

**SMALLHOLDER FARMERS' PERCEPTION ON MOBILE PHONE ADVISORY
POTENTIAL IN FARMING IN BHAGALPUR, INDIA**

Abstract

Mobile phones become an omnipotent device in human interface and interpersonal communication and itself become a paramount tool for grassroots agricultural extension linkage. It was investigated to extrapolate smallholder farmers' perception of Mobile Phone Advisory Potential in Farming. Data were collected from 120(one hundred twenty) farmers and it was found most of the farmers were middle age group(50 %), education level up to Secondary level(35.84%) and annual income INR 3 to 4 lakhs (33 %). The respondent's perception on Mobile Phone Advisory Potential in farming was, prospective tools to reach the unreached; any time retrieval of the message; better decision-makers; message relevance in sustainable mobile advisory usage; and high mobility to users. Farmer's decision making in farming is positively and significantly correlated with information access level (0.458**) social esteem and upscaling of mobile advisory usage(0.318*) and better information sharing and feedback (0.304*). Result also revealed that 54.17 per cent of farmers possessed a smartphone and use WhatsApp. Bihar Krishi Application (45%) and Social media youtube(48.33%) are getting popularity among the farming community in decision making. From the study it can be concluded that more agricultural related information should be made available in social media, agricultural information available in social media should be more localised and customised. Grassroots extension functionaries, viz. agri-input dealers and progressive farmers should be trained to used more ICT tools in general and smartphone in particular.

Key Words: Mobile Phone, Farmers, ICT, Smartphone, Mobile apps

1.Introduction

Smallholder farmers are marginal and sub-marginal farm households own cultivable land less than 2.0 hectare. Small-holder farmers are crucial for Indian agriculture and rural economy and their role to national grain production was nonetheless 41 per cent(Singh *et al.*,2002), however, smallholder farmers faced the constraints to use of various information sources as well as poor extension services (Salau *et al.*, 2013). Although Mobile phones become an omnipotent device in human interface and interpersonal communication and farmers across the globe are using it. Mobile phones have potential to connect farmers to markets, close the information gap and enable informed decisions(Masuka *et al.*, 2016), receive quality and timely information on pest and disease control of crop and irrespective of the socio-economic characteristics, the farmers were utilizing the mobile multimedia agricultural advisory system(Ganesan *et al.*,2013). Mittal and Tripathi,(2009) opined that mobile phones can act as a catalyst to improving farm productivity and rural incomes, the quality of information,

40 timeliness of information and trustworthiness of information are the three important aspects
 41 that have to be delivered to the farmers to meet their needs and expectations. However,
 42 farmers decision on selection of package of practices depends on its performance and
 43 effectiveness, awareness and information, technical and operational knowledge,
 44 environmental criteria, and financial and accessibility criteria(Sharifzadeh,2018) and
 45 influence and persuasion of inputs dealers (Panda,2014). The research was conducted among
 46 the smallholder farmers of Bihar in Bhagalpur district. In Bihar, around ninety per cent of
 47 farmers are smallholder farmers and the rural economy is agrarian nature. The major crops
 48 grown in the state are cereal(Rice, wheat, maize), pulses(lentil, gram, chickpea, grass pea),
 49 oilseeds (rapeseed and mustard, linseed), cash crops(sugarcane, potato, onion, chilli, tobacco)
 50 and different types of vegetable(cabbage, cauliflowers, brinjal, carrot, okra, radish, pumpkin).
 51 Last one decade, the state remains the centre of discussion for its agricultural growth. The
 52 state has a strong public extension delivery system and mobile advisory was delivery to the
 53 farmers. So, it becomes imperative to study the Smallholder Farmers' Perception of Mobile
 54 Phone Advisory Potential in Farming.

55 2.Methodology

56 For the present study, Bhagalpur district of Bihar state is selected purposively. Farmers those
 57 primary occupations were farming and having minimum 10 years of farming experiences
 58 were within the sampling frame. From this sampling frame, 120 (hundred twenty) farmers
 59 were selected randomly. The response of the questionnaire was collected from the
 60 respondents from March 2018 to July 2018. The summative scale and Likert Scale were used.
 61 The statistical tools included in this study were weighted mean, per cent, Rank and Pearson's
 62 Correlation Coefficient.

63 3. Results and Discussion

64 In this knowledge work, society information is crucial for reasonable decision making.
 65 Farmers need information for several reasons, however, considering farming as their
 66 livelihood, so availability of timely and correct information is crucial soft inputs in scientific
 67 farming. Mobile phone advisory is best to mean for grassroots level extension linkage.
 68 Farmers' possession and utilisation of mobile phone advisory are also associated with their
 69 socio-economic condition/profile.

