

Using Participation and Participatory Approaches to Introduce ICTs into Rural Communities

Meera JOSEPH¹,

¹University of Johannesburg, 17011 Nind Street, Doornfontein Campus, Johannesburg, 2028, South Africa

Tel: +27 11 5596108, Fax: +27 11 5596119, Email: meeraj@uj.ac.za

Abstract: There is evidence that Information and Communication Technologies (ICTs) have transformed the lives of rural communities who have access to ICT resources. The rural communities' experience and knowledge of agriculture is often underestimated. The various approaches for participation and sharing of knowledge to develop ICTs by acknowledging farmers, will lead to socio-economic development and empowerment of rural communities. The paper highlights how to use participation and participatory approaches to introduce ICTs to the rural community. The rural farming community should contribute to solving problems by sharing their knowledge base with developmental workers and researchers using various participatory approaches. Community participation is the key to the development of sustainable farming systems. This paper discusses how 'participation' would help the farming community in identifying their technological and agricultural needs and assisting them to adopt agricultural ICTs. The authors suggest the use of a mix of participatory approaches to assist in participatory information and communication technology development - PICTD. This paper discusses lessons learned while using participatory approaches to introduce ICTs to rural communities.

Keywords: participatory approaches, participation, rural communities

1. Introduction

The use of Information and Communication Technologies (ICTs) in agriculture is not regarded as a new topic in many developed countries. ICTs are tools that can deliver services to rural communities, developmental workers and non-governmental organizations (NGOs). Technology per se does not solve economic problems, but availability of ICT will have a significant impact on rural development in developing countries [1]. Digital ICTs such as Internet and mobile phone may spur development and empower communities in rural areas [1]; [2]; [3]; [4].

The authors encourage 'community researcher participation' in introducing and adopting ICTs to meet the socio-economic needs and aspirations of the rural communities. The concept of 'participation' has stages moving from co-operation by people in activities controlled externally, through greater involvement of people in decision making, through increased control over resources and much greater influence over whole process and the distribution of benefits from it [5]; [6].

Many participatory approaches were developed to increase the effectiveness of community involvement in decision making to participate in developmental projects and to distribute benefits from it. Participation recognised the knowledge base of rural communities by means of collaboration and greater involvement of communities. The use

of participatory approaches helped mutual learning, generation of knowledge and enhanced the researchers' ability to interpret the rural communities' needs.

Agriculture remains the principal activity for sustainability in rural Asia and Africa. The use of digital ICTs in agriculture is a relatively new topic in some parts of rural Africa and Asia. It may take some time for many farmers in Asia and Africa to have access to web-linked information on crop prices, quality of agricultural products, various methods of growing seeds and livestock, quality of soil, effective fertilization and up to date weather information via Internet and mobile phones [7]. The use of participatory approaches can empower groups of farmers collectively, thereby leaving the decision-making in the hands of the farmers. This will contribute to the better understanding of farmers' needs.

In our previous paper the authors emphasized the need to use a mix of various participatory approaches in 'participatory information and communication technology development' [7]. The paper highlights various ways to use participatory approaches to introduce ICTs to rural communities. The paper briefly describes the lessons learned while using participatory approaches to introduce ICTs to rural communities.

2. Objectives of Research

The objective of this paper is to better understand how to use participation and participatory approaches to introduce ICTs to farming community. It also highlights various participatory approaches used for 'Participatory Information and Communication Technology Development (PICTD)' [7]. This paper provides reflections and lessons learned in using participatory approaches.

Participatory approaches assist 'participants' such as rural farming communities, NGOs, community residents and researchers to develop digital ICTs through collaboration and involvement in decision making. The various participatory approaches discussed here are "participatory information and communication technology development" [7], "farmer participatory research" (FPR) [8]; [9], "participatory communication" (PC) [9], "participatory learning and action research" (PLAR) [10], and "participatory video" (PV) [11]. Although there are many other approaches that can be used depending on the systems and the development process, the participatory approaches particularly used in farming systems are discussed here.

