

**Lessons Learned From PAN Asia Projects on ICTs in Rural
Areas**

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1. Preface

This report is an attempt at consolidating the learning gathered from ICT for rural development projects of the International Development Research Centre (IDRC) under its Pan Asia Networking program, which is focussed on the use of information and communications technologies for development (ICT4D). This report takes a slightly detached view of approximately 10 experiments underway or completed under the programme.

The author conducted a review of selected project documents, helped to organize an experience-sharing meeting with select staff from the projects and also made short trips -typically lasting two days – to a few project sites. This report shares the resulting insights.

The document is very different from a monitoring and evaluation report. For a start, it is based on limited data collected and analyzed over a relatively short duration. The document has little to do with effectiveness of project teams or placing responsibility for the results of specific IDRC PAN Asia projects. As mentioned, it is about lessons learned from the projects.

The report should be seen as a kind of inductive analysis: It uses the specific to arrive at the general. It is more a discussion of the issues in rural applications of ICTs, using where possible, the information and experience from the projects and review of project documentation visit to some project sites and discussions with some participants. Importantly, the problems identified in this report are not necessarily those faced by all projects currently. In many cases, the project management recognized them in time and addressed them effectively. However, the issues themselves are still important for any future deployment of ICTs in rural areas.

Clearly, a more comprehensive analysis of the projects used as the basis for this report would be more valuable though, it would probably have to be a considerably larger exercise. This report has a more modest goal: to highlight, to the extent possible, some the salient issues emerging from, or facing rural applications of ICTs.

2. Objectives of this review

As mentioned in the Annex, the main objective of the report was to “Conduct a critical analysis and review of PAN-supported research projects on ICT for rural developments, particularly gathering key lessons that are important for: Determining the right amount and/or mix of connectivity, content, and level of commitment/involvement of the community in the project; Contributing to financial sustainability of projects; Potentially leading to replicability/scaling-up of best practices from the PAN-supported ICT for rural development projects”.

An additional objective was to carry out an analysis and review of contextual factors surrounding each project, as well as discerning the common successful and unsuccessful practices found in the project.

The focus in the study is more on a critical analysis of selected projects with a view to extracting lessons learned. The exercise specifically excluded detailed evaluation or review of individual projects. Such a review would, in any case, also be difficult to conduct since one would have to rely disproportionately on project documentation in view of the large amount of time and money required to visit and interview the many actors in the projects. Many key players have left. Several projects were completed sometime ago. Further, given the demands of development project reporting, existing documentation is often difficult – and perhaps even unfair – to interpret or evaluate for the purpose of distilling lessons learned, since many have been produced as part of the prescribed donor reporting requirements.

3. Methodology used for this study

The objective of collecting the various lessons learned from the projects requires access to quality data, which one would normally seek to summarise in such a report. Such data often presents unique problems.

Development projects rarely are – or, are intended to be - ‘clean’ scientific experiments, but they are often pursued in a context of several parameters which can rarely, if ever be, adequately controlled. Various contextual factors are frequently at work in determining project scope or location. This presents a challenge when one tries to pursue an objective review of development projects, especially in the absence of strong quantitative indicators due to confounding variables that exist in various different project contexts. As a result, this study will specifically highlight the contextual factors that face the projects under study, in order to give a better coverage of the conditions that may have an impact on the project outcome.

Relevant information for analysis in this report was culled from a variety sources. These included project documents and other reports commissioned by the IDRC. However, the more important source of information for this report was a meeting of project players conceptualised and facilitated by the author and held in Chennai in December 2004. Participants at the meeting represented all the projects:

- *Internet Access by Remote Communities in Sarawak, Malaysia (03820-1)*
- *Pilot Multipurpose Community Telecentres in Selected Barangays in the Philippines (04029)*
- *PAN Bangladesh (040345)*
- *Information Technology and Rural Extension in India (TANUVAS) (03820-5)*
- *Leveraging ICT through Weekly Market Centres for Tribal Communities in India (101060)*
- *Impact of Information and Communication Technologies in Rural Areas of India (Phase I, II, and III) (03778, 100580, 102340)*
- *Participatory Development Training Centre, Luang Prabang, Laos (100863)*
- *The Lighthouse Project, Thailand (03820-7)*
- *Pilot Project for Providing Internet Services in Northern Areas of Pakistan (03872)*
- *ICT for Rural Development in Mountainous and Remote Areas of Northern Pakistan (101054)*
- *Sri Lanka Virtual Villages: A Socio-anthropological and Technology Study on the “Last Mile” (102291)*

The meeting was designed to elicit inputs from participants in a thematic fashion. The meeting was held over a two-day period. There were typically

two participants from each project, one person conversant with management thinking, whereas the other is more active in implementation. This approach was an attempt to seek these two types of inputs. These inputs provided in moderated thematic sessions as well as informally during the period of the meeting constituted an important reservoir of information and experiences on which this report is based. The inputs provided by the participants at the meeting in Chennai were complemented small field trips of roughly 2 days to about 4 sites that could be conveniently visited given the constraints of time and budget. These short trips served to provide a feel of conditions on the ground. A detailed investigation of local issues was rarely considered necessary or cost effective.

After careful consideration, it was felt that the interview techniques used in the study had to be, to a large extent, informal and unstructured. Much of the information required for the analysis was aggregated over several meetings and discussions during authors interaction with project staff. This is largely due to the fact the framework used for the analysis was understandably absent when the projects were initiated. Also, given the constraints, a substantial part of the information needed to be obtained from the few staff who are presently involved in the projects (but not necessarily actively involved). For instance, several important players from the Malaysian project are no longer actively involved in the e-Bario project. Several telecentres in Philippines are no longer operational.

The questions being explored had been shared with leaders of projects visited. Almost all of them had also attended the review meeting in Chennai that the author helped to organize, and in which the issues discussed were presented and deliberated on in some detail. It is, however fair to say, that the comfort or familiarity of leaders and the participants themselves with the approach was not always uniform. For instance, the presentation of the participants at the Chennai meeting rarely followed the requested framework or format although subsequent discussions with the participants were frequently insightful.

In addition to the staff involved in the projects, the author spoke at length to the users of telecentres. In many cases they highlighted the difference in the way project staff and users saw the telecentres. For instance, the Philippines telecentres seem to inspire a great sense of pride and ownership in the community as a whole. The telecentre in Buriram, Thailand seemed to be used largely by youngsters. It was not possible to speak to users in Laos where the facilities were not available on the day of the visit.

The terms of reference of this study envisaged that the consultant would "Undertake travel to PAN-supported research projects on ICT for rural developments, as deemed necessary by the responsible PAN Program

Officer." The sites visited were selected after discussion with the IDRC Programme Officer. It was felt they highlighted a unique feature of relevance to the analysis. For instance, Malaysia's e-Bario project faced unique challenges in connectivity in view of the absence of virtually no wired telecommunication or power connectivity. Laos project is being implemented by the only non-government organization (PADETC) involved in development activities. Extensive discussions in Chennai had highlighted what seemed unprecedented level of community participation and support in the ICT projects implemented in Philippines. The Thai and Indian project are being led by high profile leaders of national organizations who have consciously seen their ICT work in the context of their very extensive and successful development programmes in other areas such as agriculture and health.

Conclusions drawn for the projects are based largely on the feedback provided to the author at the meeting in Chennai and his trips to Pondicherry, Buriram, Mindanao and Bario. In the opinion of the author, the reliance on documentation was limited for a variety of reasons, including the fact that it was often intended, rightly, for IDRC's administrative processes and frequently not broad-based enough to draw wider conclusions that could be of use outside of the specific discussions about the projects. Furthermore, much of the documentation is older than 2-3 years. In the absence of easy access to its authors and the knowledge of the unique context in which projects were designed, the analysis of this report draws from the exploration specific issues, often based the author's considerable experience and involvement with rural ICT projects.

The report and its conclusions should be seen as an inductive product that attempts to bring to bear select inputs from players, experience from other projects and current thinking on the subject to derive lessons from projects that deploy ICTs in a rural environment.

4. Introduction to the use of ICTs in Rural Areas

IDRC has supported several projects in Asia aimed at exploiting the potential of Information and Communications Technologies in rural areas of Asia. This work done over a period of almost 15 years -, in diverse areas and situations, has provided rich experience about the role ICTs can play in rural areas.

ICT is increasingly, an umbrella term encompassing many types of interventions. The scope of ICT based interventions in the field can vary widely. ICT facilities include use of a PC where the person in-charge runs applications such as word processing or spreadsheet work for those interested. In other cases, users might come to make phone calls, send faxes, browse the Internet or send email. In some places information of interest to community, services related to health, education, entertainment etc might also be available. The location could be a village hall, premises of a village council, a home, school, a grocery shop, or even a temple.

Rural areas are, of course, not all the same. They could be small villages inhabited by poor peasants and subsistence farmers e.g. In Bangladesh, Pakistan and India, large farms and plantations, or remote areas with largely wealthy farmers and families who can afford the cost of travelling to them or living there. The population of Bario, a remote village located in Sarawak, Malaysia is in general not so poor due to the abundance of natural resources in the area.

The population in rural areas could be quite sparse but can also run into thousands per village. The ambience, level of infrastructure, and the diversity of languages are all quite different in the small number of developing countries where the projects are being undertaken. In many cases, such as the telecentre in Luang Prabang, Laos, the area has several tourist and other facilities, which would be unfamiliar in say, in a typical rural part of India. Clearly, their vastly different circumstances will be an important factor in determining what can kind of role ICT solutions can play.

