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Extent of Mobile Phone Application in Farming and Paired Wise Comparison of Constraints

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ABSTRACT

Keeping in view the growing importance of mobile phone in farming, this study was intended to assess the extent of mobile phone application in farming and determine the constraints faced by the rural youth farmers and advocate suggestive measures to overcome the same. The findings revealed that mobile phone applications are being primarily used to gather prevailing market price of agricultural goods and commodities, availing credit facilities, pooling of labours for agricultural operations. The major lacunae encountered were lack of awareness of mobile phone applications in farming, incomplete information and clarification of doubts by the rural youth farmers. The study felt the need for various line departments and concern stakeholders to give training to rural youth farmers on a clusters basis, to give practical awareness with proven case studies on how mobile phone applications can be utilized with maximum efficiency in farming.

Keywords: Farming, mobile phone applications, paired wise comparison, rural youth farmers.

INTRODUCTION

The most familiar information technology across the world today, including developing countries, is the mobile phone (Furuholt and Matotay, 2011). Possession of mobile phones has become a requisite in our society irrespective of age, profession, status or different income bracket groups. As such, mobile phones hare been considered as the most broadly accessed tool among the farmers for communication and also accessing agriculture-related information predominantly for the marketing of produce (Chhachar *et al.,* 2014). Evidence from selected studies carried out by the United Nations Conference on Trade and Development shows that mobile phones have become the most important mode of telecommunication in developing countries (UNCTAD, 2007). Mobilink (2009) reported that Kisan services through the use of mobile phones in Pakistan has made it easier to the farmers to keep in touch with the latest information in various spheres of agriculture like weather updates, crops, market rates *etc.* Chhachhar *et al.,* (2014) pointed out that mobile phones have reduced the gap among the farmers, buyers and sellers in Malaysia due to better communication as well as better information on prices of products from the market. Further, Casaburi *et al.,* (2014) reported that sending SMSs messages with agricultural advice to small holder farmers in Kenya has increased the yields by 11.5 per cent as compared to the control group with no messages received via mobile phones. Further, mobile phones were also found to deliver personalized information to farmers at low cost and in a context that is timed to coincide with relevant parts of agricultural season. The presence of mobile phones also helped farmers to coordinate with buyers and secure inputs from suppliers efficiently.

Shankaraiah and Swamy (2012) highlighted that lack of practical exposure, lack of locally relevant information, low network availability, electricity problem and fear to adopt technology were the constraints faced by farmers to use mobile phones. A study by Falola and Adewumi (2011) on the factors affecting the use of mobile

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telephone by small-scale farmers revealed that non-membership in an agricultural society, inadequate extension services, fluctuating telecommunication services, inadequate access to mobile services and lack of electric power supply were the constraints faced by the farmers while using mobile telephone services by the farmers.

In India, out of every hundred citizens there are ninety people with mobile phone. A report by Kantar IMRB ICUBE (2018) highlighted that the number of internet users is 566 million as of December 2018. The report also finds that 87 per cent of the total user base, or 493 million Indians, are defined as regular users. Of this, 293 million active internet users reside in urban India, while there are 200 million active users in rural India. Not surprisingly, 97 per cent of users access the internet on their mobile device. According to the report, digital adoption is now being propelled by rural India. It is estimated that users in rural India are expected to reach 290 million by the end of 2019.

In north east India various ICT related extension service projects are implemented in different states of the region such as ASHA project in Assam which aimed at providing ICT based agri-business services through Common Information Centres (CICs), e-ARIK project of Central Agricultural University to provide ICT extension services to rural tribal farming community in Yagrung and nearby villages of East Siang district of Arunachal Pradesh, AGRISNET and other e-governance initiatives such as State Wide Area Network (SWAN) project, State Service Delivery Gateway and State Data Centers are also implemented in different states of North-east India (Syiem and Raj, 2015). 'm4agriNEI' a mobile phone application research project in agriculture was implemented in the state of Meghalaya in its six districts namely Ri-Bhoi, East Khasi Hills, West Khasi Hills, West Jaintia Hills, West Garo Hills and South West Garo Hills. Considering this, under the assumption that, mobile phone application in farming will be evident in the stated regions; the present study has been conducted to assess the extent of phone application in farming and constraints faced by the rural youth farmers with the following objectives to determine the extent of mobile phone application by tribal rural youth in farming, to examine the constraints in application of mobile phones in farming and advocate suggestive measures to overcome the same.

