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Relationship between Socioeconomic Characteristics and Usability of Online and Mobile Media among Farmers of Punjab

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Authors' contributions

This work was carried out in collaboration between both authors. Author RK performed data tabulation and the statistical analysis and wrote the first draft of the manuscript. Author ST managed the literature searches, proposal writing and final editing of manuscript. Both authors collected the data also. Both of them read and approved the final manuscript.

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ABSTRACT

The present paper is an endeavour to analyze the accessibility and usability of online and mobile media among farmers and to find out the relationship between socioeconomic variables and various online and mobile media. The primary data were collected from randomly selected 720 farmers from 16 villages of Punjab through self-structured questionnaire. The findings of the study indicate that 99.17 per cent of farmers in the study area had access to mobile phones while 78.05 per cent farmers were using internet on their mobile phones. However, 60.56 per cent farmers had used agri-apps and agricultural websites to obtain agricultural information. Only 43 per cent of them had positive perception towards the usefulness of information attained through online and mobile media. Further, there was a positive correlation of socioeconomic characteristics such as education, income and land with usage of online and mobile media whereas age and experience had shown negative correlation. This implies that with the increase in age and experience of farmers, the possibility of using mobile and online media for agricultural information declined whereas higher education, larger

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landholdings and more income facilitated greater use of mobile phones and internet for agriculture purposes. Thus, the socioeconomic characteristics of farmers had a direct and deep relationship with the accessibility and usage of online and mobile media among farmers of Punjab. The study recommends that a policy should be framed to educate the elderly farmers regarding the use of the new media. The scope of formal education among the youth should also be expended to realize the full potential of this medium.

Keywords: Online and mobile media; agriculture; agri-apps and agricultural websites; relationship; socioeconomic characteristics.

1. INTRODUCTION

India, with a population of over one billion, is predominantly an agrarian economy. According to the 2011 census of India, 68.85% of Indian population lives in rural areas and earns livelihood from agriculture or allied activities. Its contribution to the Gross Domestic Product (GDP) has decreased between 1990 to 1991 and 2010 to 2011 from 30.00% to 17.4% (GoI, 2012). Therefore, it's necessary to raise farm productivity. Agricultural research work has focused on enhancing quality and quantity of agricultural output. More emphasis is required on dissemination of scientific and technological information from agricultural research laboratories to farmers. According to National Sample Survey Organization 2005, only 40 percent of the farmer households have access to information about the new farming technology. Information needs are growing rapidly with the introduction of modern technology, hybrid seeds and changing climatic conditions. The high cost of delivering information through face-to-face interaction, crumbling extension services and poor market information have paved the way for the use of modern information and communication technology (ICT) like mobile phones and internet in disseminating agricultural information to target farmers [1].

Rapid growth of mobile telephony and the introduction of mobile-enabled information services provide ways to improve information dissemination to the knowledge intensive agriculture sector and also help to overcome information asymmetry existing among the group of farmers. It also helps, at least partially, to bridge the gap between the availability and delivery of agricultural inputs and agriculture infrastructure. As mobile penetration continues to increase among farming communities and information services and to adapt and proliferate, the scope exists for a much greater rural productivity impact in the future. To leverage the full potential of information dissemination enabled by mobile telephony along with supporting infrastructure and capacity building amongst farmers, it is essential to ensure the quality of information, its timeliness and trustworthiness.

India is the third largest smart phone user after China and USA and the figures hovered around 167.9 million in 2015 (EMarketer, 2016). During the past decades, agricultural information and technology transfers are mostly done by village level workers, extension personnels, scientists, subject matter specialists of KVKs, universities, etc. With the arrival of the internet, most of the information were tried to be accessed by web based approach (e-based services). SMSs and voice message delivery (push and pull) systems are comparatively easy, but they require a special type of options or formats to be sent to the system to get the precise information. Therefore, ICTs are moving in the direction of mobile apps. Mobile based applications are nearly at the verge of replacing the computer based services due to their cheaper cost and easy integration with various cellular services. Mobile based revolution is a package, which is led by smartphones, internet service providers and application developers. Smartphones, with advanced features like high resolution cameras, greater memory and bright display, touch screen along with 3G or 4G speed internet, attracted the users. This smart phone usage is rapidly increasing in many sectors like banking, medicine, shopping, lifestyle, games, artificial intelligence, etc. and agriculture too has to follow the same path of development but usage of new media is having its teething trouble.

According to McNamara [2] the farmers' agricultural information and economic conditions have been improved after using some communication technologies. Similarly, it was also indicated that ICT has provided facilities of different business models for offering economic and financial service to smallholders. Farmers directly communicate with the customers and sell

their produce at a good price. Agriculture-based precise and accurate information needs to be disseminated promptly to farmers so that better decisions such as managing farm fields, making continuous and scientific changes in their production systems and grabbing advantage of market opportunities can be made. Relevant and reliable knowledge can improve agriculture-related factors such as land, labor, capital and managerial ability. Hence, the information supply from extension, research, education and other organizations to its actual users is very crucial [3]. The NSSO survey of Indian farmers shows that farmers voiced the need to improve the quality, reliability and timeliness of information delivered to them.

