

Information and Communication Technologies (ICTs) for Sustainable Livelihoods: Preliminary Study April - Nov 1999.

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Case Studies:

The Project

The following case studies were compiled as part of a desk study on new communication technologies and existing information systems of small scale-farmers and entrepreneurs in rural communities. The project looked at:

Whether and how ICTs might further marginalise disadvantaged communities, to determine what could be done to mitigate those adverse effects.

Whether and how modern ICTs can be used to strengthen and develop the information systems of small-scale farmers and small-scale enterprises (SMEs) in developing countries and contribute to poverty reduction.

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Information Systems Pilot Project, Cajamarca, Peru

Upper West Commerce Association, Wa, Ghana

Coffee Growers Collective, Guatemala

**Agricultural Information Centre, Northern Province,
South Africa.**

Methodology

The case studies were compiled from various sources from the web, conference material, personal documents, project reports and many numerous email communications. Every attempt was made to gather at least two sources for each case study and wherever possible to speak more than the project managers (who may be inclined to praise the project more than necessary).

Acknowledgements

The author would like to thank all those who contributed to this document (particularly personal communications with project managers) who contributed to these documents. The author (c.m.ofarrell@rdg.ac.uk) of these case studies is responsible for any errors or inaccuracies in this document not the sources consulted.



Information and Communication Technologies (ICTs) for Sustainable Livelihoods:
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Case Studies

Village Information Shops, Pondicherry, India

Programme to create a village information system of 'information shop'.

Organizations Involved

M S Swaminathan Research Foundation, IDRC

Donor Agency

IDRC

Background

There was a strong argument that information delivery in India must be demand-driven rather than supply driven. To build demand into the system of delivery and access it is essential that 'coping information' (defined by Menou 1993) be considered. Public information must be accessible in a locally appropriate format. Studies in village level institutions reveal that availability of such information is vital for them to operate successfully. (MSSRF 1996).

Situation Analysis

To establish at Block level, a 'Value-Addition Centre' as a hub linked to rural 'Village Information Shops'.

Needs defined for the project were meteorological information, water/pest management, market information and access to civil rights information, poverty entitlements, health information and access to new and existing communication systems.

The project began with a needs assessment and had evaluation approach built in to measure impacts of information shops.

To train young in ICTs skills and generate location specific information for the translation of scientific research into locally digestible information.

Build a model for sustainable rural communication/ information infrastructure.

Solutions

Email and web can lead to generation and dissemination of locally specific knowledge that will be of use in production, marketing and employment generation and improve utilisation of poverty entitlements.

To set up six rural information shops.

To train educated youth especially women to staff and operate the shops

To train rural youth in organisation and maintenance of the system and to generate locally relevant information from generic information

To seek out and disseminate information on poverty entitlements in both traditional and new communication media.

To measure the impact of information shops and ICTs through surveys. PRA and other appropriate methods of data gathering.

To build models of information dissemination and exchange in rural areas using ICTs.

Locations and staffing were carefully chosen according to security and safety of locations and availability and competence of the staff who would run the sub centres.

Results

Initial results even at this early proposal stage.

Local database on multimedia format (available in Tamil) covering information on Indian welfare schemes and entitlements for rural people

Database containing heads of families classified as living below the poverty line The poverty line is defines as gross family income of Rs = 12,000 (US\$1 = Rs. 42).

Multimedia encyclopaedias available in the schools room.

Survey of telephones and Televisions in area has been conducted.

Recent developments: Villianur set up as project headquarters equipped with computer, telephone, modem and small telephone exchange, wireless equipment. Project staff here generate and update the databases which provide information to the people. Four other sub centres within 20Km of the centre with equipment and training is provided by the Foundation have been opened. In return those selected to run the centres work as volunteers and take care of maintenance.

Swaminathan foundation undertook the project with the proviso that the village communities would eventually run and pay for the services. This would keep the information delivery relevant and 'in touch' with demand (or people wouldn't pay).

Lessons Learned

The project has been thorough in sourcing all the possible organisations that could be involved in he project. There was a specific objective to include women in the project to work and train in the information centre.

Remarks

Initially this was an example of an ICT project with more presence on the web to attract funders that it had in the villages it was designed to serve.

Later reports show the project began operating a central information centre and a number of more local hubs with a grant from IDRC.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Web site for the project URL:

http://www.mssrf.org.sg/information_village/theprogram.html

2. S. Arunachalam (1999) Information and Knowledge in the Age of Computerisation: A developing country perspective. Paper presented to the Volkswagen foundation May 1999.

3. Village Knowledge Centres or Information shops. PowerPoint presentation sent as attachment. Contacts v.balaja@computer.org or arun@indy.iitm.ernet.in



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Case Studies

Agencia Informativa Pulsar, Ecuador

Project began in March 1996.

Organizations Involved

World Association of Radio Broadcasters (AMARC) Latin America and Caribbean office, Ecuador. Centro de Educacion Popular (CEDEP) - until 1998.

Donor Agency

CAF (Holland), SIDA (Sweden), Fredrich Ebert Foundation (Germany) and UNESCO.

Budget around US \$100,000 per year

Background

The majority of Latin American and Caribbean countries do not have laws on community radio. In consequence, radio frequencies are granted by governments or telecommunications agencies, often on the basis of political favouritism. Civil societies access to radio and television frequencies through fair and transparent means is necessary to democracy and freedom of expression. In line with this, a seminar entitled "The democratisation of the radio spectrum" was held in Caracas, Venezuela, in November 1996. Also, the office is lobbying the United Nations to obtain their approval of a resolution on the democratisation of communications.

Liberalisation of the broadcasting airwaves dramatically increased the number of radio stations operating yet the actual advertising revenue did not increase leaving more stations competing for a relatively fixed amount of revenue.

Growing trends towards globalisation and consolidation of media ownership and satellite broadcasting lead to a concentration of media ownership and control and singular interpretations of events from mainly North American or European perspectives.

Some Latin American country policies provided broadcasting licences for community radio stations.

Shifting policies in international aid, which saw Latin American countries losing out to Eastern Europe and Africa. With funding no longer secure many community radio stations had to reduce their budgets and pursue advertising revenue.

