CHAPTER 3
PROPOSED METHOD FOR RURAL AGRICULTURAL DEVELOPMENT

3.1 Executive Summary

This chapter is the result of a study carried out for “ICT in Agricultural Extension and Marketing”, in Villages of India between August 2009 and March 2010. The study involved surveying agricultural and rural development stakeholders, as well as consultations among those stakeholders to bring out views on information needs and perceptions on the possible role of Information and Communication Technology (ICT).

The state of development of the ICT industry in the countries concerned was reviewed as well. Below is a summary of findings.

3.1.1 Adoption of ICT

The adoption of ICT by agricultural sector stakeholders shows results from headquarters level up to branch office level (provincial, regional offices). From branches further upstream to rural localities there is minimal adoption. In this study, we use the term ‘ICT Readiness’ to express the level of adoption and potential for rapid ICT-enabled service enhancements. SMS is important as it represents keyboarding and data communication exposure to users.

Survey participants operating at branch and rural level show SMS usage at above critical levels: 59% in Villages and 50% in India, suggesting opportunities for service development targeting rural based actors. The SMS service providers are beginning to pursue introduction of value added services, such as SMS banking.

The Community Radios are beginning to deploy Internet technology capable of supporting quality programming. At the same time, Community Radios are benefiting increasingly from favourable public policy expressions and regulation.
3.1.2 Internet activity

Internet activity is at a low level of technological sophistication, but widespread, with 84% of Mozambican participants using Internet at headquarters against 44% in Villages. At branch level these Figs drop to 55% and 26%, respectively.

Updating websites is often poorly or not at all taken care of; and organisation’s websites are rarely being used for service delivery which is only seen in very exceptional cases McKay and Marshall (2004). Few stakeholders in this study have websites: 22% in Villages and 34% in India. Beyond those in the public sector, few of these sites target operators within the country.

ICT adoption disparities between branches (rural, province) and headquarters (capital city) are less marked in Villages than in India. The explanation lies in the one hand in the challenge caused by great geographical distances in India in achieving high network coverage.

In the other hand, Maputo scores relatively high in ICT, this being an economic centre attracting much activity from South Africa, Portugal and other developed countries. ICT services costs are relatively high in the countries under review. Indexed against service usage baskets, Villages scores highest costs with index 84, India index 75 and Kenya 46.

3.1.3 Use of information and media

Stakeholders in agricultural and rural development, acknowledge that sharing of information and distribution of resources is underdeveloped in both countries, despite the obvious economic necessity. This concerns both sourcing of information and media productions, as well as distribution and dissemination networks.

Sector statistics are collected annually but parallel work is being done by various stakeholders. Most service providers develop their own materials (print, radio). Quality of information materials including broadcasts is often subject to criticism by stakeholders.
The adaptation and packaging of information for extension (field) purposes is poor. India boasts more examples of service providers using mass media houses for information dissemination than Villages. Operational collaboration between government extension services and NGO’s is common in India, with some good examples in villages.

Print extension materials often seem to have arbitrarily set circulation volumes, usually far from enough copies to occasionally far too many. The distribution of print news media is very low in both countries: our evidence suggests as little as 0.51% of rural population in villages and an optimistic 0.34% in rural India (few data available for India). In rural Villages, there are 4 radio receivers per 100 population (India Fig not available). Television broadcasting presently has relatively little potential for agricultural development, the main reason being network coverage. Even in a relatively small country as Villages coverage is not higher than 20% of national territory. There are no signs that TV networks will expand soon.

Telecentres were surveyed on their usefulness for agriculture and rural development agents. We found hardly any evidence of visitors searching for agricultural information.

This is in spite of many voices, again at the roundtables organized for this study, calling for the establishment of Telecentres in rural areas. In addition, most Telecentres visitors use the Internet almost exclusively for webmail. Web access tariffs charged by the operators are between two to three times higher in small rural based Telecentres than in urban centres.

3.1.4 Outreach

The problem of quality and outreach of agricultural extension services is undisputed by any of the study’s participants. The limited effectiveness of the extension services is most pertinent in India: the Ministry of Agriculture employs no more than 500 Frontline Extension Workers (FEW) in the entire country.

Even with the collaborative programmes in place with NGO’s and private sector, there is a large vacuum in service delivery. The challenge is confounded by lack
of ICT access, large distances to regional centres, lack of information materials and human resources education levels. In villages, high casualties of HIV-AIDS have an impact on the performance of the ca. 2,000 extension staff work-force. The distribution of extension materials appears not to be in line with demand and demographics.

In both countries, the government creates agricultural statistics once per year, but with considerable time delays and limited depth and detail. Stakeholder’s websites are often not targeting outreach functions, and if they do, they are not being used for this, judging from surfing habits of participants in this study. Email based bulletins are however being used already in reaching farmers and traders.