Many parameters come into play to determine whether ICTs will work for a rural population. These parameters relate to the nature of ICTs deployed how easy it is to access the technology; whether training is available; the way facilities and services are managed; the involvement of the community etc. Resources like staff and funding, economic parameters, education, literacy of users can also differ. Our analysis attempts to explore the major issues highlight the diverse challenges that must be addressed to deliver maximum benefits to rural people.

Many factors are often unique to a specific ICT project. For instance, a leader or champion or expert involved with the project may have stature or following in a particular region or country. This is the case with the

organizations running the projects in India and Thailand, where the head of these organizations are people of world stature. This is common in several development projects, but clearly not the norm in real life.

Certain project regions may attract special funding for political or other reasons not directly related to the deployment of ICTs. For instance, regions like Pondicherry, Bario, Luang Prabang, etc are arguably quite unique in their respective parent countries.

“Clean” experiments which allow cause and effect” in ICT projects to be unraveled and analyzed are therefore rarely easy to undertake and ICT project results are similarly, difficult to analyze with a level of rigour that trained researchers would find comfortable in each case.

The value of the rich experience with ICTs that has been acquired in the field therefore will be enhanced when we understand the various factors and their linkages that determine the choice, effectiveness and sustainability of ICT solutions in diverse rural environments.

Nomenclature

Several types of names have been given to the premises that house ICT facilities in rural areas. These include telecentres, ICT kiosks, Multipurpose Community Telecentres (MCTs), knowledge centres, common service centres, public call offices, public information centres and other similar nomenclature. The choice of an appropriate name for these facilities is not entirely trivial and has engaged many practitioners who have variously wanted the nomenclature to highlight or emphasize specific features of ICT based community facilities such as

- open access to all irrespective of gender, social or economic status
- community ownership
- one-stop shop providing a range of ICT based services
- access to knowledge
- access tools to economic empowerment
- enhanced governance
- provision of services whether based on ICTs or not
- entrepreneurship

To many practitioners, the nomenclature gives away the mind-set of those who seek to deploy technology-based solutions in rural areas. For instance, a rural technology centre might overplay the technology aspect while a knowledge centre might underplay its importance. A public call office might evoke a bureaucratic entity.

In this report, for reasons of convenience, we frequently use the term

telecentre to describe ICT based facilities fully mindful that some may regard other nomenclature as more appropriate. An ideal telecentre could be construed as having most of the above attributes, even though most facilities on the ground would typically have only a subset. It is also important to note that the telecentre and telecentre-type projects that have been supported by PAN all have been focused for supporting community development, and were not established primarily for commercial gain or profitability. Effort will be made in the document to avoid any limitations of arbitrary nomenclature.

A terminology, or rather short hand, is also emerging to deal with the issues that arise in, or, are relevant to most projects that deploy ICTs in rural areas. The terms used do have a degree of overlap and are not always mutually exclusive. However, they represent a useful set that allows us to deal with an area that is receiving considerable attention and importance in development literature. In this report, we use the following categories:

Connectivity – access to computers and communications services including technical equipment and software;

Content – information of various kinds accessed by users related to e.g. Markets, agriculture, governance, education, health, entertainment etc;

Community Participation- the role played by the men and women in the local community in the setting up, delivery and management of the services provided to them;

Capacity Building -skills and training required in the delivery and use of ICT services to the community; Management – nature of leadership and the administrative and other steps taken by it to deploy resources in the creation, delivery and running of the services to the rural community Policy and regulation – broader policy and regulatory issues – usually at regional or national level- that impact or determine use of ICTs in rural areas.

Sustainability – issues that determine or impact the sustainability of ICT use in rural areas in the longer run

5. A thematic discussion of issues relating to PAN Asia projects in rural areas

It is useful to discuss the learning from PAN Asia projects in terms of the parameters:

- Connectivity
- Content
- Community Participation
- Capacity Building
- Management
- Policy and regulation
- Sustainability

As noted, we discuss ICT projects under these heads with the full knowledge that alternative formulations may be possible or, even preferred in some cases.

Connectivity

Computer equipment, telephone connectivity and Internet access form the basis of most projects using information and communications technologies in rural areas. The aim in these projects is usually to explore how effective these tools may be in tackling existing needs be they voice telephony, improving governance, helping entrepreneurs, improving or expanding education or health services, or simply delivering entertainment services etc.

Under connectivity, we are dealing with the physical infrastructure required before ICTs can be put to use in rural areas. It is worth mentioning here that some amount of software - e.g. Programs and applications such as say, an operating system to run a computer, an internet browser etc – are a pre-requisite before most computer equipment can be used for any purpose. To that extent, it is unhelpful to speak about physical connectivity in a very literal sense. However, it is perhaps still useful to distinguish it from software and content like say, specialized applications, documents, agricultural or health information or entertainment, which would run typically on a computer system with an operating system and a browser.

Most PAN Asia projects that the author visited do have usable telephone connectivity. An exception is Malaysia's e-Bario project, located in one of the most remote parts of Sarawak, after initial delays, obtained a satellite phone connection.

Hardware and software

In most projects the computer related equipment seems to be operational. In most projects, however, connectivity has another dimension: In most of PAN Asia's rural ICT projects, computers are relatively old models presumably because the equipment was procured when the projects were started. Many of the projects have since ended (e.g. Philippines, Malaysia, and Thailand) and upgrades would now require additional funds. Older PCs seem in good condition and well maintained, but the usage is confined to few regular users for a part of the day. This makes upgrades difficult to justify or prioritize. In this sense, unfortunately, as things stand, the services could become slower as for instance in the e-Bario project.

New hardware or upgrades need not of course mean only faster machines with greater memory. It will be an opportunity to decide whether the machines could also be networked since most telecentres have standalone PCs. Further, one would want to consider whether thin-client i.e. Which share network applications and services installed on the server could be more cost effective than standalone PCs, each loaded with its own copy of software and applications.

Telephone and Internet Connectivity

Telephone lines in projects visited are mostly working, but it was not always the case in the beginning of the project. In Pondicherry, there was no telephone service in the rural areas were limited and the project did not receive any telephone connection for sometime. In Bario, the same situation prevailed - telephone only arrived two years after the project has started. In this sense, the projects are atypical of the environment of developing countries, where telephone connectivity cannot be taken for granted. Quality equipment and support is, however, not always available and if it is, its appropriateness for the task, and whether it is affordable, reliable and robust cannot be assumed.

Due to the fact the project originally aimed at the establishment of Internet facilities, little use is made of the telephone facilities at many telecentres. However, this might also reflect the fact telephone access in most of the project areas not a problem. This is especially so for countries like Philippines where mobile penetration is over 90% and even most villages have mobile coverage.

However, opportunities would exist for telecentres, with Internet facilities, to offer cheap long distance telephony to many places. VoIP today allows virtually free calls to many places for users with Internet access. This has not happened presumably because the present regulation has not allowed it to take place in the project locations and/or the lack of awareness of this

technology.

Internet connectivity is however a more complex story. A surprising finding is that Internet connectivity is usually poor or even unavailable (e.g. Laos) in most telecentres. However, its absence is often compensated by other ICT services and applications, thus it is felt, in some places, that the lack of Internet access is not a major cause for worry. Hardly any project visited seemed to have generated much interest in the use of Internet, apart from e-mails. In the centre at Luang Prabang, Laos, it was suggested that the price of access to the Internet connectivity was rather high. This seemed to be at odds, somewhat, by the several popular cybercafes on the same street as the project telecentre.

The situation is different in South Asia e.g. In countries like India, Pakistan, Bangladesh, where rural telephone access is poor and private phones in the average village, a rarity. The reliability of existing services continues to be a challenge.

Difficult terrain in many rural areas makes it difficult for wires to be laid. Sometimes hills or other such barriers make wireless connectivity also a challenge. The costs rise considerably. Returns on investments are low and often too distant in the future because users are often too poor to pay for services.

New wireless technologies have had some success in lowering the cost of connecting rural areas. More technology options for the last mile (wireless, satellite, VoIP, fibre, etc) as well as in end-user devices, are poised to make connectivity cheaper, more robust and able to withstand the often hot and dusty environments in rural areas of developing countries. A more meaningful take on the role ICTs can play in rural areas should be possible once connectivity is more widely available thus paving the way for deployment of more diverse applications and services in rural areas than the very nominal ones available currently.

Electric Power

It is widely accepted that poor connectivity in rural areas is in fact due more to the fact that power supply is usually inadequate in rural areas of most developing countries. Frequent power failure, brown outs and occasional outages make the challenge of connecting rural areas much harder.

Continuous power is still unavailable in Bario. The population relies on a mix of generators, solar and other batteries. Computers here are powered by solar batteries and were able to run a maximum of approximately 4-6 hours in a day and are, in practice, rarely functional after early afternoon. Work was underway to introduce superior solar technologies as well as use computer

equipment, especially monitors with lower power requirement. In the MSSRF's Pondicherry project, backup power in the form of solar batteries was utilized due to frequent power failures.

However, the cost of solar power is rather high and in the short term at least likely to drag down ICT projects in rural areas. In that sense players involved in ICT projects in rural areas will need to devote considerable efforts to ensure the power challenge too is being addressed while the more direct ICT issues are being pursued.

With rapid advances in telecommunications technologies, especially wireless, telephone connectivity is considerably cheaper today than before and is understandably being deployed much more widely. However, unlike their fixed line counterparts, wireless phones are not powered from telephone exchange and require power supplies at the user end for charging wall units or handsets. Indeed there are many rural areas where power supply may be too erratic to even charge wireless equipment. This downside of wireless communications is an important issue when rural areas with unreliable power.

