriate technology is only in the jargon of those involved in rural development, and not well acknowledged by the ICT newcomers.

The world of development has known too many failures during the past 50 years and we should learn from them at least in relation to appropriate technologies. Sometimes, technology that is not appropriate can do more harm than good to development and social change. What kind of technology is necessary and justifiable in rural telecentres? Should rural telecentres be equipped with the same technology than urban telecentres? Should telecentres oriented towards community participation, development and social change be equipped with similar technology than commercial telecentre initiatives? Why is it that while there are efforts to develop the Simputer (a computer that will cost less than 200 US$), the investments in new rural telecentres are so high? What kind of technology can be locally maintained and sustainable over the years?

The issue of community participation adds to the above as a key component of telecentres for development and social change. As it happens with any development project that is originated with external inputs, sustainability can only be assured through the commitment and participation of the community of beneficiaries. This is not related only with the issue of funding. Many development projects have failed in spite of having external support during many years, because the community never developed a sense of ownership over the project or programme, and remained alien to it. Community participation is not something you can build *after* a telecentre has been already planted: it should be an essential condition to start a telecentre.

A good example of this are the telecottages that CREST[v] has supported in rural areas of North-western Romania. CREST won't start a telecottage if the community has not proved full commitment, which often translates into providing the land, constructing the building to house the telecottage and organizing groups of volunteers to run the activities. It is interesting to note that several countries of Eastern Europe are using the term *telecottage* to establish the distinction between telecentres as commercial ventures and those that have development and social change objectives.

THE GLOBAL KNOWLEDGE II WOMEN'S FORUM

ASIAN WOMEN IN THE DIGITAL ECONOMY: POLICIES FOR PARTICIPATION

United Nations Development Programme
2001

Drawing on the experiences at grass-roots level and on recent empirical research in this field, this monograph documents the way the emergence of the digital economy is transforming the lives and work of women in Malaysia and some other countries in Asia. The monograph highlights the opportunities and threats that the information and communication technologies (ICT) present to women, at the same time it indicates the way the new technologies themselves could be used to transcend the digital divide around gender. The monograph emphasises the importance of participation of all three stakeholders, the state, the private sector and the NGOs, in a policy framework that explores the use of ICT for women's empowerment and livelihood. The analysis takes note of the vision of the Malaysian Government for creating a gender-sensitive ICT-led caring society. The monograph also makes a case for an exchange of information among the policy makers and NGOs in the region.

UNDP Publication

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THE GLOBAL KNOWLEDGE II WOMEN'S FORUM

ASIAN WOMEN IN THE DIGITAL ECONOMY: POLICIES FOR PARTICIPATION

Dr. Swasti Mitter

United Nations Development Programme
2001

Box 23: NGOs Take ICT to Rural Women

It isn't every day that village women and men sit down to a personal computer, log in, and download data that is useful to them. But in six villages in the Union Territory of Pondicherry in South India, where the income level of villagers is less than Rs 43 per day (about $US1), this is happening.

In Kizhur village, 21km west of Pondicherry, three women huddle around a computer, inputting data on the self-help group project. The keyboard has English characters, with a template of Tamil (one of the Union Territory's official languages) characters. From the adjoining room comes the sound of children playing, and rice being cleaned in a mambo husker.

The project, initiated by the Chennai-based MS Swaminathan Research Foundation (MSSRF) was started in Kizhur in 1998. Intended as a pilot, its goal was to take computers to villages and use them for generating local knowledge and information needs. Research prior to the start of the pilot showed that villagers wanted information on agriculture and grain prices, general and reproductive health, and government programmes for welfare and services for those living below the poverty line.

Content is created at the village centres. There is detailed documentation on sugarcane cultivation; a guidebook on application of bio-fertilisers in rice cultivation; a how-to document on herbal medicines for minor disorders among children, and on local religious festivals.

Source: Anita Anand, Women's Feature Service

The policies that are needed to empower women in rural areas should thus be qualitatively and quantitatively different from those needed to empower women in urban areas.

Foreword

The convergence of computing and telecommunication technologies, and in particular the Internet, has had a profound and transformative effect on society and the economy; from the way we live, work and interact with each other to the way we conduct business. But while these new information and communication technologies (ICT) offer vast and unparalleled opportunities in terms of business development and job prospects in the emerging and rapidly growing digital economy, they are also one of the contributing factors to disparities among different social and income groups. This disparity, coined as the digital divide, is one of the most critical development issues emerging as a result of the rapid but extremely uneven advancement and diffusion of ICT over a very short span of time. But social and income disparity is only one aspect of the digital divide; there is also the gender-based aspect.

At the Global Knowledge II Conference held in Kuala Lumpur, Malaysia, March 2000, the Women's Forum, sponsored by Malaysia's National Council of Women's Organization and UNDP, brought to the fore the gender dimension of the digital divide. It was argued by some 130 women from around the world that the digital divide is not just the polarization between the "information rich" of developed countries and the "information poor" of developing countries, it is also the disparity in terms of access, usage and benefits of ICT between men and women everywhere. In most developing countries, women represent the majority among those on the margins of society and the mainstream economy. Unless the challenges of poverty, lack of access to resources and opportunities, illiteracy, lack of basic computer skills, or language barriers are addressed, the vast majority of women will continue to be excluded from participation in the digital economy. Rather than reaping the benefits of ICT or opportunities that the new economy brings, they will be further marginalized from the mainstream. These developmental challenges were recognized and stated as obstacles to the full implementation of the Beijing Declaration and the Platform for Action.

This monograph on women in the digital economy is a follow up to the GKII Women's Forum and the ensuing final forum report entitled "Transcending the Gender Digital Divide." By commissioning this work, UNDP wishes to not only highlight the gender challenges of the digital economy, but also to offer viable policy solutions based on experiences from the Asian region. Dr. Swasti Mitter has cogently articulated the need for policies to be geared towards infrastructure, work arrangements, education and training, challenge of content, and regulatory environment if women are to be empowered to participate in the digital economy. Following on the research work we have carried out on Teleworking in Malaysia, this monographs represents UNDP's ongoing commitment to offering innovative policy solutions that not only address the negative impacts of globalization and new technologies, but also the unprecedented opportunities that they bring.

We wish to acknowledge our counterpart, the Economic Planning Unit in the Prime Minister's Department, for the financial contribution towards the production and printing of this monograph.

Phillips Young
UNDP Resident Representative (Malaysia)

ADB INSTITUTE WORKING PAPER 12

Information and Communication Technology and Poverty: An Asian Perspective

M. G. Quibria and Ted Tschang

January 2001

The emergence of Information and Communication Technologies (ICTs), in particular the Internet, has generated new enthusiasms about the development prospects for poor economies. Many now think that new technologies can provide a faster route to better livelihoods and improved quality of life than the one afforded by the standard process of industrialization. The opposing view holds that the focus on ICTs will detract attention from the more fundamental task of addressing the basic problems of economic development.

This paper attempts an even-handed evaluation of issues relating to the direct and indirect, yet broader economic impacts of ICTs. This is done by evaluating a selection of "case stories" on the direct uses of ICTs to alleviate poverty, and an analysis of the broader issues of ICTs in relation to economic growth, and of the determinants of technology adoption. The paper shows that as far as direct impacts are concerned, the use of ICTs holds significant promise, but existing data do not afford a full-fledged cost-benefit assessment. Similarly, while ICTs can also positively contribute to the broader economy, the realization of such benefits requires a physical and social infrastructure well beyond that existing in many poor countries.

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ICT to Provide Market and Other Information for Improving Livelihoods: ICT can be an important source of market information. It can provide consumers with information on the lowest prices of products or on the lowest and different sources of supply, help reduce transaction costs and barriers to entry, and improve market efficiency. Following the lead of developed countries, but understandably to a considerably much lesser degree, ICTs are being used in various states of India as well as in other developing countries to increase the availability of market information to consumers and producers. This helps improve the efficiency of the markets in which the poor participate and, thereby, improves their economic prospects. A few examples include:

♦ *Information centers*: A number of such information systems exist in India. First, the M. S. Swaminathan Research Foundation (MSSRF) in Chennai has established village information centers to provide rural farmers with data about agricultural practices. These were set up with support of the Canadian International Development Research Center (IDRC) and other aid agencies, to provide poor villagers with various types of information through the Internet in order to enhance their economic well being. This information includes the cost and availability of farming inputs (from distant suppliers), grain and seed prices, health and life insurance, welfare opportunities, and other aspects of their work and daily lives (see case story 4 in Appendix 2). Another such project is the Warana Wired Village in Maharashtra, which has set up information kiosks in 70 villages to allow villagers access over the Internet to agricultural as well as medical and educational information (Bhatnagar, 2000). Third, on a much larger scale, states such as Andhra Pradesh and Karnataka are, through private sector investment, equipping thousands of villages with information kiosks that can access government and other information (see case stories 1 and 2 in Appendix 2).

♦ *E-Marketplaces:* In India, the Internet is being used to market the produce of poor communities. Two examples are particularly notable. First, a US-based nongovernment organization (NGO), PEOPLink, has linked producers of commodities in poor communities in Tamil Nadu to potential markets through the Internet (PEOPLink, 2000). One village in Tamil Nadu—Kizhur—which excels in making traditional cotton saris and other cotton garments, sells its produce through PEOPLink's Web site to consumers all over the world. These types of innovations have the potential of substantially reducing transaction costs by eliminating the layer of intermediaries who often absorb a large chunk of the profits (see case story 6 in Appendix 2). Second, similar functions are performed by an Indian NGO, the Foundation of Occupational Development (FOOD), which promotes the sale of rural women cooperative's products through the Internet. However, success in such efforts is not likely to be easy or immediate as there are insurmountable barriers to Internet commerce, such as trust (between buyers and sellers), payments, security and distribution (see case story 5 in Appendix 2).

♦ *Milk cooperatives:* One successful application of ICTs has been the use of technology to enhance milk collection in Gujarat milk cooperatives, India (Bhatnagar, 2000). Electronic technology is used to measure and transmit the quality and quantity of milk that farmers are delivering. This system makes the collection and evaluation process

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these provides a systematic analysis of how ICTs can provide information services that affect the poor at the project level nor do they explore their macroeconomic implications.

implied that income earned through the VP was a supplement to household income earned from other sources, mainly from nonagricultural activities.

However, it is important to note that VP operators were carefully selected among GB members based on a set of stringent criteria such as having a good loan repayment record, experience of running a profitable small business (preferably a village grocery store), being literate or at least having children who can read and write, and residing near the center of the village. These criteria were set to assure the success of the program at the beginning period. Nevertheless, they imply that VP operators are not necessary the poorest of the poor and are doing better than average GB members. It is expected that future VP operators will come from poorer-than-average households in the village. Yet, it is reported that in terms of social indicators the VP operators' households seem to be leaders in literacy, child immunization rates, use of safe drinking water and sanitary latrines thanks to their long membership of GB.

Although the VP program has proven to be a successful way to generate income from ICTs, it is not easy to replicate in many poor communities around the world, such as with other GB microcredit programs that have been successfully replicated. This is partly due to the fact that the majority of customers of GB phone operators in many Bangladeshi villages are migrant workers working abroad or in other regions of the country - who need to communicate with the family members at home. Without such sources of "demand", the overall demand for using telephones in many poor communities may be too small to generate sufficient revenues for VP operators to survive.

Source: TeleCommons Development Group, Grameen Telecom's Village Phone Programme in Rural Bangladesh: A Multi-Media Case Study, Final Report for CIDA, prepared by Don Richardson, Ricardo Ramirez and Moinul Haq, 2000.

Case Story 4: Pondicherry Village IT Project (M. S. Swaminathan Research Foundation)

MSSRF—a nonprofit foundation in Chennai (Madras) dedicated to improving rural areas through a "pro-nature, pro-poor and pro-women," as well as job-led growth strategy—has been involved in a research/pilot project to investigate the opportunities that ICTs can provide to the rural poor. A similar project that developed an online supermarket based on local information centers was implemented by another Chennai-based NGO, FOOD (see case story 5).

The MSSRF project developed five telecenters—called information centers—in the Pondicherry region of India, with IDRC funding. One called the hub or VAC collected and filtered information for the other four centers. The total population of the villages was about 11,000, of which 4,700 residents were illiterate. Some villages had only one public telephone and, at most, a few private telephones. On the other hand, the villages had anywhere from dozens to hundreds of TV sets.