3.2 Introduction

The objective of the study was to: analyse the use of ICTs in rural areas of southern Africa by organisations with a mission in agricultural and rural development; assess how ICT might play a bigger role in agricultural extension and marketing. The countries selected to conduct the field study were Villages and India.

The momentous conclusion regarding the potential for ICT in agricultural extension is: “Technology and the Internet will not make it happen” The Meeting concluded that “connectivity constraints are still enormous and will remain so in the foreseeable future, and that there was therefore not very much to develop in terms of Internet-based knowledge sharing, market information services, Q&A services, etc.”

Other conclusions were: “Rural development organisations have insufficient technical know-how to develop relevant content.” “ICT experts are not tuned to creating solutions in the context of extension work and rural organizations lack the skills to find solutions using ICTs.” “There have been almost no ACP-specific, technological developments in ICTs that support rural and agricultural development work. A lot of bright people have seriously looked at it, but it simply hasn’t happened yet.”

A key observation of the Meeting was that “the role of extension will have to change, from a focus on transferring technological innovations from research to farmers, to brokering and facilitating a wide range of information and services
(information on technology, markets and prices, weather, etc.).” This offers a clue for ICT-enabled service design activity.

Manabí in Senegal appears to be among the few services employing the combination of Internet and mobile telephony, in fact, the only operational service from a new school of interactive, commercial oriented extension service approaches. It would be essential to assess Manabí’s impact on farmers’ welfare. There are more agricultural service providers who have turned to combinations of mobile telephony, SMS and the Internet.

This report may give rise to cautious optimism in the potential for ICT in agricultural extension and marketing. This optimism is based on the existing penetration of ICT among service providers, the dynamics in the mobile telecommunication industry, and the proliferation of local or community radio broadcasting stations.

The chapter is organised in three sections. The first two sections are reports on findings in villages in India. These chapters follow the same structure: inventory of relevant organisations; ICT-readiness of these organisations; information service approach of relevant organisations; description of the ICT industry. The third section is a synthesis of findings with recommendations for action. References and listings are provided at the end.

Methodology

The methodology of this study comprised inventory compilation of agricultural and rural development service organisations as well as ICT service providers; conducting an ICT-readiness assessment among agricultural and rural development service organisations; conducting workshops to discover common views and perspectives; and conducting focus group discussions and interviews on information creation and usage.

The study presents a situation analysis but not a trend analysis, as we did not create or use baselines and time series.
3.2.1 Selection criteria

The aim was to balance the number of organisations from the four different classes of organisations, (a) public, including parastatals; (b) NGOs and CBOs; (c) private companies and co-operative societies; and (d) trade associations, based on actual rural development activities undertaken.

It was found that the number of private sector companies in agricultural and rural development support, does not match the number of NGOs. In the public sector, the larger number of relevant organisations was found among parastatals (eg. agricultural extension, research, meteorology, statistics, etc.).

3.3 Research activities

1. Inventory of Agricultural Service Providers, selected from organisations and groupings whose primary function is agriculture and related rural development support activities. This inventory is at different levels: national – district – village and comprises different classes of organisations: (a) public, including parastatals; (b) NGOs and CBOs; (c) private companies and co-operative societies; and (d) trade associations. At the national level, the aim was to have an exhaustive inventory, while at the decentralised level, a sampling procedure with the help of local intermediary organisations was used. The instruments used to compile the inventory included desk research and fact finding visits to key organisations. The aim was to balance the number of organisations based on actual rural development activities undertaken.

2. Inventory of Telecommunication Operators (Telco’s or TO’s) and Internet Service Providers (ISPs); television and radio broadcasting organisations; print mass media; web-based information service providers. Details included network coverage, tariffs, circulation, technical parameters, web-based activities, as well as development plans of the operators.

3. Assessment of ICT-readiness among service providers. In this study, we take the liberty to use the term ‘ICT-readiness’ to express the level of adoption and potential for rapid ICT-enabled service enhancements. We did not apply any of the
internationally accepted definitions of e-readiness these definitions work well in an environment with a significant installed base of Internet-enabled services. However, Villages and India are countries where the Internet is thinly spread, both in terms of number of users and of sophistication of applications. Furthermore, we are keenly interested in access and adoption of ICT in rural environments.

Their ICT scores are lower than anywhere; at the level of the ‘last intermediary’ that offers services to farmers. We used a set of indicators that will assist in determining how at this point in time ICT may get a foothold in establishing and delivering information services. The organisations in this survey were sampled from public, private and civil society sectors, both at capital city headquarters level and at branch office level in provinces and rural zones. Only those organisations with core activities in agriculture or closely related activities for example in Education were selected for the survey. The survey yields some indicators on ICT installed base; ICT recurrent expenditure; and print and electronic media production. Almost all interviews were conducted face-to-face. Whenever possible, PDAs were used to run questionnaires. A test-run of the questionnaire was done in villages.