People with special Needs

The needs of special groups for convenient access to the facilities are still an issue. The disabled would still face challenges in reaching many telecentres in project areas. Few telecentres seem to have flexible opening hours. This might be a problem for some who may not in fact be able to access services during "business hours"

Hardware, such as touch sensitive screens which enable the less literate to access services and applications by touching appropriate icons on touch sensitive screens are virtually absent in rural areas. Their usefulness might arguably have been the highest in such areas. Similarly rural users, especially in most project countries could have been benefited by multimedia input or output devices and software. Most users are not always fluent in reading and writing English in which majority of the electronic content in use in PAN Asia project countries is currently available.

Maintenance

Maintenance of ICT equipment too presents unique problems in rural areas. Repairs and related facilities are rarely available at a convenient distance. The quality of technical support available and its price are usually high in the environment of developing countries. A piece of equipment which is out of order can take several weeks to repair and can sometimes cause a complete break down in some or all services if backup machines or spares are not available. Unfortunately, given the resource crunch in which most telecentres

function, such redundancy is hardly ever possible.

Content

It is often said, rightly, that technologies are not ends in themselves but enabling tools. The role ICTs can play in rural development therefore is dependent on the nature of information and services that use the underlying technologies. A number of distinct issues related to how user experience ICTs comes under the broad head of content as distinct from the more technical issues of carriage or connectivity mentioned in the preceding section.

By all accounts content is as serious, if not an even greater challenge for ICT based projects in rural areas. The most familiar sight in ICT project sites in rural areas is of young users, typically teenagers, using the telecentre PCs. They seem to be the most eager learners as well as users. Many seem pushed by ambitious parents who perceive knowledge of computers to be important for future job prospects. There is a widespread perception amongst even the less literate or the relatively poor that computers represent progress.

The most common usage of PCs seems to be for learning or for running software packages like Microsoft Office, chatting on Internet or for playing computer games. In Laos, besides other young students, Buddhist monks constitute a large proportion of users. This is ostensibly due to their knowledge of English, which is hardly spoken by the local community but is the language of most of the content on the machines.

Most telecentres (Laos, Philippines, Thailand, Malaysia) with the exception of the one in Pondicherry, India, are rather low on any content other than standard PC applications for word processing, spreadsheets, presentations and a web-browser installed on most computers. Some telecentres offer typing and photocopying facilities. Books and CDs for off-line browsing are available in some instances.

The use of computers by the young- sometimes less than 10 years old! - is of course impressive and challenges the myth prevalent in some circles that formal education or maturity is required, if use of ICTs is to be expanded. However, it does also raise an important issue that the telecentres have been less successful in attracting the average adult village resident.

The fact that only younger users are, in general, attracted to the telecentres is then a reflection also of the lack of usable content that might be able to attract the average user.

It is therefore not surprising that older users, who already find the unfamiliar world of computers daunting, find little in most telecentres in South East Asia, that relates to their day-to-day preoccupations and needs. In some instances such as in Philippines, there is evidence that younger users are able

to use the facilities in the telecentres to obtain information, e.g. Relating to their crops, for others less confident to use the computers.

While it would be dangerous to overstate this limited anecdotal data, it seems to be the case that few users on the field expressed a very strong need for other content in the countries mentioned above. This could suggest that users, and possibly even managers of the facilities, are unaware of the many possibilities since it would be perhaps unreasonable to argue that the existing facilities are adequate to meet the information needs of the communities.

Content of possible interest to the communities would include various kinds of information – e.g. Location of schools, bus timings, emergency information, weather, entitlements- that the end user might require. Experience, especially in India, shows that information related to livelihoods, health, safety, environment, governance, entitlements etc. is in demand. There is growing use of computers for education and entertainment with users often willing to pay for them. There is evidence of ICT based services such as land registration, access to villagers to exchange goods or knowledge with them, or to doctors, agricultural experts etc to share their expertise with rural users, reservations, bookings.

Efforts are under way in many countries to collect and develop content that might be to rural communities. There is widespread appreciation that ICTs offer an important means of delivering content to the communities in a timely fashion. The Philippine Council for Health Research and Development (PCHRD) has made several efforts with health information to serve both practitioners and communities. In Pakistan too similar efforts are underway. In Laos too, PADECT has been testing multimedia approaches to delivery of content to circumvent the challenge posed by the fact very few people speak languages other than Lao in which content available is extremely limited. However, it would be fair to say that success on a large scale is still elusive.

However, while most countries are grappling with the scale of the content challenge. The resources required for the task are formidable and few agencies can expect to deal with the issue single-handed.

The widespread experience in IDRC projects is that in the absence of appropriate content, a telecentre runs the risk of becoming a computer shop with possibly, photocopying facilities. While this may still be of considerable use, it would arguably be a sub-optimal use of the facilities.

Generalized content, such as reference work like encyclopedias and directories, have little value. Few people – especially in rural areas - have the motivation or sometimes the skills and experience to wade through large books or electronic documentation to find something they might need immediately.

Community needs for content can be quite diverse. The nature of content required by the communities needs to be ascertained quite deliberately if the telecentres are to be effective in meeting information needs. Content requirements depend on age, gender, economic status, occupation, geography etc. Consider a few examples: Content needs of mothers, fishing communities, agriculture workers, students, teachers, unemployed are obviously varied. Some regions may be prone to floods. Mining areas may pose quite unique health and occupational challenges and so on.

Few rural telecentres seem to address the information needs of communities such as youth, women, unemployed, artisans etc in any targeted fashion.

Exchange of knowledge between community and external sources must be two-way to be of value. Rural communities are both a source as well as users of content. This is not just reasonable but also because it makes eminent sense for success of rural ICT projects. Rural communities often generate and use quite specialized knowledge of local relevance. For instance, specific communities possess deep knowledge and insights about medical herbs, pest repellents, or building materials etc.

Much useful Internet content for example, is unusable for purely technical reasons. This issue has been particularly serious for communities of Laos since less than five years ago there was no standard way to deliver content in Lao script electronically. Some relevant information is not readily usable and must be packaged in a form that end users find convenient. For example, the information that MS Swaminathan Foundation provides about wave heights in sea is useful to fishing communities. However, it requires a degree of education and training of the person accessing it on the Internet, before it can be passed on to those planning fishing trips.

The format (text, audio, video, multimedia) in which content is provided in the telecentres is rather more important to rural users. Rural areas, have considerably higher need for multimedia content since text based content requires a level of literacy which is typically lower in rural areas than in urban areas. Health and disability statistics too are similarly worse in villages because of poor access to facilities. There is therefore greater need for content to be in an appropriate format to be accessible to the less literate or disabled.

Quality and reliability of content may be critical in many cases like health and law. The predictably higher demand for health and education services in rural areas can be adequately met only if the ICT based material that is on offer, measures up to standards expected from it. This is not often easy but unavoidable if the ICTs are to play a role in education and health and other areas where mere data or tabulated information might not suffice. Poor quality or poorly processed information can in fact be dangerous in many instances especially when used without access to appropriate expertise.

The various aspects of content creation and delivery discussed above raise the all-important issue of costs. Given the nature of content required, its scale and quality it is easy to see that content may yet turn out to be the most expensive part of the effort required to deliver ICT based products and services to rural populations. A large part of the effort -e.g. On selection, translation, validation, editing of content – would require considerable human expertise and time. The scope of this task of content delivery in rural areas will be truly mammoth and underlines the important need to evolve systems and processes so as to ensure economies and efficiencies in the selection, creation, translation, delivery etc of content. There is an obvious need for these efforts to be concerted and the need for effective leadership.

Community Participation

Most users of ICTs, especially in developing countries live in urban areas. Most enterprises, most experts and most producers of content are to be found in cities. Consequently the deployment of ICTs in rural areas involves a substantive, often dominant, role of people who otherwise live and work in rather different circumstances. This dependence on outsiders is a risk.

It is unlikely that, in the short run, village people will experience the power of ICTs without external mediation. This means that the locals are rarely involved in the design, planning or management of rural ICT projects. Local peoples' priorities, values, aspirations, fears is some times not as real to those in charge of the projects, however competent, committed and well meaning most of them might be.

The relative lack of knowledge amongst the ICT community about the nitty-gritty of rural lives or, amongst village people of the power of ICTs to possibly transform lives need not mean that efforts towards use of ICTs in rural areas need to be abandoned, or even curtailed. The point is to mitigate this risk deliberately and as effectively as possible.

The role of communities in the PAN Asia in rural ICT projects is complex and, in many ways, defies stereotypes. In some cases, the role reflects the community's association of ICTs with possibilities of growth of the village and employment opportunities. Many see the telecentres as new hope, especially for the youth. In Philippines, where the PAN Asia telecentres in the Mindanao region were at one stage the only ones in the whole country, there was considerable pride in the facilities in spite of rather limited content or applications available and little use of the facilities beyond that by teachers and students. The Maguinda telecentre enjoyed considerable support of the village council and the community. The situation in Malingao region was similar even though Internet connectivity was rarely available. The communities were, in general, keen to be associated with a facility and

seemingly willing to wait for its benefits unfold at a later date.

An important aspect of telecentres is that, communal facilities that they include can be used for a range of other non-ICT activities of considerable importance to the community. The telecentres in Mindanao are important places for community to meet and to deliberate on issues of importance. Often awareness and training activities are held in these facilities. The telecentres therefore deliver significant value in many cases, even when their primary functions as ICT service provision tend to flounder for reasons of poor connectivity or content.

In Buriram province, Thailand the telecentre seemed to have inspired the setting up of another centre in a nearby village. The two women who manage this centre see the new telecentres as a their means of giving back something to the community. The centres though modest in terms of technology seem to have considerable goodwill and support within the community.