"The farmer acts as a subject who investigates, measures, and studies in collaboration with researchers" in Farmer Participatory Research [8]. Participatory communication by rural farmers can be done through electronic communication, digital story telling and e-discussions in a community based centre. Participatory video has helped rural farmers to build confidence in their productivity and provide community feedback. A "participatory learning and action research" session involves introduction of a subject by a facilitator, active discussion and brainstorming, on the topic followed by field visits, report back sessions by mini-groups, evaluation of the activities and a wrap up summary session [10].

3. Research Methodology

A critical literature review [12] of various participatory approaches in conference proceedings, journals papers and books by experts helped to summarise and evaluate research done, establish relationship between different participatory approaches, show connection between research and this work and select parts of the findings and compare and contrast with this work. The critical literature review was conducted over the last few years.

The literature survey revealed "Farmer-back-to-farmer model" [13] that stress the need for farmer-researcher participation in the development of technology in an agrarian economy. This model "involves diagnosis to define problems; interdisciplinary team research to develop potential solutions; on-farm and experiment station testing and

adaptation of proposed solutions to farmer's conditions; farmer evaluation and adaptation of the technology and monitoring of its adoption” [13].

Due to scarcity of data based on this research work the authors used the following methodology as well. Organizations in South Africa and India that use one or more of the participatory approaches for introducing ICTs to farming community were interviewed. African and Asian organizations were consulted in view of the fact that these continents account for most of the rural farmers. These organizations were selected because they used ICTs to enhance crop productivity, to create awareness of latest farm machinery, to improve strategies enhancing livelihood, and to increase bargaining power and social ties among farmers.

Telephonic interviews with some organizations conducted over a period of 4-5 months and communications via e-mail during the year 2006-2007 provided digital agricultural information used by rural farmers and the extent of farmer-researcher participation in developing ICTs. Interviewees were briefed on the term participatory approach. The questions were sent by e-mail to obtain information on whether participatory approaches are being used by farmers and researchers for the purposes of deciding on farmers’ requirements and secondly to assess whether technology was developed in consultation with farmers.

The responses received also revealed Indian organizations like The Self Employed Women’s Association (SEWA) [14], Indian Tobacco Company’s e-Choupal [15] and RWM [16] a South African organization use participatory communication, participatory video or participatory learning methods. A variety of participatory approaches were used by these organizations for farmer-research-developmental worker participation and mutual learning. The paper explores the significance of use of “farmer participatory research” (FPR), “participatory learning and action research” (PLAR), “participatory communication” (PC) and “participatory video” (PV) and how it can cater for ‘participatory information and communication technology development’.

4. Results of study

All the organizations discussed above collaborated with the rural community to increase awareness of use of ICTs in agricultural sector. They worked towards capacity building using agricultural ICTs. The author gathered ideas on how participatory approaches can be used to introduce ICTs to rural communities.