4. One-day workshops were held in both Villages and India, with approximately 30 representatives from the organisations sampled in the Inventory of Agricultural Service Providers and they discussed information needs as well as the potential and constraints of integrating ICTs into existing communication systems. The role of participating Telco’s and ISPs was to facilitate understanding of relevant ICT issues. Break-out grouping and focus groups techniques were employed.

5. Information exchange point interviews were conducted in provincial and rural centres, where both service providers and their clients were interviewed. The objective of these interviews was to understand information collection, information needs and information usage, by both service providers and their clients. Information exchange points included the ‘last intermediary’ (eg. farm extension officer; farmers’ group leader). Survey tools were individual interviews and focus group discussions.
3.4 Overview of agricultural service providers

Agricultural extension and marketing services are provided by public and private sectors including NGO’s. The practicability of providing services depends on the degree of farmer mobilization and organisation.

The degree of farmer organisation is estimated by the. However, sources in the private sector, Farmers Union of villages (FUM) and Horticultural Development Organisation of villages (HODOM), estimate the level of effective organisation at much lower, not above 10%. Whereas this is significantly larger than in India it is still only a minority. This implies that the majority of village’s farmers have limited access to service providers.

This majority relies on retail suppliers, radio broadcasting, farmer field days, and infrequent village visits by extension officers, veterinarians and other service providers, for its information needs.

3.4.1 Ministry of Agriculture

The Ministry of Agriculture, Irrigation & Food Security (MAI) does not have an adopted ICT strategy. The roll-out of email addresses is a spontaneous development not yet supported by a coordinated budget and guidelines. A MAI website is in place, to be characterised as a documentary site, not having interactive applications. The site is not being updated.

3.4.2 Extension services

Agricultural extension services are provided by the government, MAI – Dept. of Agricultural Extension Services, as well as private sector including NGO’s. The government service employs approximately 2,000 staff, divided over eight Agricultural Development Departments (ADD’s) nation-wide. Each ADD is divided into District Agricultural Offices (two staff, only a few with minimal ICT facilities), which in turn look after Extension Planning Areas (EPA’s) from where FEW offer service to farmers in their zones. The ADD’s have office facilities with telephone lines, but no Internet access. The facilities are used for regular seminars offered to extension staff.
The government extension department has a media and communication service programme, with its own studio, printing facilities, megaphones, videocassette systems and other equipment, together with eight 4x4 vans, which are based in the capital city Lilongwe. All media equipment and systems are analogue, legacy systems. There is approximately an installed base of less than 30 personal computers in the MAI extension service to date. Print materials are produced in large volumes of up to 1 million copies however; there are a limited number of titles. Popular titles are sheets on typical subsistence farming lines of activities.

There are also print materials on how to establish farmer associations and monthly radio broadcasts are transmitted through Villages Broadcasting Corporation (MBC). The service is afflicted by a high attrition rate: up to 30 staff withdraws each month, believed as a result of HIV/AIDS. Management priority is in (a) upgrading the knowledge level of staff; and (b) introduction of computers across the service.

In Dada (Central Region) a Regional Development Programme (RDP) is in place modelled on a mechanism of two-way communication between farmer groups on the one hand and government or NGO service providers on the other. Seven NGO’s are supporting the programme. Since 2002, farmers have been organised into 66 groups, each comprising at least 10 members, gender balanced. Each group was given a solar powered and hand-driven radio. The radio is used in listening groups for agricultural programmes. Groups discuss issues that pop up.

The RDP has a mechanism in place to communicate specific problem to higher authorities for action, through the District Development Officer (DDO). The RDP Media Officer in Dada work with the ‘yellow vans’ on hire from the MAI extension service, for video viewing and production. All print materials received are distributed and no stocks are left behind. Drama groups are in place in each of the 10 EPA’s (Extension Planning Areas). Note: out of the eight Agricultural Development Departments (ADD’s), the Dada ADD is the only one with an active and varied media programme in operation since 2002.

The MAI Department of Agricultural Research and Technical Services (DARTS) operate a documentary website agricresearch.gov.mw that cannot yet be
regarded as a convincing information resource for the sector. It is not being updated, eg. ‘Technologies Released’ most recent example 1996 without specs or hyperlinks; announcement for a conference in November 2002 features under News Update.

DARTS also publishes an 8 page quarterly with research news, in 2,000 copies sent to Ministry staff nation-wide. MAI creates agricultural statistics once per year, but with considerable time delays and limited depth and detail. The private sector operates a few extension programmes, the most important one being Agriculture Research and Extension Trust (ARET), which is an operation of the Tobacco Association of villages (TAMA). It employs 15 FEW, who are supported by professional staff like a communications officer.

