Assessing farmer perception towards Internet based intervention: an empirical study

Dr. Sudeepa Banerjee, Associate professor,
MIS .Teach in MBA, MHRM and MPSM programs of the Calcutta University,

'A quiet digital revolution is reshaping the lives of farmers in remote Indian villages. In these villages farmers grow soyabeans, wheat and coffee in small plots of land as they have for thousand years. A typical village has no reliable electricity and has antiquated telephone lines. The farmers are largely illiterate and have never seen a computer. But farmers in these villages are conducting e-business through an initiative called e-Choupal, created by ITC, one of India's largest consumer and agribusiness communities.' (Mohanbir Sawhney, 2002).

Background

A large part of the Indian population lives in rural areas. They have mostly low incomes, they are largely dependent on monsoons for their harvest, they are plagued by illiteracy, limited media reach and poor infrastructure and their markets have unviable direct distribution systems.

The vicious circle of low incomes continues due to several reasons. Some of them are the fragmentation of land that adversely impacts productivity and quality of produce, thereby reducing the bargaining power of the farmer. Wide geographical dispersion results in limited or no real time access to information and also makes whatever information delivered, very expensive. The heterogeneity of farmers imply, single farmer and multiple crops, so it becomes difficult to customize the land or other requirements like soil conditions; there is a perpetual need for investment and hence cash and finally the weak infrastructure- whether it is roads, telecommunication, power, irrigation or a distribution system leading the farmers to depend heavily on middlemen and money lenders.

Rural marketers also suffer a lot for the fragmentation on account of low effort ratio, high cost of reaching due to the geographical dispersion, not possible or worth customizing on account of heterogeneity and a passive distribution system because of poor infrastructure.

The major problems that are being faced by farmers are lack of institutional support, lack of information on best farming practices and weather, quality and information of inputs. The presence of middle men in the chain lead to incorrect pricing, quality and weightment, handling losses and waste of time.

Information and Communication Technology

The revolution in information and communication technology (ICT) is affecting people in all walks of life today. Internationally, this revolution has facilitated the globalization of the economy, business, finance and culture (Gomez 1997; Heeks 1999). Today ICT constitutes the fastest growing component of the global economy and the Indian ICT spending is expected to grow 10.3 percent in 2012 and in that Services and Software will be the fastest growing segment till the end of 2014(Gartner Press releases , 2012 and 2011).

However, the rural community in most countries is out of this growth map and Internet access in these areas is usually very marginal if at all. India is no exception- while the spread and use of information technology has been phenomenal in urban areas the rural communities are still largely left out (Agarwal, 2009).

There is a growing consensus that knowledge and information are essential for empowering rural communities. Communication is central to this process. Convergence of technologies can help people share knowledge and information. Information intermediaries like social workers, educators and mass media can help rural communities access relevant information. Internet technology can be used for strengthening research and increasing farmer linkages through better agricultural marketing, disaster mitigation through forecasting, monitoring and early warning systems. Relevance of use of Internet technology in Agriculture lies in it ability to reduce isolation, facilitate dialogue, provide information and skills training and encourage orderly structure in the system.

Social empowerment

Participatory development is necessary in terms of sustainability, relevance and empowerment and is considered better than top-down development approaches (Cooke and Kothari , 2002). The main endeavor in such processes is to involve economically and socially backward and neglected population in the decisions that affect their lives (Guijt, 1999,Khwaja,2004)**.** Participation, especially in the context of community, is deeply linked to issues of democracy, power, and asymmetries that historically exist within communities. International organizations like the World Bank and UNICEF have been dealing with community participation through rapid rural appraisal, participative rural appraisal and participative learning for action. "Participation is viewed pragmatically and ideologically—something that helps efficiency, satisfaction and progress, but which is also morally right" (Mumford 1984) .The role and relevance of modern communication technology towards social development and its improvement is being studied by various researchers (Sahay and Avgerou, 2002; Madon and Sahay, 2002).

The extent to which a farmer can understand and adopt a new technology depends on his experience with it. Strong and positive experiences will influence better acceptability amongst individuals and also groups. Certain group characteristics influence empowerment. When participants of a new technology interact with each other they make meaningful changes in their behavior and influences resulting in individual and collective empowerment. Research has shown that participation and empowerment are related to each other (Berger and Neuhaus, 1977; Thomas and Velthouse, 1990; Rappaport, 1987).

The two underlying theoretical components in empowerment are information and influence (Khwaja,2005, pp.273-275). Information is a component of empowerment where an individual or a community is able to provide information about their own preference and gain information from outside that may enhance their capacity to make optimal choices. Thus access to information can help by allowing people to make more informed decisions. Participation can be considered a means of providing and gaining information. Information exchange as a component of empowerment implies that the users have to be otherwise empowered as well as they may else perceive that there is little chance of their preferences being considered.