On the other hand, some communities around some other telecentres had a quite different response. There was reluctance by at least some members to part with land or other facilities for the telecentre. There were reports of some unwillingness to volunteer services for a facility. The value seen in telecentre by its promoters seemed not to be shared by the community.

There were other communities that seem to be rather uninvolved in the telecentre altogether presumably because the limited facilities available there had little to interest them. Perhaps the price too was not sufficiently attractive.

The contrasting responses to the telecentres are all arguably, rational. They do however show, that rural communities, like urban communities, are diverse too. Their aspirations, good sense, eccentricity, psychology, etc. are as complex as the urban communities.

There is considerable evidence from the field that top down approaches, often replicating experiences elsewhere or those projects where communities are not involved at important junctures seldom succeed. The effectiveness, usefulness and even acceptance of the rural ICT projects depend on the extent to which communities participate in the various aspects of the project and in its management. Without sufficient community involvement, ICT projects risk proceeding in an environment where neither community needs nor, the methods used to address them have been validated.

The choice of ICT-based services or applications in rural telecentres sometimes reflects this disconnect. The fact that content on a PC in some telecentres is often limited to standard computer software is presumably a case in point, though the paucity of applications that can be readily used by rural populations is obviously the other side of the coin.

Experience shows that, however difficult, it is essential to create awareness

within the community when ICT projects are rolled out. This is true even if the communities may sometimes lack technical or other specialized knowledge about what is being attempted.

It is important also that age and gender are factored carefully. Adults and children as well as men and women, have different perspectives and need that are critical when ICT projects are implemented. For instance, children and adults could both require training in use of ICTs; however, they learn differently and at a different pace and would require arguably, different type of handling. Indeed without community feedback, one could easily alienate one group while training the other.

Similarly, without credible advocacy and support of certain members of the community, take up of services can be severely handicapped. Facilitators and champions must enjoy community acceptance. It is important to mitigate the risk that hierarchy, caste, patronage play significant role in service usage in South Asia. MSSRF project in Pondicherry has attempted to tackle this risk head-on by ensuring that telecentres are established in a village only if the promoters are willing to provide volunteer staff and guarantee equal access to all irrespective of their social and economic situation.

Similarly, only somebody from within the communities can assist service providers on how communities allocate time or money in different parts of the year – perhaps depending on crop sowing and cutting cycles or busy and lean periods of businesses, or marriage seasons etc.

Women in rural areas are not necessarily busiest -or, free- when their counterparts in cities are. This can have an important bearing on suitable timings for telecentres to be open or staff to be available. Tariffs too will need to reflect demand and incomes at different times of the year. This might determine whether say, women ever get trained or have time to use the facilities on offer.

Only community participation will enable one to design and deliver services effectively and to make appropriate changes when necessary. The *barangay* councils and their leaders in Mindanao seem to play this role admirably. They seem actively involved in activities of the telecentres.

Local government institutions, such as *panchayats*, need to be actively involved at important stages of project. Their credibility and stature are a useful resource and assist in much needed buy-in of the community. The role of such institutions in Philippines and in parts of India has been insightful.

The buy-in of the community is particularly crucial for success of facilities like telecentres where regular maintenance, upgrade and safety of expensive equipment are important. Without community support this is virtually impossible. For instance a telecentre could be located in a temporary

structure. Keeping electronic equipment free from heat and dust may require considerable co-operation and effort from the community.

An actively participating community can provide tremendous energy to ICT projects. Roll out of such projects often loses momentum because users are usually unfamiliar and have limited skills related to new technologies. More and more communities now have organized self-help groups (SHGs), which can articulate community concerns quite effectively.

Management

It is well recognized that ICT deployment in rural areas is not simply a question of installing a computer with appropriate software and content in a place that user can access conveniently. This task requires leadership and considerable managerial skills. Tasks like choice and implementation of ICT applications, location of the telecentre, the hours of operation, tariffs if any, hiring and firing of staff, interfacing effectively with community leadership, arguably, require management skills. The same is true for managing the relationship with the community, content providers, local agencies, regulators and governments, etc. besides setting up arrangements for maintenance and technical support. Not all these functions are being carried out explicitly in most telecentres but most are important when one considers any substantive rollout of ICTs facilities in rural areas.

The quality of leadership and the effectiveness of champions associated with the project have played an important role in most ICT projects. In many cases this can mean that all-important linkages with government agencies whose role is pervasive in rural areas in most developing countries become easier due to the credibility and rapport that champions often enjoy. Champions play a critical role in attracting quality expertise to new projects that may otherwise seem rather obscure and risky. The stature of champions is often an important reason that donors and others feel confident funding ICT projects. In this connection, leadership in Thailand and India has been able to bring to bear its considerable credibility and prestige to their projects.

Much needed support from government and private players eventually become easier. In this connection, leadership in Thailand and Pondicherry has been able to bring to bear its considerable credibility and prestige to their projects.

As alluded to earlier, managing rural ICT projects as well as the user facilities set up under the projects is a formidable and complex task not least because there is little experience to fall back on. Even for rural projects in general, i.e. those that do not involve ICTs directly, many of these issues pose substantial challenges because expertise in rural management is in short supply.

ICT based businesses are not at a stage that an entrepreneur's profit motive and native intelligence would by themselves suffice to run them. Unlike other enterprises in rural areas, ICTs based enterprises are rarely if ever based only on individual initiative. Most are typically set up by organizations such as NGOs, government agencies, donors, etc. Few of these have a direct profit motive although most do see the importance of long-term sustainability from a financial, social and technical standpoint.

Few PAN projects are managed by people who were specially selected for the task. This is understandable given the fact that the projects are usually initiated and run at institutional levels. The organizations running the projects are a mix of government departments, academic or other research institutes, civil service organizations all of whom have their own processes in place, and staff to deal with the projects. Given the mandate of these organizations the skills of staff may not always be suited to the management of rural ICT projects.

Management of rural ICT projects deserves to be dealt with seriousness. There is need for strong leadership with effective communication skills so that it can work effectively with the staff in the facilities but also with the community. For obvious reasons therefore, management must enjoy the confidence of the community.

Managers are crucial for establishing priorities for any telecentre. Typically the manager would do so based on knowledge of what the community requires or what the skills and resources at the telecentre can support. (S)he will take a call on what needs of the community must be prioritised. Commercial decisions related to pricing, discounts etc are frequently based on arbitrary or "gut" feels. Managers would be expected to take such decisions more deliberately.

What kind of qualifications must a manager of rural ICT projects have? Is knowledge of technology important? Should the manager be from the local community or will an outsider work as well? The answers to these questions are not simple. This is less to do with the nature of question per se but because the choice on the ground is usually limited. However, this should not detract from the fact that skill limitations of managers on the ground are a risk to be addressed. This can be done to some extent by setting up management processes, such as regular consultations with appropriately qualified people within or outside the community, to fill the skill gaps in managers. This will ensure that managers are not tempted to take off the cuff decisions.

Much time and resources can be saved if managers of ICT projects were in touch or networked with their counterparts in other similar projects. Evolving best practices through such contact can be an effective tool for all players.

Managers in ICT projects are frequently un-empowered even when they are willing and able to deal with many issues that face them. It is not uncommon that a manager needs approvals from persons who may not necessarily be on the field or sufficiently aware of issues on the ground. This can even impact routine repairs, payments to suppliers etc to the detriment of the project at a time when continuity of service, cash flows etc are critical.

The role of governments in management of telecentres is frequently quite significant. Depending on the history of project – for example, whether it was a government initiative to begin with – this role can be and is a help as well hindrance. There are instances where a local government has regarded the telecentre as a service delivery vehicle and there are others, where a newly transferred government staff, with little interest in telecentre goals, have sought to control rather than support the telecentre. There is therefore a need to look systematically at the role of governments in funding, creating, supporting, running, managing the delivery of ICT-based services in rural areas. This role will differ from country to country or even, from region to region within a country. There is need for pragmatism and avoiding the temptation to be too “ideological”

Those funding and managing these projects, or the infrastructure, need to build and anticipate likely scenarios and design appropriate responses to them. It is not uncommon for ICT projects to flounder when in fact events could well have been anticipated. A typical case in point is the failure to stock spares for equipment which is usually vulnerable to specifically rural situations such as dust, poor power availability etc.

Monitoring and evaluation of rural ICT projects by competent independent professionals well versed in rural development issues is critical for effective risk management. In view of their novelty on the ground and their impact on diverse aspects of village life, monitoring is perhaps even more important for ICT projects than other projects.

It is common for those involved in rural ICT projects to miscalculate the success and failure of ICT projects. Claims of success often fail to refer to costs and investments made. The explicit or implicit subsidies such as say waiver of rents for space, unpaid access to time of experts or government staff, etc, are frequently missing from such claims. Equally important, sometimes a project seems less successful or even considered as a failure when one ignores the starting point, or initial state of a community prior to the project, and fails to appreciate that a modest looking result reflects a major shift.

All this highlights the need for careful monitoring and evaluation of rural ICT projects. This will ensure that corrective measures, if required, are taken in good time. It will also mean fewer projects will close down soon after funding by donors and corporations runs out.

As mentioned earlier in the report, the use of ICTs in rural areas can mean a variety of activities from the very simple to sometimes rather complex and sophisticated experiments. There is great need for controlled experiments, careful monitoring and evaluation so that the use of ICTs in rural areas can be more fruitful and avoids obvious mistakes.

Capacity Building

The use of ICTs in rural areas is still a novelty from many standpoints. Firstly, there is little exposure to the technologies per se. Further the nature of services and businesses being attempted using ICTs also represent to the uninitiated conceptual leaps in thinking about day-to-day issues. For example, that you could use the Internet to tell the weather, to send messages to loved ones or to buy and sell is not obvious or 'natural' to most in rural areas. Arguably, it is easier for someone to appreciate what learning to drive a vehicle will do for him or her than learning to use the computer or using the net will do. The lack of skills or capacity in ICT use is a different level of challenge. Given that ICTs are likely to play an increasing role in rural lives, the need for capacity building is subtle, real and urgent.