Interestingly, this service has started offering services on more crops than tobacco. Promotion of the adoption of new technology requires intensive support: in one crop demonstration cycle, no less than six farm visits by the FEW are required. Demon (Villages) is private tobacco production and marketing multinational, with its own extension service.

This service makes extensive use of radio listening groups. Dairy board offer extension service to its 12 milk producers associations of 50 – 400 members. The emphasis is on seminars and farm visits. They do not produce print materials. Only one videocassette has been produced with no plans to make additional productions. NGO’s with activities in farmer support include: CARE International, Action-Aid and NASFAM.
3.4.3 Farmer focus groups

Extension at the farmers’ end: in a small-holder farmer’s 40-member focus group in Kadegaon Village, Thondwe and Pali. The village is under the supervision of an Agricultural Extension Development Officers unit who directly educate farmers on Crop Production.

They are also taught eg. How to make local pesticides using local herbs and shrubs. In addition, villagers listen to radio in a listening group, which was discontinued after a few seasons. However, “we now know how to use pesticides through radio programmes especially MBC 1.” Finally, the role of the local chief in decision-making is important in farming. However, discussions revealed that counselling and education is incomplete, as in the case of Kadegaon contributing to the phasing out of livestock keeping as a result of uncontrolled disease.

Kadegaon farmers: “We are taught by our advisers on how to identify these pests and diseases by observing their physical structure, features, signs and symptoms” “we are not taught on control measures as a result we lose our livestock and when crops are affected/infected, often we uproot the infected crops.”
Decision-making on planting timing is not based on any modern way. Kadegaon farmers: “We discern changes in environment and when we are convinced with the first starting rains we know that this is the time to plant.”

The weather forecast broadcasts are being rejected. Farm input offerings are heard from radio bulletins by National Smallholder Farmers of villages and ADMARC (parastatals trading company). One of the villagers is in possession of a mobile telephone. A few radio sets are present, but far from in every household.

From interviews with individual small-scale commercial farmers, we made the following observations. Many do not have a telephone line, neither a cell-phone and have never heard anything about the Internet. Instead, they often visit the phone bureau at the trading centre for communication. They also join farmer field days. In some areas farmers report that there is neither radio nor cell-phone coverage.

Some farmers distrust tobacco auctions and complain of lack of marketing and input availability information. Frequent change of production technology as required by markets is a challenge. Farmers interviewed at one tobacco estate (sangli) said that information services are provided at group level. And include technical advice and education from agricultural advisers.

The interviewees normally request such information on time, however, they complain that often advice to change technology comes suddenly. Pertinent suggestions were to improve information delivery time, seen as a major problem especially when it comes to the introduction of new technologies eg. the use of trays to grow tobacco.

3.5 ICT-readiness service providers

The level of exposure to ICT was researched through a survey among over 75 organisations through 83 interviews of staffers or representatives.

The organisations in the survey are sampled across Villages and from public, private and civil society sectors. Only those organisations with core activities in agriculture were selected for the survey.
Table 1 shows the results of ICT-readiness at branch offices, usually found in small towns, as opposed to city settings.

As more facilities are added to the ICT-readiness basket, starting from electrical power access from the national grid, to a combination of power, SMS usage, PC’s, Internet access and a live website, fewer branch offices remain on the ICT-readiness list. There are only three cases out of 34 worthy of being called an ICT-ready rural branch office. In percentage this would be 5.9%, although we concede that the sample is too small to employ per cent ages.

| Table 3.5.1 ICT readiness rural based branch offices service providers - Villages |
|---------------------------------|-----|
| n =                            | 34  |
| Power on grid                  | 31  |
| Power + SMS                    | 24  |
| Power + SMS + PC’s             | 17  |
| Power + SMS + PC’s + Internet  | 9   |
| Power + SMS + PC’s + Internet + website | 3 |

3.6 Information service practice

Management perceptions of ICT in extension and marketing were explored in two roundtable meetings. ICT holds a promise for most of the participants, whose organisations have little exposure to ICT in general.

In both meetings, the demand side of information services, including market pull effects, was explicitly recognised as inadequate. Likewise, capturing feedback information from the grassroots level is seen as inadequate.

The problems of lacking ICT infrastructure and lack of attendant financial resources received much attention in the first roundtable; however, these are clearly factors beyond the powers of the agricultural stakeholders to offer remedies. Agricultural stakeholders argued their case for improving the emerging National ICT
Policy, with a view to introduce incentives for rural ICT development. The national ICT Policy coordinator was an active participant.