70 **Table 1: Socio-economic Profile of the Farmers**

71 n=120

Characteristics	Categories	<i>f</i>	Per cent	
1. Age Groups (in Years)	Upto 35 (Young)	30	25.00	Mean=35.07 SD=10.12 CV =28.86
	> 35 to ≤ 55 (Middle Age)	60	50.00	
	> 55 (Older)	30	25.00	
2. Level of education	Illiterate	7	5.83	
	Functional literacy	12	10.00	
	Up to primary	10	8.33	
	Up to secondary	43	35.84	
	Up to higher Secondary	41	34.17	
	Graduate and above	7	5.83	

3.Farming Experiences (in years)	>10 to ≤ 11	22	18.33	Mean=17.53 SD= 6.54 CV =37.29
	>11 to ≤ 20	32	26.67	
	>20 to ≤ 30	40	33.33	
	> 30	26	21.67	
4.Annual income (Rs. In Lakhs)	Upto 2.0	22	18.33	Mean=3.23 SD= 1.10 CV =34.05
	>2.0 to ≤ 3.0	32	26.67	
	>3.0 to ≤ 4.0	40	33.33	
	>4.0 to ≤ 5.0	20	16.67	
	>5.0 to ≤6.0	6	5.00	

72 It is noted that 50.00 per cent respondents belong to middle age group and 25.00 per cent
73 each young and middle age group. So, there is a scope to introduce new tools of ICT among
74 the farmers, especially among the young farmers, as in young age people remains enthusiastic
75 to try new tools and ideas. Finding also reveals that most of the respondent's education level
76 is up to secondary and above. About the farmers farming experience, 33.33 per cent of
77 farmers had farming experience of 20 to 30 years and only 18.83 per cent farmers farming
78 experience is 10 years. The annual income of the respondents is an important indicator of
79 farming outcome and it is noted that 33.33 per cent respondents' annual income ranged
80 between Rs. 3 to 4 lakhs with CV 34.05 (Table 1). Ogbuide and Ele (2015) noted in
81 smallholder farmers and mobile phone technology, that more young farmers use mobile
82 phones and spend more mobile phone for seeking market information than any other
83 agricultural activities and obtaining weather information.

84 **Table 2: Possession of Mobile Phone by Farmers (n=120)**

Sl. No.	Statements	Responses				
		Yes		No		
		f	%	f	%	
1	Do you own a mobile phone?	120	100	0	0	
2	Do you share the mobile phone with the family member?	120	100	0	0	
3	Do you use multiple SIM cards?	80	66.67	40	33.33	
4	Does someone else in your family own the mobile phone?	100	83.33	20	16.67	
5	Type of your mobile phone possessed in Household	Basic	80	66.67		
		Smart Phone	65	54.17		
		Basic & Smart Phone	30	25.00		

85 It becomes imperative to know the Possession of mobile phone by farmers for the advocacy
86 of the mobile phone advisory service to them. The perusal of the table 2 reveals that 100 per
87 cent farmers possessed a mobile phone, out of which 66.67 per cent, 54.17 per cent and 25.00
88 per cent farmers had basic, smartphone, and basic & smart Phone respectively. Dehnen-
89 Schmutz *et al.* (2016) noted that in citizen science agriculture most of the respondents use a
90 smartphone in farm management and use farm-specific apps. There are several Agri-Mobile

91 Apps(Kisan Suvidha, IFFCO Kisan Agriculture, RML Farmer – Krishi Mitra, Pusa Krishi,
 92 AgriApp, Kheti-Badi, Plantix, AgriMarket) support the farmers from seed selection to
 93 marketing.

94 **Table 3: Usage of mobile phone by farmers**

95 n=120

Sl. No.	Statements		Responses			
			Yes		No	
			<i>f</i>	%	<i>f</i>	%
1.	How many years you are using your smartphone?	Last 3 years	45	37.50		
		More than 3 years	20	16.67		
2.	Do you have Whatsapp on your mobile?		65	54.17		
3.	How many mobile handsets you have?	One	90	75.00		
		More than one	30	25.00		
4.	Do you know how to send SMS/texts?		120	100		
5.	Do you know how to receive SMS/texts?		120	100		
6.	Do you have access to the internet on your mobile phone?		70	58.33		
7.	Do you know how to operate the internet on your mobile phone?		50	41.67		
8.	Have you heard about the Kisan Call Centre?		70	58.33	50	41.67
9.	Do you ever make any call to Kisan Call Centre(i.e.1551)?		53	44.17	67	55.83
10.	Do you hear about Bihar Agricultural University Kisan Help Line?		30	25.00	90	75.00
11.	Do you ever make any call to Bihar Agricultural University Kisan Help Line?		25	20.83	95	79.16
12.	Do have an account in any of the social media?	facebook	16	13.33		
		Any other	0	0		