Radio can often be characterised by its local programming and the non-professionals that can operate a station in comparison to TV.

The language tone and idiom of local people broadcast in the same area.

New communication technologies that make globalisation and concentration of ownership possible can also be recouped by independent and community radio stations.

AMARC is a network of radio broadcasters promoting communication and social development. Projects are trying to combine radio with the Internet and conversely the Internet with radio. Either making use of telecentres or operating as a telecentre for value added income generation.

Situation Analysis

The project began with an evaluation of Latin American independent and community radio stations. This included an analysis of the sources available to them for international news, which found that relatively few stations had access to international news other than

regurgitating day old news from newspapers. Reporting style for print does not often lend itself to the oral medium of radio. Subscription fees to international news services such as Reuters were prohibitively expensive for many of the community radio stations. The possibilities offered by the Internet and the possible convergence of radio with the Internet.

There was an urgent need to provide independent news service to radio stations as an affordable option.

The project operates from AMARC's Latin American and Caribbean office in Ecuador.

To contribute to the improvement of programming, the prestige, the credibility and the impact of independent and community radio in Latin America.

To contribute to the technological modernisation of independent and community radio.

To help develop a better understanding of regional and global issues and to promote themes associated with democratic development

To open opportunities for citizen participation in local, national, regional and world for a with particular attention on the participation of traditionally excluded sectors.

Solutions

En Linea News service via the Internet (updated daily)

Compendio Daily news compiled and packaged at the end of the day retrievable in a single pick up.

Ciberbrujas Weekly news service for and about Latin American women.

Audio 20-40 second news clips featuring the voices of newsmakers and commentators.

Nuqanchik (no longer operating) A daily news service produced in Quechua (an indigenous language spoken by around 10 million people in Latin America) and distributed over the internet.

Results

Electronic lists are fed information 7 days a week for 15 hours a day through the news line and electronic bulletins.

Text and audio information is sent as well as providing a web page updated every 3 hours www.amarc.org/pulsar. Subscribers and non-members can browse the web for information. An audio format is expected for the web page.

Nuqanchik - Begun in 1997 but no longer running today, it was the only daily news service in the Quechua language. There are an estimated 180 radio stations broadcasting in the

Quechua language. Three short daily programmes are sent as audio files in the Quechua language. Since many of the participating radio stations did not have large computers they made use of local *cabinas publicas* (community internet access points) to download audio files and convert them onto audio cassettes for broadcasting over the local station. The communication channel is two-way with local stations forwarding their programming to other stations.

Programming costs and the price for retrieving information onto cassettes are the only costs incurred making this an extremely cost effective service.

Email is heavily used to send information with over 2000 subscribers in 54 countries.

Subscribers range from governmental and non-governmental organisations to, media production organisations and universities who also benefit the project by sending their information to Pulsar.

'Best Practice' Guidelines

Funding.

Total cost is estimated at \$100,000 per year. 40% goes to cover salaries, 12% communication costs and 6% to pay correspondents. Pulsar did not anticipate becoming self-sustaining in the first years of production. Providing information that is 100% free of charge requires that funders step in to pay for the operational costs.

It is anticipated that future funding of the project will be sought from advertising though they are unclear about the exact shape this will take though there are novel ideas being put forth.

Source: Alfonso Gumucio Dagron (1998).

Communications Strategy

Director Bruce Girard 'For years there had been a demand for a radio news agency, but only recently has the technology made it possible. When we started Pulsar there hadn't been any formal requests to do so. Frankly, I think that if we had waited for the grassroots, we might still be waiting' 'Our analysis was that there were very few stations with email, and that there would continue to be few unless there was something available for them to convince them to buy the equipment, get the account and undergo the training'.

Language and Content Development

With the objective of providing Latin American news service and local language content provided over the Internet in audio Pulsar provides an audio service in the predominantly oral language of Quechua and news pertaining to the cultural diversity of the region.

Training

There are a number of training opportunities offered by Pulsar. These include an electronic discussion list, and published guidelines for radio broadcasters *Cartilla para Corresponsales* that provide advice on programming, editing, equipment, and information on using audio attachments. Additional information is available on their websites.

Pulsar periodically provide training workshops for relevant groups.

Promoting ICTs

One of the goals of Pulsar is to promote new communication technologies to enhance the

subscriber network and create awareness surrounding ICTs. To this end they developed promotional material on computer disc 'Viaje Virtual which was sent to 350 radio stations. The website also carries explanatory information.

Sustainability

One of the goals of Pulsar is to promote new communication technologies to enhance the subscriber network and create awareness surrounding ICTs. To this end they developed promotional material on computer disc 'Viaje Virtual which was sent to 350 radio stations. aspects for evaluating Pulsar are emphasised Technology; the technology used should be evaluated over time with a view to its appropriateness and to making use of new technological developments. In addition subscribers from smaller stations without direct access to the new technologies should be encouraged and supporter to obtain these facilities. Information; Ongoing evaluation of the content, topics and the quality of professional programming should also be considered along with the use made of programming material. It is not the intention of Pulsar to replace local production but to bolster it.

Policy

The political objectives of Pulsar - to contribute to democratisation of communication in Latin America should provide a framework for evaluating the contribution Pulsar makes to news broadcasting.

Lessons Learned

In this instance waiting for radio stations to come online before suggestion an Internet solution would not have precipitated them coming online. This project tried to stimulate demand by giving radio stations a reason to get connected with new information technologies.

Remarks

Bruce Girard sees broadcasting over the Internet as an additional vehicle for radio stations to interact and share programming. So whilst their audience may only be the wealthy and those outside Latin America the stations themselves would have better interaction and a possible platform for simultaneous broadcasting.

Sources: Any errors are the responsibility of the above authors and not the sources below.

Email communication and attachments sent by Bruce Girard, Founder and former Director of the Agencia Informativa Pulsar (25/11/99)

1. Girard, B. (1997) 'Pluralism, radio and the Internet' translated from Spanish this article originally appeared in Chasqui, La revista latinoamericana de communication No 59 Sept 1997.
2. Girard, B. (1998) 'Reflections on an evaluation of the Agencia Informativa Pulsar' translation of the article Pulsar : Dos anos de radio e Internet, originally published in Spanish in Chasqui, No 61, March 1998 Quito, Ecuador, CIESPAL.
3. Lorencita Pinto B (1999) 'Combining the radio and the Internet or how

community radio promotes the participation of citizens'. Paper presented at the ITU/FES Regional Symposium on emerging sound and TV broadcasting Technologies shaping the Americas broadcasting sector. Santiago, Chile 26-28th August 1999.