Online and mobile media can benefit the farmers by helping to search new methods to increase output; monitoring weather on a daily/hourly basis; exchange of ideas between farmers, researchers, cooperatives, suppliers and buyers; purchase of machinery, seed, chemicals, etc. online; monitoring of prices; gathering investing and marketing tips, etc. The possibilities are numerous with the increasing usage of online and mobile media. Farmers' information needs may encompass subjects as diverse as agricultural, economic, literacy, health, religious or socio-political information. Therefore, to know the usage of online and mobile media among farmers of Punjab, the present study focused on the following objectives:

- To analyze the accessibility and usability of online and mobile media among farmers.
- To find out the relationship between socioeconomic variables and online and mobile media.

2. METHODOLOGY

Exploratory in nature, the present study was based on primary data collected from farmers of Punjab by using multiple stage random sampling. At Level I, four districts were randomly selected from three cultural regions of Punjab i.e. Jalandhar from Doaba, Amritsar from *Majha* and Sangrur and Moga from *Malwa* region. (Two districts were chosen from Malwa region for it being the largest of the three regions). A map of study area is given below.

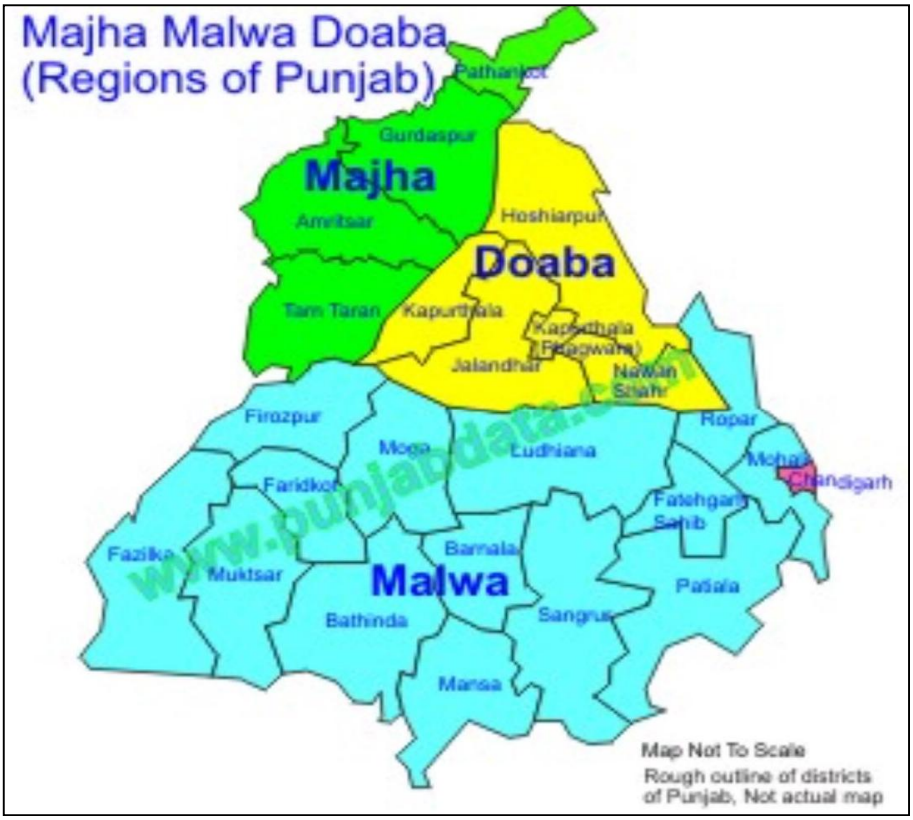

Fig. 1. Map of study area

At Level II, Two blocks were selected from each of the selected districts on random basis. Thus, a total of eight blocks were chosen from four districts. Level III: Further, two villages from each selected block were chosen. Hence, a total of 16 villages were finalized for the study from selected 8 blocks. At level IV, farmers from three categories such as marginal, small and large farmers were chosen randomly as respondents from the selected villages. For this, 15 farmers from each category were selected from each identified village. So, this added up to 45 farmers from each village. Thus, the total sample was of 720 farmers from rural areas of Punjab. They were asked to fill close-ended questionnaire in the language of their choice i.e. Punjabi and English. The obtained data were tabulated and frequency distribution, percentages and averages were worked out for analysis of data. Pearson coefficient of correlation was also employed to find out the relationship between socioeconomic characteristics and online and mobile media. On the basis of the said objectives the following hypotheses have been formulated in the study.

Null Hypothesis (H_0): There is no relationship between socioeconomic characteristics and online and mobile media

Alternate Hypothesis (H_1): There is relationship between socioeconomic characteristics and online and mobile media

Operational Definitions: The following operational definitions were framed to control the variable by making the measurement constant and to ensure reproducibility of results.

Marginal Farmer: A Marginal farmer means a farmer who cultivates agricultural land up to 2.5 acres (less than 1 hectare) as an owner or as tenant (Agriculture Census, 2015-16).