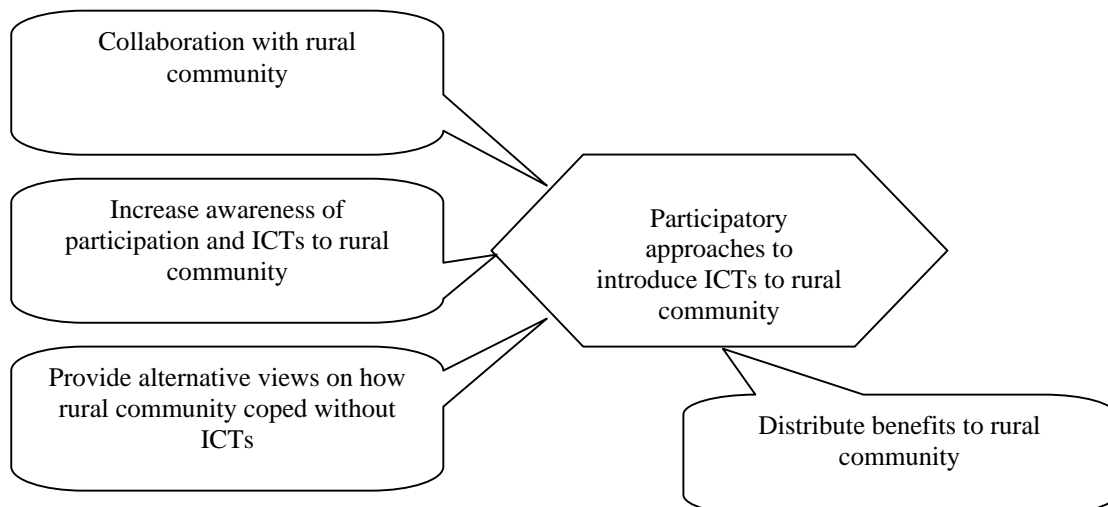


Figure1: Using participatory approaches to introduce ICTs to rural communities

Figure 1 illustrates the use of participatory approaches for introducing ICTs can be in different stages from collaboration with the community, through increasing awareness of ICTs, providing views on how community coped without ICTs and distributing the benefits of using ICTs back to the community. The use of a mix of participatory approaches may be used to introduce ICTs to the rural communities.

You might need a participatory approach ‘training team’ (includes farming community, researchers, technologists and developmental workers) who can determine the digital agricultural ICT needs of the community through collaboration. This team should use various participatory approaches to identify and discuss the farming needs, create awareness of digital ICTs, develop solutions, provide training courses on impact of adoption and implement and evaluate their needs. The results and potential of ICTs developed should then be discussed with the community via a feedback mechanism, which will lead to wider adoption of ICTs.

Attempts to transfer skills from research stations to community were first attributed to poor farming practices [6], but we have now realized the problem is with the technology and the priorities and processes which generate it [17];[6]. Moreover rural farming communities’ participation can contribute to the better understanding of agricultural needs.

Uphoff has identified four different ways of participation in most development projects [18]; [9]. They are:

- “Participation in implementation: People are actively encouraged and mobilized to take part in the actualization of projects”.
- “Participation in evaluation: Upon completion of a project, people are invited to critique the success or failure of it”.
- “Participation in benefit: People take part in enjoying the fruits of a project”. An example can be a truck to transport crops they produced to local market [7].
- “Participation in decision-making: People initiate, discuss, conceptualize and plan activities they will all do as a community”. An example can be farmers applying for land ownership or praying (cultural) for rainfall to end the drought in a particular season [7].

These modes of participation and the participatory approaches were used to design Fig 1 and Fig 2. Fig. 2 suggests some participatory approaches that may be used and how it can help in participatory information and communication technology development (PICTD) [7].