Both MSSRF and FOOD projects note that connectivity alone is not sufficient (PANAsia, 1999). On the other hand, connectivity was not much of an issue, given that commercially available hardware could be used to equip the centers for no more than $4,000 for the hub, and $750 per center (with two PCs per center).

An independent report based on a site visit identified 24 success stories from villagers. Surveys of villagers were conducted to determine their needs. The Information needs ranged from agricultural commodity prices to fishery weather information, lists of government welfare programs, references, discussions and daily news. In a sense, some of this information replaced what would normally have been released in newspapers, government documents, radio and other media. Locality-specific databases were created, some with the

help of local professionals (e.g., doctors) and domain experts. The value of the information was in the timeliness and relevance to the villagers' local livelihoods.

The operation of the VAC was considered by MSSRF to be a key component in the whole operation, because the staff—consisting of graduate-level MSSRF employees trained in development and village volunteers—were dedicated to the finding of information relevant to the needs of villagers around all five centers.

Other characteristics considered important by MSSRF were the use of local Tamil script, which most villagers could read, and the participatory development scheme used, i.e., the communities' provision of space, and staffing of centers with local volunteers. The volunteers possessed a mixture of lower-to-middle secondary schooling. They helped illiterate villagers or those who could not undertake their own searches, while MSSRF staff ensured that the equipment was operating properly.

Villages were selected for participation based on their willingness to support the centers in kind, as well as to subscribe to the ethical principles outlined by the Foundation. Some villages were removed because they failed to meet or maintain those principles, such as through damage to equipment or irregular operating hours.

The information centers were contrasted with Internet-only or traditional telecenters, such as some earlier operations in Africa, which appear not to have been designed with village users' requirements in mind. The looseness of operations in such centers apparently contributes to their reduced usefulness. In contrast, the local needs addressed by MSSRF and the business-like approach by the FOOD centers ensure that the centers continue to be used by the villages. In fact, there were a total of 10,656 users of the MSSRF centers between 1 January 1999 and 31 March 2000, of which 2,985 were repeat users, 309 were illiterates and 2,581 were assetless families. There were about nine users per day per center. Of the data accessed, 33 percent were government data, 20 percent were education data, 14 percent were agricultural and fisheries data, 10 percent were health data, and 3 percent were employment and training data (MSSRF material).

In sum, the main benefits from the centers were improved access to information, which helped make livelihoods more secure, sustainable (profitable) and safe; and development of skills. The skills developed included simple information seeking skills, while others were more complex, e.g., some volunteers learned Hypertext Markup Language (HTML) (needed for Web site development). This may be the first sign of progression to higher levels of technological sophistication. The access to opportunities, skills and information also illustrated the value of ICTs—as a means of putting some people on the path to careers with greater incomes.

In the future, more sophisticated schemes may be developed and tested, such as formal distance and other learning programs, health services, etc. The remaining issue concerns the scalability of the project, i.e., whether whole regions could be scaled up with the same degree of care, whether these regions would exhibit network economies of scale and scope, and whether coordination problems would be overwhelming. Further, MSSRF acts as a strong supportive intermediary that may be hard to duplicate consistently. There is also an issue of whether sustainable growth in user capabilities can be achieved. That is, at some point, users may need to take matters into their own hands and start to create and structure the content. Last, while sufficient funding for other village information centers may be available theoretically (e.g., through the reallocation of existing development budgets), ICTs may have lower prioritization in the meantime until basic needs of rural development are met.

Source: Based on field research, MSSRF Web site reports, PANAsia (1999).

Harnessing the power of information and communications technology for sustainable partnerships

"Seizing the extraordinary opportunities of the digital revolution is one of the most pressing challenges we face."

Kofi Annan
Secretary-General, United Nations

Introduction

The creative use of Information Technology for development remains one of the key challenges in the digital age. While development assistance has always been provided with sustainability in mind, all too often technology has lagged behind in this effort. The goal to realistically and practically transfer technology from north to south remains elusive. The Johannesburg Summit offers a useful opportunity for reflection and hopefully will generate some innovative thinking on the use of technology for achieving sustainability.

The Case for Partnerships

The PrepComs leading up to the summit have included some healthy debates on a wide range of economic, social and environmental issues, with the underlying agenda of poverty alleviation and the need for global consensus and action. The reaffirmation in Bali to encourage business and industry to showcase sustainable development partnerships is a golden opportunity for the private sector to do concrete projects on the ground to bridge the north-south divide. The commitment of the scientific and technological communities to improve collaboration between scientists and policymakers provides real impetus for progress. While aid is an essential component for helping the 2 billion plus men, women and children who live below $2 per day, there is growing consensus that sustainability depends in large part on trade, investment, and transfer of technology. The multi-stakeholder dialogue for World Summit for Sustainable Development (WSSD) underscored also the importance of good governance and accountability, protection of human rights, democratic participation, especially for women in the decision-making and capacity-building process. The Secretary General of the Summit, Mr. Nitin Desai, expects the summit to focus on the Millennium Development Goals (MDGs) adopted by 147 Heads of State and Government, and 189 Member States in total in the Millennium Declaration.

Key expected outcomes of WSSD will be political declaration from heads of state, a plan of implementation that builds on the achievements made since Rio and commits governments to undertake concrete measures and actions ("Type I"), and finally "Type II" partnerships and initiatives, involving business and other sectors of society, translating the "Type I" commitments into specific actions. It is clear that these two types of outcomes of the WSSD are closely interrelated, and that one cannot go without the other.

international agencies, the private sector, foundations, nongovernmental organizations and country partners under the principle of ensuring equitable access to health information. http://www.healthinternetwork.org

OneWorld's AIDS Radio portal offers services and networking for broadcasters and civil society organisations who are interested in using radio/audio to promote awareness, news and public education on HIV and AIDS. Radio reaches more people than any other communication medium - unrestricted by borders, literacy or gender - and, in the fight against HIV/AIDS, is a hugely important communication tool. The OneWorld Radio AIDS Network audio exchange is a platform for the free exchange of programmes between stations and organisations across the world, offering access to a wide variety of excellent programmes addressing many aspects of AIDS awareness. www.oneworld.net/radio/aids

India Health Care Project makes use of IT for delivering quality health care to the rural population. It aims to reduce or eliminate the redundant entry of data prevalent in paper registers, generate automatically Auxiliary Nurse Midwives (ANMs') monthly reports, and make data electronically available for further analysis and compilation at higher levels of the health care system. It will train the health workers in the use of Personal Digital Assistance (PDAs) to process data with ease. The PDAs are designed to cater to the semi-literate levels of the health workers. The 40-60% reduction in time for the health workers to process the data can be used to deliver quality health care. CMC Limited is partnering with Apple Computer Inc. USA, the Centre for Diffusion of Information Technology (CDIT) the Ministry of Health & Family Welfare, Government of India and the World Bank.

Agriculture

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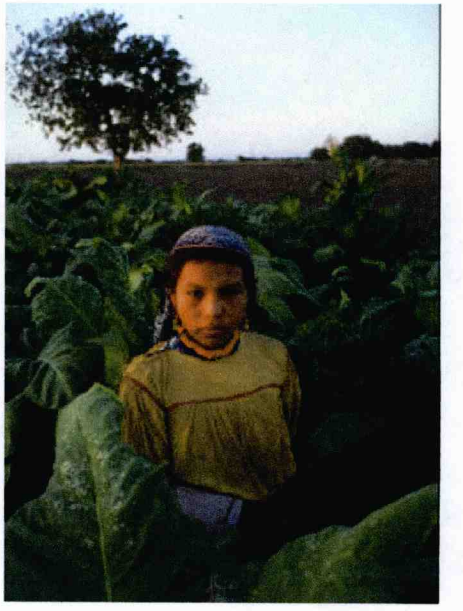

The M. S. Swaminathan Research Foundation's Information Village Research Project (IVRP) in the Union Territory of Pondicherry aims at delivering electronic knowledge to the poor. So far ten villages near Pondicherry in southern India have been connected by a hybrid wired and wireless network consisting of PCs, telephones, VHF duplex radio devices and email connectivity through dial-up telephone lines. This facilitates both voice and data transfer, and have enabled the villagers to get information that they need and can use to improve their lives. Areas covered include agriculture, health, education, cattle and feed. The project emphasizes an integrated pro-poor, pro-women, pro-nature orientation to development and community ownership of technological tools against personal or family ownership, and encourages

collective action for spread of technology. The bottom up exercise involves local volunteers to gather information, feed it into an Intranet and provide access through nodes in different villages. All centres evolved themselves to meet the information demands made by the community. The project is supported by the International Development Research Centre (IDRC), the Canadian International Development Agency (CIDA), the Ford Foundation and the Department of Science and Technology, Government of Pondicherry. www.mssrf.org

The World Agricultural Information Centre (WAICENT) established by the Food and Agriculture Organization (FAO) for agricultural information management and dissemination, in an effort to fight hunger with information. WAICENT is a strategic programme for improving access to essential documents, statistics, maps and multimedia resources to millions of users around the globe. The information includes: full-text publications and technical documents on agriculture, fisheries, nutrition and forestry; data, including maps and charts, obtained through the FAO online statistical databases, containing records covering international statistics in the area of agricultural production, trade indices, food supply, land and food aid. WAICENT is one of the world's most comprehensive sources of agricultural information, providing access to the accumulated knowledge and expertise of FAO, improving the capacities of decision-makers, professionals and the public-at-large to obtain and use information essential for achieving sustainable agriculture development and helping to combat hunger.

www.fao.org/waicent

Geographic data are vital for the execution of development projects. Using ICT, a number of UN entities (Cartographic Section of the Department of Public Information, the Department of Political Affairs, the Department of Peace-keeping Operations and the Office for the Coordination of Humanitarian Affairs) are putting together a global geographic database, consisting of basic cartographic elements and toponymic information, which will be made available to users through the Internet. In addition, a strategic plan to fully implement the database will be devised, as well as the creation of a geographic data clearinghouse. This project is a crucial capacity building effort for developing countries that otherwise cannot afford such technology. Geographic data in the form of digital maps and satellite imagery are fundamental and indispensable for environmental assessment and monitoring.

The Rural Agricultural Development Authority (RADA) is developing an Agricultural Business Information System (ABIS) to provide stakeholders in the industry with data on crop production and marketing, a 'one stop shop' computer-based system for agricultural information. The ABIS's primary objective is to develop the capacity and competitiveness of Jamaica's agricultural sector through the use of information and communication technologies. Funding for the development and implementation of the system is being provided with grants from the Ministry of Agriculture, the International Institute for Communication and Development (IICD), and the European Union (EU) through the Eastern Jamaica Agricultural Support Project (EJASP).

TIMES Computing Columns

THE WHOLE WIDE WORLD OF INFORMATION TECHNOLOGY

E-mail from the Ether

All the latest buzz

VENKATESH HARIHARAN

October 20, 1999

Leveraging IT for India's development - Part II

It is said that every revolution has its winners and losers. When it comes to the digital revolution, enough has been said about winners--the Bill Gates' and the Jeff Bezos' or closer home, the Narayana Murthys and the Azim Premjis. But what are the implications of the digital revolution for those who are not a part of its mainstream? As the clockspeeds of our PCs increase, will they leave behind the vast majority of the world that has no access to this wonderful new technology? Is it possible to harness this very same technology to benefit the poor? At the Indian Institute of Information Technology, Bangalore we have set up the Information for Development (InfoDev) Centre to study these issues on a long-term basis.

It has often been said that information is a new form of currency. Access to this currency is however restricted to those who have the education levels required to operate it and also the wealth needed to own one. Those who are a part of this elite go on to become the Bill Gates' of our era. However, if access to information is a new form of wealth, the natural corollary is that lack of access to information is a form of poverty--Information Poverty.

Privileged minority

This scenario is vividly painted by Professor Kenneth Keniston of the Massachusetts Institute of Technology (http://www.kken.net/ in his talk titled, "Politics, Culture and Software." Using the metaphor of a "bad dream" Keniston questions the implications of the fact that almost one-sixth of the world's population are excluded from the Information Age. "[This] raises questions about politics, culture, and software that are important not only to India,

but to the entire world," he adds.

"In the not-too-distant future, the entire world will be effectively controlled by a small group of individuals whom we can identify, for the sake of convenience, by four simple characteristics: they are all computer literate; they all have an Internet address and/or website; they all possess a cellular telephone (probably with direct satellite links in the future); and they all understand–and speak and write–English as their first, second, or third language," he says.