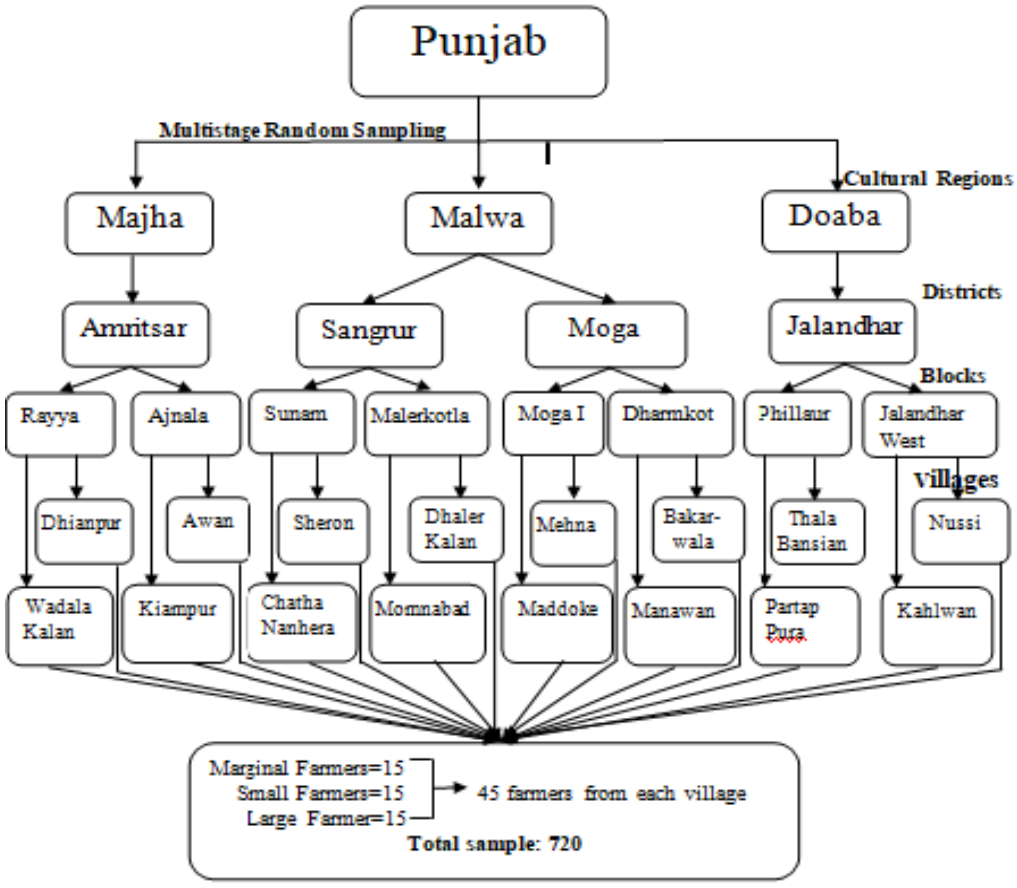

Fig. 2. Flow chart showing sampling procedure

Small Farmer: A Small farmer, whether he is land owner or tenant, cultivates agricultural land between 2.5 to up to 5 acre (1 to 2 hectare) (Agriculture Census, 2015-16).

Large Farmer: A large farmer cultivates the agricultural land more than 5 acre as an owner or as tenant (more than 2 hectare) (Agriculture Census, 2015-16). This definition was operationalized as not much difference was observed between the semi-medium, medium and large farmers during the pre-testing of questionnaire.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Characteristics of Farmers

The socioeconomic characteristics of farmers such as age, education qualifications, marital status, family type, annual income and experience in farming are important factors for the present study as these may help to determine the utilization of online and mobile media for agriculture. That is why; these variables were analyzed and have been discussed below in detail.

Age is an important variable influencing the perception and performance of an individual towards various issues of society. According to the data presented in Table 1, (30.28%+21.67%+ 13.19% = 65.14%) a large number of respondents belong to the age group of 40 years and above whereas only a few respondents were of young age group. It implies that rural youth is opting for the other lines of employment as sources of their income or livelihood, as agriculture is generally considered not very remunerative. Age comparison between three categories of farmers shows that 54.17 per cent of marginal, 51.66 per cent of small and 50 per cent large farmers belonged to age group between 40 to 60 years whereas age of 34.58 per cent of marginal farmers, 33.34 per cent of small farmers and 36.67 per cent of large farmers lied between 20 to 40 years. It indicates that children of large and marginal farmers are more likely to adopt agriculture as compared to small farmers.

Further the Table 1 reveals the education of farmers under the study. The results shown in Table 1 indicate that out of the total farmers, 15 per cent were illiterate. More than half of farmers (28.06% + 23.61%) were educated up to matric and senior secondary level, respectively and the rest were (6.93%) graduates and above. By comparing the three categories of farmers, it was observed that small farmers (30.42% and 23.75%) and large farmers (25.83% and 26.25%) were having education up to matric and senior secondary as compared to marginal farmers (27.92% matric & 20.83% senior secondary). In terms of higher education, there were 7.08 per cent (6.25% +0.83%) of small and 9.59 per cent (7.92%+1.67%) of large farmers who were graduates and above as compared to marginal farmers (4.16% graduates and above). It can be concluded that accessibility and affordability of higher education was more among small and large farmers as compared to marginal farmers.