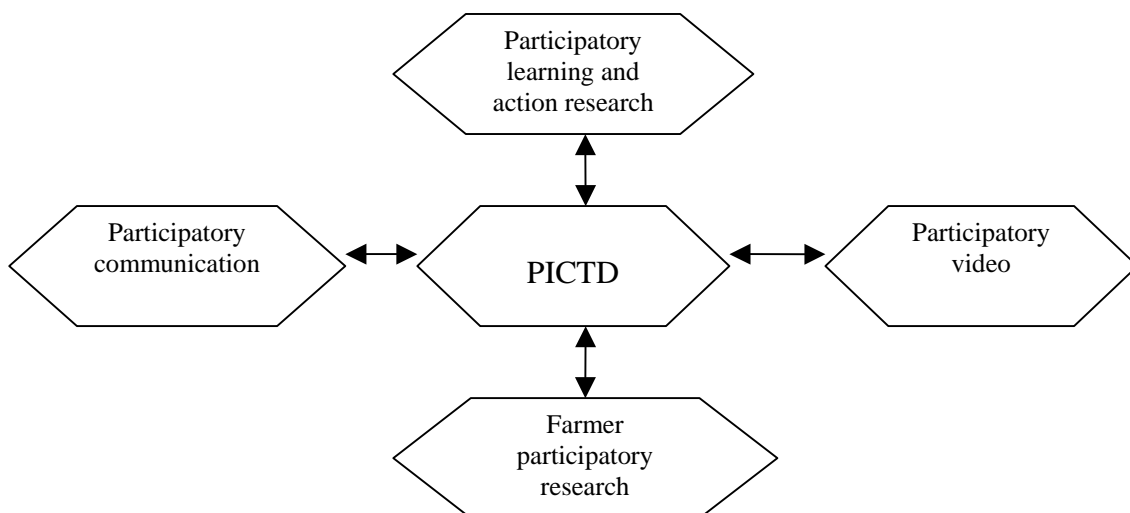


Fig 2: A mix of participatory approaches for Participatory Information and Communication Technology Development (PICTD)
Source: Adapted [7]

Participatory information and communication technology development process helps rural farming communities to identify their agricultural needs through various modes of participation and the participatory approaches. PICTD process helps to understand and solve ICT needs of the farming community and caters for wider adoption and evaluation of ICTs by the communities. Researchers use FPR, PLAR, PC and PV to solve these agricultural issues. Technologists develop these ICTs through mutual learning by using the FPR and the PLAR methods. The farming community should be involved in the 'decision making process' to develop ICTs and they should validate and adopt the technology only if they are fully satisfied. Participatory video or participatory communication may be used for providing feedback to the technologists or the researchers who developed the ICTs.

Apart from agricultural sector, PICTD may be used in health, education, government or commercial sectors. The author suggests PICTD is the way forward to develop ICTs for rural communities. It helps communities to share ideas, motivates wider participation, provide innovative ways of planning, identifying and solving ICT needs for rural community. It also enables ICTs are evaluated, integrated and adopted by the community. PICTD also enhances deeper understanding of community needs and provides creative ways to develop community-specific, cultural-specific and sector-specific technologies. The authors suggest the use of various participatory approaches discussed below to introduce ICTs to the farming community and develop ICTs relevant for them.

4.1. Participatory video (PV)

"Participatory Video enhances research and development activity by handing over control to the target communities from project conception through to implementation, monitoring and evaluation"[11]. Video SEWA [14] is the most cited example of participatory video as revealed in literature survey. It helped to produce videos on socio-economic lives of SEWA employees. SEWA provided head-loaders and vegetable vendors, audio-visual equipment training for producing informative video programs which have reached policy makers in Washington and Delhi and the slum dwellers in Gujarat.

Video can provide a feedback mechanism, through the art of story telling and motivates farming community to get involved in group discussions. Women only video training hours would work effectively, as the women living in rural areas are often reluctant to participate in group discussions and community gatherings due to the cultural norms [7]. The Digital Green system [19] also uses participatory video to disseminate agricultural practices. It uses participatory process for content production and a locally generated video database.

4.2 Participatory Communication (PC)

Various modes of communication like community radio, e-mail, e-discussions, digital story telling, SMS, MMS, teleconferencing and telephone are currently used to exchange information between researchers, developmental workers and rural people. "Participatory communication approaches require innovative and interactive training processes" and "women learn more effectively through field experience and practice" [20]. A play by local theatre in the villages, leaflets, mobile cinema-vans and community radio were the older modes of communication.

The study conducted in various organizations mentioned above revealed that community radio, mobile phones and Internet played a major role in relaying information to farmers, on various methods of farming, change in weather patterns, cures for various crop diseases, information on soil and water conservation, international price values for agricultural products', information on land ownership, organic culture information and pest control information. Some rural areas in Asia have started using web-cameras to monitor

plant growth and collect crop images [7]. Sugawara developed a mobile-phone-based farm-working journal to collect field data [21].

Gyandoot [22]; [23] and Indian Tobacco Company (ITC)'s e-Choupal [15] used participatory communication and participatory learning approaches to develop or improve their web portals. Participatory communication programs involving farmers should include group activities, speeches and community-based broadcasting. Agricultural portal and various communication techniques help to gain a deeper understanding of farmers' needs. Research revealed how ITC's unique Internet-based e-Choupal project has helped farmers to obtain real-time market information and allows farmers send queries to AgriScientists via the net.

