

Knowledge Help Extension Technology Initiative (KHETI) – A Participatory Designed M-Agriculture Solution for Rural Livelihood Promotions

Key Words: Rural e-Services, KHETI, Participatory Designing, PRAs, Livelihoods Empowerment

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Abstract

The paper is based on the findings and experiences from the Rural e-Services Project in India (ReSPI) which resulted in designing of Knowledge Help Extension Technology Initiative (KHETI). ReSPI was an action research project to bridge the socio-economic divide digitally. The project has demonstrated that a right approach with appropriate mix of methodologies and social context could lead the designing of Information Communication Technology (ICT) solutions. In the aftermath of the project and development of KHETI Technology, claims could be made that designing of Information Communication Technology solutions are very much possible with so called 'less privileged groups' using participatory interaction design methodologies and treating users as co-designers. The paper describes strengths and challenges in the participatory designing processes of KHETI as an M-Agriculture system and examines how it addresses the problems of local poor farmers by recognising their socio-economic realities.

ACKNOWLEDGEMENTS

The authors wish to acknowledge supports of SCPL members, Xiaolan Fu of Oxford University, Subodh Gupta of Safal Solutions, Paul Matthew of University of West England and Staffs of PRDDAN and SCPL for providing the cooperation and help while working on Rural e-Services Project.

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I. BACKGROUND

In the contemporary world, powers of Information Communication and Technologies (hence after ICTs) have been realised by one and all across all walks of life. The access and usage of ICTs are very varied in countries like India. There are few who have complete access, other have partial whereas there is a sizeable lot not exposed to technological wonders. Though the ICTs potentials are enormous yet the digital divide is huge.

In India, generally the poor are not having access to ICTs and could not get benefitted of their applications in true sense especially in rural areas which is inhabited by about 72 percent of the India's 1.1 billion people. They are unaware about innovations and applications and are compelled to follow traditional methods and approaches. In the words of Former UN General Secretary Kofi Annan, "The new information and communication technologies are among the driving forces of globalization; they are bringing people together, and bringing decision-makers unprecedented new tools for development. At the same time, however there is real danger that the world's poor will be excluded from the emerging knowledge based economies". Hence there is a need to explore possibilities of penetrating ICTs in various spheres of lives of people particularly in the areas of agriculture, health, education and poverty alleviations.

II. ICTS IN AGRICULTURE

Agriculture is one of the most important sectors in India, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio-economic conditions of poor in backward regions. Agriculture constitutes a major livelihoods sector and most of the rural poor depend on rain-fed agriculture and fragile forests for their livelihoods. Farmers in rural areas have to deal with failed crops and animal illness frequently and due to limited communication facilities, solutions to their problems remain out of reach (World Bank, 2009)¹.

It is only recently that some importance of applications of ICTs could be seen in livelihoods promotions of poor and marginalized. In June 2008, United Nations (UN)² Secretary General, Ban Ki Moon desired that: "by the year 2030, we must increase global food production by 50%"¹. One strategic response for increasing global food productivity is applying information and communication technologies (ICT) to disseminate agricultural knowledge and to enable farmers to apply agricultural inputs more efficiently. A recent international survey of e-agriculture, conducted by the UN's International Telecoms Union (ITU) and the FAO³, identified

¹ [Secretary-General Ban Ki-moon's opening remarks at press briefing on Food Security](#)

information exchange and communication processes as critical, highlighting the following areas:

- Developing virtual communities/networks for information and knowledge exchange between rural stakeholders, as well as for their empowerment through participation;
- Capacity building of rural stakeholders in use and application of ICT;
- Enhancing farmers and producers access to markets and information on techniques and practices
- Improving dissemination of and access to scientific and technical information;
- Enhancing access to statistics and other types of information for policy and decision-making.