The data pertaining to marital status in Table 1 indicates that majority (92.22%) of farmers was married and 7.50 per cent were unmarried. Same trend was observed among all categories of farmers (92.92% of marginal, 91.67% of small and 92.08% of large farmers) regarding marital status. Family system has been undergoing many changes which affect not only its functions but also its structure. From last one decade, nuclear family system is become quite common not only in urban India but also in rural India due to changing social norms, urban and western influences, modernization, growing individualistic approach, etc. Similar results were found in the study. Results presented in Table 1 reveal that more than half of farmers (58.61%) were having nuclear families whereas only 41.39 per cent of them belong to joint families. It depicts that nuclear families which were earlier found in urban areas have now made inroads in rural areas too as shown in Table 1. Interestingly, the number of joint families was more among the large farmers (46.25%) as compared to marginal (38.33%) and small (39.58%) farmers.

As far as annual income is concerned, it was found that more than one-fifth of farmers had annual income less than Rs. 100000 from which majority was the marginal farmers and only five per cent were small farmers. Further, it was noticed that more than one-third (36.67%) and nearly one-fourth (24.31%) of farmers had annual income between Rs. 100000 ≥ and Rs.< 300000 and Rs. 300000 ≥ and Rs.< 500000, respectively whereas only 17.23 per cent of them were having annual income above Rs. 500000 annually, out of which 5.83 per cent were small farmers and 45.84 per cent were large farmers. It implies that overall, majority of farmers whether they are marginal or small, had income between

Rs. 100000 to Rs. 300000 per annum except large farmers who earned even up to Rs.700000 and above annually.

The figures pertaining to farming experience show that more than one-third of farmers (34.67%) had more than 20 years experience in farming followed by one-fourth (24.72%) and one-fifth (21.53%) farmers who had experience of 10 ≥ and < 15 years and 15 ≥ and <20 years, respectively. The remaining 18.88 per cent (6.94+11.94) were pursuing agriculture for up to 10 years (Table 1).

3.2 Accessibility of Mobile Phones and Its Usage Pattern

In the present study, farmers were asked about ownership of mobile phones and their pattern of usage. As presented in Table 2, overall, majority of farmers (99.17%) had their own mobile phones while a very few of them (0.83%, 6 in numbers) did not have mobile phones which could be due to ignorance and poor economic conditions. Therefore, the study implies that farmers had accessibility and availability of mobile phones as it is affordable, portable as well as beneficial during hours of emergency. The study is also in line with the findings of Jain L and Kaur H. [4] and Chhachar et al., [5].

Regarding the availability of mobile phones at home, the table discloses that the farmers having two mobile phones and 'three or more' mobile phones at homes were 40.42 per cent each followed by 18.75 per cent farmers with one mobile phone at their homes which either belonged to the farmers or their family members. The difference between categories of farmers shows that there are maximum percentages (34.58% and 52.09%) of those large farmers who had two and 'three or more' mobile phones, respectively at their homes in comparison to marginal (39.58% and 32.50%) and small (47.08% and 36.67%) farmers, respectively. More than one fourth (26.67%) of marginal farmers were having one mobile handsets at their houses as compared to 16.25 per cent of small and 13.33 per cent of large farmers.

A further investigation elicited the responses regarding number of hours mobile phones were used by farmers in a day. A majority of 27.17 per cent farmers spent less than one hour in a day on a mobile phone which could be due to time constraints whereas 18.91 per cent and 15.69 per cent of them were making use of mobile phones between 1-2 and 2-3 hours, respectively. Only 5.32 per cent farmers (3.78%+1.54%) used mobile phones for more than three hours per day. Though, farmers (49.36% marginal, 45.83% small and 35.15% large farmers) from all three categories used mobile phones for less than one hour, in a day, but maximum percentages of such low users belonged to marginal category.

3.3 Purpose of Using Mobile Phones

The data presented in Table 3 revealed that almost every single farmer was making use of mobile phones to keep in touch with friends/family members/relatives via calling. Maximum numbers of farmers were found to be making good use of mobile phones for agriculture or obtaining agriculture related information as well. It was seen that 57.56 per cent farmers had used it for getting weather updates regularly as it is the first and foremost information required by farmers. SMS service for updates on agriculture news, sending/receiving calls to agriculture experts, establishing link with markets and seeking market information scored 43.84 per cent, 32.07 per cent and 29.55 per cent, respectively. Only 14.01 per cent of them were accessing extension service through mobile phones.

As explained above, mostly, farmers were accessing the information related to weather updates/news through mobile phones. However, it was observed that percentages of small and large farmers were almost similar (60.42% and 59.41 per cent, respectively) in seeking weather information whereas marginal farmers with 52.77 per cent were slightly behind them. A closer look reveals that large farmers were using mobile phones for various purposes more often as compared to small and marginal farmers except weather updates and chat as shown in Table 3.

3.4 Accessibility of Online Media and Its Usage Pattern

Out of the total respondents, 78.05 per cent farmers were the internet users whereas 21.95 per cent of them were non internet users because either they had simple phones or they were unable to use and afford internet packages. Comparison between marginal, small and large farmers shows that percentages (85%) of large farmers were on higher side as active internet users as compared to small (77.92%) and marginal (71.25%) farmers. It indicates that large farmers were a step ahead inadopting new technology.