Alfonso Gumucio Dagon (1998) 'Pulsar: Radio, Internet and Democracy in Latin America'. Paper presented at The Rockefeller Foundation, Cape Town Meeting 6-10 October 1998



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Case Studies

Multipurpose Community Centre Nakaseke , Uganda

This project is a 3-year sponsored Multi-purpose Community Telecentre begun October 1997 and Inaugurated March 1999. It aims to provide information and communications to rural communities catalyses their development leading to general improvement in quality of life. This is part of a wider joint effort by UNESCO, IDRC and ITU working in Uganda, Tanzania, Mali, Mozambique and Benin.

Organizations Involved

Ugandan commission for UNESCO, Ugandan Public Libraries board(UPLB) Uganda Telecom Ltd (UTL) [formerly: Ugandan Post and Telecommunications Corporation], Nakaseke Local Councils and the communities of Nakaseke.

Donor Agency

UNESCO under DANIDA Funds-in Trust, in partnership with IDRC, ITU, British Council

Costs: US \$427,243

Background

Uganda is struggling to build economic progress after 10 years of relative peace and democracy. GDP per capita has risen over the last decade and plans for modernisation of the infrastructure and institutions marks an important step towards ensuring economic and political

stability.

Uganda's health, education and communication structures are in need of modernisation. The discrepancy between urban and rural services also needs attention. This project had the specific aim of bringing ICTs to the rural community of Nakaseke.

Situation Analysis

Nakaseke was chosen, as it typifies an unconnected rural but is sufficiently close enough to Kampala (50km) for ongoing monitoring. Information and learning needs survey was conducted April 1988 sponsored by British Council. This identified specific needs or core user groups, content and possible contribution of the community, and a structure whereby the community could participate in the implementation process.

Solutions

Two major components identified as

The Library, printed material, newspapers, radio and video cassettes, public photocopying facility and space for holding workshops and seminars

Telecommunication services (2 phones), a fax, printer and scanner, email and Internet access. Arrangement for a Tele-medicine service has been made

Results

The implementation phase required a lot of renovations and installation of new telephone equipment and electric or solar power. This greatly hindered the project in Nakaseke)

According to Mona Dahms of Aalborg University in Denmark, who visited the centre in September 1999 there are a number of lessons to be learned from the telecentre experience in Nakaseke.

Despite high usage of the library facilities there was a large demand for local language material and appropriately packaged information for non-literate people, in particular farmers, which was not being met. This raises the issue as to whether the telecentre is serving the needs of the whole community of mostly those who have the educational and financial ability to use the centre. 'Making the local knowledge explicit and communicable would increase the collective body of knowledge in the community, i.e. organisational learning would take place. In the process of learning, knowledge generated outside the community would be more easily integrated into the tacit workhabits of the local people, thereby contributing to the collective learning process'

the dichotomy between 'information rich' and 'information poor' as is often referred to in documents (e.g. UNDP, Mansell and When) is over simplistic.

Taking the example of a highly skilled IT person in the west and an highly skilled farmer in the South the degree to which both these people are rich in knowledge and wisdom regarding their

own specialisms

Photocopying is the most popular service with people paying US\$ 0.04 per page. The two phones (one inside and one outside the centre) charge US\$0.21 per minute. They have approx. 15-20 callers per day mainly calling the capital Kampala. The fax machine is the least used service.

Computer training is a key service area. A least 100 people have been trained between March and September 1999 (mostly hospital staff, secretaries and secondary school students). Courses offer 30 hours of tuition for US\$14.29.

Lessons Learned

High illiteracy rates amongst the target community made the sensitisation and awareness raising process very slow

Lack of available and ready premises for the telecentre. Community had donated a building but it was not able to house the equipment of provide a conducive reading environment for the library.

Absence of sufficient telecommunications connectivity. There was poor quality fixed telephone line; the telecentre location was 16km away from the nearest telephone pole.

Lack of electrical solar power.

Need for locally relevant applications that draw from the daily aspirations and working practices of the community which is the reason for the telecentre and the root of its expected sustainability.

Brain drain of trained volunteers finding paid employment with their newly acquired skills. Whilst this is a positive step for the volunteers there are so few volunteers that training has to begin again over-stretching the managers time.

It appears the equipment was available before the community was ready for it.

The technology appears to be propelling this project. Greater community awareness raising is required.

Networking of existing and planned initiatives in promotion of rural connectivity should be promoted.

Remarks

Stakeholders should be consulted at every stage of the development to make sure a technology driven project does not disempower the community.

Focus should be placed on localised telecentre applications that meet the specific needs of the target communities and the different needs and requirements of those communities (e.g. agriculture, business entrepreneurship, rural community development and extension service as well as literacy campaigns. This is the only sure way of facilitating ownership, relevancy and sustainability of telecentres.

Consultation and sharing with other actors in generation and creation of telecentres is useful.

Specialised departments; research institutions and NGO's were very responsive when asked to collaborate.

Communication strategy is vital to launching activities, especially in rural areas, demonstration of the telecentre concept and technology helps the community make the necessary links between their livelihoods and the possible uses they can make of ICT tools.

Persistency and consistency are needed as well as a high level of concentration when implementing a telecentre. In rural Africa basic infrastructure is not readily available and where it does exist it might not be able to support data communications or allow you to run computers.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. per written by Meddie Mayanja (Nakaseke Pilot Project, Uganda. Presented at the BICA conference in South Africa 22-25 February 1999.

<http://realserver.itu.ch/BICA99/sp6.html>

2. Project Document 'From the Ground Up' The planning and implementation of the Nakaseke Multipurpose Community Telecentre.

3. Dahms, Mona (1999)'For the Educated people only Reflections on a visit to two Multipurpose Community Telecentres in Uganda' Paper appears in Telecentres Evaluation: Global Perspective. A report of an international meeting on Telecentre Evaluation. Ed Ricardo Gomez and Patrik Hunt, IDRC. Far Hills Inn Quebec, Canada. September 28-30 1999.