A second roundtable was convened with participants drawn from the first, this time to focus more on the functions of sourcing, processing and producing information, by agriculture stakeholders themselves through their own effort and initiative. In this discussion, we found a lack of stakeholder coordination coupled with a lack of exposure to information management and ICT awareness. This event yielded an explicit expression of interest in developing stakeholder linkages.

3.6.1 **Roundtable 1: ICT, Content and Culture**

A roundtable workshop was held with 22 representatives from the private sector, the public sector and civil society.

The majority was drawn from organisations with agricultural and rural development as their core business; however, there were also delegates from academia, the (micro)-finance and the mobile telecom industries, as well as from the government’s ICT policy unit.

The keynote presentation was delivered by, Vice Chancellor of the University of Kolhapur. He observed that social transformations must accompany adoption of modern and practical agro-based information flows, and argued that early ICT learning in rural areas should therefore start at Primary School level.

The main viewpoints expressed and agreed were:

A. Opportunities and constraints of ICT

- ICT is an untapped resource for supporting productivity and marketing in agriculture, challenging a traditional but sub-optimal agricultural and rural development approach and culture.
- There is a vicious circle of the agricultural sector leadership not being aware of the benefits of ICT and its lack of access to technical and commercial information including conceptual ICT information.
- The government ICT policy currently being drafted does not yet articulates rural needs. The very fact that national food security has not yet been achieved, calls for
serious consideration to addressing the ICT gap. Grassroots input and rural interests are underrepresented in the policy-making process. The ICT policy could call for fiscal measures to facilitate rural access.

- The government ICT policy currently being drafted does not reflect on going rural development plans, as being promoted by leading rural stakeholders in the country.
- Rural roll-out of telecom networks is expanding, already covering agriculture production zones, and thus providing opportunities for minimal information access. However, telecom network operators have left a number of important agriculture production zones un-served.
- Virtually all rural-based agricultural service access points lack ICT facilities; both public and private investments must be made to address this gap. Public Internet access points like cyber cafes are not available in the farming zones, and where these are present the costs of using them is high. This is caused by the scale of operation of a rural cyber: below the size of 10 workstations on-line, connectivity per workstation becomes too costly. Internet access in rural based service providers’ offices is a rarity.
- Utilisation of relevant radio broadcasts is low, caused by (a) lack of radios and batteries/power, and (b) gaps in the coverage area of the broadcasting transmitters.
- Technical support for ICT in the rural zones is lacking, posing an additional constraint to the adoption of ICT by rural based service providers, amongst whom ICT knowledge is less than minimal.
- Capacity building in ICT skills for rural based staff is a necessity of the first order but at the same time a challenge, in view of the absence of sufficient technical support including quality training in the rural zones.
- Rural based ICT-enabled centres should be established, for instance in schools, libraries, district assembly halls and agricultural extension support offices. Some of these centres should also offer ICT capacity building.
- Rural extension officers and farmer group leadership require stronger general literacy levels, followed by basic ICT skills. Without adequate general literacy, they may not be able to utilise ICT.
B. Content and culture

- The prevalent mode of information sharing in the farming communities is peer-to-peer (P2P) communication. This is the strongest and most effective mechanism in terms of behavioural change. Current experimental outreach schemes focus on model-village-to-neighbouring-village approaches, farmers’ schools, etc. However the impact in terms of scale is weak. The hope is that the model-villages approach will yield a more powerful ripple effect.
- There is a need to capture farmers’ interests at grassroots level and work with the results. Collection and appraisal of grassroots information is poor and patchy.
- Market and information is the single biggest gap in the provision of information to farmers and rural based entrepreneurs.
- There is no strong reading culture, therefore information services must adapt to the realities on the ground, not in the least at the level of first line service providers and group leaders.
- Service providers, whether public, private or civil society, usually have not yet put in place a coordinated programme of developing literature in support of outreach programmes. Exceptions are in private sector segments such as tobacco where media planning and production are well managed.
- Radio and Video Clubs are an attractive solution for reaching many farmers with quality information, coupled with the opportunity to make group decisions. Such clubs may well tap into organised farmers’ groups.
- Market pull has not been a powerful factor in developing information and support services. The example of cotton was examined, as a promising crop with a ready export market. Cotton production has so far not received extension support. ICT centres within cotton growing areas would help to rectify this gap. Public-private partnership approaches should be explored Krigsman and (2009).