Table 1. Distribution of farmers on the basis of socioeconomic characteristics

Age (In years)	Marginal farmer n=240	Small farmer n=240	Large farmer n=240	Total (N=720)
20 years ≥ and < 30 years	23 (9.58)	25 (10.42)	29 (12.08)	77(10.69)
30 years ≥ and < 40 years	60 (25.00)	55 (22.92)	59 (24.59)	174 (24.17)
40 years ≥ and < 50 years	82 (34.17)	84 (35.00)	52 (21.67)	218 (30.28)
50 years ≥ and < 60 years	48 (20.00)	40 (16.66)	68 (28.33)	156 (21.67)
≥ 60 years	27 (11.25)	36 (15.00)	32 (13.33)	95(13.19)
Educational qualifications				
Illiterate	50 (20.83)	32 (13.33)	26 (10.83)	108 (15.00)
Primary	24 (10.00)	16 (6.67)	18 (3.33)	58(8.06)
Middle	39 (16.25)	46 (19.17)	47 (19.58)	132 (18.33)
Matric	67 (27.92)	73 (30.42)	62 (25.83)	202 (28.06)
Senior Secondary	50 (20.83)	57 (23.75)	63 (26.25)	170(23.61)
Graduate	8 (3.33)	15 (6.25)	19 (7.92)	42(5.83)
Post Graduate & above	2 (0.83)	2 (0.83)	4 (1.67)	8 (1.11)
Marital status				
Unmarried	16 (6.67)	19 (7.92)	19 (7.92)	54 (7.50)
Married	223 (92.92)	220 (91.67)	221 (92.08)	664 (92.22)
Divorced	1 (0.42)	1 (0.42)	-	2 (0.28)
Family type				
Joint family	92 (38.33)	95 (39.58)	111 (46.25)	298 (41.39)
Nuclear	148(61.67)	145 (60.42)	129 (53.75)	422 (58.61)
Annual income (In rupees)				
< 100000	145 (60.42)	12 (5.00)	-	157(21.81)
100000 ≥ and < 300000	79 (32.91)	152 (63.33)	33 (13.74)	264(36.67)
300000 ≥ and < 500000	16 (6.67)	62 (25.84)	97 (40.42)	175 (24.31)
500000 ≥ and < 700000	-	14 (5.83)	88 (36.67)	102 (14.17)
≥ 700000	-	-	22 (9.17)	22 (3.06)
Experience in farming (In years)				
< 5	21 (8.75)	16 (6.67)	13 (5.42)	50 (6.94)
5 ≥ and < 10	31 (12.92)	31 (12.92)	24 (10.00)	86 (11.94)
10 ≥ and < 15	65 (27.08)	55 (22.92)	58 (24.17)	178 (24.72)
15 ≥ and < 20	53 (22.08)	47 (19.58)	55 (22.92)	155 (21.53)
≥ 20	70 (29.17)	91 (37.92)	90 (37.50)	251 (34.86)

Figures in parentheses are percentages
Source: Primary Data

3.5 Type of Agricultural Information Searching through Internet

Further, the study explored the various kinds of information, the farmers searched on the internet i.e. weather report, new technology, input prices, marketing information, financial assistance, etc. Out of internet user respondents (562 in numbers, Table 4), it was observed that amongst all information, weather related information was the first and foremost information required and searched by all farmers from all regions on internet. The presented data in Table 5 indicates that a majority (94.48%) of farmers regularly searched on internet for weather report/updates followed by marketing information (53.56%), new technology (39.32%) and input prices/availability (25.62%) whereas only 13.52 per cent, 12.81 per cent and 11.03 per cent farmers sought information related to financial assistant/bank loans, best packages of practices and allied occupation, respectively on internet. Information regarding plant protection technology (8.72%) and crop insurance (3.56%) was searched by a very few farmers.

Further, the data shows slight difference between marginal, small and large farmers for acquiring information through internet as shown in Table 5. Largely, farmers were interested in acquiring information related to weather updates, new technology and marketing information through internet.

Table 2. Distribution of farmers on the basis of their mobile phone usage pattern

Ownership of mobile	Marginal farmer n=240	Small farmer n=240	Large farmer n=240	Total (N=720)
Yes	235 (97.92)	240 (100)	239 (99.58)	714 (99.17)
No	5 (2.08)	-	1 (0.42)	6 (0.83)
No of mobiles are there at home				
None	3 (1.25)	-	-	3 (0.41)
One	64 (26.67)	39 (16.25)	32 (13.33)	135 (18.75)
Two	95 (39.58)	113 (47.08)	83 (34.58)	291 (40.42)
Three or more	78 (32.50)	88 (36.67)	125 (52.09)	291(40.42)
Type of mobile				
Ordinary Phone	70 (29.79)	71 (29.58)	50 (20.92)	191 (26.75)
Smart Phone	165 (70.21)	169 (70.42)	189 (79.08)	523 (73.25)
Hours spent on using mobile in a day	**Marginal farmers n_1=235**	**Small farmers n_2=240**	**Large farmers n_3=239**	***Total N=714**
<1	116 (49.36)	110(45.83)	84(35.15)	194(27.17)
1-2	67 (28.51)	59(24.58)	76(31.80)	135(18.91)
2-3	42 (17.87)	55(22.92)	57(23.84)	112(15.69)
3-4	7(2.98)	10(4.17)	17(7.11)	27(3.78)
>4	3(1.28)	3(1.25)	5(2.09)	11(1.54)

