Effectiveness of Mobile Agro-Advisory Services in Extension Delivery System in Meghalaya- A Multinomial Logistic Regression Model

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ABSTRACT

Information and knowledge through the usage of Information and Communication Technology (ICT) can boost agricultural production. Among the ICTs, mobile telephony has emerged as the ICT of choice of the majority of the rural masses. The study was, hence developed with the aim of evaluating the gratification of the farmers on the services provided by the mobile based agro-advisory system in Northeast India (m4agriNEI) and analysing the effect of the recommended practices disseminated. A sample of ninety registered farmers was selected from Ribhoi district of Meghalaya. More than eighty per cent of the farmers were satisfied with the results of the recommended practices and about 87.78 per cent of the farmers implied that the immediacy of feedback was within the same day, which was timely and one of its best features. The multinomial logistic regression model was used and the factors viz., *'education level', 'social participation' , 'awareness of m4agriNEI services' and 'number of crops grown' were found to be statistically significant in influencing the gratification level of the farmers in the services provided by m4agriNEi. Moreover, the model revealed that between 63.2 per cent and 77.2 per cent of the variability in the dependent variable 'gratification level' was explained by these factors. More than fifty per cent of the farmers indicated that there was change in their yield and quality of produce upto some extent while 48.3 per cent of the farmers stated that their income level change upto some extent. The study concludes that information received from m4agriNEI proved to be effective and the change in the farmer's yield and income indicates the important role m4agriNEI in the farming community.*

***Keywords**: Mobile agro-advisory services; Gratification level; Multinomial logistic regression model;*

Information and Communication Technology (ICT) is a popular medium today used for bridging the information gap between farmers and the agricultural stakeholders. Among the ICTs, mobile telephony has emerged as the technology of choice of the majority of the urban and even the rural masses (*Ansari and Pandey, 2013*). The possession of mobile phones particularly has become a necessity in the contemporary society irrespective of age, status, profession, income groups or place of residence. As such, mobile phones have been regarded as the widely accessed tool among the farmers for communication and also accessing agriculture-related information particularly for the marketing of produce (*Chhachar et al., 2014*). In this context, mobile technologies can offer the means for development in developing countries (*Rashid and Elder, 2009*). ICTs, therefore, offer opportunities to reach more people through easy access to local or global information and knowledge.

The growth rate of communication in Meghalaya, India has also increased significantly. In the year 2001, there was an average of only 6.0 per cent subscribers of telephone, however in 2011, an average of 43.0 per cent are subscribers of telephone. The total mobile users in Meghalaya is 39.1 per cent (*GOI, 2011*), out of which 29.9 per cent are rural subscribers. The growth of mobile phones in the state, Meghalaya has been phenomenal during the last one decade. It has surpassed the growth

of other popular ICT tools like TV and radio in the last decade though it is the latest addition to the list. Mobile agro-advisory services can therefore, offer great opportunities to reach more people from the farming community through easy access to local or global information and knowledge. A mobile agro-advisory services functioning in Meghalaya is *m4agriNEI* (mobile based agro-advisory system in Northeast India). Thus, the study was develop to evaluate the gratification of the farmers on the services provided by the m4agriNEI, implying multinomial logistic regression model to identify the factors which determined the gratification level and analysing the effect of the recommended practices disseminated.

METHODOLOGY

The study was conducted in Umsning block of Ri-bhoi district, Meghalaya. Three villages- Nongladaw, Madanratiang and Kweng village were purposively selected as recent trainings were conducted by m4agriNEI in these place. A semi- structured questionnaire was developed for collecting data from a sample of ninety registered farmers of *m4agriNEI*.

The multinomial logistic regression model is an extension of the binomial logistic regression model and used when the dependent variable has more than two nominal or unordered categories. The response variable in the analysis namely 'Gratification level' had been assumed three nominal outcomes of 'Low Gratification level', 'Medium Gratification Level' and 'High Gratification Level' with nominal values of '1', '2' and '3' respectively due to set of seven distribution free independent variables *viz.*, 'Age', 'Education Level', 'Operational Landholding', 'Family monthly income', 'Social participation', 'Number of crops grown', and 'Awareness of m4agri services'.