METHODOLOGY

A three stage sampling has been followed in the study. In the first stage, the districts have been selected purposively. In the second stage two villages from each district having more than one thousand populations were selected thereby entailing twelve villages in total. Finally, snowball sampling was carried out to select twenty respondents to constitute a true representative of the population under research from each village which brought total respondents to 240. All of the respondents were rural youth farmers between the ages of 19-35 years. One of the indifferent criterions for the sample rural youth will be the farmer who possesses a smart mobile phone.

Extent of mobile phone application by the farmers was measured by placing ten mobile phone use dimensions and ranking them. The following formula has been used to develop a scale on extent of mobile phone use in farming

$$MPUI = MPUh \times 4 + MPUm \times 3 + MPUl \times 2 + MPUn \times 1$$

Where,

MPUI = Mobile phone use index

MPUh = Number of respondents with high mobile phone use

MPUm = Number of respondents with medium mobile phone use

MPUl = Number of respondents with low mobile phone use

MPUn = Number of respondents with no mobile phone use

Since the total numbers of the respondents were 240, the MPUI of each dimension thus could range from 240 to 960. But, to express the MPUI in a meaningful way, it was necessary to convert as Standardized Mobile Phone Use Index (SMPUI) by using the following method.

$$SMPUI = \frac{\text{Computed MPUI}}{\text{Highest Possible MPUI}} \times 100$$

SMPUI of each of the dimension could range from 0 to 100, whilst 0 indicating no need and 100 indicating highly need of the farmers. This technique of scale development is in concordance with scales of Kabir *et al.,* (2014). Paired comparison technique was employed to rank the constraints faced by the farmers. In this method, the stimuli (items, statements or variables) are presented in pairs in all possible combinations and the respondents are asked to select one stimulus over the other from each pair, which is judged as more favourable. This method of

psychological scaling also provides an estimate of the distances between each of the stimuli, in comparison to the stimulus with least preference, whose scale value is (arbitrarily) brought down to zero. The numbers of pairs which may be obtained are n (n-1)/2. It was noted that, with increase in the value of n, the number of pairs increase rapidly. As more number of pairs may confuse the respondents and increase the probability of error in judgement, the number of stimuli n should be optimum *i.e.,* neither too many nor too few (Ray and Sagar Mondal, 2016). Therefore, only the most relevant in the present study was taken into account.

To eliminate response bias, both the stimuli in each pair and the pairs themselves, are randomly arranged. For this purpose the table of random numbers was consulted. The stimuli are then presented to the respondents, who are asked to select one stimulus over the other from each pair, which they consider as more favourable. The F – matrix (appendix I) was developed initially, followed by P – matrix (appendix II) which gives the proportion of times the column stimulus was judges more favourable than the row stimulus. A re-arranged P – matrix (appendix III) was then made with the stimulus having the highest column at the right and the smallest at the left. Finally, the Z – matrix (appendix IV) was developed which gives the normal deviates corresponding to the proportion in the table of P – matrix. These were obtained from the corresponding table of normal deviates (Edwards, 1969).

Appendix I

F-matrix	**Cost of mobile phone**	**Low network connectivity**	**Lack of awareness of mobile phone application**	**Available information is incomplete**	**Clarificatio n is difficult if any doubt arises**	**Difficulty in understandi ng**	**Erratic power supply**
Cost of mobile phone	-	68	166	146	147	111	74
Low network connectivity	172	-	187	142	188	99	112
Lack of awareness of mobile phone application in farming	74	53	-	183	96	61	63
Available information is incomplete	94	98	57	-	84	107	85
Clarification is difficult if any doubt arises	93	52	144	156	-	74	59
Difficulty in understanding	129	141	179	133	166	-	138
Erratic power supply	166	128	177	155	181	102	-

Appendix II

P-matrix corresponding to F-matrix	**Cost of mobile phone**	**Low network connectivity**	**Lack of awareness of mobile phone application in farming**	**Available information is incomplete**	**Clarificatio n is difficult if any doubt arises**	**Difficulty in understandi ng**	**Erratic power supply**
Cost of mobile phone	0.000	0.283	0.692	0.608	0.613	0.463	0.308
Low network connectivity	0.717	0.000	0.779	0.592	0.783	0.413	0.467
Lack of awareness of mobile phone application in farming	0.308	0.221	0.000	0.763	0.400	0.254	0.263
Available information is incomplete	0.392	0.408	0.238	0.000	0.350	0.446	0.354
Clarification is difficult if any doubt arises	0.388	0.217	0.600	0.650	0.000	0.308	0.246
Difficulty in understanding	0.538	0.588	0.746	0.554	0.692	0.000	0.575
Erratic power supply	0.692	0.533	0.738	0.646	0.754	0.425	0.000
Sum	3.033	2.250	3.792	3.813	3.592	2.308	2.213