Figures in parentheses are percentages
Source: Primary data
MF=Marginal farmer, SF=Small farmer, LF=Large farmer
**those respondents who have their own personal mobile phones*

Table 3. Purpose of using mobile phone

Multiple responses

Purpose	Marginal farmers n_1=235	Small farmers n_2=240	Large farmers n_3=239	*Total N=714
Sending/receiving calls to friends/family/relatives	235(100.0)	240(100.0)	239(100.0)	714(100.0)
Sending/receiving calls to agriculture experts	88(37.45)	88(36.67)	112(46.86)	288(40.33)
Access to extension services	17(25.96)	29(12.08)	54(22.59)	100(14.01)
Establishing market links	61(32.77)	68(28.33)	100(4.84)	229(32.07)
Seeking market information	77(32.76)	66(27.50)	68(28.45)	211(29.55)
Using SMS service for updates on agriculture news	75(31.91)	106(44.17)	132(55.23)	313(43.84)
Listening to music	112(47.66)	120(50.00)	129(53.97)	361(50.57)
Watching films/songs through mobile internet	95(40.42)	98(40.83)	107(44.77)	300(42.01)
Weather updates	124(52.77)	145(60.42)	142(59.41)	411(57.56)

Figures in parentheses are percentages
Source: Primary data
**those respondents who have their own personal mobile phones*

Table 4. Distribution of farmers on the basis of their internet usage

Internet using	Marginal farmers n=240	Small farmers n=240	Large farmers n=240	Total N=720
Yes	171(71.25)	187(77.92)	204(85.00)	562(78.05)
No	69(28.75)	53(22.08)	36(15.00)	158(21.95)

Figures in parentheses are percentages
Source: Primary data

Table 5. Distribution of respondents according to type of agricultural information searched through internet

Multiple responses

	Marginal farmers n_1=171	Small farmers n_2=187	Large farmers n_3=204	*Total N=562
Weather report	165(96.49)	182(97.33)	184(94.19)	531(94.48)
New technology	52(30.40)	68(36.36)	101(49.51)	221(39.32)
Input prices and availability	30(17.54)	45(24.06)	69(33.82)	144(25.62)
Marketing information	94(54.97)	97(51.87)	110(53.92)	301(53.56)
Plant protection technology	9(5.26)	20(10.69)	20(9.80)	49(8.72)
Financial assistance/Bank loans	27(15.79)	1910.16)	30(14.71)	76(13.52)
Best package of practices	13(7.60)	24(12.83)	30(14.70)	72(12.81)
Crop Insurance	4(2.33)	7(3.74	9(4.41)	20(3.56)
Allied occupations	12(7.02)	25(12.25)	25(12.25)	62(11.03)

Figures in parentheses are percentages
Source: Primary data
**those respondents who are internet users*

3.6 Usage of Mobile Based Agri Apps

Out of the total internet users, 59.79per cent farmers used mobile based agri-apps for obtaining agricultural information. Comparison between farmers' categories reveals that lesser number of marginal farmers (53.22%) use agri apps as compared to small (63.64%) and large (61.76%) farmers. It can be concluded that despite limited education, more than half of the respondents who used internet, were using agri apps through mobile phones.

Further, the perusal of Table 6 shows the distribution of farmers on the basis of type of apps they preferred for information and these farmers were those who were using agri apps on their own. So the data indicates that amongst all agri-apps, Kheti-Badi (55.65%) and KisanSuvidha (47.02%) were preferred often by farmers for agricultural information followed by IFFCO Kisan (28.27%), AgriApp (17.56%) and KrishiGyan (14.29%). PusaKrishi (7.74%), Agri-Market (1.19%) and Crop insurance (0.89%) were used by very few farmers. Same trend was observed among marginal, small and large farmers regarding the type of agri apps used.

3.7 Website Accessed by Farmers Often

Out of total internet users, 72.77 per cent farmers were using agricultural websites for acquiring agricultural information (Table 7). It is interesting to note that percentage of marginal (74.85%) farmers using websites is slightly higher than small (70.53%) and large (73.54%) farmers. Further, farmers were asked about the types of websites accessed often by them for acquiring different kinds of agricultural information. So the perusal of Table 7 shows that *Krishiworld.com* is the most accessed website by 42.29 per cent of farmers followed by farmer.gov.in (23.23%), krishijagran.com (20.78%), agriwatch.com (11%), agriquest.info (10.27%) and agricoop.nic.in (8.80%) whereas isapindia.org (5.87%), rmlglobal.com (3.42%), fert.nic.in (2.44%), indiaagristat.com (1.71%) and fciweb.nic.in (0.98%) were preferred by a very few farmers for agricultural information. Data discloses that there was slight difference in percentages of marginal, small and large farmers from all regions.

3.8 Criteria of Selecting the Apps or Websites

Here, the study sought to know the criteria adopted by farmers while selecting agri-apps and websites for agricultural information (Table 8). It is interesting to note that nearly half (47.25%) of farmers had relied on expert advice while selecting them whereas 19.72 per cent of them relied on the suggestions given by their friends/relatives. About 15.83 per cent of farmers' selection criteria were based on the popularity of apps and websites while 17.20 per cent of them chose apps and websites on random basis.