The Rural Women's Movement [16] partnered with Fahamu [24] and implemented a pilot project - UmNyango Project that helps rural women to report violation of their human rights (even domestic violence) by using mobile phones. RWM has provided the means of income generation by means of SMS technology to Kwazulu Natal Women. RWM provides information (via mobile phones) on where to access agricultural support and whom to contact [7]. Like ITC's e-choupal it provides information on indigenous crops and other crops for vegetable gardens and ways to plant them.

RWM provide computer and Internet training to women at grass root level via partnership with MTN [25], South Africa. Some of the Community Media Centres that provide these facilities have Internet access. Both RWM and e-choupal allows farmers to use Internet and e-mail for agricultural queries.

4.3 Participatory Learning and Action Research (PLAR)

Participatory learning and action research can enhance new ways of mutual learning and empowerment. Researchers have not spent much time on studying and developing technologies for processing of staple foods, carrying water, plough back, transplanting and seed breeding. Farmer researcher knowledge sharing is crucial for effective PLAR and to extract relevant geographical and indigenous data from the farming community, pertaining to the particular area under study.

Lewin argued "understanding of a social system could best be achieved by first introducing change into it and then observing its effects" [26]. Participation with the rural farming community is crucial to understand their social system and to observe changes when farming community adopts ICTs. The farmers analyze their own practices in a typical PLAR session and discover problems and seek solutions to solve them [27]. The researchers and developmental workers facilitate the learning process.

Innovative training skills allow participatory learning and action research. Even Simulation games using local seeds or piles of stones may be used to initiate discussion and provide training for farmers [7]. Participatory learning has helped technologists produce region specific agricultural data on soil fertility, water availability and climatic changes.

4.3 Farmer Participatory Research (FPR)

Farmer Participatory Research is a "practical process for bringing together the knowledge and research capacities of the local farming communities with that of the commercial and scientific institutions in an interactive way" [28]. Moreover, it is a shared process that will help address farming issues and get more control over the research results and allows decision-making in the hands of farmers.

The farming community's participation is crucial for community involvement and rural development. The increased farmer-researcher participation gives farmers decision making power that leads to empowerment. FPR strengthens farmer participation in technology development.

The author suggest the use of Participatory Rural Appraisal (PRA) [29] and participation in evaluation [18]; [9] to examine, monitor and evaluate the communities' needs and criticize any success or failure in the adoption of ICTs. The use of PRA (as part of FPR) to collect impact data on adoption of technology on farmers' fields in International Centre of Tropical Agriculture (CIAT) [30] Cassava project funded by Consultative Group on International Agricultural Research [31] should be noted. This project used FPR to "test and develop best practices for controlling erosion and maintaining soil fertility in Thailand and Vietnam" [31]. PRA allowed the rural people to collect document and analyse farming data and find solutions based on the data.

The Participatory Rural Appraisal is the assessment technique for other participatory approaches. The technologists may provide a broad range of options while implementing the technology. One way to ensure wider participation would be through participation in benefit [18]; [9]. When the participants enjoy the benefits of using ICTs there will be a chain reaction for wider participation in solving ICT needs.

There is scope for the use of digital ICTs and PRA in approaches such as Participatory Varietal Selection (PVS) [32]; [33] and Participatory Plant Breeding (PPB) [33]. PVS helps farmers to select and use multiple quality traits to assess and test the value of a variety. It allows them to use diverse variety in their farms and increase the varietal replacement. PPB is a farmer-centred breeding programme where breeders consult farmers to evaluate the breeding material grown on research station and select and grow them in the farmers' fields. Some international organisations such as Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) [34] for maize in southern Africa and for wheat in marginal areas in South Asia; the West Africa Rice Development (WARDA) [27] for rice in West Africa; and the International Rice Research Institute (IRRI) [35] for upland rice were successful in facilitating use of PVS [33].