He adds that this new ruling class will be concentrated in the nations of the so-called North, but its members will also be found in the major metros of the world, jet from continent to continent; and communicate instantaneously with each other in English. Their culture "will be inspired and perhaps dominated by Disney, Sony, Murdoch, MTV (suitably adapted to conditions

in Delhi or Buenos Aires), McDonald's, CNN, Mitsubishi, Nike, Philips, Levi's, Nestle, Microsoft, Intel, and corporations as yet to be invented. Faced with the power of this new electronic culture, traditional, non-English-speaking, ancient, non-electronic cultures will stagger and perhaps be overwhelmed.

Keniston adds, "The remaining 99 percent of the world's population–not computer literate, not fluent in English, without Internet websites and cellular phones–will be gently ruled by this new global telectronic ruling class, the new digirati".

Digital divide

Unfortunately, there are very few people who are aware of the dangers of the digital divide. The world's IT industry (and India is no exception) is a smug and highly self-congratulatory industry that makes politically correct noises about the digital have-nots but does very little about it. Like it or not, Information Technology is like a sword that divides the world into haves and have-nots because every new technology is appropriated by the elite for their own advancement. The momentous October Revolution in 1907 that created the USSR and marked the beginning of this millennium had as its slogan, "Turn swords into ploughshares." In other words, the peasants who revolted against the oppression of the wealthy demanded that capital be distributed more

evenly, leading to the development of the communist movement. The USSR ultimately disintegrated but the ideals that gave birth to the movement–the ideal of the equality of mankind–have had a lasting impact on our history. Similarly, can the sword of information technology be turned into ploughshares?

Need for information

It is a fact of life that the need for information pervades all aspects of our lives. Whether one is a farmer or a stockbroker, access to timely information determines whether one loses or gains wealth. Today the benefits of information technology are, as Professor Keniston points out, restricted to a westernised, urbanised elite. However, there is no reason why this should be so. Projects like the MS Swaminathan Research Foundation's Info Village (http://www.mssrf.org/) project are demons-trating that information techno-logy can "reach the unreached."

The foundation states that, "The ongoing Information Technology Revolution has opened up uncommon opportunities for providing low-cost access to information as well as to interactive, distance-learning in rural India. Computer-aided knowledge dissemination mechanisms help to reach the unreached and foster new voices and new leaders. A pilot study undertaken by MSSRF in villages in the Union Territory of Pondicherry has yielded encouraging results on the impact of IT on rural societies."

If projects like the Info Village are replicated on a national level, IT could become an enabler of economic development that indeed reaches the poorest of the poor.

Bill Gates led a revolution with his ambition of putting a PC on every desk. But if this industry wants to be really great, it has to put the power of information technology into the hands of those who cannot even afford a desk. That would be the finest example of leveraging IT for India's development.

Prof. Venkatesh Hariharan is a faculty member of the Indian Institute of Information Techno-logy, Bangalore. He can be contacted at venky@venky.org

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India starts hooking up villages with Internet Access to services touted as benefit, but critics unconvinced

Monday, January 27, 2003
San Francisco Chronicle
CHRONICLE SECTIONS

Amol Sharma, Chronicle Foreign Service

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Veerampattinam, India -- Each morning, scores of fishermen in this seaside hamlet line up to listen to eight loudspeakers blaring out detailed reports on weather and tide conditions before launching their rickety canoes into the Bay of Bengal.

The information emanates from a 20-by-30-foot room near the shore with five computers where data is downloaded from a U.S. Navy Web site. Such reports can be a matter of life and death for these fishermen, who live six miles south of the southern city of Pondicherry. Two years ago, five villagers drowned after an unforeseen storm engulfed their tiny vessels.

"I have a natural sense if the weather will be bad, but this is better because it's always accurate," said 35-year-old fisherman S. Sakthivel.

Veerampattinam and hundreds of other "e-villages" nationwide are part of an ambitious effort to bring the information revolution to India's 600,000 villages, where more than two-thirds of the country's 1 billion inhabitants live. The idea is not simply to offer Internet access and e-mail but a range of agricultural, health, education and government services.

Closing the urban-rural divide has become a high priority for many nongovernmental and private companies -- including Palo Alto's Hewlett-Packard -- and is winning increasing support from national policymakers.

The government "intends to take all possible measures to ensure that benefits of this technology reach the common man, even in the remotest part of the country," said Pramod Mahajan, minister of information technology.

In wired villages, peasants are logging on to find the latest market prices for crops and fish, to strengthen their position with greedy middlemen. They are also participating in videoconferences with experts to help treat crop and animal

e-villages in much the same fashion as a city cyber cafe.

Coupled with wireless technologies that can extend telephone signals from urban hubs to far-flung areas without expensive wiring, Swaminathan's approach has made it possible for rural communities to hook up to the Internet cheaply.

"You don't have to be a super-duper engineer to bring down the price of technology," said Subbiah Arunachalam, senior supervisor for the foundation's e-village project.

The Swaminathan foundation, which relies heavily on funding from such international sources as Canada's International Development Research Center and the Ford Foundation to support its mostly free services, is widely considered to be the pioneer in bringing the Web to the countryside.

But it has been followed by a number of other ventures, which charge for services.

"Every project that is not based on a profit model will fall apart as soon as the aid behind it is withdrawn," said Ashok Jhunjhunwala, who founded his n- Logue wireless company in 2001. "If you want to get this (Internet) everywhere,

you have to show that it can make money."

In the past year, n-Logue has brought the information highway to 38 villages in the southern state of Tamil Nadu, most of which are turning a profit, and plans to wire 500 more nationwide in the next three years, Jhunjhunwala says.

N-Logue first identifies a villager who shows a knack for learning computer technology before lending him or her $1,000 to provide the necessary equipment.

The designated villager then agrees to pay the firm $15 a month for the use of its wireless technology as well as cover the average $40 monthly utility bills. He or she can then charge from 20 cents to 30 cents for most services, which many residents can afford.

In the southern state of Andhra Pradesh, some officials have teamed up with Seattle's World Corps and Hewlett-Packard to wire several villages.

World Corps, a nonprofit organization, trains operators and raises startup funds to get e-villages off the ground. Hewlett-Packard provides equipment while the state government offers low-interest loans. So far, the results have been encouraging -- five villagers in the district of Kuppam are online, and officials plan to expand the program throughout the state.

focus on information technology

OFANews

Pacific Edition

ONCE & FUTURE ACTION NETWORK OF WOMEN IN SCIENCE & TECHNOLOGY

SEPTEMBER 2002

1ST PREPCOM FOR THE WORLD SUMMIT ON THE INFORMATION SOCIETY (WSIS)

Putting Gender on the Agenda of WSIS

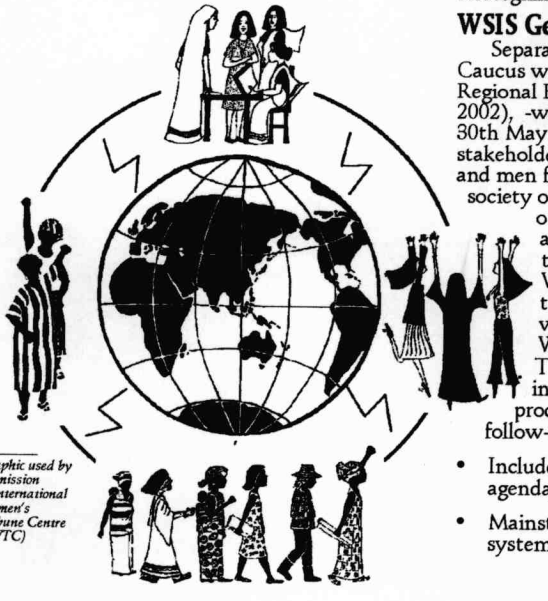
The first PrepCom for WSIS was held in Geneva July 1-5, 2002. IWTC participated in the meeting, joining forces with other women to find ways to place gender and gender perspectives onto the agenda.

Background to WSIS

In 1998, the International Telecommunication Union (ITU) resolved to place the question of the holding of a World Summit on the Information Society (WSIS) on the agenda of the United Nations Administrative Committee on Coordination (ACC). ACC agreed with the idea and decided that the World Summit would be held under the high patronage of the UN Secretary-General, with ITU taking the lead role in preparations.

Two World Summits

In 2001, the ITU Council decided to hold the World Summit in two phases with the first phase to be held from 10 to 12 December 2003, in Geneva, Switzerland and the second in 2005 in Tunis, Tunisia.



Graphic used by permission of International Women's Tribune Centre (IWTC)

In the weeks leading up to the first PrepCom in Geneva in July, strategizing on ways in which gender could be made central to the WSIS planning process was high on the agenda of several women and media groups, including IWTC, the APC Women's Network Support Programme (APC/WNSP), and Isis international/ Manila.

The CRIS Campaign

Karen Banks of APC/WNSP and Anne S. Walker of IWTC are also members of the CRIS campaign (Communication Rights in the Information Society) a campaign launched by the Platform for Communication Rights, -a group of communications researchers, practitioners, writers and policy-makers, men and women, set up in 1996. Including a gender perspective as an integral part of any discussions on information rights also became part of CRIS campaign strategizing.

WSIS Gender Caucus

Separate to this, a WSIS Gender Caucus was formed during the African Regional Preparatory Conference (Bamako 2002), -which took place in Mali from 25-30th May 2002. Formed as a multi-stakeholder group consisting of women and men from national governments, civil society organizations, non-governmental organizations, the private sector and the United Nations system, the strategic objective of the WSIS-Gender Caucus is to ensure that gender equality and women's rights is integrated into WSIS and its outcome processes. The Caucus urges all stakeholders, in planning the preparatory processes, the Summit, and the follow-up programmes, to:

- Include gender equality goals in the agenda, programme, and background;
- Mainstream participation by UN system gender advocacy units in planning and preparatory mechanisms at all levels;
- Ensure the participation of national machineries for women, women NGOs and the UN system gender focal points;
- Include women's participation in all the planned capacity building and training programmes;
- Encourage member states and other participating entities to include at least 30% women including gender and ICT experts in delegations and to ensure participation by civil society representatives.

An NGO Gender Issues Strategy:

In order to further encourage the full participation of non-governmental women from every world region in the discussion around gender issues and perspectives in the Information Society and in media policy as it relates to gender in general, IWTC, with APC/ WNSP, Isis International/Manila and other interested women's information and media networks, have put together a plan to hold WSIS and gender panels and discussions at several international and

Continued on page 4 ...

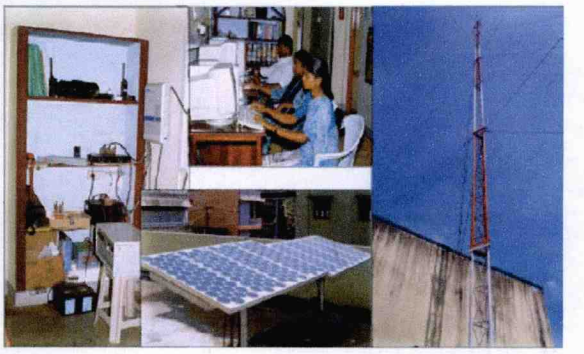
THIS IS THE LAST ISSUE OF THE OFAN NEWSLETTER. READ THE SPECIAL EDITORIAL OVERLEAF.

Information Village project of the M S Swaminathan Research Foundation, Pondicherry

In an experiment in electronic knowledge delivery to the poor, the M.S. Swaminathan Research Foundation set up knowledge centers in ten villages near Pondicherry in southern India and connected them by a hybrid wired and wireless network – consisting of PCs, telephones, VHF duplex radio devices, spread spectrum and email connectivity through dial-up telephone lines – that allows both voice and data transfer. This set up allows the villagers to get information they can use to improve their lot. All the knowledge centers are open to all, irrespective of age, sex, religion, caste, and level of literacy and education. The entire project is based in the holistic philosophy of Swaminathan, which emphasizes integrated pro-poor, pro-women, pro-Nature orientation to development and community ownership of technological tools against personal or family ownership, and encourages collective action for spread of information and technology.