However, it is useful to repeat, what has been stated elsewhere in this report, that IT skills are not the only type of capacity building that has to be addressed when one attempts to deploy ICTs in rural areas. There is as much need for building capacity of rural communities in other areas such as content identification, sourcing and management. Telecentre staff requires skills in business management, dealing with government functionaries, managing vendors, etc.

Technical skills relevant for ICT projects, which are sparse elsewhere, are virtually non-existent amongst rural communities. One cannot assume even basic familiarity with computers – sometimes even telephones- in rural areas. Appropriate -though not elaborate – training is necessary for use of ICT facilities by rural users.

Capacity Building is also required for those from outside too who are implementing ICT projects in rural areas. Many of these have very little knowledge of rural realities.

The challenge of capacity building, though formidable and complex is not insurmountable. As is seen in many places, some relatively complex tasks are being carried out quite effectively by staff with limited experience or formal education. It is probably fair to say that the real challenge in capacity building is to recognize that it is not formal training but initial "hand-holding" that is often required. Unfamiliarity is frequently taken for a lack of ability. This has time and again been proven to be false. Literacy in rural areas of developing countries is still not 100%. In some parts of South Asia some villages could

have virtually no literate person at all. In many more a majority of the population, especially women, may be illiterate.

Telecentre staff in MSSRF in Pondicherry, whose formal qualifications are modest, have been variously, trained, to carry out activities such as downloading wave height data that enables fisher folks to plan fishing trips, running video-conferencing applications, bringing out a community publication, uploading and downloading information about entitlements of villagers, training village men and women to use these ICT applications and much more. Much of the skills and knowledge to do this, when shorn of its technical jargon, has been transferred to several, if not all, members of the local community demonstrating the possibilities that can be exploited.

The lack of technical skills and literacy present significant challenges to the uptake of ICTs in rural areas. However, one must be deliberate and careful in deciding the nature and scope of the capacity building required by different players in rural ICT projects.

Extensive training in software and hardware is hardly ever required. However, familiarity with the computer and the applications that are being provided to the users can often take quite long in view of the issues raised in beginning of this section.

Capacity building is however a mammoth undertaking, if ICTs are to help rural people to realise their full potential. This task might itself be helped by use of sophisticated ICTs. There is considerable scope to create and provide training materials that make the best use of ICT based graphics, multimedia and input and output devices that help overcome some of the disadvantages due to language and literacy as well as of disabilities. The technologies, if suitably supported and managed by vendors and trainers, could yet play an all-important role in delivery of ICTs to rural populations.

Usable training resources e.g. staff, courseware, needed for telecentre practitioners are clearly necessary. In many cases they need to be created. Sometimes customization, translation etc may also be required.

The trainer is important too. The experience is that both local and external trainers have to be involved. Interestingly young people, who are often fast learners, have turned out to be very effective as teachers. One comes across many such examples in India and Philippines

Management of capacity building is in itself an important issue. Given the numbers involved the potential size of the undertaking can be formidable. Much of what is needed by the communities will be unique given their specificity of language, culture, geography, economic status, etc. However much else should be common to many communities. Appropriate synergies and efficiencies are clearly necessary. This may bring down substantially the

effort required and costs and may well determine the pace of roll out of ICT applications in rural areas.

Regulation and Policy

Most countries in the region have specific policies for use of ICT in rural areas. However, the region has had greater success in creating huge mobile markets than in generating comparable activity in rural communications.

The policy and regulatory support for rural communications is inadequate in most countries since till recently the communications sector was largely a monopoly.

While most countries are moving towards competition, rural populations rarely have much choice of services or providers. This is true in most project countries as well.

Most countries in the region require telecom service providers to have licences. There is usually little incentive for those willing to take risks in creating high cost and usually low revenue rural networks or services. For instance, an entrepreneur willing to invest his/her own money to set a rural network may not be allowed to do so. In India for instance, licences are not issued for regions less than the size of a province.

There also sizable fees to pay for setting up rural networks even though few large players might have shown an interest in connecting them. The result is that rural populations lose out on some of the potentially most useful features of ICTs.

Wireless technologies, which are often the only way to connect many rural areas, are not easy to deploy in many countries. In some cases, this is because of onerous restrictions on their use. In others, the charges for the use of the spectrum can be prohibitive. In many cases rules reflect assumptions more valid in a time when the potential of such technologies in rural areas was less appreciated. In other cases, the assumptions – e.g. those related to security-need revisiting in the new environment.

Another area where regulation has come in the way of rural users exploiting ICTs is the treatment of Internet based telephony, which seems to be restricted in several countries. This means that the people in rural areas cannot utilize a potentially valuable and virtually free service on the Internet. This is all the more worrying because in a way, rural users would tend to benefit most from Internet telephony. This is because a majority of calls made by rural communities are in fact long distance, and such calls are priced much higher in developing countries than elsewhere. Regulators have yet to unravel the legacy issues to enable the often poor rural communities to use Internet

telephony which, because it would use a PC, could be expected to expand the ICT applications in rural areas market and use of telecentres significantly.

Assuming that Internet will be an increasingly important tool as more and more processes, services and documents get web enabled, the issue of availability and pricing of bandwidth is undoubtedly, an area for governments and regulators to look into.

At another level, policy makers need to address the fact that private investors in most developing countries do not find it attractive to set up infrastructure in rural areas even in cases where they are allowed to do so. The governments and regulators would need to address market failure in rural communications since in the absence of specific measures for users in commercially unattractive villages, residents would wait indefinitely to get access to ICT infrastructure and lose out on its potential to address the needs.

Governments would need to be creative in their approaches. A common approach is to establish universal service funds (USF) from revenues of the sector. The idea is to use the proceeds to fund operators to provide services in rural areas. Several examples of best practices exist in configuring USF so as to ensure that there are adequate incentives for those who receive them, to provide rural infrastructure in an accountable, efficient and targeted manner.

Governments need also to put in place measures so that it, or, an agency set up or appointed by the government, can be operators of last resort for areas that fail to attract an investor or service provider. This 'safety net' may go a long way to ensure that rural ICT infrastructure does not lag behind.

However record of governments in this is mixed. In several countries in the region (e.g. India, Philippines) government agencies themselves wade through bureaucratic and other hurdles as they struggle to serve the rural poor. ICT deployment in rural areas therefore is also linked to reform of government run telecommunication facilities.

Stakeholders in rural ICT delivery therefore need to engage and influence policymakers/ regulators to modify earlier policies relating to telecom markets or devise new ones.

Sustainability

Most telecentres in the region are considered to be "top heavy". IDRC and partners have helped to install hardware and software of good quality at considerably high costs. Premises may have been acquired or rented at some cost or as is the case in Laos and elsewhere, premises may simply have been loaned for use. Given the usage of the facilities created, it seems unlikely that costs incurred in creating ICT facilities can be recovered in the short run.

Predictably therefore, a recurring theme, in most projects deploying ICTs in

rural areas is whether this is sustainable in the long run. Can the telecentres survive without continued external support of outside experts or donors? Can the communities sustain the services through fees? Can technology, equipment, hardware, software be upgraded as necessary? Long-term sustainability of ICT projects is a complex issue. Many have argued that sustainability must not be equated with mere financial sustainability or the need for appropriate business models. Whether rural ICT projects are sustainable from a technical or social standpoint is perhaps more important. For instance, whether equipment can be maintained or connectivity reliably sustained in rural areas is still an issue. Specialized institutions are rarely located close to rural areas, magnitude of economic activity in rural areas is often minimal and the returns poor, the terrain too is often difficult. Consequently, experts and vendors are rarely at hand to revive and repair services and equipment when things go out of order.

Considerable hope has been invested in e-governance or the provision of government based services to citizens using the telecentres. It is suggested that in future there will be considerable and recurring demand for many such services such as land records, birth certificates, and information about entitlements and jobs. Their value is believed to be tangible and it is hoped the users will be willing to pay.

However, the evidence from revenues of electronic and e-governance services is still inconclusive. Few telecentres seem to raise much revenue from such services. But, this could also be due to the fact that services have a long way to go in meeting all needs as well as in their quality.

Will governments be effective in delivering services electronically? In countries of South Asia and others government records are generally not available in an electronic form. Where there are available electronically, the work on interfaces to enable access from telecentres is still incomplete or sometimes yet to begin.

The business models, to the critics, detract from the goal of social equity in projects delivering ICT to rural areas. To others, the discussion about business models is about cost effectiveness, efficiencies and delivering rural services in a sustainable way without making the poor dependent on subsidies forever.

The chances of recovering costs of ICT based interventions may be much higher from provision of services such as entertainment, education, health since they could well fill important gaps or substitute existing services of usually indifferent quality. The chances of recovering costs of ICT based interventions may be much higher from provision of services such as entertainment, education, health since they could well fill important gaps or substitute existing services of usually indifferent quality. This will depend on many related issues. Will adequate content be easy to source and deliver in a

form that rural communities can use and at a price they can afford? Answer to this question would it seems be different in each country and in probably many areas and populations within it.

There has been an often-divisive debate in the development community on business models. Critics have often argued that raising commercial issues that are implied in business models could eventually lead to poor being excluded since they can rarely pay for the services in telecentres.

There are however important practical issues that might determine the success or failure of some telecentres. In most telecentres, the services are rarely provided free even though they seem to be subsidized. This approach to charge at least nominally for all services is based on the reasonable premise that a service provided free is often undervalued and will need to be subsidized for a longer period or forever.