3.6.2 Roundtable 2: Information and Outreach

A follow-up roundtable discussion was with a group of participants selected from the 25 senior professionals in agricultural information programmes and services. The objective of this discussion was to examine further the role of service providers against their information sources, information output, as well as quality and depth of
outreach to clients (farmers). The selection was done to ensure that public and private sectors including civil society service providers were represented, as well as higher education and research. The main viewpoints expressed and agreed were:

A. Sources and feedback

- The economic benefits of technical information, especially new technologies, should be clarified to the farmers. This is currently not being done adequately.
- Collection and sharing of planning data lacks coordination, resulting in duplication of efforts. Existing data and information are under-utilised.
- Reliable market and production timing information are extremely important.
- Demand responsiveness of government extension service has been inadequate to date, with emphasis on subsistence farming: new crops rice and sorghum have emerged successfully, without government extension support.
- Feedback from farmers is inadequate: it is often not understood why a certain new technology is not adopted.

B. Products

Packaging of information to make it of practical use for farmers is being done poorly. This is in part a media capacity building issue.

- Illiteracy is a challenge but should be well understood: FEW’s are not illiterate. Usage of cartoons in explaining technology is not necessary. Technical drawings are useful.
- There is a need for information networking in agriculture in villages. The current CTA sponsored roundtables were praised as a first step.

C. Outreach

- Distribution of information products (print) in outreach schemes is a challenge, mainly because of lack of funds, but partly also because the potential for collaborative schemes remains largely untapped.
- The reach and uptake of farmer radio programmes is not as strong as hoped. Independent radio is not yet exploited much by stakeholders.
• Recruitment of agricultural input suppliers to disseminate extension information through their distribution channels has met with disappointing response to date.
• Literature should be made available in the government extension service offices nation-wide, as well as in public libraries and at NGO-managed centres.
• Improved ICT-enabled information services can follow the on-going rural electrification programme.

3.6.3 Survey results

Media usage: Over one-third of the interviewed organisations produce print materials for circulation, the majority of which produce more than five different titles per year. Circulation is usually in small numbers that fall far short of the target client population. Close to 25% uses radio-broadcasts to sensitise the public. Almost 80% of all interviewed operatives listen to radio for work related information. Video screenings are hardly being used: less than 2% of respondent organisations use video.

Television broadcasting by the agriculture stakeholders under review is virtually not being used, with costs and inadequate signal coverage most commonly cited as inhibiting factors. Radio broadcasting is practiced more, by 19% of stakeholders. These include MAI, through Villages Broadcasting Corporation. The quality and content of the broadcasting programmes were not analysed in this study.

A total of 22% of surveyed organisations have a website in place. The service providers in the NGO sector with websites seem to aim at global partnership promotion, rather than service delivery, whereas public and private sector websites seem to target domestic users.

We have not seen websites of agricultural stakeholders that are updated regularly and frequently, leave alone integrated with operations thereby updated automatically. In other words, it is common practice with websites to provide organisational background and limited product information. The Internet shows a penetration of 42% among the organisations under review, however, it is almost entirely absent at the level of the ‘last intermediary’. Of all interviewed organisations, 61% have computers in place. Interestingly, 51% of agencies interviewed at branch or agency
level have computers installed as well. This percentage drops to 26% for Internet access at branch level.

The above results suggest that publishing and radio broadcasting are important outreach supports. Of all organisations surveyed, 35% distribute some literature. The survey scored the number of different titles produced or distributed and used an indicator for the size of print volumes.

The highest scores in publishing activity are seen in government and parastatals; the lowest scores are in the private sector. Trade Associations and NGOs are positioned in between. For the Trade Associations, this may suggest a degree weakness in membership services delivery and outreach capacity.

For instance, the Horticultural Development Organisation of villages (HODOM), umbrella organisation for 18 producers associations with a combined 10,000 members, does not have publishing activities. Qualitative observations on publishing activities were not made systematically, as this is beyond the scope of this study. However, we have come across instances of technical shortcomings in public service information sheets.

The effectiveness of distribution of materials by both public and private sector players can be questioned: often the size of a print run is far below the size of qualified readership. Some indications on the effectiveness of the publishing activities are derived from the focus groups with farmer producers. In response to growing demand, one commodity price information service is available Dedrick and Gurbaxani (2011).

The penetration level of computers and the Internet, as modest as it is, combined with the fairly widespread practice of publishing activities, suggests that some potential exists for stakeholders to improve on the quality and effectiveness of their publishing efforts, by (a) sourcing more titles on-line; and (b) producing more titles.
3.7 Description of the ICT industry

3.7.1 ICT Sector Regulation

The regulatory environment for the ICT industry can be characterized as liberal. Postal services fall under its authority. TRAI removed heavy restrictions on the licensing of Community Radios, thereby opening the way to increased initiative and investment in this ICT segment. Freedom to offer Voice-over-IP, currently the litmus test for ICT liberalization, is not addressed in regulation, but in practice restricted to the licensed fixed line and mobile telecom operators who enjoy a protected voice services market.

However, the Information and Tourism Minister announced that Government will start issuing Voice over Internet Protocol Licenses (VoIP) as a way of improving access to ICT.