Appendix III

Rearranged P-matrix	**Available information is incomplete**	**Lack of awareness of mobile phone application in farming**	**Clarificatio n is difficult if any doubt arises beneficial**	**Cost of mobile phone**	**Difficulty in understandi ng**	**Low network connectivity**	**Erratic power supply**
Available information is incomplete	0.000	0.238	0.350	0.392	0.446	0.408	0.354
Lack of awareness of mobile phone application in farming	0.763	0.000	0.400	0.308	0.254	0.221	0.263
Clarification is difficult if any doubt arises	0.650	0.600	0.000	0.388	0.308	0.217	0.246
Cost of mobile phone	0.608	0.692	0.613	0.000	0.463	0.283	0.308
Difficulty in understanding	0.554	0.746	0.692	0.538	0.000	0.588	0.575
Low network connectivity	0.592	0.779	0.783	0.717	0.413	0.000	0.467
Erratic power supply	0.646	0.738	0.754	0.692	0.425	0.533	0.000
Sum	3.813	3.792	3.592	3.033	2.308	2.250	2.213

Appendix IV

Z-matrix	Available information is incomplete	Lack of awareness of mobile phone application	Clarification is difficult if any doubt arises	Cost of mobile phone	Difficulty in understanding	Low network connectivity	Erratic power supply
Available information is incomplete	0	-0.713	-0.385	-0.274	-0.136	-0.233	-0.375
Lack of awareness of mobile phone application in farming	0.716	0	-0.253	-0.502	-0.662	-0.769	-0.634
Clarification is difficult if any doubt arises	0.385	0.253	0	-0.285	-0.502	-0.782	-0.687
Cost of mobile phone	0.274	0.502	0.287	0	-0.093	-0.574	-0.502
Difficulty in understanding	0.136	0.662	0.502	0.095	0	0.222	0.189
Low network connectivity	0.233	0.769	0.782	0.574	-0.22	0	-0.083
Erratic power supply	0.375	0.637	0.687	0.502	-0.189	0.083	0
Sum	2.119	2.110	1.620	0.110	-1.802	-2.053	-2.092
Mean	0.303	0.301	0.231	0.016	-0.257	-0.293	-0.299
Adding largest negative value	0.602	0.600	0.530	0.315	0.042	0.006	0.000

Content validity was estimated by a group of experts to review the test items. Accordingly, the experts were given the list of content areas specified in the test blueprint, along with the test items intended to be based on each content area. The experts were then asked to indicate whether or not they agree to each item. Then, based on the experts' comments, some of the items were revised and others were dropped from the list.

Reliability of the scales was measured with Cronbach Alpha (Cronbach, 1951), the Cronbach's Alpha results showed values all above 0.5, suggesting good internal consistency reliability (Julie, 2007). The value for reliability of scale for extent of mobile phone application is given in table 2 showing good internal consistency. As a result, all variables were retained for subsequent analysis. Prior to actual data collection, the interview schedule was pre-tested, and piloting was used to refine the questionnaire with 30 non-sampled rural youth farmers who were selected randomly from non-sampled area. Finally, suitable modification was made and reliability was tested. The final interview was conducted by recruiting enumerators under close supervision of the researcher. The primary data were gathered from 240 respondents using an interview schedule.

RESULTS AND DISCUSSION

Extent of mobile phone application

It can be seen from Table 1 that mobile phone applications are being primarily used to determine the market price of agricultural goods and commodities including prevailing produce prices from time to time with SMPUI 57.81. Availing credit facilities (through bank enquiry or borrowings made through friends, families or money lenders) ranked second with SMPUI 53.54. In the third, Pooling of labours for agricultural operations which are usually organized by larger farmers stood with SMPUI 53.44. Availability of inputs and pest and disease management ranked at fourth and fifth place with SMPUI at 48.85 and 41.88 respectively. Selling of produce ranked at sixth where the farmers sell their produce with the help of mobile phone. Here, the farmers are not marginal farmers but better – off farmers who cultivate a larger area where they can sell their produce at bulk. The farmers contact with a buyer before the crops are harvested and only after negotiating and mutual understanding between the two parties including the selling price will only the selling of the produce takes place in a two way process where the dealer comes to pick up the harvest or the farmers go and sell.