Information provided in the village knowledge centres is locale specific and relates to prices of agricultural inputs (such as seeds, fertilizers, pesticides) and outputs (rice, vegetables, sugarcane), market, entitlement (the multitude of schemes of the Pondicherry government), health care (availability of doctors and paramedics in nearby hospitals, women's diseases), cattle diseases, transport (road conditions, cancellation of bus trips), weather (appropriate time for sowing, areas of abundant fish catch, wave heights in the sea), etc. Unique to our project is the fact that most information is collected and fed in by volunteers from the local community itself. The centres are operated by local volunteers, mostly women thus giving them status and influence. All centres were set up because of demands made by the community.

Local volunteers gather information, feed it into an intranet-type network and provide access through nodes in different villages. Information is made available in the local language (Tamil), multimedia is used (to facilitate illiterate users), and local people actively participate from the beginning.



VHF two-way radio, Internet, Spread spectrum antenna and solar panels at Villianur

Information from the computers in this area, where people live in thatched mud huts, has saved the life of a milk cow named Jayalakshmi and routinely warns fishermen of stormy weather that can claim lives.

Some months back, Subrayan Panjaili, a woman who cannot read or write, sat in the courtyard of her small home in the village of Kizhur, in Pondicherry, with the family's only milk cow, Jayalakshmi. For five days and nights, the cow moaned while in labor. Something had gone wrong and she was unable to deliver her calf. Mrs Panjaili grew ever more fearful that the cow would die. "This is the only good income we have," she said, explaining that the four gallons of milk the cow produced each day paid the bills. Word of Mrs Panjaili's woebegone cow soon spread to Govindaswami, a public-spirited farmer. The village's computer, obtained through the Swaminathan Foundation, is in the anteroom of his home. The computer is operated full time and for no pay by his 23-year-old, college-educated daughter, Ezhilarasi, who used it to call up a list of area veterinarians. One doctor arrived that night and, by the light of a bare electric bulb, stuck his arm into Jayalakshmi, pulled out the calf's spindly leg and tied a rope to it, then dragged the calf into the world.

The Value Addition Centre at Villianur delivers daily images obtained from a web site run by the US Navy of the predicted wave conditions in the Bay of Bengal to the centers at Veerampattinam and Nallavadu. The villagers there are fisherfolk, and the sea conditions are of crucial interest for their safety. The information is so critical that the voice report from Villianur is transmitted at the coastal villages over a public address system to the fishermen as they prepare their boats in the early morning. "It saves lives", said one respondent when asked about its usefulness.

Information provided in the village knowledge centres is locale specific and relates to prices of agricultural inputs (such as seeds, fertilizers, pesticides) and outputs (rice, vegetables, sugarcane), market, entitlement (the multitude of schemes of the Pondicherry government), health care (availability of doctors and paramedics in nearby hospitals, women's diseases), cattle diseases, transport (road conditions, cancellation of bus trips), weather (appropriate time for sowing, areas of abundant fish catch, wave heights in the sea), etc. Unique to our project is the fact that most information is collected and fed in by volunteers from the local community itself. The centres are operated by local volunteers, mostly women.

From: Reaching the unreached: How can we use ICTs to empower the rural poor in the developing world through enhanced access to relevant information? By Subbiah Arunachalam and "Connecting rural India to the world", Celia Dugger,* The New York Times, *28 May 2000.* §

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strengthen networking among women's groups and organizations: this is where much NGO and development agency effort has been focussed in the last decade with many local, national, regional and global communications networks being set up in all parts of the world, such as WomenAction, formed to lobby in the Beijing+5 process (www.womenaction.org), and the APC Women's Networking Support Programme. Such networks have done much in terms of strengthening women's social and political advocacy, and strengthening their participation in the political process. It has also helped them to become less isolated and to find allies across communities, nations and regions.

To date, much less emphasis has been placed on looking at the role ICTs can play in assisting women living in poverty to increase their economic productivity. There would seem to be two main ways in which ICTs could be used for this purpose:

(1) to provide women with information on productive technologies which can be used to reduce the burden of their domestic chores or increase the productivity and quality of their enterprises. IWTC and UNIFEM, founding members of OFAN, have been involved in a series of programmes going back to 1990 on 'Disseminating Information on Technologies to Rural Women'. While some progress has been made using traditional forms of communication, it is now time to see if the advent of ICTs can speed up this process by helping women to find information on basic needs technologies such as water pumps, oil presses and grinding mills, along with supporting technical and financial information. There has

Editorial concludes on back page...

Software Applications and Poverty Reduction

A review of experience

Jane Millar
Robin Mansell

INK@SPRU
University of Sussex

30 June 1999
(Revised 1 October 1999)

Final Report prepared for the
Department for International Development
London

in Le-soto, South Africa. A blurring of boundaries between application fields also occurs in the case of Environmental/Geographical Information Systems, i.e. the Information Village in Pondicherry, and in the case of support for micro and small business activities, e.g., the information kiosk at Warana Nagar, India or the Multipurpose Community Telecentre in Mamelodi, South Africa.

> *Integrated techno-educational strategies in Jamaica*[65]
> In the EduTech Programme pedagogy, technology, emerging educational methods, learner- and group-centred problem solving are integrated in order to co-evolve learning and skill development among children and teachers alike in Jamaica.

In the case of India, there are six examples of initiatives in the education sector that involve the use of software and three examples of the use of library and information service software in poor communities. Local government or the private sector has funded all but one of these initiatives. Approximately half of them, including all of those that have been funded by the private sector and one that has attracted foreign funding, have the potential for connectivity to the Internet. Although they are designed so they can be linked to the Internet, there is little information about whether this facility is actually in use. Some initiatives are in the early stage of development and the educational initiatives generally are orchestrated within broad programmes. There is limited information about Internet use across schools within such programmes.

In Jamaica, most of the six educational initiatives, one of which could also be classified as an example of software use for library and information services, are designed to support Internet connectivity; they are locally funded and involve the participation of the Jamaican Computer Society Education Foundation (JCSEF). Five of the seven initiatives in the education and library information services sector in South Africa (five educational initiatives and three examples of software support for library and information services – due to the fact that some software is used for both library services and education) have been funded either wholly or in-part by foreign donors. Available information suggests that six of these initiatives involved some use of the Internet.

Most of the initiatives can be clustered around a technology-focused or a community-focused pole. The technology-focused initiatives display the following predominant characteristics:

- a concentration on the supply of computer hardware and Internet services for poor communities
- limited efforts to integrate software into local community practices

The community-focused initiatives, in contrast, display characteristics that suggest more attention is being given to the social, cultural and organisational features of software use. These features include the fact that:

- implementation is one element in an overarching pedagogical philosophy
- applications enable the provision of educational as well as local community services
- extensive efforts are being made to integrate software into educational practices
- beneficiaries include members of the local community as well as the staff and students in the educational institution

65 See http://www.colis.com/eduteeh/centre.htm

Annex 1: Taxonomy of Community Software Use in India

User community	Application domain	Developer community	Source of funding	Packaged, custom or bespoke	Stand alone or connected	Context sensitivity	Measures for cultural integration	Impact on poverty
Farmers in Chidambaram India	EIS pest management	MSSRF[104], India	MSSRF CAPART[105] India	Custom	Stand Alone	Support for Tamil, Multi-media	Build user capabilities through training, using by doing and horizontal (farmer to farmer) interactive learning	Testing phase (no systematic data yet available)
Villagers in Pondicherry, India	EIS/GIS LIS Information Village Information for agriculture and health	MSSRF, India	IDRC, Canada	Custom	Connected (WLL) and stand alone operation	Support for Tamil	Training of user capabilities in the village telecentre as well as in the local community is integral to project	Contributes to sustainable food security and local villagers health[106] (no systematic data yet available)
Villagers in Tilonia, India	EIS/GIS[107] Interactive map of village water resources	The Ajit Foundation[108], India in association with SWRC[109] and ESRI, USA[110]		Bespoke OSS	Stand alone	Icon driven front end, touch screen		Testing phase

[104] M.S.Swaminathan Foundation, a non-political Trust that is pro-nature, pro-poor and pro-women, (http://www.mssrf.org).

[105] The Council for Advancement of Peoples Action for Technology (CAPART) (http://www.ninc.in/capart). CAPART is primarily funded by the Ministry of Rural Areas and Employment, Government of India.

[106] Subbiah Arunachalam, pers. comm., May 1999.

[107] This entry concerns the product Jal-Chitra. Jal-Chitra builds on and extends the capabilities of an earlier model SimTanka that is discussed under GIS entries that are being used in Uganda.

data and information sharing between organisations and individuals in India was serving as an impediment to applications development. Thirdly, there was believed to be undue secrecy and restrictions concerning the use of particular kinds of data and information, and finally, there was believed to be a lack of understanding and an unwillingness to adopt GIS applications among politicians and bureaucrats.

Walsham and Sahay, two academic researchers, have argued on the basis of case study evidence of GIS designed for district-level administrations in India, that 'GIS technology inscribes the values of its Western developers, which are to some extent at odds with Indian values, in at least three dimensions of rational decision making, a map-based culture and co-ordinated action'.[81] They assert that these differences, combined with an inability to establish a stable network of local stakeholders in GIS at the local government level, impede the wider diffusion of these applications within India. They recommend the introduction of simple map-based applications and substantial political support for co-ordinated and collaborative activity within and between developer institutions and government departments.

Based on an examination of Vietnamese and Jamaican GIS technology transfer initiatives, Coiner, a representative of the Remote Sensing and Information Systems company based in the United States, has drawn attention to similar factors that have contributed to the absence of Enterprise GIS applications, i.e. applications used by a variety of agencies including different ministries and departments in a government or within an organisation, in Jamaica.[82] Barriers were found to include the absence of agreed standards for data communication, a lack of technical resources and funding, and the absence of a common base map in the case of Jamaica. Together with the predominance of vendor-driven activity fuelling the perception that it is possible to profit from the sale of GIS data and concerns about data ownership, [83] these factors have combined to inhibit data sharing and co-ordination. These activities are necessary if GIS applications are to be implemented and used in ways that benefit poor communities.

The analysis of EIS/GIS applications in use highlights the importance of applications that are responsive to the needs of local community members, that support extensive user training, and are customised to provide simple user interfaces and to support local languages.

3.4.2 The Information Village, India

According to the M.S.Swaminathan Research Foundation (MSSRF),[84] a major investor in telecentre facilities in Villianur, Pondicherry, they are enabling the rural poor to access information relevant to their survival needs in their local language. The project consists of one central centre at Villianur and three local village Information Shops. The Villianur centre has facilities for dial up access to the Internet. Trained shop operators use the Internet to obtain information to meet the information needs of community members. Meteorological information, water, pest and disease management, marketing information, information about women's health issues, etc., is translated from English into Tamil and stored in databases and GIS applications at the Villianur site. These information sources are accessed (using short-wave VHF radio) by bulletin board systems that are supported by PCs at Information Shops in village centres. Trained local

81 Walsham and Sahay (forthcoming 1999), Draft available at http://www.jims.cam.ac.uk/directry/S12304F.html

82 Coiner (1997), Paper available at http://www.rsiss.com/GIS_Transfer.htm

83 Coiner (1997).

84 The M.S.Swaminathan Research Foundation is a pro-poor, pro-women, pro-nature non-political Trust that aims to promote scientific and technological applications for sustainable and socially equitable development, see http://www.mssrf.org.sg/information_village/index.htm

operators convey the information to local community members. The trained pool of local operators has been found to be critical to the sustainability of the Information Village concept. In selecting local trainees, preference is given, wherever possible, to educated, literate, local women and to members of poor families.

This initiative appears to be supporting capability building for those who work at the telecentre and for the communities that are served by it. This example draws attention to the need for software initiatives to be relevant to community concerns, in this case, primarily, sustainable food production, if they are to be integrated into the lives of people within the community. The location of the centre within a network of information suppliers, information processors (value adders) and the community is shown in Figure 1. It appears to operate as a geographically distributed multipurpose community telecentre. The important role of intermediaries in enabling external sources of information to be transformed into useful knowledge for community members is particularly evident in this example.