The study followed the nominal response: baseline category multinomial logit regression model. Here, *Y* was a categorical response with *j* = 3 categories. These three category logit model for nominal response variables simultaneously describe log odds for all (3/2) pairs of categories. Given a certain choice of 3-1 of these, the rest are considered redundant. Therefore $\pi_j(\boldsymbol{x}) = P(Y = j|\boldsymbol{x})$ at a fixed setting of $\boldsymbol{x}$for explanatory variables, with $\sum_j \pi_j(\boldsymbol{x}) = 1$. For observation at that setting, the study considered the counts at the 3 categories of *Y* as multinomial with probabilities $\{\pi_1(x).....\pi_3(x)\}$. Thereference category was 'High Competency Level' on performing mitigative and adaptive practices.

RESULTS AND DISCUSSION

Gratification of services provided by m4agriNEI: Table 1 depicts that majority of the farmers about eighty-two per cent (82.22%) were satisfied with the results of recommended practices given by *m4agriNEI*. About eighty-seven per cent of the farmers stated that the answer to their queries was given within the same day, which adds up to the level of satisfaction of the users. After being aware and satisfied with the information and knowledge gained through *m4agriNEI*, it can be divulged from Table 1 that maximum about fifty-one per cent (51.11%) of farmers utilized the agricultural knowledge gained to the fullest extent. The utilization of the information provided by *m4agriNEI* to the fullest implies the competency and effectiveness of the recommended practices and services provided by the mobile agro-advisory service

Table 1. Gratification of services provided by *m4agriNEI*

Category	No.	%
Results of recommended practices		
Satisfied	74	82.22
Not satisfied	16	17.79
Immediacy of feedback		
Within the same day	79	87.78
Within a week	11	12.22
More than a week	0	0
Utilization of the knowledge gained		
Utilized to fullest extent	46	51.11
Utilized to medium extent	38	42.22
Not utilized	6	6.67

Model on Farmers' Gratification level of m4agriNEI services :

Overall test of relationship: A perusal of Table 2 below could divulge that the probability of the model chi-square (336.739) was 0.00 which was highly significant (i.e. $p<0.01$). Hence, the alternate hypothesis was accepted. As evident in Table 2, it could be suggested that there existed a relationship between the independent variables *viz*'Age', 'Education Level', 'Operational landholding', 'Family monthly income', 'Social participation', 'Number of crops grown', and 'Awareness of m4agri services' and the dependent variable namely 'Gratification level of *m4agriNEI* services'.

Table 2. Model fitting information

Model	2logLikelihood	Chi-square	Df	Sig
Intercept Only		325.065		
Final	88.326	336.739	22	0.000

Table 3. Pseudo R-Square

Cox and Snell	Nagelkerke
0.632	0.772

Strength of multinomial logistic regression relationship: Perusal of Table 3 could reveal the Cox & Snell R^2 and the Nagelkerke R^2 values which were 0.732 and 0.872 respectively. This implies that between 63.20 and 77.20 per cent of the variability in the dependent variable 'Gratification level' is explained by the independent variables *viz*'Age', 'Education Level', 'Operational Landholding', 'Family monthly income', 'Social participation', 'Number of crops grown', and 'Awareness of m4agri services' used in the model.

Relationship of independent variables and dependent variable using likelihood ratio test: Ascertaining the relationship between independent and dependant variables, the study employs the 'Likelihood ratio test'. The 'Likelihood ratio test' evaluates the overall relationship between an independent variables and dependent variable. A perusal of Table 4 depicts that independent variables *viz.,* 'Education level', 'Social Participation and 'Awareness of m4agriNEI services' were highly significant at 1% level of significance while the independent variables *viz.,* ''Number of crops grown' was significant at 5% level of significance apropos of 'Low gratification level' and 'Medium gratification level'.