The other motivation is to see the penetration of ICTs in the lives of poor so that they could get benefits of the same. But it is believed that bringing readymade and 'foreign' ICT Solutions from 'outside' and imposing on them is not serving the goals of empowerment. Rather designing of solutions should be done indigenously with equal participation of users and the beneficiaries. The Rural e-Services in India have been a sincere attempt in this direction and Knowledge Help Extension Technology Initiative (KHETI) was an outcome of the project.

III. KNOWLEDGE HELP EXTENSION TECHNOLOGY INITIATIVE (KHETI) OF RURAL E-SERVICES PROJECT

A. The Project

Rural e-Services Project in India (hence after ReSPI) was an action research project to develop sustainable ICT solutions for the livelihoods empowerment of rural communities in India. It started in India from April 2007 with funding from Engineering and Physical Sciences Research Council, United Kingdom and was managed by Sheffield Hallam University, U.K. The collaborators to the project were Oxford University, UK; Overseas Development Institute, UK/University of West England, UK and Safal Solutions, India. [PRADAN](#), India was other major collaborator and intermediary organisation.

The project was experimented and implemented at Sironj Crop Producers Company Private Limited (SCPCL) – a cooperative formed by small and marginalised farmers and supported and facilitated by PRADAN with support from District Poverty Initiative Programme of government of Madhya. The first author of this paper has been the researcher in the project to ensure the community/users participation, through conduction of PRA exercises, in the designing processes besides the day to day management of the project in Sironj. The second was the Principal Investigator of the project and he besides managing the

overall project activities was also responsible for ensuring the use of participatory interactive designing in the designing processes.

B. The Designing Processes

ReSPI has adopted intense processes for designing and developing ICT solutions. It has combined the interactive ICT Designing and Agile Methodologies and Participatory Development Methodologies. The project team itself has a unique blend of interactive designer, participatory development researcher/ practitioner and software developer.

C. Participatory ICT methodologies used in ReSPI

Unlike traditional ICT Designing Methodologies, in ReSPI the users (farmers) were treated as co-designers at every stage of the project. Besides seeking their true participation at every level through meetings, focus group discussions, interviews and other PRA exercises – timelines, matrix ranking, chapatti diagramming, the focus always remained to make the processes themselves empowering (Oakley, 1991)⁴ to people where they have control over the processes and decide as per their needs and local realities (Chambers, 1994)⁵.

D. The Designing Stages in ReSPI and Their Outcomes

The designing processes started with entry to the field and rapport building with community. A lot of emphasis has been laid in understanding the context and enabling people to identify their own needs and roles and applications of ICTs in these. About three months have been spent with the community to develop rapport and build their capacities in realising the importance of ICTs. To achieve these many informal and formal meetings, focused group discussions and transect walks were organised to enable community to explore the importance of ICTs in their lives. Timeline exercises were conducted to facilitate people to identify the deprivations and strengths in their lives. The timeline exercises were followed by chapatti diagramming² exercises to prioritise various events and facilities according to their importance.

These exercises paved ways to finally have a project establishment meeting and agreement on the sector/s where the application of ICTs would be of greatest value to community members. It was further refined by developing a matrix and Agriculture Information Flow System was identified as the 'area' where the solutions should be designed. The farmers unanimously agreed about the need of timely information/ inputs for

² Chapatti is the Hindi name for round shape bread. In PRA exercises, different shapes of chapattis were used to show the importance of various events, facilities etc., in the lives of farmers.

improved agriculture practices. They felt that this was not happening because of the physical distances between the agriculture experts and the farmers. After establishing the project and agreeing on the focus, farmers were facilitated to explore actors and their roles in the 'would be' Agriculture Information Flow System (AIFS).