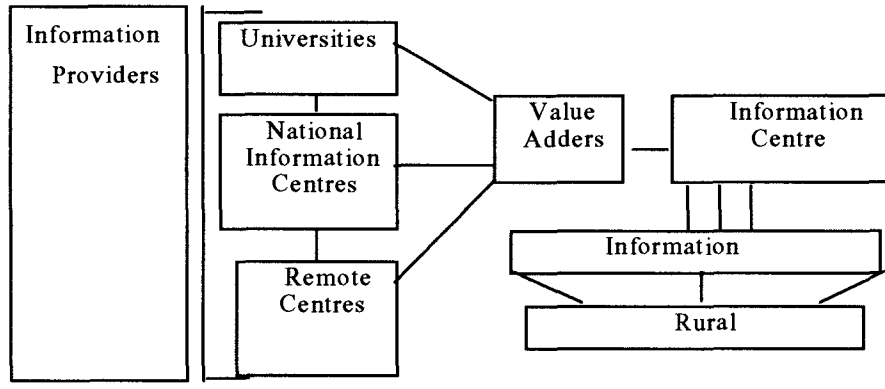

Figure 1 The Information Village

The Information Village concept in Pondicherry has received international funding from the International Development Research Centre (IDRC) and is supported by a wireless network in the local areas that is connected to a fixed telecommunication link providing access to the Internet. According to the Foundation, the Information Village initiative is the most elaborated EIS/GIS-based model in use in India. Based on documentation available from the Foundation and personal communications several features appear to be contributing to its success.[85]

3.4.2.1 Local Preparedness

Pondicherry was selected for this initiative for three main reasons: 1) the availability of a general level of infrastructure support including roads, markets, and hospitals in the region, was reasonably adequate; 2) there was continuity of governance in the region; and 3) the pre-existence in the region of a complementary Foundation sponsored technology-based poverty alleviation programme, the BioVillage Project. The opportunity for building synergies across these two programmes was considered an asset. There appears to have been a strong degree of local preparedness that would favour the success of a software initiative.

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85 Systematic data regarding the implications of the initiative for community poverty are being collected but are not yet published. However, the MSSRF have given positive accounts of the Pondicherry initiative. See also notes from lecture given by Subbiah Arunachalam, MSSRF, Brighton University, 17 May 1999.

3.4.2.2 In-depth Planning and Analysis of Social Networks

The Foundation undertook studies of the existing information and communication networks being used by villagers in the region. The results of a detailed survey by MSSRF of 10 per cent of the resident population, revealed trends that were expected to enable the strategic positioning of the Information Village concept. This study showed that village information flows typically were confined to the supra-locality, that is, information was exchanged between the shopkeeper, marketplace and members of rural poor households. In addition, the perception was that the sources of development-related information available to the public were ineffective. As indicated in Table 10, despite the poverty in the region, the use of electronic media was reasonably well-established.

Village	No. Telephones (Public)	No. Telephones (Private)	TV Sets (with cable connection)	Total No. of Families	No. Families Below Poverty Line
Sorapet	1	3	300 (150)	626	264
Vambupet	1	0	100 (10)	160	118
Sellipet	2	0	110 (50)	424	313
Thondamanathan	2	2	50 (50)	472	51
Ramanathapuram	2	2	50 (50)	356	50
Pillayarkuppam	1	1	75 (50)	421	54
Olaivaikkal	1	0	15 (0)	106	12
Oussudu	1	0l	25 (0)	444	5
Uruvaiyaru	1	4	50 (50)	531	45
Mangalam	4	1	75 (30)	569	268
Kizhur	2	3	30 (30)	400	120

Source: Adapted from MSSRF, June 1998, http://www.mssrf.org/table5-1.html#top

Table 10 Reach of Telephony and Cable TV in Rural Areas of Pondicherry

On the basis of these studies, and in order to ensure that attempts to operationalise the Information Village concept would maintain a demand-driven perspective, the Foundation decided that Information Shops initially should complement the functions of existing local networks of information exchange and then extend these in order to provide value-added information.

3.4.3 Jal-Chitra and SimTanka, India

The EIS/GIS application that is being developed and tested in India by The Ajit Foundation is an innovative and complex technology-driven solution to help villagers meet their need to manage their water supplies by using multiple source rainwater harvesting systems. The *Jal-Chitra* (water-map) provides community users with a simple-to-use, icon-driven, interactive map of village water supplies. The bespoke, stand-alone software application has been built by the Vikram Vyas at the Ajit Foundation on the basis of extensive scientific and technological research. It will be made available as a 'free' open source modifiable software package in June 2000.

Jal-Chitra is an extension of another GIS application, *SimTanka,* also designed and built by Vikram Vyas at The Ajit Foundation. *SimTanka* models the adequacy of single source rainwater harvesting systems using covered storage tanks. *SimTanka* is supplied as a free software package. Although many institutions have downloaded the software from the Ajit Foundation website, only one instance of its use in Uganda has been reported by the system developer.

ISSUES OF DIGITAL DIVIDE IN SOUTH ASIA: 'IT FOR PEOPLE' EXPERIMENTS IN THE REGION

Partha Pratim Sarker

Bytes for All, Bangladesh

Abstract:

This paper is aimed at examining the causes and consequences of digital divide in South Asia, a region that is often considered to be an area of major contributor to ICT developments. Development of major software-hardware industries, programmers, IT training schools, telecommunication businesses etc. that often get synonymous with South Asia, is also a region where a significant majority did not even hear a dial tone. The article will underline the scenarios that are contradictory and will review its relationship to social divides. Our idea is to focus on different access realities, policy issues, infrastructure etc through which this divide is being widened or entertained and to analyze the consequences that are natural to grow with this divide. But amidst this dismal backdrop the article will also focus on some alternative ICT initiatives that are directed to common people and to bring about a qualitative change to their lives. The article also recommends an outline on which ICT initiatives should be built up in order to bridge the gap that is already overwhelming in between information rich and poor.

Introduction:

The facts of 'Digital Divide' is not any surprising classfication to South Asia and is rather a manifestation of other divides & disparities that already exist within the societies and have to be examined both in terms of technology ownership patterns and of resource distribution modes of our societies. Many other factors such as, lack of education, electricity and other infrastructures, language barriers, costly access to computers, lack of pro-poor ICT policies have also added more complexity to this situation. But unlike any other divides, digital divide deals directly with an economy that is entirely knowledge and information driven. In this economy the productivity and competitiveness of units and agents depends heavily on the capacity to generate, process and apply efficiently this knowledge-based information. Information itself has become the product of the production process.[1] As a result, the relationship between information and development stands in a way where it can be assumed, (a) information leads to resources; (b) information leads to opportunities that generate resources; (c) access to information leads

[1] The New Economy: Informationalism, Globalization, Networking: The Rise of Network Society, Manuel Castells, Page 78

(such as soybean and wheat) and information on welfare services available in the district. The cyber-cafes can be accessed easily since their locations are often at the roadside of the central villages where people normally pass. Farmers can also get daily updates on market prices of locally produced food grains and vegetable crops such as potato, maze, tomato or soybean in various markets around the district for Rupees Five.

In addition to these services, villagers can also file complaints to top officials of the district administration about non-delivery of public services such as absences of teachers, malfunctioning pumps, irresponsible officials or poor seed/fertilizer provided by certain traders. These complaints can be sent through an electronic form online and replies are guaranteed within seven days.

Another remarkable feature of the project is its financial sustainability and customer orientation. An initial fund of Rs. 2,500,000 (equivalent to $55,000), borne by the elected village councils, was invested in the whole network of 21 cyber-cafes—an upshot of the decentralization drive embarked on by Madhya Pradesh. The selection of services, operators, and the design and testing of the network were all performed through regular consultations with the local villagers prior to operation. The operators (called *soonchaks*) selected by the council were mostly youths from the village and a government employee. They were trained at their own expense to run the cafes (equipped with a computer, a modem and a printer) at their own cost. Each has to pay the councils 10 percent of the income earned through user fees. (Project Description has been collected from ADB Institute Working Paper on 'Information and Communication Technology and Poverty: An Asian Perspective' By M. G. Quibria and Ted Tschang,, A Social Investor's Guide to ICTs for Development By Aditya Dev Sood, The Stockholm Challenge Award Information on Gyandoot http://www.stockholm.se)

Name of the Project:	M S Swaminathan Research Foundation
Country of Origin:	Chennai, India
Categories:	Rural Telecenters
Supporting URLs:	http://www.mssrf.org
Contacting Address:	Third Cross Road, Taramani Institutional Area, CPT Campus, Chennai (Madras) 600113, India

Project Description: M S Swaminathan Research Foundation is one of the pioneers in developing participatory Village Information Centers (or Tele-centers) in the rural areas of Southern India. This foundation has established five centers (in different villages of Pondicherry) that can communicate with each other as well as to the Internet. A hybrid of technologies is used-wired with wireless for communication and solar with mains for power supply. The hub provides connectivity to the Internet through dial-up telephone lines, and the staff there creates locally useful content. The village centers receive queries from the local residents and transmit information, collected from the hub, back to them. An important feature of this project is the strong sense of ownership that the village communities have developed towards the village centers. The other key feature is the active participation of rural women in the management of the village center as well as in using it. A system of close consultation between the project staff and the rural users has been evolved, so that information needs are realistically assessed. Quantitative data are collected on the use patterns, and stories of deriving benefit have beer chronicled. These centers have also made some interesting mixing of offline-online information delivery methods. Like for example, in one of the fishermen's villages in Pondicherry, MSSRF tele-center downloads regular weather information via US commissioned spy satellites and transfer these in local language for local needs. This information is then transmitted via loudspeaker to the bay or lagoon areas from where fishermen go into deep sea.

The main benefits from the centers were improved access to information, which helped make livelihoods more secure, sustainable (profitable) and safe; and development of skills. The skills developed included simple information seeking skills, while others were more complex, e.g., some volunteers learned Hypertext Markup Language (HTML) (needed for Web site development). This may be the first sign of progression to higher levels of technological sophistication. The access to opportunities, skills and information also illustrated the value of ICTs—as a means of putting some people on the path to careers with greater incomes.

Although the project displays outstanding sensitivity to local needs and has conducted pioneering participatory experimentation and documentation, it has not developed a strong economic model to ensure its financial sustainability. For this reason, the project could not be expanded or scaled up to other areas of the same region.
(Project Description has been collected from ADB Institute Working Paper on 'Information and Communication Technology

and Poverty: An Asian Perspective' By M. G. Quibria and Ted Tschang,, A Social Investor's Guide to ICTs for Development By Aditya Dev Sood, Assessment of Impact of Information Technology on Rural Areas of India, MS Swaminathan Research Foundation, http://www.mssrf.org)

Name of the Project:	Kothmale Internet Radio Experience
Country of Origin:	Kothmale, Sri Lanka
Categories:	Community Radio with Internet Connectivity
Supporting URLs:	http://www.kothmale.net http://www.unesco.org/webworld/netaid/com/sri_lanka.html
Contacting Address:	Kothmale FM Community Radio Riverside, Mawathura, VIA GAMPOLA, Sri Lanka ph (61) (08) 350 421 Email: kc_radio@email.com

Project Description: Kothmale Community Radio experiment is a unique experience of serving the community through radio means and of marrying Internet with that of traditional technology such as radio. The Kothmale community radio serves a target area of almost 8000 sq. km, which includes a number of rural settlements such as Gampola, Nawalapitiya and Thispane. Radio programs are broadcasted mainly through FM channels and are listened by a large number of rural audiences. The Kothmale community radio, connected to the Internet, serves as a link between this powerful source of information and rural populations. The radio team browses the Net for information requested by the audience, translates it into the local languages and then broadcasts it in a daily programme. If requested, it also provides printouts of the downloaded information. The community radio also develops its own computer database compiling information from the Internet that is often requested by community members. Much of the information on this website is available in local languages. This database attempts to solve the problem of non-availability of packaged information on the Internet adapted to rural needs. In addition, a collection of CD-ROMs will be made available at the community radio for public use.

In parallel, local communities are provided with free Internet access. Besides its own Internet Café, the community radio has set up two free Internet access points at Gampola and Nawalapitiya community libraries. This has a big advantage for rural users, since even those of them who may have access to the Internet have to pay a long distance telephone call each time they use it, a luxury that only very few can afford. The access points are also used as direct links to radio station to produce and air live broadcast programmes.

Social Capital and Access

by Mark Warschauer -- University of California, Irvine

Abstract

Physical access to computers does not guarantee access to the information society. To help ensure that the first type of access translates into the second, it is necessary to pay attention to how computer and Internet use can enhance social capital. Drawing on examples from technology projects in India and other countries, this paper examines the concept of social capital and its relationship to information and communication technology, focusing on the role of both micro-level and macro-level social capital.