5. Reflections and Lessons Learned

Language constraints: Participants (especially women) were often reluctant to speak in front of video, due to cultural norms. Participants should be allowed to express their needs in local languages for effective participatory communication. This might need a translator while using participatory video or participatory communication approaches. It is also important to translate agricultural information on the web into participants' home language and back to English. ITC's e-choupal initiative allows farmers in each Indian state to access agricultural information in the state's local language.

Lack of resources: Sufficient resources such as hardware, software, trainers, Internet kiosks, community radio, other ICT resources and video are not readily available in rural areas. These resources would help to bring local farmers' knowledge to scientific or research institutions in an interactive way using FPR. Community radio and PV enhances participation and provides feedback mechanism to all the participants. The grassroots associations, NGO, research institutions, and developmental workers should share their ICT resources for PLAR and to develop ICTs.

Lack of participation due to cultural norms: Due to their cultural norms rural farming community felt intimidated while using participatory video or participatory communication. The developmental workers or the agents did not prefer rural setting for participatory learning. Lack of involvement by farmers in decision making and lack of confidence due to cultural constraints while using various participatory approaches still remain a challenge while developing technology.

Lack of decision-making power: There is very little or no 'community' involvement in developing ICTs for rural people. Decision-making power to go ahead with the production often lies on the research institutions and companies that develop ICTs. There is a need for rural people to make informed decisions while developing ICTs to consider any

negative impact that the technology would create on the community. One way to enhance the decision making power in development of technology and participatory communication among rural people would be by being part of an 'international network of rural people' where their voices will be heard globally.

Lack of reliability in using participatory approaches: The methods and techniques used in various participatory approaches are still evolving. There might be lack of validity and reliability of ICTs developed by participatory information and communication technology development and other approaches. The extent of collaboration between farmer and researcher depends on the reasons for participation in research. Participatory approach is not an exact science. It is very interpretative.

Conflict resolution: Some problems could arise in using mix of participatory approaches. Participatory communication and participatory video tend to create conflict among participants. These approaches show evidence of participants' reluctance towards using a technology. Community leader should resolve any conflict arising from use of participatory communication and participatory video. Video clips on how other farmers benefited by using ICTs may motivate them to use it and resolve conflicts arising from the adoption of technology.

The authors suggest that the use of various participatory approaches for ICT development should be well publicized. Mediators may be required to resolve conflict arising from the use of any participatory approach. Electricity is a scarce resource in rural areas. The author suggests the use of battery powered radio for participatory communication (especially through community radio). Participatory video and participatory communication approach should include language translators for effective exchange of information.

6. Conclusion

It emerged from the study that researchers should not underestimate rural communities' indigenous knowledge, ability to heal using herbal medicine and farming practices used in rural areas. The participatory approaches stress the need to encourage farmer-researcher-developmental worker participation to expediate mutual learning and for the socio-economic development of the farming community.

Participatory video, participatory communication, participatory learning and action research and farmer participatory research act as a two way communication process between participants and researchers thereby encouraging participation and mutual learning. All these approaches use the "farmer knows the best" approach – by allowing farming community to get involved in research and aimed at empowering marginalized groups of farmers rather than individuals. The role of researchers and technologists in developing digital agricultural ICTs is of equal importance.

PICTD in the agricultural sector can be achieved only if farmers participate in the decision making process using various participatory approaches as discussed in this paper. The extent of farmer participation in research while using farmer participatory research and participatory learning and action research is unknown. Some of the benefits of using participatory approaches for participatory information and communication technology development could include improved adoption of ICT, allowing experimentation of ICTs, and allowing researchers to get access to farmers' indigenous knowledge systems [7].

In terms of the challenges anticipated the authors propose the use of language translation software for effective use of agricultural information published over the Internet. ICTs like community radio, Internet, mobile phones, e-mail should be made readily available to empower rural farming communities by providing information on cropping style, market requirements, farm products and weather patterns and soil conditions. ICTs

developed by ‘participation’ can improve the living conditions of farmers and enhance the knowledge of researchers and developmental workers.