They were facilitated to create small stories on various kinds of communications that could take place between them and other stakeholders for seeking inputs in agriculture practices. Farmers were finding it difficult to create stories on various communications in their lives especially in agriculture related work. This led to explorations of other PRA methods and an innovation was thought and used. Characters were created as 'cartoons' and hence seven actors emerged as the protagonists in the communication between farmers and outside world for agriculture related activities. The idea of cartoon led pictures was tested and the farmers were found comfortable with the idea and narrated the conversation against each character. This new narrative then provided a common basis for dialogue between the farmers thinking about their new AIFS, and between the farmers and the software developers.

E. Defining system functions

The participants were facilitated to explore and envisage benefits which the system should provide to them. In discussions, two major areas were identified as important for the community and the organisation - maintaining general information within the co-operative about membership, carrying details such as names, socio-economic and family details, photo, land plot details (size, slope, soil, water availability etc.), crops and 'package of practice' (POP) profiles, experience report profile, seed plot registration and fee details for the inputs/services.

Being able to exchange queries and support discussions between farmers in their villages with the co-op's agricultural advisor based in Sironj town. Different functions of the system were prioritised in terms of immediate and remote needs of the farmers in their agriculture practices. They agreed that most important for them is to have a device where they could exchange information (audio-visual) on their problems and with experts quickly from their places and get inputs when they are in need of it. The next in priority, they emphasised, to have a complete data base about the co-operative - its stakeholders and their socio-economic and agriculture profiles (MIS).

F. Delivering the Software

To develop the software, an 'agile' process model (Cohen et al., 2004)⁶ was adopted in which small collections of functionality were developed and delivered in a series of short cycles. Each cycle was

between 3 and 6 weeks. Half way through each cycle, a group of farmers travelled to developer's place at Secunderabad (AP) to conduct Alpha testing and to suggest ways that the software could be improved. At the end of each cycle, farmers participated in 'Beta' testing in Sironj to ensure that the new system met their expectations and to identify any problems. After each cycle, the farmers and developers revisited the list of possible functions to reprioritise them (Dearden and Rizvi, 2008)⁷.

IV. PROJECT OUTCOMES

The ReSPI has been successful in getting the technology designed for farmers in a participatory manner on their actual needs and farmers as co-designers at every stage of project by ensuring their true participation. The technology developed under ReSPI has been termed as Knowledge Help Extension Technology Initiative (KHETI).

The KHETI system has been designed on a mobile phone platform. The developed features and their functionalities aim to speed-up and improve communications amongst various stakeholders especially between the co-op's Agriculture Specialist, community farmer representatives and farmers.

A. KHETI in Operation

Kheti provides a means to exchange multi-media messages between the farmer and the agricultural advisor. The agriculture advisor is regular employee of the cooperative who is well versed with members of the cooperative and their agriculture details e.g. land, crop pattern, diseases, availability of water and other resources. The role of local agriculture advisor was very important. The use of KHETI software running on a mobile camera phone, allows the creation of Short Dialogue Strips (SDS). These are composed of up to 6 photographs, together with a short audio track of up to 1.5 minutes, (image + voice = SDS). These are then sent to web server where they can be accessed by the agricultural advisor. The advisor is then able to respond either by creating other SDS, or by phoning the farmer.

Besides farmers as the recipient of the services and Agriculture Advisor as the responder on the queries, the farmers themselves suggested that they need to have a person in the villages who assist them in making SDSs on their problems and facilitate the communication with Agriculture Advisor (Dearden and Rizvi, 2009)⁸. They named these persons as 'Munna' (a popular character in a Hindi feature film *Munna Bhai MBBS*). A Munna was responsible for 4-5 close vicinity villages and used to visit the villages on every alternate day. So, the farmers could contact them in their villages and if not available he could be contacted on his mobile. The technology was designed on mobile platform and Nokia Navigator 6110 with python application in the General Packet Radio Service (GPRS) compatible phone was used. The

mobiles were arranged by the project and were with Munnas. Generally the farmers were not having such high end mobiles, so the SDSs were made by the mobiles with Munnas. The farmers were free to use mobiles to make SDSs and upload on Vikasdwar server.