96 It becomes imperative to know the access and possession of mobile phone as a tool of
 97 information interface for farmers, accordingly, number of statements were set and asked the
 98 respondent based on dichotomous variables(mostly-yes or no). The result showed that most
 99 of the farmers were using the smartphone for the last three years and 54.17 per cent
 100 respondents had WhatsApp in their mobile. It was also noted that 58.33 per cent of
 101 respondents access the internet on their mobile. Farmers also called to Kisan Call Centre(
 102 i.e.1551) for advisory service(44.17%) and only 13.33 per cent farmers use facebook(social
 103 Media) as general-purpose(Table 3). Mobile phones as a primary conduit for agricultural
 104 information and services(Steinfeld *et al.*, 2015), and presents an opportunity to strengthen
 105 market linkage. However, the cost of mobile phone airtime recharge vouchers and the lack of
 106 electricity for recharging phone batteries are the major impediments to the use of mobile
 107 phones(Okello *et al.* 2010).

108 **Table 4: Rank Position of Farmers' Perception towards Mobile Phone Advisory Service**
 109 **Potential in Decision Making in Farming**

110 n=120

Sl.No.	Farmers' Perception	Weighted Mean	Rank	
			Broad Areas Specific	Overall
A.	Access of information in anytime	4.87		I
i.	Mobiles are potential tools to reach the unreached	4.50	I	I
ii.	Any time retrieval of the text message is possible in mobile advisory services	4.03	II	III
iii.	In the physical absence of expert, mobile advisory leads the adoption of technology and information	3.37	III	XVI
iv.	Mobile advisories can replace the personal extension contact methods	3.13	IV	XVII
v.	Mobile technology delivers personalized information	2.56	V	XXIII
B.	Enhancing social esteem and upscaling	4.11		II
i.	Better informed farmers are better decision makers	4.37	I	II
ii.	Mobile advisory subscription enhances self-esteem and reputation of a farmers	3.90	II	V
iii.	Mobile advisories can meet location-specific needs of the farmers	3.80	III	VII
iv.	Farmer's interaction can be upscaled with mobile advisories.	3.70	IV	IX
C.	Challenges in the use of mobile service	3.97		III
i.	Illiteracy is a constraint in using mobile information services	3.93	I	IV
ii.	Absence of a smartphone creates a problem in getting proper advisory service.	3.87	II	VI
iii.	Higher mobile use skill is needed to receive and read the messages	3.80	III	VII
iv.	Mobile advisory usage requires a high level of literacy	3.07	IV	XVIII
v.	Mobile technology access is difficult for resource-poor farmers	3.06	V	XIX
vi.	Only rich farmers are affordable to use mobile agro advisories	3.03	VI	XX
vii.	Mobile advisory subscription will increase the phone recharge expenditures	2.80	VII	XXI
D.	Sustainability and farm planning	3.74		IV
i.	The relevance of the message decides the sustainable mobile advisory usage	3.77	I	VIII

ii.	Mobile advisories save travel time/cost of the farmers.	3.66	II	X
iii.	Mobile advisories help farmers in farm planning exercises	3.60	III	XI
F.	Information Sharing and feedback	3.41		V
i.	Early feedback can be obtained through mobile advisory service than traditional extension methods	3.50	I	XIII
ii.	Mobile Phones offers high mobility to users	3.49	II	XIV
iii.	Sharing of information will be easier via mobile technology	3.38	III	XV
iv.	Anytime anywhere message delivery is possible through mobile advisory services	2.67	IV	XXII
G.	Socio-economic development and cost in access	3.11		VI
i.	As a knowledge disseminating tool, mobile technology will contribute to socio-economic development	3.60	I	XII
ii.	Mobile handsets facilitate low-cost access to information	2.03	II	XXIV