Observing the 'Low gratification level' and 'Medium gratification level' of services provided by m4GRInei and examining the estimates which were significant at 1%, it could be inferred that the independent variables *viz.* Education of the farmer, social participation and awareness of *m4agriNEI* services led to low and medium categories of gratification of m4agriNEI services by respondents.

Effect of the information disseminated by m4agriNEI: The economic changes due to adoption of practices recommended by m4agriNEI were studied for five components. It is clear from Table 5 that information or practices recommended by m4agriNEI tried to bring positive changes among the farming community like increase in yield, changes in the quality of produce, income level, diversification of crops, disease control. More than half of the farmers said that there was change upto some extent in the increase in yield (63.30%) and quality of produce (53.30%). About 48.30 per cent of

Table 4. Relationship of independent variables and competency level of farmers using Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
	88.326[a]	.000	0	.
Education	109.812***	21.486	2	.000
Age	130.439	42.113	14	.988
Land holding	106.336***	18.010	2	.818
No.of crops grown	94.372**	6.046	2	.042
Monthly income	89.285	.958	2	.619
Social participation	98.044**	9.717	2	.009
Aware of m4agri	104.431***	16.105	2	.006

[a] This reduced model is equivalent to the final model because omitting the effect does not increase the degree of freedom.
** $p < 0.05$, *** $p < 0.01$

Table 5. Effect of information dissemination by *m4agriNEI* on the farmers

Change aspects	Change Percentage		
	No change	Up to some extent	Up to a large extent
Increase in yield	30.0	63.3	6.7
Change in quality of produce	36.7	53.3	10.0
Income level	43.3	43.3	13.3
Diversification of crops	70.0	23.3	6.7
Disease control	23.3	43.3	33.3

the farmers stated that there was change upto some extent in income level. Most of the changes tilted towards negative side like more than half (70.00 %) of the farmers reported that there was no change in diversification of crops while a fair percentage (43.30%) of farmers said that positive changes happened due to adoption of the practices recommended by *m4agriNEI* for disease control.

Thus, on an average economic changes were satisfactory to some extent but still a large majority of farmers did not experience the changes. The possible reason could be that any information generally takes some time to be penetrated into the society and takes relatively good time to be adopted.

CONCLUSION

ICTs modify the practice of extension services and open interesting avenues for the collection and dissemination of local knowledge and its integration with modern and global knowledge. It facilitates information delivery and bridge the gap existing between different actors in the agricultural development system. Farmers started using different ICT tools and it shows the greatest revolution in the field of agriculture. The information disseminated through mobile ICT (m-extension) can play a great role in enhancing efficiency of extension system by reaching large number of people. The study concludes that information received from *m4agriNEI* proved to be effective and farmers are finding this source of information as timely and of great use which indicates the important role *m4agriNEI* plays in the farming community. For better services, the *m4agriNEI* staffs have to regularly evaluate the responses of farmers to eradicate the problems in delivery of message. The information has to be tailored according to the enterprises, crops adopted by the farmers and based on the assessment of felt needs of the stakeholders. The information sent should be specific, brief and clear so that interest of the farmers could be maintained.

REFERENCES

Ansari, M.A. and Yogeshwar, A. K. (2009). Empowering and enabling farmers: A case study of e-chaupal in Uttarakhand. Proceedings of International Conference on Development Communication in the Era of Globalization. Pp. 6-7, July 9-11. Chennai.

Chhachhar, A.R.; Querestic, B.; Khushk, G.M. and Ahmed, S. (2014). Impact of ICTs in Agriculture Development. *J.of Basic Applied Scientific Research*, **4**(1):281-288.

GoI. (2011). Faster, sustainable and more inclusive growth-an Approach to the twelfth Five Year Plan (2012-17). Planning Commission, Government of India, October, 2011. *http://planningcommission.nic.in/plans/planrel/12appdrft/appraoch_12plan.pd*f (Accessed on 15t August, 2015).

Rashid, A.T. and Elder, L. (2009). Mobile Phones and Development : An Analysis of IDRC- Supported Projects. *The Electr. J. on Info. Systems in Dev. Countries*, **36** (2):1-16.