<http://www.idrc.ca/pan/telecentres.html>

4. Telecentre focus group meeting 28/10/99 African Development Forum, Addis Ababa. 24-28 October 1999. Reporter: Clare O'Farrell.



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Case Studies

Telecentre Projects, Mexico

To provide public information databases and information and communication technologies to

communities in Mexico

Organizations Involved

Programme for Sustainable Development (PORDERS) Ministry of the Environment, Natural Resources and Fisheries and the Anthropology Department of the Autonomous Metropolitan University, Iztapalapa, Mexico.

Donor Agency.

Ministry of the Environment, Natural Resources and Fisheries.

Background

The North American Free Trade (NAFTA1993) brought increased pressure to bear on rural producers to become market orientated and proactive towards competing on a global scale. They became particularly vulnerable in the light of cheap imported food and feed grains. The retreat of government support to small-scale producers meant civil society organisations NGO's were obliged to consider new channels to solicit and disseminate information.

A number of local producer organisations and their supporting NGO's struggling to sustain their business had led to the adoption of Internet technology. These new tools are conceived as one set of mitigating instruments in the context of the current structural adjustment policies and global competition. Demand for Internet tools has grown slowly because of the lack of timely and affordable value added information.

There is little more than governmental presence on the web. Virtually all sectors of the Federal government have WebPages though the information is not sufficient to resolve contacting them by mail or telephone.

Situation Analysis

Political polarisation epitomised by the 1994 rebellion in the southern states of Chiapas fragmented municipalities into pro and anti government authorities. A few NGO's rose to the occasion to supply public domain information to rural areas. The Rural Information Network (RIR) www.laneta.apc.org/rir/ is an example and another Sustainable Development Network (operating with UNDP support) www.rds.org.mx.sirds/ constitute key antecedents of the Telecentre initiative in Mexico.

Digital technology has only penetrated rural areas for entertainment purposes. Nearly all villages have video arcades predominantly populated by younger males.

Gender roles are linked to employment with most public libraries being generally considered feminine spaces. It is hoped that by situating Telecentres within public institutions such as libraries, schools create a role model for young women.

The Telecentre initiative in Mexico was interpreted as more than a communication tool but as a centre of public domain information.

Solutions

To create locally relevant information databases in order to amplify non-confidential public domain information.

To establish rural Telecentres at a cost of around \$3500 each. This would include one

computer with access to the Internet and an Internet subscription account. Some costs would also be directed towards training.

To recruit Telecentre support groups including collaborating with public institutions like libraries that would eventually take responsibility for managing the centres thus making them locally sustainable.

Negotiate approval with local authorities

Conduct historical and ethnographical surveys for the creation of databases and online profiles of each municipality. Additional online information also collated from census data, etc. from official sources.

Directing user-training programmes including responsibilities for management and technical maintenance of the Telecentres.

Results

In early 1997 seven Telecentres over a six-month period were set up on the rural towns on the periphery of Mexico City. A small team (5) of social anthropology graduates were responsible for locating Telecentre venues and recruiting potential managerial groups. To date the Federal District Government (GDF) has pledged to continue the project and expand service delivery. Internet accounts were taken up with nearest ISP. Only three of which had local dial up exchanges the others incurred the cost of a long distance telephone call.

For the next phase in December 1997, a total of 16 Telecentres were opened. 13 of which were in towns and run by local institutions and the remaining three were in smaller towns in the surrounding regions all within the State of Michoacan. 7 of the 16 Telecentres have not received their promised telephone lines.

By 1999 two Telecentres remain in operation with the third folding due to the high cost of the dial up connection.

Two Successful Examples

1. Los Reyes Telecentre (population 60,000) this project benefited from an influential figure (a champion) co-ordinating the Centre as well as the town being an important hub avocado producers. The Telecentre linked producers with potential markets thus showing an immediate and successful application of the tool.

2. Uruapan (population 150,000) earns most of its income also from avocado. The Telecentre is situated within their library of the town's Cultural Centre. The Telecentre is frequented by youths and business people in the town and run by a young female librarian. It is believed the success of the Telecentres relies on a high demand for its services amongst the professional and students keen to keep it functioning and financially able to patronise it.

Lessons Learned

Criterion for selecting Telecentre venues:

Staff committed to the project

Collaboration of local support organisations

A secure location

Telecommunications access.

Lack of Success attributed to;
Changes in important 'decision makers' both within PORDERS and the Municipal authorities affected the fate of the Telecentres. New appointee's had to be convinced about the projects.
Reduced budget due to failing oil prices
No tariff agreement for ISP and call charges.
Timing -Subsequent time delays and problems incurred during this start up stage (as detailed above) severely affected local attitudes and motivation for the project.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Robinson Scott S. (1999) n estimating Telecentre Demand in Mexican Rural Municipios. IDRC: Working Session on Telecentre Evaluation. 28-39 September 1999. <http://www.idrc.ca/pan/teleentres.html>
 2. Telecentres in Mexico: The First Phase. Paper presented to the UNRISD conference 22-24 June 1998. http://www.unrisd.org/infotech/publicat/robi/robi.htm#P78_13875
 3. Robinson Scott S. (1998) Telecentres in Mexico: Learning the Hard Way. Paper presented 'Partner ships and Participation in Telecommunications for Rural Development: Exploring what works and Why'. University of Gulped, Ontario, Canada. 26-27 October 1998. <http://www.devmedia.org/documents/robinson.htm>
 4. Robinson Scott S. pers comms. Anthropology Department, Autonomous Metropolitan University Iztapalapa, Mexico. ssr@laneta.apc.org
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Case Studies

Grameen Village Telephones, Bangladesh

Grameen Phone, Bangladesh

Organizations Involved

51% -Telnor (Norwegian, State owned telecommunications company)
 35% - Grameen Telecom (Grameen Bank of Bangladesh)
 9.5% Japanese Marubeni Corporation and
 4.5% Gonophone (USA based private company).