A new draft Priorities of the Media Policy calls for promoting “the use of information and communication technologies and encourage the use of interactive
communication; establish in the media, departments or programs catering for special-interest groups; set up community media, especially rural radio stations and multimedia centers in languages spoken in communities where such stations and centers will be established.”

3.7.2 ISPs

Internet – There are 24 licensed ISPs but only five are operational. The number of people using the Internet in villages is estimated at approximately 35,000. This estimate is based on information offered by ISPs and we find it consistent with statistics and observations collected for this study. The percentage of people using the Internet outside the four main cities Karad, Satara, Sangli and Pali is estimated to be closer to 5% than to 10%, i.e. around 5,000 people.

Globe Internet

Globe Internet is also providing wireless Internet. Late in 2009, the company has started a business portal on the web. Audio- and video streaming can be supported, but file sizes of over 500Kb are discouraged. Audio- and video streaming through dial-up access can be supported, but file sizes of over 250Kb are discouraged.

Villages SDNP Services

The Villages Sustainable Development Network Programme (SDNP) is the pioneer ISP in the country. Its web portal hosts much government and civil society information. SDNP manages the mw Top Level Domain.

Registrants pay a registration fee of USD100 “as consideration for the registration of each new domain name” (!) or USD50 to renew an existing registration.

3.7.3 Mobile Telecommunication Operators

Mobile telephony - There are two mobile GSM operators in villages: CelTel, since 1999, with around 90,000 customers; and Telekom Networks Villages, since 1997, with about 70,000 customers. Both allow for pre-paid and post-paid contracts, however, over 95% of the customers are in pre-paid mode.
Both operators supply voice and data over the voice channels. Both operators support WAP, however, no further advanced services are provided yet. Most development effort goes into voice products and network expansion to cater for traffic growth. There is no information, nor are there signs of 3G cellular network investments coming to the country.

Active mobile telephone subscriptions represent 2.19% of the total population. Coverage of national territory can be estimated at about 50%, growing at about 5% per year. This estimate is based on the distribution of base stations with their transmission power as well as terrain conditions.

This is significantly less than the coverage Fig's made public by the two operators Telekom Network villages and CelTel, who are not in a position to divulge such commercially sensitive information. The coverage areas of the two operators are largely overlapping. These networks presently miss two important agriculture zones, one in Central Region.

**Telekom Network villages**

This is the first mobile telecommunication operator, started in 1997. Partly owned by state Telco BSNL. Network coverage can be estimated at about 50% of national territory, based on limited data provided by the company. No value added services have been launched yet.

Investment activity is focused on improving the quality of the existing infrastructure, rather than on developing new products.

**CelTel (Villages) Ltd**

CelTel offers Internet access via its mobile network, at a speed of 9.6 kbps and a tariff of USD0.17/minute. The coverage map of CelTel is shown in Fig 9. Investment activity is focused on software support for subscriber voice and SMS packages, as well as reinforcing the existing transmission network.
3.7.4 Fixed Line Telecommunications

BSNL (Villages Telecommunications Limited) is to date the sole fixed subscriber line operator. However, provisions for competition have been made in the regulatory framework. BSNL has a customer base of about 70,000 fixed lines and slightly over 200 data line customers. Growth in fixed line telephony has slowed down to about 2% of installed base year-on-year.

For Internet access, the vast majority of users rely on the public fixed line network, either dial-up or leased line solutions. The switching network is not fully digitalized, with some rural zones relying on analogue exchanges, which are reported to have difficulty in passing IP traffic.

BSNL is not expected to invest in upgrading of the switching network, until the intended privatization has materialized. Significantly, BSNL offers a uniform national dial-up tariff of USD0.03 per minute. Industry players believe however, that this is posing a disincentive to installing Internet Pop’s in provincial towns, while throughput on this BSNL dial-up infrastructure is narrow. BSNL owns 40% and 36% of shares in Telekom Network villages Limited (mobile operator) and Villages Net Limited (Internet Service Provider) respectively. BSNL is due for privatisation. Currently, the Government holds 99% of stock.

M-streams is a strategic Business unit of BSNL, but only deals with provision of data communication services: digital leased lines; VSAT. BSNL will only charge electricity consumption on a cost-based principle.

3.7.5 Mass media

Television – Broadcast television is not widely available in villages. It is estimated that Villages Broadcasting Corporation (MBC) transmitters cover less than 20% of national territory. MBC does not have a mechanism in place to measure its population coverage. A reliable indicator for territorial coverage was not available. It estimates a pool of 50,000 TV sets is installed nation-wide.