111 Farmers' Perception towards Mobile Phone Advisory Service Potential in Decision Making
112 in Farming is assessed in terms of broad areas of Access of information in any time;
113 Enhancing social esteem and upscaling; Challenges in use of mobile service; Sustainability
114 and farm planning, Information Sharing and feedback; and Socio-economic development and
115 cost in access. The finding reveals that mobiles are potential tools to reach the
116 unreached(Rank I) and any time retrieval of the text message is possible in mobile advisory
117 services(Rank II) are major perceived factors about the broad area of Information access.
118 Regarding the Enhancing social esteem and upscaling, it is noted that major perceived factors
119 are better-informed farmers are better decision-makers(Rank I) and mobile advisory
120 subscription enhances self-esteem and reputation of farmers (Rank II). While farmer also
121 faces challenges in use of mobile service about illiteracy is a constraint in using mobile
122 information services(Rank I) and absence of smartphone create problem in getting proper
123 advisory service(Rank II). Regarding Sustainability and farm planning the mobile advisory
124 service contribute in Relevance of the message decides the sustainable mobile advisory
125 usage(Rank I), Mobile advisories save travel time/cost of the farmers(Rank II) and mobile
126 advisories helps farmers in farm planning exercises(Rank III). Regarding the Information
127 Sharing and feedback in mobile advisory service, the major factors are receiving of early
128 feedback(Rank I), Mobility in Use(Rank II) and easy sharing of information (Rank III)(Table
129 4).

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134 **Table 5: Rank Position of Broad Areas of Farmers' Perception towards Mobile phone**
 135 **Advisory Service Potential in Decision Making in Farming**

136 n=120

Sl. No.	Farmers perception	Weighted Mean	Rank
1.	Access of information in anytime	4.87	I
2.	Enhancing social esteem and upscaling	4.11	II
3.	Challenges in the use of mobile service	3.97	III
4.	Sustainability and farm planning	3.74	IV
5.	Information Sharing and feedback	3.41	V
6.	Socio-economic development and cost in access	3.11	VI

137 Amongst the different broad areas of farmers Perception towards Mobile phone Advisory
 138 Service Potential in Decision Making in Farming, the major perceived areas are Access of
 139 information in any time (Rank I), Enhancing social esteem and upscaling(Rank II) and
 140 Constraints in use of mobile service(Rank III)(Table 5).

141 It becomes imperative to know farmers decision making in farming about their perception
 142 towards Mobile Phone Advisory Service, accordingly, Correlation Coefficient was assessed.
 143 It was noted that decision making in farming was positively and significantly correlated with
 144 the variables $X_1(0.458^{**})$, $X_2(0.318^*)$, $X_3(0.486^{**})$, $X_5(0.304^*)$. It implies that mobile phone
 145 advisory service can increase any time access of information, promote social esteem of
 146 farmers, better information sharing and ultimately it assisted farmers in better decision
 147 making in farming(Table 6). It was also noted that socio-economic variables age is positively
 148 and significantly correlated with the access of the information in anytime ($X_1: 0.486^{**}$),
 149 Education level is positively and significantly correlated with the access of the information in
 150 anytime($X_1: 0.327^*$) and challenges in use of mobile service($X_3:0.356^*$). It is also observed
 151 that annual income of farmers was positively significantly correlated with the access of the
 152 information in anytime ($X_1: 0.321^*$), Enhancing social esteem and upscaling ($X_2: 0.376^*$)
 153 and Challenges in use of mobile service($X_3: 0.387^*$)(Table 7).

154 **Table 6: Correlation Coefficient between Farmers' Perception towards Mobile Phone**
 155 **Advisory Service (independent variables) and Decision Making in farming (dependent**
 156 **variable)**

157 n=120

Sl. No.	Farmers perceptions	Correlation Co-efficient (r)
1.	Access of information at any time (X_1)	0.458**
2.	Enhancing social esteem and upscaling(X_2)	0.318*
3.	Challenges in use of mobile service(X_3)	0.421**

4.	Sustainability and farm planning(X_4)	0.187 ^{NS}
5.	Information Sharing and feedback(X_5)	0.304*
6.	Socio-economic development and cost in access(X_6)	0.156 ^{NS}

158 **Correlation is significant at the 0.01 level.

159 *Correlation is significant at the 0.05 level.