Most of the farmers were exposed to SDSs making and uploading because it was they who decided the steps and processes to make a SDS in five simple steps without much use of language. But as a matter of practice Munnas used to do this job for farmers e.g. a service provider i.e. Munna, is approached by a farmer to give solutions to a strange disease in the crop. The Munna visits the field, enquire about the problems and tries to solve the problem at his level but in case he thinks that the Agriculture Specialist should be approached for this and so creates an SDS. Figure 1 illustrates this scenario Dearden and Rizvi, (2010)⁹.



Figure 1: SDS Making in Progress. (Source: Rural e-Services Project data Base)

He sends the SDS to the Agriculture Specialist by uploading on the *Vikasdwar* web³ server, who gets the details on the system/computer with internet connectivity at the cooperative. The Agriculture Specialist sees the SDS and responds back with solutions within a cycle of 24 hours. The other possible application of the system are Agriculture Specialist sharing the short dialogue strips with other experts, floating a discussion locally, sharing the emerged knowledge with others users etc. Figure 2 shows the advisor's interface

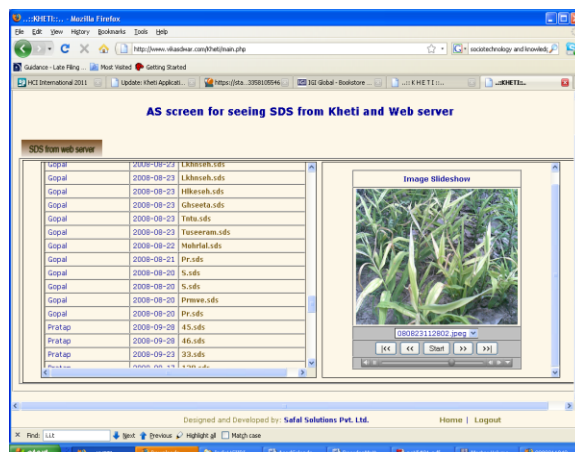


Figure 2: Advisor's web interface. The left hand part of the screen gives a list of the SDS messages received. The right hand side provides a player for the SDS.

Figure 3 illustrates the technical configuration of the service. The important technical constraint is that the local phone service must support at least some level of data network, although this need only be at the level of GPRS, rather than full 3rd Generation (3G) networking.

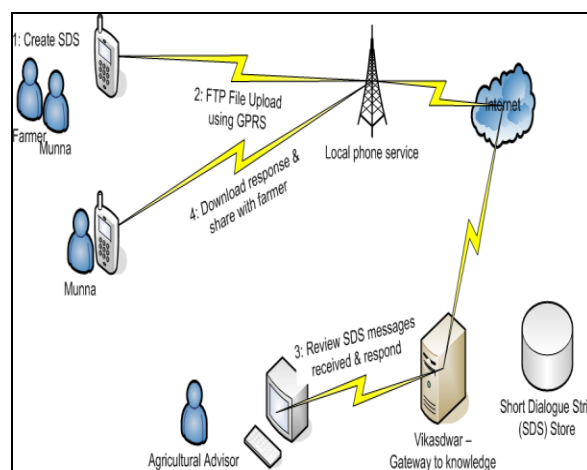


Figure 3: Using Short Dialogue Strips to seek advice. (Source: Rural e-Services Project data Base)

B. The impacts of KHETI in lives of farmers

The system was rolled out in August 2008. Till date about 300 queries were handled and some significant risks to harvests (and household economies) were mitigated.