Donor Agency

1996: Grameenbank, NORAD.
 1999: Additional funding from Worldbank, Commonwealth Development corporation, the Asian Development bank and Soros Economic Development fund

Background

Bangladesh is one of the poorest countries in the world with per capita income of \$USD240 (1998). Agriculture accounts for 32% of GDP and more than two thirds of all employment (Source Bayes A. (1999) Approximately 53% of the population is illiterate, over 80% live in rural areas and about 47% live below the poverty line. Telecommunications in Bangladesh are restricted to urban and surrounding area serving about 10% of the population. Until 1996 the Government operated a monopoly telecoms industry. Licences were granted for cellular phone to 4 operators, one of which was Grameen bank. Teledensity 0.26:100 compared to India: 1.0, Nepal: 0.5, Pakistan: 2.1. Customers have a 5-year wait and \$500 fee for a new telephone installation. There is a skeleton infrastructure spanning the country that is mainly access by the wealthy.

Situation Analysis

Lack of appropriate and timely information is one of the main causes of inequality

Lack of access to information impedes development.

Grameen Bank has been successfully providing micro-credit (small loans) to entrepreneurs too poor to qualify for traditional bank loans. A typical Grameen loan provides capital for self-employment projects specifically targeting the poor.

The structure of that loan is such that borrowers repay small amounts in line with their income, whether they purchase a sewing machine, a cow or a mobile phone.

Bangladeshi government opened up telecommunications market by offering cellular licences in 1994

Solutions

1996 - Grameen were granted cellular licence for mobile phones and began operating early in 1997. Initially this served those in the capital Dhaka

1998 - The other major cities had connection and some of their surrounding areas.

Grameen borrowed money to purchase the mobile phones and construct the network.

Rural female borrowers were chosen for the pilot scheme on the basis of their previous success rate in repaying Grameen loans.

Women were specifically targeted to be the beneficiaries.

Results

A small impact study was undertaken by ZEF, University of Bonn to determine the early effects of rural development and poverty reduction both on the owners and the users. Sample participants: 50 out of possible 80 phone owners and an estimated 27% users (excluding owner/users). The study found the following impacts:

1. 15% of the users are the rural poor
2. Phones are most used to exchange market price, business and health and kinship information.
3. Phones provide economic benefit directly to the phone service providers and indirectly to the users.
4. Phones also have social impact raising the status of the women providers or 'phone bari's' as they call themselves.
5. It is believed that the phones also strengthen kinship relations with those working away from home.

6. It is also believed that the phones specifically help women in the villages by providing them with access to phones they might not use if the service providers had been male.

Creating awareness and empowerment towards technology is an additional factor mentioned.

Lessons Learned

Mobile phones can be considered as a core, capital investment for an entrepreneur.

Mobile communications are part of an emerging 'service sector industry'.

Access to information on agricultural produce can have significant impact on pricing and subsequent incomes of farmers.

Access to telecommunications can strengthen kinship relations and thus add to social wellbeing of rural communities.

The pilot study is relatively insignificant in terms of geography and the population benefiting from the study. The test sites are also comparatively close to Dhaka.

Further research is needed into the possible adverse effects of the mobile phones. Particularly those who do not use the service.

Issues of replication have yet to be discussed.

"Grameen has invested \$80 million in order to implement its innovative cell-phone leasing service to 100,000 customers in 250 villages. But Bangladesh has a population of 120 million spread throughout 65,000 villages.

Extrapolating from the impact of this investment Hans d'Orville estimates an \$80, billion investment would be required to deliver countrywide cell-phone access in Bangladesh.

The widespread publication of the Grameen Phone is also a useful example of the spread of research project publications over the internet. Many people have heard of the project despite the relatively minute impact on the Bangladeshi population. There is the danger that research published on the web might gain more credence and publicity than the project actually warrants.

Remarks

Issues of replication have yet to be considered although the rate of replication within Bangladesh appears promising. Whether other countries can adopt this model is questionable.

The study clearly 'piggy backed' on the micro credit system that was already in

place. This means the organisational structures for giving out the phones and most importantly administering the loans and collecting repayments was already functioning successfully under the micro credit scheme.

Countries wishing to adopt the Grameen project should consider the means of collecting the revenue from the phones.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Bayes, A, Von Braun, R. Akhter, A (1999) Village Pay Phones and Poverty Reduction ZEF Discussion Papers on Development Policy. No 8 June 1999.
<http://www.zef.uni-bonn.de>
2. Qadir I (1998) Connecting Bangladeshi Villages.
<http://www.devmeida.org/documents/Qadir.htm>
3. Qadir, I (1999) Inventor of the village phone concept. Email communications.
4. Richardson, Don (22.11.99) email communications to Global Knowledge Discussion list. Archives on gkp@phoenix.edc.org. Report of his visit (with Ricardo Ramirez) to the Grameen project soon to be available on <http://www.telecommons.com>
5. Hans d'Orville (1999) 'Without new Taxes, IT math adds up to a new kind of poverty', *The World Paper* (USA) July 1999.



Information and Communication Technologies (ICTs) for Sustainable Livelihoods: Preliminary Study April - Nov 1999.

Case Studies

Meru Pilot Radio Project, Kenya

Participatory audience research to inform rural radio broadcasting in Kenya through 'soap operas' and magazine programming on agricultural issues. Jan-March 1993

Organizations Involved

The Agricultural Information Centre (AIC), Kenyan Ministry of Agriculture.
ODA (now known as DFID)

Donor Agency

ODA pilot project funding 1992 and subsequent funding in 1994

Background

The Agriculture Information Centre (AIC) produced radio programmes on behalf of the Kenyan Ministry of Agriculture however with the liberalisation of the broadcasting corporation programming was no longer subsidised. Programme producers had to seek commercial funding to cover the cost of their programming. This motivated the programmers to provide top quality programming that would address a wide range of farmers needs and thus attract larger audiences.

Situation Analysis

A pilot project was organised in the Meru region of Mount Kenya and funded by the ODA. This area was chosen because of the diversity of farming systems and ethnic groupings in the region.

A research team of 13 Ministry of agriculture technicians were nominated and received training in participatory approaches particularly to develop their listening and data collection skills. A checklist of issues and indicators to take to the communities was also devised. The participatory training was viewed as a crucial component to the audience research studies and the project overall.