However this has meant that other approaches, which might still be in tune with the same goals, have not been tried. For instance, few telecentres seem to have tried offering monthly subscriptions, off peak or volume discounts and many well-known innovations that urban businesses use to expand markets, optimize resources, reduce losses, etc. In particular, it is quite likely that most users find it a disincentive to try any unknown product or service if they have to pay even to sample it as they have to in some telecentres. A free trial is rarely offered. A monthly fixed charge rather than one that is based on actual usage, will be greater incentive to use say the Internet, as is borne out by usage of the Internet in North America where a user who pays a monthly telephone subscription is able to access the Internet for as long as (s)he wants.

It is clear that irrespective of the success of pilot projects, long-term sustainability depends on scalability and replicability of approaches, services and solutions being provided in rural ICT projects. It is easy also to appreciate that services that depend on volunteers are likely to be as unsustainable as are those where disproportionately salaries are paid to project staff. It was suggested to the author that there instances in the projects of both these extremes.

There is need for effective institutional mechanisms, capable of addressing the many persisting challenges facing rural ICT projects. These include, lack of adequate technical skills, high cost of equipment, lack of relevant content, high operational costs, need for access at times convenient to communities and not just "9to5", effective management, advocacy with government and other agencies, and many more.

It may be useful to review approaches to sustainability of rural ICT solutions. One important reason for this, as indicated earlier in the report, is that this is still a largely untravelled road. Many changes currently underway, in

governance, commerce, technology, entertainment, education and health will have a serious intertwined with ICTs. It is perhaps reasonable to argue for support to ICT applications in rural areas as an attempt to ensure that the capacity of rural populations to benefit from a phenomenal potentially empowering tool is not compromised. The risk to rural development prospects from excluding the rural poor from ICTs is a far more urgent concern at the moment. To that extent, the talk about sustainability is rather premature.

5. *Contextual Factors*

It is important to underline that much of the success and failure of projects related to ICTs in rural areas can be attributed to factors which may be unique to specific projects, regions or countries.

There is significant evidence that the effectiveness, success and failure of ICT projects can depend rather critically on the context in which they are designed and implemented. For instance, projects led by community champions or individuals of credibility and stature find easier acceptance and widespread support from players such as government, educational institutions or local organizations. For instance a large part of the success of the organizations running the projects in Thailand and India can be attributed to the world stature of their leadership.

Take for instance, India and Philippines, where government agencies (such as BSNL, Telof) play an important role in rural connectivity. Such an organization would be conscious of the need to put its best foot forward while dealing with an agency led by a person of eminence. Similarly a technology provider or a private company dealing in content, would be conscious that its services would attract a higher level of publicity as well as scrutiny in projects which are led by high profile individuals.

Interesting factors come into play when ICT projects are implemented in particular areas. As an example of the latter, the case of Bario in Malaysia is relevant. Bario is quite unlike any part of Malaysia in being so remote as to be dependent entirely on satellite communications and solar power. It has attracted a level of concentrated academic effort and oversight of the staff of Sarawak's University of Malaysia. Such a situation may not be as typical for other environments.

Individuals of eminence would expect to be taken more seriously by regulators especially when such institutions are weak. In general, funding for experimental projects is easier to come by when a person of proven standing can vouch for its seriousness or importance. The role of contextual factors in development projects can therefore be extremely critical. This is more so in ICT projects with a shorter history of experimentation and success

It would be prudent to derive two important lessons from this: one, that leadership is important for success and two, that to expect this level of success or support from the environment in all cases may be unrealistic.

Some countries have a history of civil society led projects. Others have a history of government supervision or control. Private sector entrepreneurs, often important for running effective businesses, are not available or active to the same extent everywhere. Some countries are more supportive of

entrepreneurs. Laos and Philippines are contrasting examples.

There are several instances, for example in Philippines and Laos, where changes in the environment have affected the direction of projects. The degree of support, especially from political or government agencies, the entry or exit of an individual in authority or position of influence seems to impact development projects such as those involving ICT deployment more than other types of projects. Their relative unfamiliarity to important players or their 'unproven-ness' in the field means that that ICT projects are more vulnerable to these effects than other types of projects.

Countries like India have a large pool of qualified work force. Capacity building would be expected to be easier here. India's large film industry would be an important source of entertainment-based content. But its rural population, as that of the rest of South Asia, is in general much poorer than say that in most countries of South East Asia. Rural education and literacy levels are lower too. Expect ICT challenges and, strategies that work, to be different.

Some communities are extremely diverse. Language, income, social barriers etc can create many challenges for ICT projects, which may not exist everywhere to the same extent. Prosperity could easily expand market size. Areas that are more homogenous linguistically or with higher levels of education will find capacity building easier to some extent. Many such contextual parameters may have a bearing on rural ICT projects.

It is of course, difficult to enumerate all the many contextual factors at work in the project region. However, their role can be quite significant and may need to be taken into consideration, to the limited extent possible, in analysis of ICT projects.

6. Conclusions : Learning from the Projects

Few experiments conducted in project areas are done in controlled conditions and hardly any ICT deployment has a scale that would allow unambiguous conclusions to be made about their effectiveness or otherwise.

“Clean” experiments that allow “cause and effect” in ICT projects to be unraveled and analyzed are rarely easy to undertake and results are similarly, difficult to analyze. However, the potential impact of such experiments on the life and livelihoods of the poor is an important and desirable enough objective to undertake carefully implemented ICT projects as more robust theoretical frameworks evolve to study their impact more rigorously.

This report has discussed rural ICT projects under the following thematic heads

- Connectivity
- Content
- Community Participation-
- Capacity Building
- Management -
- Policy and regulation -
- Sustainability

Connectivity

Telephone connectivity is seen by many as the most capital-intensive part of delivering ICTs to rural areas. Computers and peripherals too are expensive and become obsolete in a relatively short time, which is rarely enough to recover the investment on the hardware. Maintenance of ICT equipment also presents unique problems in rural areas since repair of equipment on site is rarely possible, thus leading to massive delays and service interruptions.

Populations in the project areas visited do have access to the public telephone network. However, most rural areas in Asia, especially South Asia, face considerable challenges in obtaining adequate and reliable access. In general, demand for telecom services is low, largely due to relatively limited ability to pay.

New wireless technologies that provide cheaper connectivity and higher bandwidths will be critical for larger scale deployment of ICTs in rural areas so that populations could try out a full bouquet of applications and services. This will enable more robust conclusions to be made about the relevance or otherwise of ICTs in rural areas.

Internet access is absent in most rural areas. Where access to Internet does

exist, the usage is relatively low. Interestingly, however, Internet access seems to be rarely missed thus highlighting the fact that users in rural areas find little of interest on the Internet.

Poor connectivity in rural areas is in fact often due more to the fact that power supply is usually inadequate in rural areas of most developing countries. Power supply is sometimes too erratic even to charge wireless equipment. This downside of wireless communications is an important issue when rural areas with unreliable power.

Some project areas have significant problems in obtain continuous and reliable power. While solar power is being used to some extent, it is important to appreciate that it is still far from being a cost effective alternative in most rural areas. The cost of solar power, in the short term at least, likely to drag down ICT projects in rural areas.

Content

By all accounts content is as serious, if not an even greater challenge for ICT based projects in rural areas. Many telecentres have little content other than a couple of popular software packages. In the absence of appropriate content, a telecentre runs the risk of becoming little more than a computer shop. This may not in itself be a problem but it does mean a lost opportunity to make more effective use of expensive hardware.

The telecentres have been less successful in attracting the average adult village resident. Lack of appropriate content may be one, if not the only factor. There is a widespread perception amongst even the less literate or the relatively poor that computers represent progress. Adults are frequently willing to pay for youngsters to learn use of computers. Younger users are early and fast learners. In some cases, they are also able to use the facilities in the telecentres to obtain information, e.g. Relating to their crops, for others less confident to use the computers. Youngsters in many instances are effective teachers of adults as well. This represents interesting and unique possibilities and deserves to be pursued further.

Experience, especially in India, shows that information related to livelihoods, health, safety, environment, governance, entitlements etc. is in demand. Also in demand is entertainment as evident from extensive use of some telecentre PCs for ruing movies etc. This too has received inadequate attention in most development projects, which frequently take the high road.

Much of the available information is not readily usable. Content relevant to local communities and in their languages is missing in most telecentres.

In view of the limited content available in most telecentres, issues such as safety and privacy are rarely raised. Quality and reliability of content is

sometimes a concern. It may be critical in many cases like health and law.

Content creation and delivery will require huge funds the cost of which may yet turn out to be comparable to those of connectivity itself. The scope of this task of content delivery in rural areas will be truly mammoth and underlines the important need to evolve systems and processes so as to ensure economies and efficiencies in the selection, creation, translation, delivery etc of content. There is an obvious need for these efforts to be concerted and the need for effective leadership

Community Participation

The more successful projects tend to have a considerable amount of community support. Effective deployment of ICTs in rural areas requires a substantive, often assertive role of the village communities. Without sufficient community involvement, ICT projects risks proceeding in an environment where neither community needs nor, the methods used to address them have been validated.

Certain critical inputs can only come through active involvement in the project. The communities, to whom ICT projects are targeted, live and work in rather different circumstances. However given the relative novelty of ICTs in the rural environment, expertise of outsiders will almost certainly be necessary in the short-term at least. This dependence on outsiders, therefore, is a necessity as well as a risk that must be carefully mitigated.

It is important, especially for outsiders, to remind themselves that rural communities, like urban communities, are diverse too. Their aspirations, good sense, eccentricity, psychology, etc is as complex as urban communities. Working with stereotypes can be risky.