Keywords

Access, social capital, community informatics, community development, social development

in their lives. For example, a software program called Choices (2001) helps people reflect on and research the kinds of careers they are interested and the types of preparation those careers require.[8]

In summary, Cyberhood is not an end in itself. As the director of Bresee explained:

> "We don't just teach people computers, it's not just about developing skills – it's about connections with people and building relations. This community lacks the kind of mediating institutions like good schools, churches, and parents involved in the schooling. Our technology programs work together with all our other programs to help people develop these kinds of relations that are often missing. In this way we can be a gathering place and hub for the community".[9]

MS Swaminathan Research Foundation. A rural counterpart to the work of Bresee is that of the MS Swaminathan Research Foundation (MSSRF) in southern India.[10] MSSRF has been carrying out economic and environmental programs in communities in Pondicherry and Tamil Nadu since 1991. MSSRF works with the neediest groups in order to simultaneously combat both rural poverty and environmental degradation. Its strategy in rural India is to help landless laborers and small farmers develop the skills, resources, and organization they need in order to obtain much greater value from their labor. As a centerpiece to this, they have developed two model biovillages, where

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[8] Information on Choices available at http://www.careerware.com/products/us/choices.htm. There is also an Internet version called eChoices, with information at http://www.echoices.com.

[9] Interview with Jeff Carr, Director of Bresee Community Center, April 2001.

[10] Information on MS Swaminathan Research Foundation projects comes from a visit to their headquarters and rural projects in July 2001 and interviews with members of their staff. Further information is available from their Website at http://www.mssrf.org.

agricultural laborers can come to observe environmentally sustainable farming processes first-hand and learn new skills, techniques, and knowledge. Projects at the biovillages center on aquaculture, mushroom and flower cultivation, fodder cultivation, horticulture, conservation of rainwater, composting, rope-making from coconuts, pest control, and dairy farming.

MSSRF later developed their Village Knowledge Centers, a network of computer kiosks in rural villages, to serve this broader socio-economic development project. Content from the bio-village projects is made available throughout an intranet that connects the centers. Even if the farmers themselves can't read it, the center staff can share information about bio-farming with them. With funding from the Commonwealth of Learning, a local farmers' group is further developing this content into databases to assist rural development campaigns throughout India. In addition, MSSRF is helping women's collectives learn computer skills needed for micro-finance management, so that they can better work to obtain and manage their bank credit in carrying out sustainable agriculture projects.

One of the more exciting offshoots of this program is Oddanchatrammarket.com, an e-commerce Website and campaign started by a local farmers' association. In order to enhance demand – farms in the area lay fallow 40% of the year because of lack of a market for the goods — the local small farmers' association went to the suppliers and offered to announce their goods on a Website. The intention is to increase national demand for local products, thus providing greater income for the suppliers, farmers, and agricultural laborers alike. The suppliers will pay a nominal fee for the service, thus providing additional funds for the farmers' association.

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Information Technologies to Serve the Poor
How Rural Areas Can Benefit from the Communications Revolution

Georg Caspary

Modern information and communications technologies (ICTs) hold great promises for developing countries. However, if they are to benefit the poor their introduction must be carefully examined. This article shows several models of affordable access to ICTs which have been tried in various parts of the developing world

Common wisdom has it that the advent of modern information and communication technologies (ICTs) such as telephony or the internet hold unprecedented opportunities for developing countries. Academics, policymakers and entrepreneurs alike frequently claim that ICTs represent one of the most powerful tools in the struggle against poverty.

There appear to be good reasons for such claims, too. After all, there are a number of ways – some obvious and some not-so-obvious ones – in which ICTs may serve the development process. For instance, private entrepreneurs benefit because ICTs help to improve access to markets or supply chains and provide a broader base for decision making, thus making risk more calculable. Moreover, many local communities have experienced that ICTs have increased civil society participation in political decision making processes and may expand the reach and accessibility of government services and public infrastructure. In the Indian state of Andhra Pradesh, Internet-based Integrated Citizen Service Centres allow for electronic bill payment, issuing of certificates, permits and licenses; or access to public information.

Nevertheless, a word of caution is in order. There is as yet little systematic empirical evidence of the supposed enormous ‚developmental' impacts of ICTs. Moreover, in many – especially rural – areas of developing countries, the private sector is so far less than keen to invest in ICTs because of lack of experience with rural developing-country markets or low purchasing power of the local population. This means that, if ICT access is to be expanded, public money will have to be spent – which in turn means that there are important trade-offs to be considered. In many areas, there are serious questions about how much money policymakers should spare for the build-up of ICTs instead of investing further in education or health care.

Given such trade-offs, there is a need to identify which kinds of ICT access deliver the best value for money in developing countries, and how the limited resources that can be spent on it can be made to best suit the particular needs of the poor. A number of ‚models' for affordable access have so far been tried.

One of the most famous projects ones is the Grameen Village Phone system, undertaken by Grameen Telecom (a member of the Grameen Group). The project aims at ultimately spreading phone access to the over 100 million inhabitants of Bangladesh who are so far 'unwired', made possible by combining the Grameen Bank's expertise in village-based micro-enterprise and micro-credit with the latest digital wireless technology. The aim is to have selected member borrowers of Grameen Bank purchase the phones under a lease programme and make the phones available to all users in the village on a fee-paying basis.

Benefits to rural households

Recent research by the consulting firm Telecommons Development Group has shown that the Village Pay Phone Programme yields significant positive social and economic impacts, including relatively large consumer surpluses and immeasurable quality of life benefits. The consumer surplus for a single phone call from a village to Dhaka, a call that replaces a physical trip to the city, ranges from 2.6 to 9.8 per cent of mean monthly household income. The cost of a trip to the city ranges from 2 to 8 times the cost of a single phone call, meaning real savings for poor rural people of between 132 to 490 Taka ($ 2.70 to $10) per call.

Another model of ICT provision in rural areas of developing countries, and one which attempts to combine phone access with access to other ICTs (in particular the Internet), is that of so-called telecentres. A telecentre is a common point of access for multiple users (often an entire community), providing a range of ICT services including Internet, fax, word processing, and even specialised information retrieval or applications (e.g. distance education).

Telecentres have been established widely in the developing world, and vary in their service provision and means of funding. In Peru, the establishment of numerous ‚Cabinas Públicas' has lead to one of the highest concentrations of public internet access and a significant reduction in prices. Nevertheless, the experience with telecentres has so far been a mixed one. In numerous cases, usage, particularly of PCs, has been lower than expected or commercial viability was not attained. Of the over 70 Community Telecentres established since 1997 by the South African Universal Services Agency, only 40 per cent remain open today, with only 3 per cent making enough money to cover costs. Many other telecentres failed to serve their particular target groups (some telecentres are, for instance, being used disproportionately by tourists).

Telecentres exist in various kinds, each with their respective merits. First, one might distinguish between small, private sector telecentres on the one hand and bigger, donor-funded telecentres on the other hand. Smaller, privately-run telecentres are often financially self-sustaining – but are thus usually restricted to areas where they expect to be viable (usually urban centres) and are usually neither within physical nor financial reach of the poor. They are also unlikely to be able to provide local content. – By contrast, larger, often externally funded telecentres are rarely financially

sustainable but can focus more on specific 'development' – aspects, including access specifically targeted at rural communities and the poorest in general, as well as a focus on training.

A second distinction one might make between telecentres is according to the institutional context they are embedded in. This often has a significant influence on the 'developmental impact' of telecentres. Commercial telecentres and commercial franchises (usually resembling Internet Cafés of the kind that exist in many industrialised countries) are usually closest to commercial viability but, as mentioned, are unlikely to have an impact on rural areas and on the poor. Telecentres run by or with the involvement of developmental NGOs are more likely to target poor and marginalised communities and focus on much-needed additional services (training, content creation, provision of public goods) without which ICT access provision would be of limited developmental use. Telecentres in schools and universities have the significant advantage that for their establishment an existing physical infrastructure only has to be extended to accommodate the telecentre, and some of the ICT-relevant training can be cost-effectively integrated into the mainstream curriculum of the educational institution. At the same time, telecentres in universities have obviously little impact on those with little formal education, and hence on the mass of the rural poor. Moreover, most universities in developing countries are in urban areas. Generally, it is important to connect these types of telecentres with the rest of the community, e.g., by opening their doors to the public at the end of the school day. Finally, community telecentres are usually not attached to any outside institution and can thus focus on access and training to targeted marginalised communities. At the same time, however, they cannot benefit from the same synergies as telecentres in schools and universities.

Electronic mail systems for individual villagers

The 'Village Phone System' and Telecentres are possibly the two most famous but not the only promising examples of low-cost ICT access. One further idea are Virtual Telephones or village voice mail systems, as have been set up in Brazil. These can provide individuals with their own telephone number and access to a voice mailbox. In other words, the individual need not possess a telephone but can receive calls to a voice mailbox using his/
her personal PIN. Extending this idea to text e-mail access, a South African company assigns e-mail addresses to every Post Office box address in the country, thereby providing electronic mail indirectly to around eight million South African households through public internet terminals located in post offices which users can acess with a personal identification number. Finally, Internet Kiosks are are small stores fitted with phone lines. Individuals visit a kiosk and dictate an e-mail message over the phone to the closest telecentre against a fee payable to the kiosk owner (who will, in turn, have to pay the telecentre). Some telecentres even provide voicemail services for 24-hour access, and provide a service in which incoming e-mail services are dictated back over the phone to the kiosk owner, to be delivered to the appropriate customer. E-mail is therefore available to anyone with access to an internet kiosk, and small operators can enter the telecentre business with a minimum investment. When a kiosk scheme was set up in India, around 50 telephone booth operators enrolled in it. However, the scheme has hardly been a roaring success so far. The end-users seemed to find it difficult to adapt to voicing an e-mail message on a telephone. Traffic volumes did not

achieve expectations, and of the 50 original subscribers, around 10 remain in the scheme, servicing only a handful of messages weekly.

Whatever the model chosen, there are a number of features pertaining to those ICT access projects that are particularly successful from a ‚developmental' viewpoint (even though of these features can probably be more easily implemented with some access models than with others): The overriding and most general of these features is that successful ICT access projects have managed to extend service in a meaningful way. This means, for instance, to somehow convey the relevant (local) content provided through internet access to the largely illiterate rural populations of developing countries in local language. The Kothmale Community Radio in Sri Lanka is exceptional in this respect since it has combined community radio and Internet access. It has a leased line connection to the Internet, and in the so-called process of 'radio browsing' programme presenters browse the Web in the studio on behalf of listeners (who provide requests/input through phone or post). Relevant 'experts' from the community (lawyers, doctors etc.) then interpret the information for listeners. – A particularly good example of the creation of relevant local content are the 'Infoshops' in Pondicherry, India. After information requirements had been identified during a trial period, volunteers from the village created a local database comprising government programs for low income rural families; cost and availability of farming inputs such as seeds and fertilisers, grain prices in different local markets; a directory of insurance plans for crops and families; pest managements plans for rice and sugar cane; a directory of local hospitals, medical practitioners and their specialities; a regional timetable for buses and trains; a directory of local veterinarians, cattle and animal husbandry programs.

A second important feature of successful ICT access programs is the link between the access program and more general assistance to the community concerned. A particularly interesting case of this is the link some projects make between ICT access and microfinance programs, thus reaping synergies between the two kinds of projects.

Need of training

Finally, the successfulness of an ICT access project to a large extent depends on the inclusion of an element of training. Luckily, training in ICT access points can usually capitalise on the multiplier effect through training of future trainers, as long as the trainers be equipped to keep up with rapid developments in the field. One example of an ICT access project that contains substantial training aspects is the MS Swaminathan Research Foundation (MSSRF). Here, work in village telecentres includes the training of villagers, especially young people and women, in how to operate the telecentres and training in the production of locally relevant material from generic information.

All this means that it is highly probable that ICTs do hold some significant potential gains for the development process, leading to a widely-perceived risk of some developing countries being bypassed by the ICT revolution if they do not invest into this sector. Yet, just as great is the danger of exaggerated expectations from ICTs for development leading decision-makers to expend scarce public resources where this little hard evidence to justify such steps. Until further systematic evidence on the precise developmental impact of different ICTs on different communities exists, or until there is substantially more private investment in this sector, maximising the use

from ICTs for developing countries will require an understanding not only of the opportunities ICTs present, but also of the trade-offs involved – and of the particular ways in which ICT access has to be tailored if any developmental benefits are to be reaped.