	<p>Farmer: Hello, I am Joseph from Bahadi. Suddenly there appeared an insect (<i>illi</i>) in my field. We call it <i>padbichchu</i>. What kind of insect is this? Please tell the name and the medicine to get rid of this. Also tell how to apply the medicine.</p>
	<p>Advisor: Yes Ramu, are you in Bahadi? No, no problems. Listen, the insect which has appeared in Joseph's field is the hock moth insect and it is controlled by systemic insecticide but now it is at larval stage. It is very harmful for soybean it gives large number of eggs, so we suggest the farmer to collect the larvae and sink in kerosene oil.</p>

Figure 4: An SDS dealing with a major threat to crops (Source: Rural e-Services Project data Base)

³ Vikasdwar portal was a web space where space for KHETI was booked by Safal Solutions, Secunderabad. Safal solution was not only the developer of the technology rather collaborated in the project, as well. The mobiles used were having GPRS connection and uploading on Vikasdwar was one of the features of KHETI.

SDSs have been uploaded by the service provider on the Vikasdwar web. SDSs highlighted the issues and problems such as insect attacks on various crops; diseases in soybean, gram, wheat and vegetables; falling of leaves, only flowering but not converting in fruits in vegetables; choice of crops in case of unavailability or less availability of water; premature fruits and flowering; soil and seed borne diseases; use of fertilizer – quantity and type; varieties of seed especially certified and foundation seeds; affects of termites on soil and the treatment; choice of crop against the soil type and patterns of crop rotation.

V. CONCLUSIONS

The paper has dealt with two aspects of ‘designing the ICT solutions’ with the poor and their impacts in the lives of poor. It has shown the importance of participatory interactive designing processes (users as co-designers) and their impacts not only in livelihood promotions but also the relevance and applicability of the technology designed. The roles and importance of KHETI in agriculture in general and for livelihoods promotions in particular are summarised below.

A. Addressing agriculture/livelihoods concerns

KHETI has handled some significant risks to harvests and household economies though SDSs uploaded by the service provider on the Vikasdwar web. The numbers of SDSs uploaded on the Vikasdwar in a span of four months and nature of queries posed through SDSs shows importance and need of such a system in the lives of poor rural people.

B. Addressing the social challenges

There are several efforts for bridging the digital divide with varied approaches. It should not be in an ‘imposing’ manner or ‘bombarding’ the ICT solutions designed and decided by ‘others’ rather efforts should be made to make people realize the importance of ICTs in their lives and they decide ‘what they exactly wish to have’ and ‘how it should look like’ which then might be converted in ICT Design Solutions. The Rural e-Services Project have successfully used Participatory Methodologies and participatory Interactive Designs and Agile Methodology to develop KHETI. The user remained co-designers through the project processes. So the features in technology not only took care of the socio-economic aspects of the farmers rather the usability and interface of KHETI is very high.

C. Demonstrated Impacts on Policy

The novelty and one of the biggest feature of the case is that the farmers and their representatives were able to operate high end mobile Nokia Navigator 6110. They could create Short dialogue strips on the local problems and issues with help of mobiles and upload the same on

the server from their places/villages. The making of SDS is done using five simple steps and instructions are in Hindi. And the beauty of the system is that all the interfaces in the mobile are in Hindi. They could also talk to Agriculture Specialist using IVRS. They are getting the solutions to their agriculture problems and related inputs at their places/villages.

ReSPI has established that ICTs designing and penetration for the poor are the immediately needed for their empowerments but these have to be done in participatory manner where the processes are humane and empowering for them besides need and importance of a Public Private Community Partnerships.

D. The Sustainability Aspect

By design, ReSPI is very much sustainable because as per the practice the farmers are travelling far of places to get various inputs when they need it most especially during the peak seasons. Hence they are wasting their time and other resources. By the help of technology they could get timely inputs by being at their own places in very less amount irrespective of query or monthly or yearly service based payments. About 80% farmers who were the part of the designing of the technology or the beneficiaries of technology expressed their willingness to pay for the services. But the users need to be oriented and told regarding the ‘payment for services’ rather owning ‘the running of services’ from very beginning. There might be struggles, if the resource burdens are put on the poor users/community only, so a business model for sustenance of such ICT intervention with a group of rural poor it is imperative to have external support. Any business should be developed per the local realities.

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