160 ^{NS} Not Significant

161 **Table 7:** Correlation Coefficient between Farmers' Perception towards Mobile Advisory
162 Service Potential and Demographic variables

163 n=120

Sl. No.	Farmers perception	Correlation Co-efficient			
		r_1	r_2	r_3	r_4
1.	Access of information in anytime(X_1)	0.486**	0.327*	0.287*	0.321*
2.	Enhancing social esteem and upscaling(X_2)	0.167 ^{NS}	0.178 ^{NS}	0.312*	0.376*
3.	Challenges in the use of mobile service(X_3)	0.167 ^{NS}	0.356*	0.173 ^{NS}	0.387*
4.	Sustainability and farm planning(X_4)	0.189 ^{NS}	0.298*	0.128 ^{NS}	0.198 ^{NS}
5.	Information Sharing and feedback(X_5)	0.194 ^{NS}	0.187 ^{NS}	0.432*	0.231*
6.	Socio-economic development and cost in access(X_6)	0.145 ^{NS}	0.178 ^{NS}	0.139 ^{NS}	0.368*

164 **Correlation is significant at the 0.01 level.

165 *Correlation is significant at the 0.05 level.

166 ^{NS} Not Significant

167 r_1 = Correlation Coefficient of Age, r_2 = Correlation Coefficient of Education level

168 r_3 = Correlation Coefficient of Farming Experience, r_4 = Correlation Coefficient of Annual
169 Income

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171 **Table 8: ICT Tools usage by Farmers**

172 n=120

Sl. No.	ICT tools	f^*	Per cent
1.	Whatsapp Group	70	58.33
2.	Mobile SMS	95	79.17
3.	Bihar Krishi mobile Application(Mobile Apps)	54	45.00
4.	Video Screening through LCD Projectors	110	91.67
5.	Video Screening from Youtube (Social Media)	58	48.33
6.	Attending farmers personal phone call	40	33.33
7.	E-leaflet	55	45.83

173 *Multiple responses

174 Due to the progress of Information and Communication Technology(ICT) and the high
175 penetration of mobile technology and mobile network in rural areas, the farmers are using the

176 number of ICT tools. Farmers ICT tool usage was assessed. From the study, it was noted that
177 farmers used the number of ICT tools – Mobile SMS(79.17%), WhatsApp(58.33%), Bihar
178 Krishi mobile Application(45.00%), Youtube(48.33%) and remaining as shown in table 8.

179 **4. Conclusion and Recommendation**

180 Mobile phones become an omnipotent device. Due to the availability of low cost
181 basic/feature phone to moderate cost multifunctional smart/android phone, itself become a
182 paramount tool for grassroots extension linkage. Smallholder farmers are future of world
183 agriculture and in national agriculture, their contribution to grain production was nonetheless
184 41 per cent. Farmers considered that Mobile Phone Advisory in farming is prospective tools
185 to reach the unreached; anytime message/content retrieval; farmers can take decision better,
186 however, the relevance of the message decides the sustainable mobile advisory usage. Being
187 it is a very small device, its portability and mobility are high. Farmer's decision making in
188 farming is positively and significantly correlated with information access level (0.458**)
189 social esteem and upscaling of mobile advisory usage(0.318*) and information sharing and
190 feedback (0.304*). Socio-economic variables age and education are positively and
191 significantly correlated with the access to the information in anytime(0.486**). It was noted
192 that 54.17 per cent farmer possessed a smartphone and use WhatsApp. Bihar Krishi mobile
193 Application(45%) and Social media youtube(48.33%) are getting popularity among the
194 farming community in decision making. Farmers also called to Kisan Call Centre(i.e.1551)
195 for advisory service(44.17%) and only 13.33 per cent farmers use facebook(social Media) as
196 general purpose. From the study it can be concluded that more agricultural related
197 information should be made available in social media, agricultural information available in
198 social media should be more localised and customised. Grassroots extension functionaries,
199 agri-input dealers and progressive farmers should be trained to used more ICT tools in
200 general and smartphone in particular. There is the number of Agri-Mobile Apps(Kisan
201 Suvidha, IFFCO Kisan Agriculture, RML Farmer – Krishi Mitra, Pusa Krishi, AgriApp,
202 Kheti-Badi, Plantix, AgriMarket) support the farmers from seed selection to marketing.
203 Mobile applications (m-apps) hold a significant role in providing the most affordable ways
204 for millions of farmers to access information, markets, finance, and governance
205 systems(Qiang *et al.*, 2012).

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210 **COMPETING INTERESTS DISCLAIMER:**

211

212 Authors have declared that no competing interests exist. The products used for this research
213 are commonly and predominantly use products in our area of research and country. There is
214 no conflict of interest between the authors and producers of the products because we do not
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218

219 **Consent**

220 As per international standard ,respondents' written consent has been collected and preserved by
221 the author(s).

222

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