Georg Caspary is a Policy Analyst at the Organisation for Economic Cooperation and Development (OECD). The background research for this article was conducted at the OECD Development Centre.

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IMPACT ASSESSMENT OF APPROPRIATE AND INNOVATIVE TECHNOLOGIES IN ENTERPRISE DEVELOPMENT

by Oliver Wakelin,
co-authored by Basheer Shadrach

CONTENTS:

SUMMARY

The impact of innovative and appropriate technologies on the livelihoods of the poor and the disadvantaged in developing countries has been the concern of DFID for some time. Modern Information and Communication Technologies (ICTs) have the potential to play a substantial role in poverty reduction, but further knowledge and work on realising benefits and understanding the impact of ICTs is needed.

This paper looks at examples of both types of intervention and their potential impact on poverty. It presents several methodologies for impact assessment and assesses their relevance and usefulness to ICT based projects, particularly in the field of enterprise development.

- Section 1 of the paper introduces the way ICTs can be linked to poverty alleviation and enterprise development
- Section 2 addresses the issues and needs for impact assessment within ICT based projects
- Section 3 outlines some approaches to impact assessment
- Section 4 gives practical advice as to how to design and implement impact evaluations on ICT based projects
- Section 5 concludes with the thoughts that much more impact assessment is needed in the field of ICTs, both qualitative, and quantitative. The cross-

2. Assessing the impact of ICTs in development: issues and needs

2.1 The effects of ICTs

Recent experiments show that ICTs can have very positive impacts among the poor.

The Grameen Bank's Village pay phones programme, for instance, has shown an average net profit of 277 takas (£3.60) a week per phone for selling phone services to villagers. Further, the innovative usage of the mobile phone resulted in alternative means of communication, empowerment of Muslim women and the mobility of poor people in the village. ICTs are bringing market transparency and relief from life threatening situations at local levels. The InfoVillage programme of M S Swaminathan Foundation in Pondicherry is able to deliver daily images obtained from a web site run by the US Navy of the predicted wave conditions in the Bay of Bengal at Veerampattinam. The villagers who are fisher folk are able to learn the sea conditions and decide whether or not to go fishing on a given day. This information, that is so crucial for their lives, is transmitted verbally across a public address system, from loud speakers, to these fishermen as they prepare their boats in the early morning.

The impact of ICTs is witnessed in many aspects of the day-to-day lives of the poor.

- ICTs can have a major role in reducing the impact of natural disasters on the poor in low-income countries. The WorldBank's hazard management programme in high risk areas of Andhra Pradesh, India involves ICT components in cyclone warning, communication and response, awareness raising, education and community involvement in hazard reduction activities.

- ICTs can improve the efficiency of government through public finance processes by reducing opportunities for corruption. The Automated Systems for Customs Data (Asycuda), developed by UNCTAD, is now used by over 70 developing countries to manage tariff collection and reduce frontier corruption. The system speeds up goods movement, reduces transport expenses, and only costs US$ 2 million to install. (Kenny *et al*, 2000).

- Use of rural radio and teleconferencing education has shown tremendous impact on the lives of children. In Mexico, over 700,000 secondary-school students in remote villages now have access to the *Telesecundaria* program, which provides televised classes and a comprehensive curriculum through closed-circuit television, satellite transmissions, and teleconferencing between students and teachers. Studies have found that the program is only 16 percent more expensive per pupil served than

In 1997 DFID spelt out its policies to achieve sustainable development in developing countries by addressing the poverty that those populations face (DFID, 1997). The International Development Targets, DFID believes, can be achieved by promotion of human rights and fundamental freedoms of individuals and communities. The human rights approach of DFID is based on three cross-cutting principles, which, in the example below, have been applied to the InfoVillage Project of M S Swaminathan Foundation in Pondicherry

PRINCIPLES	EXAMPLES AS APPLED TO ICTs	FACTORS TO TAKE INTO ACCOUNT
Participation - enabling people to realise their rights to participate in, and access information relating to, the decision-making processes which affect their lives	The InfoVillage Project of M S Swaminathan Foundation in Pondicherry, India, has developed an 'entitlements database' with the help of the government authorities and the local people there. The database enables people to access information on various government programmes for the poor and realise immediate benefits such as subsidy loans from the bank, unemployment allowance, widow's pension etc.	The following learning points have come from developing this database: • Available information is often buried in offices and files • Identification of the right information that should go onto the database is needed • Disbursement of government benefits quickly to the needy and the poor is increased • The chances of corruption are highly reduced
Inclusion - building socially inclusive societies, based on values of equality and non-discrimination, through development which promotes all human rights for all people	While negotiating with the community the Infovillage project has made it mandatory that the project should be inclusive of women, the marginalised (locally the Dalit) and children. The project has more female staff members than their counterparts	• Male dominated communities were not receptive to this idea. But the project ensured that this would happen. • It is equally important that the men realise that the project is beneficial to the community.
Fulfilling obligations - strengthening institutions and policies which ensure that obligations to promote human rights are fulfilled by states and other duty bearers	Women also used the scheme to access a previously confidential government list of families eligible for low-income assistance	• Government is willing to participate in collating of information for the database

Grey E. Burkhart, Seymour E. Goodman, Arun Mehta, Larry Press

The Internet in India: Better Times Ahead?

India: The world's largest democracy; focal point of competition between rival empires—local and foreign—for more than 4,000 years; the world's second most populous nation, after the People's Republic of China.

The number of English-speaking professionals, large middle class, and extensive community of Indian expatriates working and studying in North America and Europe suggest India should be as well-developed as a producer and user of information technology as China. However, although India is world famous for software exports, including code, finished products, and brainpower (body-shopping), the country lags behind its large neighbor in virtually every other sector, including Internet connectivity [4].

For example, India has had Internet connectivity since 1989, but China, where connectivity began in 1993, already has twice the number of hosts and three times the number of users. In India, per-capita use and the number of network domains and hosts have developed slowly (Table 1).

The Indian government and people expect this situation to improve in the near future; we examine the basis of this belief and prospects for growth success. The central and some state governments have chosen a basic route to development: build the infrastructure and national wealth shall follow.

BOB DALY

India's plan for a fully realized IT sector

Specifically, the central government recently announced major initiatives in the IT sector, based upon the belief that IT at once forms a necessary base for most other forms of development and is one of India's notable strengths. The Indian National Task Force on IT and Software Development has singled out the Internet as fundamental to future IT development.

There are 300,000 to 400,000 Internet users in India today and an undetermined number of email users without full TCP/IP connectivity. S. Ramani, director of the National Centre for Software Technology, estimates there are 312,000 Net users in India with full IP access from any public or special-purpose service provider.

Four government organizations currently provide connectivity: the Education and Research Network (ERNET) India society, serving the academic and research communities; the National Informatics Centre (NIC), which provides IT services to government agencies; Software Technology Parks of India (STPI), business incubators for software development companies; and Videsh Sanchar Nigam, Ltd. (VSNL), the government's monopoly international telecommunications service provider (see www.vsnl.net.in).

The first Internet network in India, ERNET (www.doe.ernet.in), was established in 1986 with assistance from the UN Development Programme (UNDP). The National Centre for Software

grew at an annual rate of 250% this year, prior to the recent decisions that will liberalize services in the near future. Should many new ISPs sprout up, with the concomitant increase in quality and availability of service and lower prices, the growth rate in subscribership might quickly double [3].

Other promising first steps include the development of multilingual software and the establishment of development projects with a central role for the Internet.

Earlier this year, the DoE announced that Indian-language software was available, free of charge, on the Internet (see www.doe.gov.in/~doe/new.htm). Two word processors for "major Indian languages" have been posted on the Web site of the Center for Development of Advanced Computing in Pune. The initial focus of the development of local-language software has been Hindi and the Devanagari script, on which many Indian languages are based. Hypertext mark-up languages, Internet browsers, and email have been targeted for early indigenization.

Rural development is getting increased attention, and some interesting projects, such as the Wired Villages project in Maharashtra and a pilot project by the M.S. Swaminathan Research Foundation (www. mssrf.org) in the Pondicherry enclaves, hold out the hope for increasing the reach and benefits of the Internet beyond urban centers. With over 70% of the population in rural areas, the Internet must reach the villages if it is to decrease the pressure for urban migration. The Pondicherry project is distinguished by the fact that it began with a detailed survey of the region, including an analysis of communication patterns and infrastructure, in an effort to establish requirements. Based on this background information, information shops are being established in six villages to collect and distribute agricultural, health, and entitlement information to improve the local farmers' productivity.

The use of IT in government, started by the NIC, is being refined in Hyderabad by the Chief Minister of Andhra Pradesh State, Chandrababu Naidu, who is a nationally recognized supporter of aggressive IT infrastructure development. One hears Bangalore referred to as the "Silicon Valley of India," but Hyderabad is recognized as an up-and-coming center for IT. In 1996, Naidu initiated the development of an Executive Information System (EIS) for monitoring the progress of governmental programs and covering 44 areas, including law and order, family welfare, hospitals, education, and electrical power. Naidu plans to network the entire state, and envisions improved government efficiency and bringing government service to the people electronically.

Naidu also sees IT as a path to development and investment. In March 1998, he met with Bill Gates, and subsequently Microsoft agreed to locate its Indian software development center in the HITEC City complex in Hyderabad and to establish a training facility at the new Indian Institute for IT (IIIT). HITEC City and IIIT exemplify projects that may lead to rapid expansion of Indian IT and networking. HITEC City is a 175-acre joint venture between the government of Andhra Pradesh and Larsen & Toubro (L&T), India's largest construction company. The IIIT is another government-industry joint venture. It opens this year with 50 students, and is expected to grow to 600 undergraduate and 650 graduate students by 2004.

Companies were invited to locate their data centers and training facilities on the campus. IBM, Oracle, Microsoft, Metamor, and Satyam Computers have accepted. The university has a core faculty, but will rely upon the industrial training staff as adjunct professors.

Perhaps the most encouraging sign is the creation of the National Task Force on IT and Software Development (it-taskforce.nic.in/it-task force). The National Agenda for Governance issued by the newly installed Bharatiya Janata Party (BJP) in March 1998 said that "India can be a software superpower," and that a national informatics policy leading to that goal would be announced. The task force was created in May 1998, and subsequently published a Background report (it-taskforce.nic.in/it-taskforce/bgnew.html), comments on which were solicited worldwide, and an Action Plan (it-taskforce.nic.in/it-task force/infplan.htm), approved by the cabinet within a few weeks of publication. The next step, publication of a national informatics policy draft, is expected to be completed before the end of this year.

The Action Plan features 108 recommendations for removing bottlenecks to IT development to "facilitate India's emergence as an IT Superpower," under three gen-

TELECENTRE 2000

Report 2:
INTERNATIONAL CASE STUDIES

Section 2.2:
INTERNATIONAL CASE STUDY - INDIA

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2 Telecentres and Information Programmes in India

The Concept

Rural villages are often disempowered as a result of the lack of access to telephony or other sources of information technology. Locality specific information can provide a wealth of benefits and advantages to farmers and fisherman whose livelihood and survival may be dependent on such information. Generic information is thus tailored to the specific needs of individual locations, and is disseminated to a central point within the localities from which it can be easily accessed by all members of the community. The individual localities themselves identify the nature of the information that is most useful. In addition, generic information regarding a range of services is made available from these points. These centres can provide additional services such as training and literacy in computer use, thus further empowering community members. The community, through various mechanisms, assumes ownership of the project, which becomes a mechanism for development within the community.

India is characterised by extremely low access to telephony and informatics, in both urban and rural areas. This may appear incongruous with the fact that the country is the second largest producer of computer software behind the United States of America. However, the latest government figures place national teledensity at 2.20, with rural teledensity at approximately 0.4. Cellular technology is of very limited significance in the country, with cellular teledensity estimated 0.12[8]. These figures indicate the very limited access to voice telephony that the majority of the Indian population has, especially in rural areas. The access to information is even more limited. Two particular projects in India are attempting to challenge this restricted access. The **MS Swaminathan Research Foundation** (MSSRF) and the **Foundation of Occupational Development** (FOOD) have initiated a number of projects that engage rural villages in the delivery of tailored information.