Solutions

Audience research to assess the most effective ways for communicating through rural radio with a view to scaling up the results. Particular emphasis was placed on understanding and addressing the needs of female listeners.

The methodological tools included questionnaire to ascertain penetration of radios and ownership of the radio within households, focus groups and listening survey's which entailed writing down conversational content heard in daily interactions showing what was of concern to people on a day to day level.

Audience research and participatory approaches to content and programming development.

Findings showed :

Radio penetration 69% of rural households surveyed with only 7% having no access at all to a radio. Out of the 80% of radios owned by males only 17% of the women said that their access was restricted on account of this.

The respondents requested information on varied subjects not solely restricted to agricultural information. Some women surveyed requested programming that would create awareness of gender issues amongst the males listeners as well as information on family planning, livestock, health and income generation.

The use of drama, humour and music was also appreciated.

Each community surveyed requested programming in their mother tongue (there were six major dialects recorded within the area) which presented problems for the programmers. In the end it was decided not to broadcast in the community dialects in favour of Ki-Swahili for fear of prejudicing one over another.

Results

Women were selected to be AIC's prime target audience however they programmers had to ensure that the programme also appealed to male listeners so they could become more aware of gendered issues and also, in order to prevent some men turning off the set and restricting women's access).

Programmes are ready at least a week in advance of broadcasting (initial scripting begins six months prior to this. Evening broadcasting times were chosen for between 8:00 and 10:00pm according to the survey report indicating this is when women have more free time for listening.

1. *Ndinga Nacio* ('Hit me with it') radio soap opera launched Jan 1994 broadcast on Mondays. Scriptwriters were recruited from the area so they understood this issues at hand. Actors also from the same area so the voices were locally recognisable. The programme producer although based in Nairobi was also from the area. The drama format is able to raise awareness though presenting an issue and encouraging the listener to form his or her own conclusions on the subject. Different characters from the various ethnic groups have been incorporated into the drama. Sensitivity towards representation of all the ethnic groups was later found to be crucial to the success and wide audience for the programme. Broadcast at 8:30pm

2. *Mugugi ni Mwire* ('Those who listen, learn') is a sister programme, aired on Wednesdays, presenting more factual material relating to the issues raised through the drama. This also includes stories from 'roving reporters' in the field and a 'Tip of the Week' slot. Broadcast at 8:00pm
These programmes are repeated on Friday evening on Kenyan Central service.

Subsequent Programming Developments

The success of the pilot project led to further programming for broadcast on the National Kenyan Broadcast Service

1. *Tembea na Majira* ('Move with the times') drama programme

2. *Sikisa Uerevuke* ('Listen and be enlightened') factual magazine following on from the issues raised in the drama.

These programmes are aired on Mondays 8:45pm and Wednesdays 8:00pm receptively and repeated back to back on Sundays.

In an effort to be more self sustaining AIC has attracted clients who will pay a proportion of the programming costs to have their messages aired through the programming such as GTZ presenting agricultural information relating to farm management and Plan International's awareness raising campaign on HIV and AIDS.

They have also made attempts at soliciting commercial advertisers such as 'Key Soap' as their listeners are also the target audience for this product.

Lessons Learned

Participatory approach to understanding the audience. Its tastes, topical issues and listening preferences.

Informing content through ongoing feedback from listeners

Generating funds from development orientated clients.

Sensitivity towards local voices, though it dos raise debates about programming specifically for the diverse ethnic languages in the area.

Remarks

It could be argued that the shift towards commercial programming prompted a more responsive and more attuned programming in meeting farmers needs. This factor also suggests that the previous programmes receiving government subsidies were not at their best. However, it is not difficult to deduce that the drive to attract commercial sponsorship in the field of agriculture could influence the programming content orientating it more in line with the agendas of the advertising sponsors than the farmers themselves

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Lloyd Morgan, K & Mukarebe (1998) 'Kenya: experience with rural radio.' The Rural Extension Bulletin June 1998 AERDD, The University of Reading.
2. Dr Patricia Norrish (Pers Comms). AERDD University of Reading.



Information and Communication Technologies (ICTs) for Sustainable Livelihoods:
Preliminary Study April - Nov 1999.

Case Studies

Information Systems Pilot Project, Cajamarca, Peru

Began: 1998

Organizations Involved

Intermediate Technology Development Group (ITDG)

Donor Agency

Worldbank *InfoDev* programme.

Costs : US \$250,000

Background

Cajamarca is a rural area with a population of over one million people. The region is rich in natural resources and there has been a recent trend to diversify production, including manufacturing and agro-processing.

The Cajamarca Municipality does not have access to essential services and has historically received little attention from the state. In addition there is now a move to devolve power to the local authorities. However, small-scale producers and local authorities have limited access to relevant information concerning economic development. And improved local management.

Situation Analysis

To contribute to rural development by raising production capacity of small producers including crop and livestock, agro-industrial, artisanal and manufacturing and improvement of the administrative performance of local public sector authorities including mayors, councilmen, municipal authorities, agriculture, health and education representatives, industry and tourism.

There is a need to promote local development in Cajamarca. One way to achieve this was to increase local producer and local authority access to information for their respective activities.

Solutions

Baseline survey completed in 1998/9 and contributed to the design of the information service to be provided.

To design and implement a system to provide information (technological, legal, financial) to rural, small-scale producers (and local government.

The information system will be administered by the Cajamarca Municipality and/or other local Producers Association, with the support and technical supervision of ITDG.

Results

First information centre was operational May 1999.

A central Co-ordination Centre was established at the Public Library where 10 public cabins have a dedicated line to the internet. There are also four information centres for Rural and Urban Development (CIDUR) in the towns of Shiraq, La Encanada, Chanta and Llacanora. These access points contain one computer with a dial up connection to the Library at Cajamarca. Four other municipalities have also signed agreements to take part in the programme. From a number of these town access points there are also mobile units (Mobile information Unit for Urban rural Development, CIMDUR) The mobile unit contains a computer, with access to the internet, video projector, photocopier and written information. One mobile unit now employs a teacher (responsible for the rural libraries) and a sociologist (responsible for public communication) - both with a good knowledge of the local information needs.

Lessons Learned

It is hoped that the pilot project will generate a methodology for implementing information services for other areas in Peru and elsewhere.