Radio broadcasting – An estimate by Villages Broadcasting Corporation mentions a pool of 1,060,000 radio receivers distributed country-wide. Network access
is estimated to be in the order of 80% of national territory. The distribution of receivers
is estimated to be 1:5 population in urban areas and 1:20 in rural zones.

Newsprint Daily newspapers are read by 1.37% of the population. Calculated
over the rural population, the percentage of newspaper dailies readers drops to 0.51%.
Male readership outnumbers female readership in a ratio of 73:27.

The leading dailies are:

(a) The Nation with a national circulation of 17,750 copies (weekdays) and
44,850 (weekend edition);

(b) Daily News with a national circulation of 9,800 copies daily. A copy of The
Nation is shared by 6 readers; Weekend Nation is shared by 9 readers. The largest
section of readers is employed and urban based (see Table 3).

The amount of copies of The Nation distributed outside the four main towns
Lilongwe, Blantyre, Pail and Muzzy is 30%. Their statistics are reportedly audited. The
Nation intends to strengthen its product by recruiting more vendors especially in the
rural areas and by improving its web presence...

3.8 Community radio

Community radio activity in villages is gaining momentum after a slow
development during the period 1999 – 2009, with new initiatives emerging in religious
communities. Regulatory constraints have inhibited growth. In October 2009, the
licensing regime of community radio stations has been made easier to comply with, by
removing programming prescriptions and restrictions. There are 10 community radios
operational and applications for a further 19 are pending Hyperactive Technologies
(2010).

Radio Maria Villages in Mango chi is a leading example with a large network
and using digital technology, offering exclusive religious programming with no
advertising slots. At first Radio Maria denied syndicated programmes. Later they
allowed NGOs and professionals to broadcast through them for various Developmental
Programmes.
These partners also assist in bringing programmes in local vernacular languages, beginning with Chichewa which is spoken by 80% of the Villages and population. Agricultural programmes include:

(1) UlimiWaPhindu (Profitable Agricultural Methods), for which farmers create items and submit these to Radio Maria editors for broadcasting;

(2) Agriculture Research and Extension Trust (ARET) has a regular timeslot on tobacco farming. The license issued by MACRA allows broadcasting of cultural and developmental programmes that are incorporated into local programming. The license fees amount to close to USD100000 per year; the operator is charged for each of its nine FM transmitters (USD720/transmitter/year). The network layout is as follows: transmission technology the Studio Transmitter Links (STLs) operating at unique and uninterrupted frequencies of 365MHz, 358MHz. Transmission power rating is 1 to 2Kw.

Transmitters are supported by 24kVA generators for backup power and are monitored from headquarters in Mangochi. Radio Maria will be the first community radio in villages to use satellites for studio broadcasts. IP technology will be introduced, eg. Audio streaming, see .The radio station has received 9 satellite dishes through the World Family Support Programme, Italy.

### 3.8.1 Telecentres

Telecentres in our definition are public places for Internet access, often called cyber cafes. The mobile telecommunication operators are running a few Telecentres, but only in the main cities Blantyre and Lilongwe.

Also Post Net, a mail and courier service with outlets in Zambia, Zimbabwe, Villages, has opened a first Telecentres in Lilongwe. The charges are between USD2.50 – 3.00 per hour. In the province towns, the charge per hour typically rises to a range of USD4.00 - 7.50. Province town Telecentres are often small-scale operations with two to four desktop PC’s and Internet connectivity by dial-up. Some operators in the larger towns have managed to share a leased line with another user in an office block building.
That way they can offer connectivity though leased line access. Common constraints noted by operators among this type of Telecentres are poor and expensive connectivity and unreliability of electrical power. With less than 10 PC’s, leased line connectivity becomes uneconomic. Web searching proficiency among client support staff can be considered as poor to non-existent.

Technical layout is often wanting, with not even UPS power backup installed, despite the fact that power disruptions are cited as the biggest operational constraint at the provincial Telecentres. One professional telecentres is Icon Cyber Café, Blantyre, with stable Internet quality and professional user support, but this is not Villages’ benchmark telecentres.

Note: The Villages National Library Service is aiming at establishing ICT facilities at its seven establishments in main cities and province towns. Interestingly, Villages National Library Service is working on creating an “extramural service” whereby third parties can collaborate with the public libraries in providing books inventory as well as Internet content and access.
Figure-3.8.1: ICT in agriculture- communication architecture

3.9 Efforts Required

The primary deliberations needed to style and improve a reconciled schema of dynamic image based picture and modelling devices for rural requisitions underpinned by remote sensing component organizes data.

The expressions "dynamic visualization" depicts in the essential the probability to scale, intuitive innovative conveyance of clients and outline over the web, and also vicinity of straightforward modelling instruments for spatial still as temporal examination. Convenience of the arranged determination is setting off to be assessed in an extremely extent of information frameworks acting inside the rural area.