Communities possess information that is often vital to the success of projects. For instance, services will attract users only if they are available at convenient times and priced shrewdly. But what opening hours are convenient and what prices are appropriate in a rural context is not a trivial issue. Only somebody from within the communities can assist service providers on how communities allocate time or money. For instance, women in rural areas are not necessarily busiest or free when their counterparts in cities are.

Local government institutions, such as *panchayats*, village councils etc, need to be actively involved at important stages of project. Their support wherever it has existed in the project has been invaluable for the telecentres to gain acceptance and legitimacy as well as in attracting volunteers. Their role can be critical in safeguarding assets of the telecentres. Staff and facilitators, must enjoy community acceptance.

Management

The quality of leadership and the effectiveness of champions associated with the project have played an important role in most ICT projects. .

Managing rural ICT projects as well as the user facilities set up under the projects is a formidable and complex task not least because there is little experience to fall back on. Working with government agencies to source information, motivating communities, dealing with their needs and sensitivities, managing contracts with equipment vendors, sales and marketing etc are some of the skills required. Managers are crucial for establishing priorities for any telecentre.

ICT based businesses are not at a stage that an entrepreneur's profit motive and native intelligence would by themselves suffice to run them.

Management of rural ICT projects deserves to be dealt with seriousness. Commercial decisions related to pricing, discounts etc are frequently based on arbitrary or gut feels. Administrative decisions too follow a similar approach. Managers would be expected to take such decisions more deliberately.

It is common for uninitiated management in rural ICT projects to miscalculate the success and failure of ICT projects since analysis is often incomplete. There is great need for controlled experiments, careful monitoring and evaluation. Monitoring and evaluation of rural ICT is critical for effective risk management. This task needs to be carried out with a degree of rigour to ensure all relevant factors are captured to the extent possible.

Capacity Building

The use of ICTs in rural areas is still a novelty for most users. Given that ICTs are likely to play an increasing role in rural lives, the need for capacity building is subtle, real and urgent. However, the need for capacity building is not limited to acquiring IT skills alone. There is a shortage of skills in other related areas too, such as business development, client servicing, sales, vendor management, and identifying and developing content.

Extensive training in software and hardware is hardly ever required.

Capacity building is however a mammoth undertaking, if ICTs are to help rural people to realize their full potential. Much of what is needed by the communities will be unique given their specificity of language, culture, geography, economic status, etc. However, much else should be common to many communities. Appropriate synergies and efficiencies are clearly necessary.

Interestingly, young people are often fast learners and turned out to be very effective as teachers.

Regulation and Policy

It is ironic that use of ICTs in rural areas can sometimes, be hindered by government rules, regulation, and policies.

There is usually little incentive for those willing to take risks in developing infrastructure which rural areas often lack. There are also onerous restrictions on types of service permissible. For instance Internet based telephony could be a boon for users in rural areas since the majority of their calls are long distance. However, there are major restrictions on use or provision of the service in countries like India.

Similarly sizable fees are expected be paid for licences, etc. The charges for the use of the spectrum can be prohibitive.

The governments and regulators would need to address market failure in rural communications. There is a need for provisions to have operators as a last resort for areas that fail to attract an investor or service provider. Rural service is still dominated by government run telecommunication facilities most of which are often perceived to be overly bureaucratic and inefficient. There is urgent need to reform these entities so that rural areas can be served speedily.

On their part, players in the ICT in rural areas space, need to appreciate the links between their work and the regulatory environment so as to optimize the impact of their efforts. They must engage with and influence policy-makers and regulators

Sustainability

A recurring theme in most projects deploying ICTs in rural areas is whether the use of these technologies in these regions is sustainable in the long run.

Sustainability should not be equated with mere financial sustainability or the need for appropriate business models. This may be necessary but is certainly not sufficient for the success of ICT deployments in rural areas.

Sustainability issues may well be being blown out of proportion. It is arguably untimely to talk about the sustainability of ICT in rural services when the products and services on offer in rural areas are far from well defined, rarely fully understood, and even rarely explained adequately. Many services are often dysfunctional due to limited technical support and a host of other issues, which will determine whether the services meet community needs. In the current scenario it is difficult to take a view on what the low usage of services in rural areas actually reflects. Clearly much more time is required before ICT in rural areas is a 'stable' product. In this sense the evidence from revenues of most services is still inconclusive.

While government-provided content is important, it is unlikely that it can be priced appropriately to recover the high costs of the infrastructure

There is evidence that there is a demand for and willingness to pay for certain types of services. The chances of recovering costs of ICT based interventions may be much higher from provision of services such as entertainment, education, health since they could well fill important gaps or substitute existing services of usually indifferent quality.

The role of business models needs to be kept in perspective. While focussing solely on commercial sustainability implied in such models may be inappropriate, there is every reason to address issues related to cost effectiveness, efficiencies and delivering rural services in a sustainable way without making the poor dependent on subsidies forever.

There is little evidence in any telecentre that business models have engaged the promoters of the projects. In the development projects under discussion, this was not neither promised nor expected. However this means that there is relatively little emphasis on cost effectiveness of interventions, looking for hardware or software that is a closer fit with requirements in the field. There is similarly little attention to extracting all the economies of scope from the hardware and software as well as other resources deployed in many rural ICT projects. This may well be reason why correcting mistakes in ICT and related projects takes longer than necessary. For instance, in many cases, the specification of equipment in use is wasteful and usage rather limited. Commercial innovation seems minimal.

To sum up, a discussion on long-term sustainability will be more meaningful when scale of ICT interventions is of a critical magnitude. Current projects are on the whole too small – which is of course understandable since IDRC focuses on research – and the services are too limited and amorphous, and barely optimized for delivery to an appreciable number of potential users. Users themselves are often unaware of the products and services. To talk of whether such interventions are sustainable would seem premature. Much more effort and time is required till operations reach a kind stability to allow controlled testing of these interventions.

7. Recommendations

1. Need to synergize all efforts by creating an effective institutional mechanisms

Many challenges in projects related to ICT use in rural areas are common. There are much duplication that can be avoided and often little capacity, time or funding to pursue any issue substantively. There is therefore need to synergize all efforts by creating an effective institutional mechanisms, so that challenges addressing the many ICT projects are pursued in a more generic and thematic fashion. These include, lack of adequate technical skills, high cost of equipment, lack of relevant content, high operational costs, effective management, monitoring and evaluation, advocacy with government and other agencies, and many more. Such an institutional mechanism could help produce resources including tool kits, short courses as well as help lobby governments and other agencies to facilitate effective roll out of ICT in rural areas.

2. Need to engage with and influence policy-makers/regulators

Many policies and regulations in developing countries are out of sync with effective roll out ICTs in rural areas. Costs of providing adequate connectivity and appropriate content can come down significantly by targeted policy support. Connectivity costs can often come down substantively by enabling easier participation of entrepreneurs through changes in licensing norms, access to cheaper spectrum, waiving duties on equipment, etc. Much governance related content can be easier or cheaper to access, if the authorities in these countries mandate appropriate standards and interfaces.

Stakeholders in rural ICT delivery, therefore, need to engage with and influence policy-makers/regulators to modify earlier policies relating to telecom markets or devise new ones so that barriers facing speedy roll out services to rural areas can be removed with more delay.

3. Co-ordinate, as far as possible, efforts to produce and distribute usable training resources.

Much content and software required in rural applications of ICTs is common. Much duplication in creating modules to train operators to run standard applications such as word processing, accessing the internet for specific information, setting up facilities such as video conferencing, etc. could not only be avoided but the resources so spared could be deployed for higher quality, more user friendly, material more readily usable in rural areas.

Players and stakeholders must co-ordinate, as far as possible, efforts to produce and distribute usable training resources (e.g., staff, courseware, needed for telecentre practitioners). Sometimes however, customization, translation etc may also be required.

4. Prioritize timely and effective monitoring and evaluation of rural ICT projects.

There is considerable evidence that corrective measures are delayed because of failure to diagnose challenges faced by rural ICT projects in good time. For instance, many telecentres are still focused on technology and fail to prioritize content or capacity building.

Monitoring and evaluation of rural ICT projects by competent independent professionals, well versed in rural development issues is critical for effective risk management. However, involving the project stakeholders in the monitoring and evaluation process will be equally crucial, even if monitoring and evaluation is being led by a competent, independent professional.

5. Role of governments must be systematically evaluated.

Governments are usually the largest player in rural areas in most developing countries. They frequently control most infrastructure and many services, which are required by rural communities (e.g. microfinance, health and other information). Nonetheless, these services can sometimes be delivered more effectively by the telecentres themselves (i.e., the project) than government departments. Governments often control rights on much useful content and can assist by making it available through telecentres at affordable prices.

There is a need to look systematically at the role of governments in funding, creating, supporting, running, managing the delivery of ICT-based services in rural areas. This role will differ from country to country or even, from region to region within a country. There is need for pragmatism and avoiding the temptation to be too “ideological”

6. Management of rural ICT projects deserves to be dealt with seriousness.

Rural ICT projects predictably, have little specialized staff and frequently suffer from problems that managers are arguably, trained to address quite effectively. Managing staff, dealing with suppliers, setting prices etc seem to receive little deliberate attention in rural ICT projects.

Management of rural ICT projects therefore deserves to be dealt with seriousness. Skill limitations of managers on the ground are a risk to be

addressed. This can be done to some extent by encouraging management processes, such as regular consultations with appropriately qualified people within or outside the community and identified in advance, to fill the skill gaps in managers. This will ensure that managers are not tempted to take off the cuff decisions.