Comparison between farmers' categories shows the selection criteria of 57.85 per cent of small farmers was based on expert advice by extension/agricultural expert followed by

Table 6. Distribution of respondents according to the use of mobile based agri. Apps for getting agricultural information

	Marginal farmers n_1=171	**Small farmers n_2=187**	**Large farmers n_3=204**	***Total N=562**
Yes	91(53.22)	119(63.64)	126(61.76)	336(59.79)
If yes, which mobile based agro-advisory service or agri apps do you use multiple responses				
	Marginal farmers n_1=91	**Small farmers n_2=119**	**Large farmers n_3=126**	****Total N=336**
IFFCO Kisan	25(27.47)	22(18.49)	48(38.09)	95(28.27)
KisanSuvidha	38(41.76)	54(45.38)	66(52.38)	158(47.02)
Kheti-Badi	53(58.24)	70(58.82)	64(50.97)	187(55.65)
AgriApp	12(13.19)	21(17.65)	26(20.63)	59(17.56)
Fertilizer calculator	1(1.09)	3(2.52)	4(3.17)	8(2.38)
PusaKrishi	7(7.69)	11(9.24)	8(6.34)	26(7.74)
KrishiGyan	8(8.79)	18(15.13)	22(17.46)	48(14.29)
Crop Insurance	2(2.19)	1(0.84)	-	3(0.89)
AgriMarket	-	2(1.68)	2(1.59)	4(1.19)

Figures in parentheses are percentages
Source: Primary data
**those respondents who are internet users*
***those respondents who are using only apps*

Table 7. Website accessed by farmers often

Multiple responses

Accessed websites	**Marginal farmers n_1=171**	**Small farmers n_2=187**	**Large farmers n_3=204**	***Total N=562**
Yes	128(74.85)	131(70.53)	150(73.54)	409(72.77)
Types of websites	**Marginal farmers n_1=128**	**Small farmers n_2=131**	**Large farmers n_3=150**	**Total N=409**
agricoop.nic.in	14(10.94)	9(6.87)	13(8.67)	36(8.80)
agriquest.info	14(10.94)	12(9.16)	16(10.67)	42(10.27)
agriwatch.com	15(11.72)	12(9.16)	18(12.00)	45(11.00)
farmer.gov.in	32(25.00)	27(20.61)	36(24.00)	95(23.23)
isapindia.org	4(3.13)	10(7.63)	10(6.67)	24(5.87)
rmlglobal.com	7(5.47)	3(2.29)	4(2.67))	14(3.42)
krishijagran.com	15(11.72)	34(25.95)	36(24.00)	85(20.78)
agmarknet.nic.in	15(11.72)	19(14.50)	15(10.00)	49(11.78)
fert.nic.in	3(2.34)	2(1.53)	5(3.33)	10(2.44)
krishiworld.com	46(35.94)	59(45.04)	68(45.33)	173(42.29)
indiaagristat.com	3(2.34)	2(1.53)	2(1.33)	7(1.71)
fciweb.nic.in	1(0.78)	1(0.76)	2(1.33)	4(0.98)

Figures in parentheses are percentages
Source: Primary data
MF = Marginal farmer, SF = Small farmer, LF = Large farmer

marginal (41.18%) and large (43.13%) farmers. It implies that small farmers relied heavily on expert advice for selecting agri-apps and websites as compared to marginal and large farmers.

3.9 Perception of Farmers Regarding Usefulness of Online Information

Farmers were asked whether agricultural information attained through internet is really beneficial for them or not. The Table 9 describes the perception of farmers regarding usefulness of agricultural information. Overall, 43.47 per cent farmers reported that information obtained through internet was really useful for them whereas 23.89 per cent replied in negative and 32.64 per cent farmers had a neutral approach. Among all the three categories of farmers, more than half of (54.17%) large farmers had a positive perception along with the 34.42 per cent of marginal and 40.83 per cent of small farmers

towards it whereas 28.75 per cent marginal and 26.67 per cent small farmers had given negative opinion as they did not find online agricultural information useful. This portends that the digital or online content needs to be improved and made more gripping to evoke the interest of the farming community. Only then can an agriculturist harvest the benefits of online medium.

3.10 Relationship between Online and Mobile Media Use and Various Socioeconomic Variables

Information pertaining to socioeconomic characteristics facilitates the judicious selection of medium which enhances the efficacy of extension work [6]. Moreover, Socio-economic characteristics should be under consideration for spreading various ICTs [7]. Keeping in view the importance of this issue, Pearson coefficient correlation test was applied to find out the relationship between various socioeconomic variables such as age, education, marital status, land, family type, income and experience and usage pattern of online and mobile media among farmers. The results of correlation coefficient have been discussed below in detail.

The results presented in Table 10 depict that positive significant correlation was found between education (.441**), income (.313**), land (.285**) and usage of mobile media whereas mobile phone usage had negative correlation with age (-.209**), marital status (-.150**), and experience (-.188**). It indicates that usage of mobile media for agriculture escalated with increase in the level of education, land, income; whereas, negative correlation shows that with increasing age and experience, use of mobile phone for agriculture decreased.