Table 1: Rank order of extent of mobile phone application in farming based on SMPUI

Extent of Mobile phone application	High	Medium	Low	Never	MPUI	SMPUI	Rank
Market Price	51	36	90	63	555	57.81	1
Credit Facility/subsidies	28	30	130	52	514	53.54	2
Pooling of labour	24	36	129	51	513	53.44	3
Availability of Inputs	19	25	122	74	469	48.85	4
Pest and Disease management	0	30	102	108	402	41.88	5
Selling crops via mobile phone	0	35	67	138	377	39.27	6
Recommended varieties	6	15	48	171	336	35.00	7
Post harvest practices	0	0	34	206	274	28.54	8
Advance warning of weather risk	0	0	19	221	259	26.98	9
Money transfer and payments for farming purpose	0	0	0	240	240	25.00	10

Extend of mobile phone applications regarding recommended varieties, post harvest practices are low with SMPUI at 35.00 and 28.54 respectively. This may be because of the attitude the farmers has who are adapted to the existing crop varieties they have been cultivating since the time of their forefathers or lack of awareness of new recommended varieties. It can also be seen that mobile phone applications are being utilized to forecast weather with SMPUI of 26.98 only. This indicated lack of awareness or disbelieve in technology. It can also be clearly observed from the table that none of the farmers

used mobile phone applications to transfer money for farming purposes. The respondents expressed using PayTm to transfer money for personal purposes but not for farming and marketing as they are not ready to take risk if some problem arises during the transaction process.

Table 2: Cronbach Alpha for Extent of Mobile Phone Application in farming

Reliability Statistics	
Cronbach's Alpha	N of Items
.894	10

Table 2 gives the overall reliability test with alpha value of .894 which is highly reliable for the ten dimensions to measure the extent of mobile phone application in farming.

Constraints faced by the farmers

Table 3: Distribution of respondents according to problems faced by them

Problems	Score	Rank
Available information is incomplete	0.602	I
Lack of awareness of mobile phone application in farming	0.600	II
Clarification is difficult if any doubt arises	0.530	III
Cost of mobile phone	0.315	IV
Difficulty in understanding	0.042	V
Low network connectivity	0.006	VI
Erratic power supply	0.000	VII

It can be observe from Table 3 that "available information is incomplete" was the most prioritized problem as reported by the respondents with scale value of 0.602. This can be attributed to the fact that they are not getting the complete information for a successful farming which are in terms of market price, credit facilities/ subsidies, availability of inputs etc.

Further, "lack of awareness of mobile phone application in farming" was the second problem encountered by the rural youth farmers. This is basically due to unawareness of the potential of mobile phone application in farming. Thus, more awareness programme on the potential of mobile phone application should be done at village level.

The third major problem lingered with as reported by the rural youth farmers was "clarification is difficult if any doubt arises". This might be due to the fact that agriculture and allied system need diverse information with high uncertainty right from sowing till marketing. Regardless of the low budget smart phone available in the market, some of the respondents still perceived cost of mobile phone as high because of their low disposable income which can be spend on purchasing mobile phone, thus "Cost of mobile phone" ranked fourth as a constraint.

Even though they mostly understood information gathered through mobile phone applications, they still find hard to apply on the field which tend them to express "difficulty in understanding" at fifth place. "Low network connectivity" and "erratic power supply" ranked lowest at sixth and seventh position. It can be deduced that there is fairly good network connectivity even in village areas and the power supply does not hinder much in day-to-day farming operation of mobile phone applications in farming.

CONCLUSION

Though some of the rural youth farmers use mobile phone application to gather information related to market price, availing credit facility, pooling of labour *etc.,* it can be said that the optimum use of mobile phone application in farming is still in infancy to the larger population. And the fundamental problems were lack of awareness and incomplete information. Therefore, more awareness programme about the practical usefulness of mobile phone application in farming should be conducted at village level.

This can be sideline with Attracting Rural Youth in Agriculture (ARYA) programme where mobile phone can be used as a tool to attract rural youth in farming and also in line with budget 2019-20 which aimed to create ten thousand new farmer organisations. It is suggested that various line departments and concern stakeholders must give training to rural youth farmers on a cluster basis to give practical awareness with proven case studies on how mobile phone applications can be utilized at maximum, to obtain the best out of it for farming purposes.

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