7. Need to partner and fortify local government institutions.

Local government institutions, such as *panchayats*, need to be actively involved at important stages of project. Their credibility and stature are a useful resource and assist in much needed buy-in of the community. The role of such institutions in Philippines and in parts of India has often been admirable.

8. Need to create awareness for ICT projects.

Rural communities have considerably less exposure to ICTs and their usefulness. An application that provides critical health or agricultural information, may fail to take off in spite of its obvious relevance because of the accompanying “paraphernalia” that ICT projects may seem to bring or the unfamiliar form or setting in which the service is provided.

It is therefore important to prioritise awareness creation within the community when ICT projects are rolled out. This is necessary even if the communities may sometimes lack technical or other specialised knowledge about what is being attempted.

9. The gender and age composition and diversity of rural communities needs to addressed effectively.

Adults and children as well as men and women, have different perspectives and needs that are critical to the success of ICT projects are implemented. For instance, children and adults could both require training in use of ICTs; however, they learn differently and at a different pace and would require arguably, different type of handling. Efforts should be made in ICT projects to ensure that age and gender are factored carefully.

10. Mitigate the risk inherent in the frequently dominant role of outsiders in ICT projects

The deployment of ICTs in rural areas involves a substantive, often dominant, role of people who otherwise live and work in rather different circumstances. Their assumptions about rural needs and aspirations are often out of sync with those of the village people themselves. Their knowledge of local incomes and spending too could be based on stereotypes. This can impact critical

decisions related to telecentres. This dependence on outsiders is a risk which must be mitigated effectively and deliberately.

11. Need to carry out a rural needs assessment before elaborate ICT projects are undertaken.

Community needs for content can be quite diverse. Agricultural communities differ in many different ways including crops, prosperity, cultural practices, migration and much more. Some may need help with trading, others with subsistence and yet others with environmental concerns. Fishing communities may need different kinds of support and so on. Women's needs could differ depending on their social, religious or cultural circumstances.

The nature of content required by the communities, therefore, needs to be ascertained quite deliberately and systematically if the telecentres are to be effective in meeting information needs.

12. ICT projects must be attempted in a larger development project context.

ICT projects require a degree of insight and understanding of development issues. This is even more important in view of the rather limited number of well-documented successful ICT projects. A less experienced development professional or agency will have a better handle on rural dynamics and is more likely to be able to solve emerging issues on the fly. In general, ICT projects in rural areas, which are done outside of the context of an integrated development exercise, are likely to falter. Larger development projects, with additional components, (e.g., family planning, housing etc.), must be prioritized over pure technical/technology-driven projects.

Annex: Issues Discussed in Experience Sharing Meeting (Chennai, December 2004)

OPERATIONAL ISSUES

CONTENT

1 What is the nature of content required by rural users?

1 Is there a gap between demand and supply of content?

2 What can be done to eliminate or reduce the gap?

CONNECTIVITY

1. What type of hardware is more important for rural ICT projects?

2. Is technical expertise important?

3. Are new technologies like wi-fi, VOIP etc more promising than conventional approaches?

COMMUNITY PARTICIPATION

1. How important is Community participation in rural ICT projects?

2. What is the most effective method of ensuring community participation?

3. What role should the community play?

PROJECT GOVERNANCE ISSUES:

MANAGEMENT

1. What type of management works best for rural ICT projects?
2. How important is it to involve the community in management?
3. What type of management processes (e.g. hierarchical, collective or flexible) work best?

SUSTAINABILITY

1. Is a large subsidy almost always required?
2. What is the role of cultural and social factors in sustainability? E.g. Community ownership, champions wider participation etc.?
3. What is the role of marketing and other business development techniques in making project sustainable?

POLICY AND REGULATION

1. Have government rules been a help or hindrance in rural ICT projects?
2. Is their sufficient encouragement to rural communities to serve themselves by setting up appropriate equipment, networks and services?
3. Are conventional telecom operators likely to serve populations in rural areas?

Annex: Questions explored during visits to project areas

EXPERIENCES WITH USE OF ICTS IN RURAL AREAS

Questions to be explored during visits to project areas

Content

A.How important was content in your rural ICT project?

B.What was the experience in obtaining relevant content?

C.What type of content did the users want most?

D.Was appropriate content readily available? If not, how was/is this tackled? Is it still an issue?

E.What role did the community play? Did the community participate in creating or providing contents or were they only users?

F.What were the problems encountered? Was content in local language available?

G.Was specialised content required? Was specialised content, e.g. health information, available?

H.How much of your resources in time and money are spent in dealing with content issues?

I.What are critical concerns relating to content that you currently have?

Connectivity

A.What is the type of connectivity available to users in your project area- PCs, telephones, Internet, etc?

B.Is connectivity adequate, reliable and affordable?

C.What proportion of your time or money is spent on addressing connectivity issues.

D.Are appropriate technologies, bandwidth etc. available? If no, how serious is this problem?

E.Can people use the connectivity conveniently?

F.Is training required and available?

Community Participation

A.What proportion of the community in your project region is involved in the project in any way, e.g. users, staff, champions, service provider?

B.What is the age and gender profile of the community of users?

C.Does community feel a sense of ownership for the project?

D.Is there a champion of the project in the community? Is local government support available?

Management

A.Who manages the ICT project in your region? Is it a local person? Is it a community leader, etc.?

B.Who manages the facilities like community access kiosks, or telecentres etc? Is it a computer professional?

C.Is the project managed by a government appointed person?

D.Is the management sufficiently empowered?

E.Does the project have a mechanism for solving day-to-day problems or impending issues?

F.Does the management maintain linkages with other similar or related projects?

Capacity Building

A.How was training and capacity building handled for staff, users, community etc?

B.Are there special issues related to training of older persons, disabled, less literate persons, women, etc.?

C.Were local trainers available?

Monitoring and evaluation

A.Have the results of the project been monitored regularly? How frequently?

B.Were monitoring inputs available during the project duration? Were they useful?

C.Were changes made following any monitoring report?

Regulation and Policy

A.How have policy and regulation impacted the project?

B.Can some rules, if changed, accelerate the delivery of benefits of the project?

C.Does project management interact with, or, have access to policy makers and regulators?

Sustainability

A.How does project management view Sustainability?

B.Is it likely that the project will be sustainable in the long run?

C.What kind of interventions from actors in the project or from those outside can help sustainability of the project?

D.How critical is finance? Are capacity building or connectivity more important?

E.What is the role of volunteers in sustainability of the project?

Context

A.How important is local context to the project's results?

B.What roles do champions have in rural ICT projects?

C.Where should champions come from? Government? Technologists? Private Sector?

Community leaders?

D. Do macroeconomic indicators like GDP, household incomes, number of phone lines, etc have a critical bearing on the success of rural ICT projects?

E. Are rural ICT projects more, or less, successful when governments take the lead?

F. What is the role of civil society organizations in the success of rural ICT projects?

Annex: Terms of Reference of the Report

The principle objective of this contract will be to undertake a review of PAN-supported research projects * (attached at the end of the contract) on ICT for rural developments, in order to come up with key strategic recommendations for future similar projects.

The work under this contract must be performed by Dr. Mahesh Uppal.

Pursuant to this contract, the consultant shall:

- 1) Conduct a critical analysis and review of PAN-supported research projects on ICT for rural developments, particularly gathering key lessons that are important for:
 - (a) Determining the right amount and/or mix of connectivity, content, and level of commitment/involvement of the community in the project;
 - (b) Contributing to financial sustainability of projects;
 - (c) Potentially leading to replicability/scaling-up of best practices from the PAN-supported ICT for rural development projects.

This critical analysis and review shall include an in-depth analysis into the contextual factors surrounding each project, as well as discerning the common successful and unsuccessful practices found in the project.

This critical analysis and review shall also include the following sub-tasks:

- a) Perform a review of project files and available project reports and develop an agenda for a meeting involving project leaders of PAN-supported research

projects on ICT for rural development. The review and agenda should be completed by October 31, 2004;

- b) Coordinate and convene a meeting for gathering further input from project leaders of PAN-supported research projects on ICT for rural developments. The meeting shall take place no later than December 15, 2004;
- c) Undertake travel to PAN-supported research projects on ICT for rural developments, as deemed necessary by the responsible PAN Program Officer identified in section 8 of this contract. All travels shall be completed by February 28, 2005; and
- d) Document and submit to the Centre, the output of the review and meeting on a synthesized written report which will form the basis for a peer-reviewed publication on the subject, by March 31, 2005.

- 2) Assist the responsible PAN program officer in the final editing and compilation of the peer-reviewed publication on the subject, to be completed by July 31, 2005.

The dates and destinations of travel remain to be confirmed. The Centre shall establish those in accord with the consultant based on future consultation with the responsible Centre representative as indicated in section 8 of this contract.

- PAN-supported research projects on ICT for rural development to date:
- Internet Access by Remote Communities in Sarawak, Malaysia (03820-1)

- Pilot Multipurpose Community Telecentres in Selected Barangays in the Philippines (04029)
- Information Technology and Rural Extension in India (TANUVAS) (03820-5)
- Leveraging ICT through Weekly Market Centres for Tribal Communities in India (101060)
- Impact of Information and Communication Technologies in Rural Areas of India (Phase I, II, and III) (03778, 100580, 102340)
- Participatory Development Training Centre, Luang Prabang, Laos (100863)
- The Lighthouse Project, Thailand (03820-7)
- Pilot Project for Providing Internet Services in Northern Areas of Pakistan (03872)
- ICT for Rural Development in Mountainous and Remote Areas of Northern Pakistan (101054)
- Sri Lanka Virtual Villages: A Socio-anthropological and Technology Study on the “Last Mile” (102291)