While information is necessary it is not sufficient o produce the desired outcome .There is another component called influence or 'bargaining power'(Khwaja, 2005,pp.274) that is also required. Users may have access to information , but unless they have the ability to influence the decision and also know that they have this ability, they will have little motivation to either provide or gain the requisite information-this is the influence component of empowerment which leads to decisions that may be considered a less tangible asset.

Research question

Internet as a medium has been put to use in some rural areas of India. It is necessary to investigate how the farmers have perceived its use. A positive response and experience is necessary for more farmers to use this medium thus contributing to the 'critical mass' that can convert this technology to a mass media.

The objective of this research includes an examination of the perception of empowerment amongst farmers who use Internet technology through e-Choupals. A modest attempt has been made to fill up the gap by identifying the following research question :

What are the effects of different elements of the e-Choupal on the overall empowerment of farmers?

Study design

To answer this research question the researcher will be using the case of ITC's e-choupal. ITC is well known for its corporate and social responsibility and it is this philosophy that initiated the e-choupal system, where the business

model increased shareholders value as well as contributed to social development. ITC envisioned this project by using Internet as a medium.

ITC and e-Choupal

The ITC group of companies has a yearly turnover of Rs 7.5 billion and is involved in tobacco, cigarettes, paper and packaging, paperboard manufacturing, hotels and tourism, information technology and agricultural exports.

Of these its Agri Business Division is one of India's largest exporters of agricultural commodities. Initially the agricultural commodity trading business was small compared to International players. The opening up of the Indian market around 1996 brought in international competition. ITC took the route of information technology through e-Choupals to create a competitive business that did not need a large asset base. The e-Choupal has been able to install computers with Internet access in rural farming villages, where it serves both as a social gathering place for exchange of information and an e-commerce hub. The computer is typically housed in the Sanchalak's house, who is also a local farmer and is linked to the Internet via phone lines or VSAT connectivity and normally serves around 10 villages within a radius of about five kilometers. There is an initial investment to set it up and an annual maintenance charge normally shared between ITC and the Sanchalak. Using the system costs nothing to the farmer. While a pure trading model does not require much capital investment, the e-Choupal model, in contrast, has required ITC to make significant investments to create and maintain its own IT network in rural India and to identify and train local farmers (Sanchalaks and Samayojaks) to set up and manage each e-Choupal.

Users of e-Choupal can use the computer to access daily closing prices on local mandis(government –fair price mandated markets),as well as to track global price trends or find information about new farming techniques or about fertilizers, weather , best global practices etc either by themselves or with assistance from the Sanchalak who is trained by ITC. Further they can also order quality seeds, fertilizers and other products such as consumer goods from ITC or its partners, at prices lower than those from village traders ; the Sanchalak basically aggregates the village demand of the various products and sends the order to an ITC representative. At harvest time, ITC offers to buy the crop directly from any farmer at prevailing prices, the testing of quality is done scientifically and the farmer is informed about the quality of his produce and the altered price if any in view of poorer quality. If the farmer is willing to sell , he then transports his produce to the local collecting centre where it is weighed electronically and reassessed for quality .The farmer gets paid for the crop as well as a transportation and bagging fee immediately. The Sanchalak on the other hand benefits from increased prestige and a commission paid to him for all e-Choupal transactions. This is in contrast to the normal trade route where the farmer sells his produce to a small trader called a kaccha adat, who sells the produce to a larger trader called pakka adat, who in turn takes the produce to a local mandi or a market place, where

a larger trader buys the same. The mandi traders then operate through brokers to negotiate prices with specific companies like ITC and then sell. This long route results in high procurement cost for companies, unfair price recovery for farmers, loss in handling and also deterioration of the quality of produce due to this time-consuming system. Additionally, there is a long wait at mandi's for farmers as well as harassment in the hands of the various middlemen. Further, the payment for the crops is also not scientific and farmers have to wait very long to recover their dues.

Methodology
Model

An additive form of multiple regression model has been considered for the research question as mentioned earlier and postulated as:

$$Y = b_0 + b_i \sum_{i=1}^{n} X_i + \xi, \quad i=1.....4$$

where,

Y = mean value of overall empowerment for each respondent
b_0 = constant
b_i = regression coefficient of the ith constraint

$$X_i = \left[\left(\sum_{j=1}^{N} X_j \right) / N \right] \text{ for each respondent}$$

X_j = score on j^{th} item of each respondent
N= number of items of ith construct
ξ= Random error terms is assumed to be normally distributed.