Olawoye suggested that “due to the important roles that women farmers play in supply of labour for production processing and distribution of food crops, they must have greater access to those resources necessary for agricultural production” [36]. The agricultural ICTs and specific working hours for women in information kiosks may allow them to get connected in spite of all cultural barriers. There is scope for further research on the ways to improve women’s participation in decision making and developing digital ICTs.

Acknowledgments

The author is indebted to Mr. Nikhil Singh, Knowledge Officer, ITC – International Business Division, India, Rural Women’s Movement, South Africa, and SEWA, India for providing valuable information.

References

- [1] M. K. Joseph and T. N. Andrew, 2006. "An Overview of Information and Communication Technology (ICT) Initiatives in Rural Africa Towards Empowerment", IST-Africa 2006 Conference Proceedings, Paul Cunningham and Miriam Cunningham (Eds). IIMC International Information Management Corporation, South Africa, 2006, ISBN: 1-905824-01-7
- [2] Makuleke project, (21 Oct 2009); http://www.fara-africa.org/media/uploads/File/NSF2/RAILS/Innovative_Farmer_Advisory_Systems.pdf
- [3] M. K. Joseph and T. N. Andrew, 2009. "Information and Communication Technology policy imperatives for rural women empowerment : focus on South Africa", Proceedings of IEEE Africon 09, Kenya, Sep 2009, IEEE ISBN 978-1-4244-3919-5
- [4] M. K. Joseph and T. N. Andrew, 2007, "Convergence opportunities and factors influencing the use of internet and telephony by rural women in South Africa and India towards empowerment"; IFIP - International Federation for Information Processing, Volume 241, Home Informatics and Telematics: ICT for the Next Billion, eds. Venkatesh, A., Gonsalves, T., Monk, A., Buckner, K., (Boston: Springer), pp. 1–20. ISBN: 978-0-387-73696-9 (Proceedings of IFIP TC 9, WG 9.3 HOIT 2007, IIT, Chennai, India; [Online]. Available: <http://www.springerlink.com/content/13p24x387271105q4/>
- [5] P. Oakley, 1991 "Projects with people", International Labour Office, Geneva.
- [6] FAO (2009, Nov 18), "New Approaches to participation in fisheries research", [Online]. Available: <http://www.fao.org/docrep/007/y1127e/y1127e04.htm>
- [7] M. K. Joseph and T. N. Andrew, "Participatory Approaches for the Development and use of Information and Communication Technologies (ICTs) for rural farmers" Proceedings of IEEE International Symposium on Technology and Society (ISTAS 08), New Brunswick, Canada, June 26-28 2008, IEEE catalog no: CFP08SIT CDR, ISBN 978 1 424416707
- [8] J.A. Ashby, "The Effects of Different Types of Farmer Participation in the Management of On-Farm Trials", Agricultural Administration and Extension, 1987, 25: 235-252.
- [9] D. Selener, "Typologies and Concepts 1 - Definitions, Assumptions, Characteristics and Types of Farmer Participatory Research". (2007, Nov 12) IDRC [Online]. Available: http://www.idrc.ca/en/ev-85043-201-1-DO_TOPIC.html
- [10] WARDA Annual Report 2002-2003 (2007, Oct 22) [Online]. Available: <http://www.warda.org/publications/AR2002-03/participatory%20learning.pdf>
- [11] C. S. Yoon, Participatory Communication for Development (2007, Oct 12) [Online]. Available: <http://www.southbound.com.my/communication/parcom.htm>
- [12] M. K. Kabilan "Writing-Critical-Literature-Review" (2009, Nov 4) [Online]. Available: <http://www.scribd.com/doc/267683/Writing-Critical-Literature-Review>
- [13] Alternative research and extension systems technology transfer model (2007, Oct 12) [Online]. Available: <http://www.fao.org/docrep/W7508E/w7508e0d.htm>
- [14] SEWA (2006, Nov 28) [Online]. Available: <http://www.sewa.org/aboutus/index.asp>; <http://www.videosewa.org/aboutus.htm>
- [15] E-Choupal (2006, Nov 12) [Online]. Available: http://www.itcportal.com/ruraldevp_philosophy/echoupal.htm
- [16] S. Ngubane, "Rural Women’s Movement" (2007, Oct 12) [Online]. Available: <http://www.rwm.org.za/articles/rwmarticle>