2.1 The M.S. Swaminathan Research Foundation

The MSSRF is a non-profit NGO established in 1988 by Dr. MS Swaminathan as a science and technology research body. The organisation is involved in a number of programmes including coastal management systems, education and training, communications, biodiversity and biotechnology, ecotechnology and sustainable agriculture, and capacity building. The geographical focus is primarily on rural villages, situated in the Chennai and Pondicherry areas in the south of India. The offices are situated at the Chennai Central Polytechnic campus, with satellite and programme management offices in the various areas in which projects are implemented.

In 1990 the MSSRF initiated the Village Knowledge Centre or Information Shop project, as part of the Knowledge System for Sustainable Food Security Programme. There are currently four village information shops, and one value-added centre which serves as the information hub for the project.

Prior to the implementation of the project, the Foundation undertook a comprehensive needs analysis and potential user survey in approximately twenty villages surrounding the proposed hub in the Pondicherry region. Not only did this enable the MSSRF to assess the existing infrastructure in the area, but also entailed the use of various community participation mechanisms including Participatory Rapid Appraisal (PRA). This ensured that the perceived

[8] Shanmugavalan, *ibid.*

needs of the community were not imposed by the project staff and rather that the communities were themselves able to identify the specific needs that might be met. Of these, a total of six villages were selected in which to pilot the programme. The findings of the infrastructure component provide an indication of the low levels of teledensity, in the region at least, and are reflected in Table One. While no concrete criteria exist for the selection of the specific villages, a number of de facto criteria were used. Factors such as the perceived need for the different services; the willingness of the community to engage as partners with the Foundation, rather than recipients; and the willingness (and ability) to meet various potential contractual obligations were used to select the villages. These contractual obligations included the provision of a safe, suitable space in which the shop could be housed, at no charge, the provision of free electricity, and the recruitment of volunteers (half of which were to be women) from the villages to run the shop. Cognisance was also taken of the dynamics and politics within each village, and within the village leadership. In order to pilot the project within a range of environments, the economic base of the villages was also considered. This led to the selection of both agricultural and fishing villages. The hub, or value-addition centre was established in Villianur, and the various shops were established in Kizhur, Embalam, Veerampattinam, Pillayarkuppam, Mangalam and Nettapakkam. These villages have an average population of 15 000, with illiteracy rates of between 50 and 67%.

Table One. Existing Communication Infrastructure in Pondicherry[9]

Village	House holds	Poverty Hholds**.	Population	Telephones		TV Sets		Post Office
				Public	Private	Total	Cable	
Sorapet	626	264	3,052	1	3	300	150	y
Vampupet	160	118	786	1*	0	100	10	n
Sellipet	424	313	1,899	2	0	110	50	y
Thondamanatham	472	51	2,394	1	8	300	45	y
Ramanathapuram	356	50	1,613	1	3	59	59	n
Pillayarkuppam	421	54	2058	1	1	75	50	y
Olavaikal	106	12	733	1	0	14	0	n
Oussudu	444	5	2,227	1*	0	25	0	n
Uruvaiyaru	531	45	2,513	1*	4	50	n. a.	n
Sathamangalam	433	268	2,095	1	4	75	30	y
Kizhur	400	120	2,095	1*	4	30	30	y
Totals	4,373	1,300	21,465	12	27	1,129	424	

* not working
**poverty is taken to be where the annual household income < 12,000 Rupees (=~ US$300).

2.1.1 The Value-Addition Centre (Hub), Villianur

The value addition centre at Villianur is equipped with a full duplex single channel trunk controller and EPABX system, utilising a hybrid of wired and wireless technology. The full duplex system is capable of a transfer rate of 14.4 kbps, and has two PSTN wired lines and two internet dial-up connections. The PCs are connected via a local area network utilising Windows NT. The hub is powered by a hybrid solar power system, that can support the centre for up to eight hours in the case of electrical outages. The hub itself functions as an information centre for the village, as well as providing a room that can be utilised for small meetings. Generic information is collected at the centre, and is transformed into the locality-specific format required by the various village shops. Information collected includes commodity prices, weather, government announcements and daily news. This information is sourced from the internet, and from local markets and newspapers. Information is translated into the Tamil, which makes it accessible to the local communities, the majority of whom cannot understand or read English. Staff at the centre has recently started recording voice clips of certain information, which are attached to the electronic format before being distributed to the various information shops. Thus the visible form of the weather will include a sound clip detailing the information. This makes the information available to those that may be sight or hearing impaired, as well as those that may be illiterate, a huge consideration given the high levels of illiteracy rates within the villages. Some information, such as the news and weather, is updated on a daily basis, and is distributed to the shops by midday. Images of the wave and sea conditions are downloaded daily, as are images tracking the location of fish schools. Other information and databases such as different government schemes and support, local emergency contact information and local sector expert contacts are updated regularly. Information on health care and medical issues provide a platform from which more

[9] Source: M.S. Swaminathan Research Foundation, June, 1998: http://www.mssrf.org/information%20village/knowledge-system-telecom-infrastructure.html

Functions of Value Addition Centre

- Gathering and transmission of information including commodity prices, weather, government announcements, daily news
- Generating data: surveys, library references, discussions
- Issue of bulletins
- Creation/maintenance of Locality-specific databases:
  - Local hospitals/doctors
  - Training programmes
  - High school/college course guidance
  - Government welfare programmes/entitlements
  - Transport
  - Local sector experts
  - Government organograms and contacts
  - Official list of families below poverty line
  - Soil/agronomy/weather/cropping patterns
- Relaying queries to sources and receiving responses
- Training for village volunteers

comprehensive Tele-medicine services can be developed[10]. Daily information such as bus timetables and doctors consulting hours are also updated frequently.

The flow of information is a reciprocal process. Information is fed back to the centre from each of the shops on a daily basis. This may include the type and nature of the information required by the village, as well as requests for specific information that is not available at the shop. If this information is not available at the centre, the staff utilise the broad networks developed in order to source the information. Thus if a specific crop disease is identified by a farmer, and information is not readily available, staff at the centre locate experts throughout the region that can provide the required information, and then direct it back to the village shop. This process is generally completed within a day, and at most may require a couple of days before the information is available to the villager requesting it. The type of information sought by villagers is also reported back to the centre on a daily basis, and thus the trends and needs of the different villages can be tracked.

2.1.2 THE VILLAGE KNOWLEDGE/ INFORMATION SHOPS

While six village shops were initially established, two have been closed down as a result of damage to equipment and irregular operating hours. Further, in the process prior to the establishment of the shops, several villages that were potential partners were excluded by the Foundation as various negative dynamics resulting from internal politicking, and a lack of willingness to meet their obligations, were identified by the MSSRF. A memorandum of understanding is formulated with each village, and is renewed on a quarterly basis. This stipulates the obligations from the villages as well as the guarantees of access and protection. The facility serves all sectors of the community, including Dalits (previously the untouchable caste), the illiterate, and the disabled. The shops located in each of the villages comprise two Pentium PCs, a modem, deskjet printer, a phone line, and the same hybrid solar power system utilised at Villianur. The solar power package utilises half the number of cells as Villianur, and can provide adequate power to keep the shop operating for four hours. One PC is allocated for training, while the other is connected to the intranet and is utilised for information collection and dissemination. The equipment is housed in a specially designed container to protect it from

[10] During the period of the visit to India, the first Tele-medicine surgical procedure utilising telecentres in India was conducted.

rodents. A number of different community 'ownership' models are being tested. The memorandum of understanding formulated between the villages and the MSSRF stipulate that the village provide the accommodation for the shop. In two villages, the shop is located in a room belonging to the local temple. In the third village the shop is in a private household, and is run by a young woman and her brother. In the final model, the shop is housed in a room belonging to the local Panchayat[11]. This room is utilised by the community structure every Sunday. This does not effect the functioning of the shop as all the information shops close on Sundays.

Each shop is staffed by two volunteers from the village. These volunteers receive training at the Villianur in MS Office programmes, the use of Tamil fonts with a standard Windows 95 keyboard, MS-Exchange, Wav. files, Zip and Unzip utilities and REALAUDIO, as well as MS Explorer. The time taken to train volunteers is lower than might be expected: reported time taken for training in basic Windows 95 operations is two weeks; to transact data on wireless equipment, 3 sittings; to gain preliminary understanding of HTML, one week; Word 97, two days; PowerPoint, one week; and Tamil fonts, ten days. While a minimum educational level of a high school pass is required, volunteers are generally computer illiterate prior to training[12].

The Foundation stipulates that at least 50% of the volunteers must be women. In the case of three of the four shops, the staff consist of one male and one female; in the case of the fourth shop, the staff consist of four women who work shifts around their household activities. The gender composition of the staff is significant, not only in terms of the representation of the gender breakdown of the communities, and those trapped within poverty, but also in terms of the accessibility of the information to women in the communities. For example, the centre that is staffed wholly by women record more women users than the other three centres, despite the fact that the gender composition of the community is not significantly different. This implies that women are more willing to utilise the shops that are staffed by women themselves. There is also, apparently, a gender component to the information that is sought. It is reported that women seek more information on health and welfare, while men tend to require more information on technical issues, meteorology and economic opportunities.

Given the high levels of illiteracy in many of the communities, alternative mechanisms have been established for disseminating the information that is received at the shops from the centre. Thus the ability to utilise a computer is not a prerequisite. Not only are sound clips attached to certain information, much of what is considered (by the community) to be essential is written in Tamil on a board outside the centre. In one fishing village, the weather sound clip is broadcast daily on speakers that have been positioned throughout the village.

The village shops also provide a telephone for use by the community. This provides a means of accessing emergency services should the need arrive. As such, it provides a source of some security where none previously existed. A token fee is charged for telephone usage. Services such as typing of documents are also provided by the shop staff. Staff working at each shop are also free to conduct project, or non-official work, utilising the equipment, as long as this does not interfere with the functioning of each shop. The focus on information as a means of empowerment should, ideally, create the opportunity for enhanced, sustainable economic and social development, following which, or as part of which, increased access to everyday voice telephony should be evident.

The financial sustainability of the project is something which is yet to be established. The project has been implemented with financial and technical support from the International Development Research Centre (IDRC), who remains the primary donor to the project, with some sub-cost charging by MSSRF. However, the information services have been provided to the communities free to date. The objectives of the programme stipulate the need for medium to long term sustainability of the project, following the withdrawal of the project donors. The project

[11] The Panchayat is a local government body.
[12] The staff at the value-added centre all have a minimum of a first university degree.

management team are thus currently in the process of establishing the degree to which each shop shows potential to start recouping operating costs. This is considered, correctly, to be a necessary precursor to profit generation. However, while the village shops have the majority of the direct customers, it is the hub that incurs the primary operating costs, including the production of the information itself. The generating of information, and the tailoring of it to local needs, is generally not profitable in itself, which might point to the need for additional, profit-generating activities.

As a means towards establishing the feasibility of financial sustainability, the actual usage of different facilities at each shop are recorded on a monthly basis. Thus any income generated by typing, the usage of information material, any non-official work, telephone calls made, and computer training, is recorded. It is envisaged, given that the value of the services has already been established by the community, that the community will be willing to pay what will initially be a token amount for the services. The process of achieving any degree of financial autonomy is seen to be a medium term process, during which the donor agencies gradually withdraw as the community becomes increasingly responsible for the financial sustainability of the shop. Such a process cannot be completed over a period of months, but rather over a five to seven year period. Ideally, the project should become wholly able to support itself financially over this period. However, given the constraints imposed by the economic profile of the population served, it is likely that donor support will be reduced, rather than totally withdrawn. During this process, financial management will, however, remain primarily located at the value-added centre in Villianur.

The impact of the centre to this point has primarily been measured by the utilization of the services, as recorded in the user log books. However, while this does provide one means of assessing the impact, it does not accurately assess the impact on the generally well-being or difference made within the communities as a whole, as opposed to individual users. An evaluation of the programme has recently been undertaken by the IDRC and the PANTLEG mission. However, it is suggested that benefits may be reaped from an impact assessment of the communities surrounding each of the village shops, exploring the specific impact on quality of life and economic benefits that the project may have provided.

2.2 Foundation of Occupational Development (FOOD)

The Foundation of Occupational Development is a NGO that has been established for over twenty years. The focus of the organisation in the past has primarily been the development of small enterprises and the creation of employment opportunities. Over the past four years, however, the focus has evolved to include the role of an ISP and networking agent for other NGOs and CBOs. The objectives of the organisation are detailed in the following text box[13].

[13] These are derived from Roger Harris's draft evaluation report of the PANTLEG mission to India, November 1999.