Hypothesis
The perception of farmers towards i^{th} construct will have a positive impact on overall empowerment. Mathematically
$H_0 : B_i = 0$ against
$H_1 : B_i > 0$

Questionnaire design

In the early stage of concept development (what is to be measured and what can be measured), an extensive review of literature on the subject and an analysis of possible components to be measured have been done. Some were established measures, while others were modified or developed for this study based on intuition, knowledge and experience. After identifying a set of possible items an intensive discussion with a group of target respondents (farmers using e-Choupal for trade and information) has been conducted to assess the proposed concepts, definition, terminology and final selection of the relevant items. In the next stage, face-to-face in-depth interviews with managers from ITC have been conducted to discuss all the items. After consultation with two academicians, these items have been confirmed and questions framed on them on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The Likert scale has been used as it is a reliable and commonly used scale that can be easily interpreted .All the items are framed in closed-end form.

For the purpose of pre testing the questionnaire a pilot survey had been performed on 22 respondents.

Therefore, in this study farmer perception was operationalized as a multidimensional concept and thus the questionnaire finally consists of 19 items. These are all refined items, which have been derived from 39 items by repetitive factor analysis as well as consideration of standard deviation of each item (rejected when standard deviation was below 1). The dimensions or constructs that have been considered are fair price, price information-current as well as trend, faster recovery of dues, reduced dependence on money lenders, language barrier, ease of use, soil testing facility, weather information, information on fertilizers, pesticides and best practices, increased productivity of land, reduced wastage, availability of newer and better farming products that include seeds, tools, fertilizers and pesticides, reduced harassment and overall sense of empowerment.

To measure the underlying dimensions of these items, exploratory factor analysis (PCA) has been performed and **4 dimensions** have been revealed: (1) **increase in income**, (2) **inclusion/participation (**Khwaja,2005, P.272**),** (3) **decision-making power** (Renuka and Lekshmi, 2003) and (4) **additional benefits** .The number of items varies from 3 to 5 between constructs. This ensures the questionnaire satisfies the construct validity. As far as reliability is concerned Cronbach alpha for each construct has been calculated and it varies between 0.6 and 0.8 (Nunnally, 1994).

A single item that measures overall empowerment has been also framed on a 5-point Likert scale which has been used as a dependent variable in subsequent analysis.

Sampling technique and sampling size

The sample frame of the farmers was available; hence simple random sampling technique was used. By this technique a sample size of 200 had been drawn from a population of 584.The sample size was more than 5% of the population and hence this was a finite population and so the sample size (180) has been given an adjustment by finite population correction factor (FPCF) of 0.83, calculated as

FPCF= $\sqrt{(N-n)/(N-1)}$; N=population size, n=sample size. Finally data have been collected from 150 , (FPCF x n) respondents.

Method of interview

The researcher conducted a questionnaire-based survey with farmers of wheat of the Basai ki Nagla village e-Choupal near Hathras in western UP in 2009. Interviews were conducted with Rana Sharma- Sanchalak, samyojaks, Mandi adatiyas and ITC personnels to gain a better understanding of the linkages among Internet, participatory development, social development and empowerment.

Results and discussion

Table 1 shows the result of the multiple regression analysis. It also shows the beta values, which indicate the variables' explanatory power.

The model cannot be interpreted before checking the multicollinearity of the independent variables. When high level of correlation exists between two or more independent variables used in the regression, then it is difficult to determine the contribution of each independent variable, because their effects are confounded (Hair and Anderson , 2005, pp.188-89) .For this the variance inflation factor (VIF) has been assessed. The values are within the common cutoff threshold of 10(Hair and Anderson , 2005, pp.220-21) **.**

Table 1: Results of the regression analysis between overall sense of empowerment, increase in income, decision-making power, inclusion/participation and additional benefits.

The regression equation is: $y=0.64+0.55x_1+0.54x_2+0.49x_3+0.44x_4$						
Predictor	**Coefficient**	**SE**	**T**	**Std Beta**	**VIF**	**Rank**
Constant	0.64	0.45	1.42			
Increase in income(x1)	0.55	0.27	2.05[**]	0.93	7.9	3
Decision-making power (x2)	0.54	0.14	3.76[*]	1.34	4.6	1
Inclusion/ participation(x3)	0.49	0.22	2.19[*]	1.21	5.3	2
Additional benefits (x4)	0.44	0.22	1.99[*]	0.74	9.8	4

Notes: [*]**P < 0.01,** [**] **P< 0.05, VIF: Variance inflation factor**

From the results presented in Table 1, it can be observed that the regression coefficient is positive in all the cases. This indicates that these variables have a positive relationship with the dependent variable – overall perception of empowerment. The coefficients of the four constructs ((1) **increase in income**, (2) **inclusion/participation,** (3) **decision-making power** and (4) **additional benefits)** are 0.55,0.54,0.49,0.44 respectively. That is the change in perception of farmers with respect to increase in income by 1 unit, will change the overall empowerment by 0.55 and so on.