The results reflect the existence of highly significant correlation of farmers' education (341**), income (.188**) and land (.171**) with usage of online media among them at 1per cent level of significance. It implies that usage of online media increased with the higher education level. In other words, educated farmers were accessing various types of agricultural information through online media. Their income was also contributing to increase in the use of online media among farmers as with high income, they were able to avail the internet services and their agricultural land was their source of income. On the other hand, age (-.214**) and experience (-.225**) appeared as negatively significant. It indicates that curiosity to learn new technology and its adoption declined with increasing age and experience of the farmers and they preferred to follow traditional ways rather than new ones.

Further, the study observed a deep effect of socioeconomic variables on the usage of overall mobile and online media for agriculture among farmers. Age, education, land, income, experience had a significant correlation with the overall usage of online and mobile media except marital status and family type. Among these five,

Table 8. Criteria of selecting the apps or website for agricultural information by farmers

	Marginal farmers n_1=136	Small farmers n_2=140	Large farmers n_3=160	*Total N=436
Expert advice	56(41.18)	81(57.85)	69(43.13)	206(47.25)
Popularity	24(17.65)	15(10.71)	30(18.75)	69(15.83)
Choose randomly	27(19.85)	20(14.28)	28(17.50)	75(17.20)
Suggested by friends/relatives	29(21.32)	24(17.14)	33(20.62)	86(19.72)

Figures in parentheses are percentages
Source: Primary data
**those farmers who are using websies and agri-apps*

Table 9. Perception of farmers regarding usefulness of online information

	Marginal farmers n=240	Small farmers n=240	Large farmers n=240	Total N=720
Yes	85(34.42)	98(40.83)	130(54.17)	313(43.47)
No	69(28.75)	64(26.67)	39(16.25)	172(23.89)
Can't say	86(35.83)	78(32.50)	71(29.58)	235(32.64)

Figures in parentheses are percentages
Source: Primary data

Table 10. Relationship between farmers' socioeconomic characteristics and usage pattern of online and mobile media

	Age	Education	Marital status	Land	Family type	Income	Experience
Mobile media	-.209**	.441**	-.150**	.285**	-.073*	.313**	-.188**
Significance (p-value)	0.000	0.000	0.000	0.000	0.02	0.000	0.000
Online media	-.214**	.341**	-0.043	.171**	-0.022	.188**	-.225**
Significance (p-value)	0.000	0.000	0.124	0.000	0.28	0.000	0.000
Overall usage of mobile and online media	-.214**	.341**	-0.043	.171**	-0.022	.188**	-.225**
Significance (p-value)	0.000	0.000	0.011	0.000	0.13	0.000	0.000

*** Correlation is significant at the .001 level (1-tailed)*
Source: Primary data

age (-.214**) and experience (-.225**) was found negatively correlated with online and mobilemedia at one per cent level whereas education (.341* at 5% level), land (.171* at 5% level), income (.188** at 1% level) had positive and significant correlation with it. Further, category-wise analysis illustrates that age (-.155**), education (.324**), land (.300**), income (.264**), experience (-.213**) of marginal farmers were significantly correlated with online and mobile media at one per cent level followed by small farmers with age (-.199**), education (.325**) and experience (.213**). On the other hand, no significant relation was found between socioeconomic characteristics of large farmers and overall usage of online and mobile media. The results of the correlations corroborate the studies by Khan et al., [8] Asif et al., [9] and Hinduja et al. [10], who reported similar findings.

It is clear that due to higher age, usage of mobile phones and internet remains less and curiosity to gain new knowledge and to do new experiments is also reduced due to ample knowledge gained already through experience. They believe in usual farming practices etc. [11,12]. They (old farmers) are more traditional in nature and they are much interested to follow their customary ways in doing agriculture. A study by Richardson et al. (2000) disclosed that young and middle aged farmers have more curiosity to learn and adopt new ideas, new technology and new ICTs tools such as computer, mobile/smart phones, internet/online media, etc.

4. CONCLUSION

Mobile phone and internet usage makes the lives of farmers easier in modern times. Mobile phones facilitate farmers to get in touch with their relatives and friends, agricultural experts/extension experts, explore markets for agriculture updates on affordable prices, transportation, etc. and that too by spending less time. However, the fact that almost half of the farmers in the present study utilized mobile phones for their profession i.e. agriculture and the rest were unable to harvest the benefits facilitated by mobile phones, leaves a question mark on realizing the full potential of mobile media in agriculture. This could be due to low education, less exposure to new technology, fear or disinterest in accepting or operating new technology in old age etc. Farmers' socioeconomic characteristics such as education, land, income had significant correlations with online and mobile media. It means that with better education and income resources, interest in obtaining new knowledge related to farming by using mobile and online media also increased. While age and experience had negative significant correlation with concerned variables, which indicates declining trend of using mobile and online media for agricultural information with increasing farmers 'age and experience. Therefore, there is a need to pay attention towards education of adults (old farmers). Government should organize workshops for old farmers to make them aware about the usage and benefits of online and mobile media and also encourage them to make use of it. Moreover, the information about agriculture should be available online in the local language of the farmers so that they can easily comprehend it. The web developers as well as app creators should also focus on easy navigation of the app or website to encourage its maximum use. Along with that, formal education among the youth should be promoted and efforts should be made to increase the sources of farmers' income in order to escalate the accessibility of the online and mobile media among them. Only then will the farmers be able to harvest the full potential of new media for agriculture purposes.

CONSENT

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

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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