Remarks

This project is in its infancy. There are no details regarding a system for evaluating the impacts and effects of these Information Centres. There is no information regarding the cost of accessing the information and whether this is an affordable sum for rural people. It is also unclear how the project will become sustainable.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. ITDG project Documentation and Summaries
<http://www.itdg.org.pe/infodes>
2. Worldbank InfoDev Site: Case Studies: Cajamarca
<http://www.infodev.org/projects/funded.htm>

Personal Communications:

3. Maria Stuttaford / Andrew Scott (ITDG) andrews@itdg.org.uk
4. Miguel Saravia (ITDG, Peru) miguel@itdg.org.pe



Information and Communication Technologies (ICTs) for Sustainable Livelihoods:
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Case Studies

Upper West Commerce Association, Wa, Ghana

Upper West Commence Association (UWCA). Tod Bruning. & Reena Patel
From 1996 to August 1999
After this the project hopes to be self sustaining

Organizations Involved

UWCA, USAID

Donor Agency

USAID

Background

UWCA was formed 1993 to promote business development in the Upper West area. A grant from the small project assistance (SPA) in USAID enabled equipment to be purchased (2 x IBM compatible computers running windows packages).

Later Grant from USAID, Africalink programme to provide internet access for 2 years.

Situation Analysis

Upper West area was been suffering from population decline as people moved to main cities Accra, Kumasi.. The project is sponsored by Upper West Commerce Association (UWCA).

UWCA believes that it can have the most impact in the region by expanding the use of email: First, it opens up communication for people. Next, it allows people access to information that would not easily be available. Finally, it gives people the opportunity to develop business and education contacts abroad.

Solutions

This is a small computer-training centre (3 computers) one with Internet access. The sole instigator and motor behind the project is Mr Todd Bruning uwca@ighmail.cc working for the Peace Corps in Ghana. He developed the training programme himself.

To facilitate cooperation between the private sector and government.

To promote the Upper West region to encourage migration, investment and government support.

To promote export activities nationally and internationally.

To increase effectiveness of local businesses and encourage new start up enterprises through training programs and support services.

Specific targets for the Business Communications Centre:

1. To provide subsidised computer literacy training for 25 people by end of 1998 and 100 more by 1999.
2. To use internet to establish connections between local artisans and international markets.
3. To cover expenses through income generation activities in the centre
4. Commercial business services such as fax, telephone IDD, photocopying, and computer access. To use the revenue from these services to subsidies computer literacy training and public internet access.

Results

The project was in grave danger of folding before the second USAID Africalink grant as Todd is finishing his coming to the end of his contract in Ghana. Part of this grant was spent on a UPS providing power to three computers for 1.5 hours per day.

Total cost \$5,000 plus \$66 for rent and utilities. Telecoms are a separate charge. Some extra equipment has been purchased by revenue generated by fees from the training classes.

A link was created to enable weavers to market their products through the Peoplink site < <http://www.peoplink.org> >

There is a high demand for the training classes with about 3 month waiting list in 1998.

Update 1999

Negotiations with Ghana's leading Internet service provider Network Computer Systems (NCS) has led to UWCA effectively becoming their own ISP and offering dial up connection to the surrounding area including the local hospital.. This alleviates the long distance calls to Accra and allows for more links with other hospitals etc. The new role requires costly outlay for additional space and maintenance to make the location weatherproof and properly wired.

Some Anecdotes

"First, it opens up communication for people. For example, one of our regular customers has a sister in the states who is assisting him in building a small house. By using the email he is able to advise of the goods he needs to purchase and the costs involved. She in turn is able to advise when and where the money will be sent. What before would have been a very expensive phone call or taken a month to transact via the post office is now done in less than 2 days at a cost that is the equivalent of 75 cents".

"Next, it allows people access to information that would not easily be available. A man who works at the local bank had applied to a school in Oklahoma. He got a letter via post office that he had been accepted and he had a few questions. We emailed his questions and got a response on the same day. Here we are in a town that is a minimum 12 hour bus ride from the capital and we can get a response from an admissions office in Oklahoma within 1 business day"!

"Finally, it gives people the opportunity to develop business and education contacts abroad. Many people in town have contacts outside of Ghana, but to correspond was both expensive (telephone) and time-consuming (post office). One of our customers used email to speed up their admission process to a university in Australia. Simultaneously, he was co-ordinating with a friend in Australia via email on funding sources".

From: Reena Patel, UWCA (update report sent via email).

Lessons Learned

Only case study to provide financial breakdown of the telecentre earnings and out-goings.

Peer training proving a useful technique. Most have gone on to gain employment.

They are advertising on the radio to market their services.

Actively seeking sponsorship and explaining their plight to the ISP providers resulted in them gaining their own server.

Role of the centre manager is very important to the life of the centre. Ms Sauda Mohammad was one of the first students to receive training and returned to run the centre after 2 years working in a local mining firm. She mainly teaches computer applications. A co-ordinator is also employed to train basic computing skills.

Remarks

The challenges they faced were:

- i) Acquiring qualified personnel to run the centre.
- ii) Generating enough local demand to cover subsidy costs and depreciation.
- iii) Problems with infrastructure (electricity and phone connection).

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. ITDG project Documentation and Summaries
<http://www.itdg.org.pe/infodes>
2. Worldbank InfoDev Site: Case Studies: Cajamarca
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Information and Communication Technologies (ICTs) for Sustainable Livelihoods:
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Case Studies

Coffee Growers Co-operative, Guatemala

Coffee Growers, Guatemala Begun: September 1995 end: September 1998

Organizations Involved

Canadian Centre for International Studies and Co-operation (CEDI) and local collective farmers association.

Donor Agency

USAID

Background

Barillas-Huehuetenango regions in northern Guatemala near the Mexican border. Population has high number of settled refugees who have fled Mexico or other parts of Guatemala because of conflict or political repression.

Coffee and cardamom and to a lesser extent, corn are the main crops grown. The farmers association was failing.

Situation Analysis

Collective farmers association floundering.

Farmers harvested coffee beans rather than cultivating produce.

Non existent or inconsistent market information meant farmers sold to middlemen without being aware of the selling environment.