From the Table 1, it can be seen that the t values are significant at desired level, and hence all the *hypotheses related to the four constructs* ((1) increase in income, (2) inclusion/participation, (3) decision-making power and (4) additional benefits)) *as mentioned earlier have been confirmed in this work.*

From the results presented in Table 1, the standardized beta coefficients indicate the impact that each independent variable has on the dependent variable. *Decision-making power has the highest impact on empowerment followed by inclusion/participation, increase in income and finally additional benefits.*

The R^2 value or variance explained is significant at 52.1% (F=25.86, P=0.000) as expected (Anderson et.al ,2009) as is shown in Table 2 below.

Table 2: Validation statistics

R^2	F	P
52.1%	25.86	0.000

Conclusion

The objective of this study was to measure the acceptability of Internet amongst the rural people in general and farmers in particular. Data have been gathered and analysed empirically. Subsequently results have been interpreted. Findings suggest that overall sense of empowerment has been enhanced since farmer perception towards different dimensions is positively inclined. Hence the objective of this study has been fulfilled. Managers of e-Choupal on the other hand should consider farmer's perception to formulate better strategy for the acceptance of Internet in rural India which in turn will uplift the rural community by increasing their income, inclusion and participation, their decision making powers and provide other benefits.

Reference

Agarwal, S., May 7 2009, Connectivity, penetration keep IT away from rural India, Financial Express.

Anderson, D.R., Sweeney , D.J., & Williams , T.A., Statistics for Business and Economics, Cengage learning, 2009, UK, P 563.

Berger, P. L., and Neuhaus, R. J. ,1977, To empower people: The role of mediating structures in public policy. Washington DC: American Enterprise Institute for Public Policy Research.

Cooke, B., and Kothari, U., 2002, The case for participation as tyranny. In B. Cooke and U. Kothari (Eds.), Participation: The new tyranny, pp. 1–15, New York, Zed Books.

Gartner Says Indian ICT Spending to Grow 10.3 Percent in 2011, Gartner Press release : Mumbai, November 23,2011.

Gomez, R., 1997, Information society and civil society: NGOs and computer-mediated communication in Latin America. In J. Berleur & D. Whitehouse (Eds.), An Ethical Global Information Society: Culture and Democracy Revisited, pp. 186-196,. London: Chapman & Hall.

Guijt, I. , 1999, Participatory monitoring and evaluation for natural resource management and research, Socio-economic Methodologies for Natural Resources Research. Chatham, UK, Natural Resources Institute, pp.1-22.

Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C., Multivariate data analysis (5th edn), Pearson education, Delhi, 2005, pp.188-189.

Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C., Multivariate data analysis (5th edn), Pearson education, Delhi, 2005,220-221.

Heeks, Richard (1999) 'Information and Communication Technologies, Poverty and Development. Development

Informatics', Working Paper Series, Working Paper No. 5. , Manchester: Institute for Development Policy and Management, University of Manchester.

Khwaja, A.I., Measuring the empowerment at the community level : an economists's perspective. In Narayan,D(Eds),Measuring empowerment, cross discipline perspectives. Washington,D.C, The World Bank, 2005, pp.267-284.

Khwaja, A.I.,2004,Is increasing community participation always good thing?, Journal of the European Economic Association ,Vol.2(2-3), pp.427-436.

Madon, S., and Sahay, S., 2002, An information-based model of NGO mediation for the empowerment of slum dwellers in Bangalore, The Information Society, Vol.18 (1), pp.13–19.

Mumford, E. , 1984, Participation—from Aristotle to today , in T. Bemelmans (Ed.), Beyond productivity: Information Systems Development for Organisational Effectiveness ,pp.95–104,Amsterdam, the Netherlands, North-Holland Press.

Nunnaly, J.L., and Bernstein, I.H., Psychometric theory, 3rd ed, McGraw-Hill, New York, 1994, pp.83-112.

Rappaport ,J ,1987, Terms of empowerment / Exemplars of prevention- Towards a Theory for Community Psychology, American Journal of Community Psychology, Vol.15(2), pp.121-148.

Renuka ,P., and Lekshmi ,D., 2003, Influence of female earners on the economic status of the family-Some evidence from the micro-level, Asian Economic Review., pp. 45-54.

Sahay, S., and Avgerou, C., 2002, Introducing the special issue on information and communication technologies in developing countries, The Information Society, Vol.18, pp.73–76.

Sawhney Mohanbir , Fields of online dreams ,CIO Magazine, October 15, 2002, accessed and downloaded from http://www.itcportal.com/newsroom/press_oct15.htm on 10/12/2008.

Thomas, K.W, and Velthouse, B.A ,1990,Cognitive elements of empowerment,Academy of management review,Vol.15,pp.661-681.

***