- [17] R.Chambers, A. Pacey and L.A. Thrupp (1989). “*Farmer First: Farmer Innovation and Agricultural Research*”. Intermediate Technology Publications, London.
- [18] N. Uphoff. “Fitting projects to people” in Cernea, M.M. (ed.) Putting people first: sociological variables in rural development. Oxford, UK: Oxford University Press. 1985. Pg.369-378.
- [19] R. Gandhi, R. Veeraraghavan, K. Toyama, V. Ramprasad (2007). “*Digital Green: Participatory Video for Agricultural Extension*”. ICTD 2007 Proceedings of 2nd IEEE/ACM International conference on Information and Communication Technologies, 15-16 December 2007, India.
- [20] S. Balit, “Voices for Change: Rural Women and Communication”, Rome, Italy: FAO 1999, (2007, Nov 5) [Online]. Available: <http://www.fao.org/docrep/X2550E/X2550e03.htm#TopOfPage>
- [21] K. Sugawara, “Farming diary system using Internet-enabled cellular phones”, Internet Workshop 2001 Proc.II Applications, 2001, 247-252.
- [22] S.Bhatnagar and N.Vyas. “Community-Owned Rural Internet Kiosks” Washington, D. C.: World Bank, 2001; (2006, Nov 12) [Online]. Available: www1.worldbank.org/publicsector/egov/gyandootcs.htm
- [23] Gyandoot (2006, Nov 12) [Online]. Available: <http://www.gyandoot.nic.in/>
- [24] Fahamu (2007, Oct 12) [Online]. Available: <http://www.fahamu.org/>
- [25] MTN (2009, Oct 29) [Online]. Available: www.mtn.co.za
- [26] K .Lewin, “Grounded theory in management research”. Sage publications Ltd; 1951
- [27] WARDA (2009, Nov 19), “Participatory Learning and Action Research”, [Online]. Available: <http://www.warda.org/publications/PLAR/manuel/2.LeCurriculum.pdf>
- [28] B. Haverkort, W. Hiemstra, C. Reijntjes and S. Essers. 1988. “Strengthening Farmers’ Capacity for Technology Development”. ILEIA Newsletter. Issue on Participative Technology Development, 4, 3: 3-7.
- [29] Participatory Rural Appraisal (2007, Oct 12) [Online]. Available: <http://www.iisd.org/cas/CASLGuide/PRA.htm>
- [30] CIAT (2010, Feb 8) [Online]. Available : <http://knowledge.cta.int/en/Dossiers/Demanding-Innovation/Commodities/Links/Cassava/CIAT-Centro-Internacional-de-Agricultura-Tropical-International-Centre-of-Tropical-Agriculture>
- [31] Participatory Research and Gender Analysis, Annual Report 2003-2004 (2010, Feb 2) [Online]. Available : http://clayuca.org/newsroom/prga_report/executive_summary04.pdf
- [32] M. Jones, FARA (2010, Feb 2) [Online]. Available : <http://www.ardaf.org/NR/rdonlyres/8AC52435-983F-47B5-BE00-E5E6DC5B244A/0/MontyFoodSecurity.pdf>
- [33] Participatory Plant Breeding (2010, Feb 2) [Online]. Available : http://www.idrc.ca/en/ev-85067-201-1-DO_TOPIC.html
- [34] CIMMYT (2010, Feb 8) [Online]. Available : <http://beta.cimmyt.org/>
- [35] IRRI (2010, Feb 8) [Online]. Available : <http://beta.irri.org/index.php/Home/Welcome/Frontpage.html>
- [36] J. E. Olawoye, “Difficulties of rural women in securing resources for agricultural production: Two case studies from Oyo State, Nigeria”. Rural Development in Nigeria, 1989, 3(2):77–81.