Solutions

Revitalise the collective farmers association (and network with other organisations).

Market pricing information sought daily via the internet from the New York Stock Exchange website. This information was translated by the association into local currency and disseminated equally to all farmers.

Technical, production and post-harvest training along with management training given. Information on trends in the market.

Results

Changes in the prices received for Coffee. Democratisation of economic information has eliminated distortion between local and international coffee prices.

Production and processing techniques. Some quantity and quality improvements were observed but longer time needed to generate conclusive evidence. Organisational methods. 731 active members in the ASOBAGRI farmers association serving 1/3 of the households in the region. It is self-sufficient org its assets have increased four fold since the start of the project.

Lessons Learned

Daily information of world prices for even the smallest producers in remote areas helps balance their production and allows them to be responsive to supply and demand trends. Monopoly of middlemen is reduced although they are not put out of business.

Partially processing their coffee produce helps them increase the value of their commodity but also gives them the possibility of spreading or postponing their sales. Better commercial skills, credit sales.

Local organisations are important for harnessing information, making it locally relevant and disseminating it amongst its members.

It is vital for small-scale producers to group together to acquire adequate services (information, training, negotiation and organisation skills).

Remarks

The use of information and communication technologies has partially solved the age-old problem of incomplete market information'. From the above case study other factors such as community dynamics, responsiveness to new information and extensive further training also contributed to greater efficiency in coffee production.

The pricing information did not directly result in an increase in the value of coffee itself but resulted in a more even distribution of the value between the growers and intermediary buyers.

The new technical and organisational training did however increase directly the incomes of the farmers as they produced more coffee more efficiently.

Through the new information systems trends and consumer tastes e.g. for organic coffee, have led farmers to adopt these growing practices simply because they will get a better rate of return for organic produce.

This case study shows a solution to a particular problem. Each issue for communities must be considered first and a specific solution sought. Although this suggests quite high possibility of being replicable elsewhere. Compare this situation with the fisher-people of BOBP. Market information would not change the price they sell their produce for as they are bound by credit agreements with traders to sell at a required price regardless of market differentials. Leads to a stronger argument for national broadcasting of coffee prices for farmers.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Alain Grimard 'World Development Report 1998: Knowledge and Information
2. Alain Grimard pers comm by email (05/26/99) GrimA@rswinc.com



Information and Communication Technologies (ICTs) for Sustainable Livelihoods:
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Case Studies

Agricultural Information Resource Centre, Northern Territories, South Africa

Proposed Agricultural Information Resource Centre in Northern Province, South Africa. Began July 1998

Organizations Involved

National Department of Agriculture (NDA) CABI international, University of Pretoria (Agriculture and IT Dept)

Donor Agency

IDRC

Background

Agricultural policy in South Africa advocates a sustainable livelihoods approach where access to sufficient food, resources, training, and employment. Particular emphasis is placed on resource poor farmers. National Department of Agriculture has been revamped with new management and structures and more emphasis on regional provincial departments. Farmers associations and NGO's are playing a stronger role and the universities are beginning to seek direct links for their research outputs. This context sets the scene for delivery of agricultural information to rural farmers housed within a community managed information centre.

NDA's Directorate of Communication has a mandate to meet the information needs of rural farmers through audiovisual services, public relations and information (library) services. The nation has quite reliable telecommunication service and many internet service providers. There are extensive radio networks and television broadcasting channels as well as print media. The task is to harness these technologies for appropriate delivery and use by rural farmers.

The concept of multi-purpose community Telecentres has been developed by the Universal

Service Agency (USA) and Department of Communications in S. Africa to address the information and communication needs of the country. These initiatives have not been specifically focused on the agricultural information needs and culture of rural agricultural communities.

Situation Analysis

Stakeholder information Baseline survey and community workshops held in region to ascertain community access to ICTs and determine information, communication and training needs (perceived or not).

Survey also included information on current information service providers (phoneshops and postal services). What services they provided and what new business areas if any were they developing.

The baseline would act as a yardstick for later ICT projects in the area. It also helped develop a methodology for assessing ICT needs and deficits.

FINDINGS concluded that the culture of isolation and information deficits that this region suffers must be replaced with a culture oriented towards addressing information and communication needs. Technological solutions are not enough with as much investment and a great deal more time needing spent on building a community that can make use of ICTs for their own gains.

Telecentres are part of the new service industry and should be encouraged to become consumer driven and market orientated.

Workshop in the area brought together the stakeholders to provide a platform for the establishment of a pilot project to provide a self sustaining information centre to support the agricultural community, especially farmers. The workshop findings outlines the model for the establishment of a local information centre.

Solutions

Multiple stakeholders agreed to the establishment of a pilot information centre using local independent structure with full community participation in decision making, planning and needs analysis.

Centre would be managed by the community with a key employee as a manager and local contact point. CABi would be involved to in the planning and implementation stage. Networking with local public and private sector, NGO's, associations' etc.

Target audience would consist of a mix of end users and local intermediaries. As well as awareness raising within the area.

Sustainability is expected to be achieved through marketing of the service to maintain participation, encouraging entrepreneurs and through a process of monitoring and feedback to continue tailoring the services to the local needs.

Little mention here given regarding appropriate measures for financial sustainability.

A combination of traditional and existing media is expected to be available with advice sought from local intermediaries about appropriateness of differing media.

In the first instance the information should be agricultural in nature

Results

Funding anticipated early April 2000
Business model to be refined.

Lessons Learned

Good example of
best practice approach to stakeholder survey's
multi-stakeholder capacity building towards a defined goal.

Remarks

This project is also an example of the difficulties encountered by project managers when the Inception phase (creating initial awareness, getting organisations on board and motivating the community) is not followed directly by funding for the next installation stages.

Sources: Any errors are the responsibility of the above authors and not the sources below.

1. Workshop Report on Agri Information Resource Centre (Northern Province, South Africa 9-10 Nov 1998)
2. Stakeholder Information Baseline Survey (Eastern, Northern Cape and Northern Province) South Africa September 1998.
3. Feasibility Survey for Web based Agricultural Information System, South Africa. Ben Fouche Associates for NDA.
4. Margot Bellamy (CABI) UK, pers comms.
5. Bed Fouche, email communications.