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Profile, information access and pattern of smartphone utilization for agricultural information among farmers of Gwalior District, Madhya Pradesh, India

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Abstract

It is quite evident that smartphones are one of the easiest means through which farmers can access agricultural advisories, weather information, market prices and government schemes, but the possession of the smartphone cannot be considered sufficient for utilizing its full agricultural potential. The present study titled "Exploring Smartphone Utilization among Farmers of Gwalior District of Madhya Pradesh" was conducted to examine the profile of smartphone using farmers, the type of agricultural information accessed by them, their extent of smartphone utilization, and the relationship between their profile characteristics and extent of utilization. The descriptive research design was used, and 151 farmers were chosen using a multi-stage sampling technique from eight villages randomly selected from four blocks of Gwalior district, using the proportionate sampling method applied to the beneficiary list of Krishi Vigyan Kendra, Gwalior. The data were collected using a pretested structured interview schedule and were analyzed using frequency, percentage, mean, standard deviation and Karl Pearson's coefficient of correlation. It was found that the majority of the respondents (63.58%) belonged to the middle-age group, were more males (78.81%), and had a moderately favorable attitude toward ICT (65.56%). All the respondents used smartphones for accessing internet and social media was the most preferred channel for accessing agricultural information. Two-thirds of the respondents (66.23%) had a medium overall extent of smartphone utilization. The variables attitude towards ICT, innovativeness, and network availability were found to have a highly significant relationship with the extent of utilization, whereas family size and land holding were non-significant.

Keywords: Smartphone utilization, Information and Communication Technology, Extent of utilization, Agricultural information, Farmers

Introduction

In spite of all challenges, agriculture continues to be a backbone of the Indian economy and knowledge dissemination from research institutions to farmers plays an important role in keeping agricultural growth going. Conventional extension methodologies like field visits, demonstrations and meetings had been making significant contribution towards the diffusion of agricultural innovations but are time-consuming, expensive and reach limited areas, particularly the distant rural areas. Rapid increase in mobile telecommunication has made way for agricultural information dissemination in the last few years and the smartphone appears to be one of the most flexible instruments available to the farming community.

As compared to previous generations of mobile phones, which were mostly used for voice communication, sending SMS-based advisories and Kisan Call Centre type services, the smartphone provides farmers the opportunity to access real-time information about crop production, weather forecast, pest and disease management, market price and government schemes directly via mobile applications and

other digital platforms. It also allows interaction with extension functionaries and fellow farmers, and multimedia facilities like videos, photographs and audio messages that facilitate better learning for farmers with poor literacy levels. The internet user base in India's rural areas has crossed 350 million and the wireless subscriber base has gone past 1.1 billion (Telecom Regulatory Authority of India, 2023-24). Therefore, the smartphone has become a key instrument for the dissemination of agricultural information.

In the state of Madhya Pradesh and particularly in Gwalior district, farmers are increasingly using smartphones to obtain information about government schemes, communicate with agricultural experts and stay aware of market trends. Yet the extent to which this ownership translates into effective agricultural use varies considerably, depending on factors such as education, digital literacy, network connectivity, cost of data and awareness of relevant applications. Analysing this would facilitate the development of usable and applicable digital extension strategies.

Keeping the above facts in mind, the present study has been conducted with the following objectives: (i) to know the

profile of farmers using smartphone services; (ii) to find out the types of agricultural information accessed by farmers via smartphones; (iii) to study the extent of use of smartphone by farmers for agricultural information; and (iv) to find out the relationship between the profile of the farmers and the extent of use of smartphone.

Materials and Methods

The study was purposefully conducted in Gwalior district of Madhya Pradesh because it is an important agricultural district having a considerable farming population, a high rate of smartphone adoption, sufficient mobile connectivity and easy accessibility for data collection. A descriptive research methodology was adopted, as the study focused on assessing the existing scenario of smartphone use by farmers.

A multi-stage sampling procedure was employed in the study. All four blocks of the district, namely Morar, Bhitwar, Ghatigaon and Dabra, were selected purposively to ensure comprehensive coverage of the study area. From each of these four blocks, two villages with the maximum number of beneficiary farmers registered with Krishi Vigyan Kendra, Gwalior, were selected purposively, resulting in eight villages in all. Using the beneficiary farmers' list as the sampling frame, a total sample size of 151 respondents was arrived at using Slovin's formula and the proportionate sampling technique.

Twelve independent variables relating to the socio-personal, socio-economic, technological and psychological attributes of the respondents — age, gender, education, family size, farming experience, annual income from farming, size of land holding, network availability, data affordability, attitude towards ICT, innovativeness and exposure to extension services related to smartphones — along with one dependent variable, the extent of smartphone utilization, were investigated. Attitude towards ICT was ascertained through a twelve-statement scale on a five-point continuum, while innovativeness was evaluated using the scale developed by Natikar (2001) [11]. Utilization was measured through a self-structured ten-statement schedule on a Yes/No basis relating to use of internet, agricultural mobile applications, weather information, contact with experts, banking and information exchange. Primary data were collected through personal, face-to-face interviews using a pretested structured schedule in Hindi in order to remove the problem of language barrier, and secondary data were collected from published journals, books and official government documents. The collected data were tabulated in MS Excel and analyzed using frequency, percentage, arithmetic mean, standard deviation and Karl Pearson's coefficient of correlation.

Results and Discussion

The important characteristics considered for the study were age, gender, education, family size, farming experience, annual farming income, land holding, network availability, data affordability, attitude towards ICT, innovativeness and exposure to extension services, along with the type of agricultural information accessed, the extent of smartphone utilization, and the relationship between profile characteristics and extent of utilization. The data analyzed in this respect are presented in Table 1.

Age

The data in Table 1 indicated that the majority of farmers

(63.58%) belonged to the middle age group (33-53 years) followed by 25.16 per cent in the young age group and 11.26 per cent in the old age group (Mean = 42.13, S.D. = 10.49). This implies that farmers who have enough experience in handling agricultural activities independently, and who are also receptive to new technologies, form the major chunk of smartphone users, which is in conformity with the findings of Huria *et al.* (2021) [4] and Kaushik and Sabharwal (2021).

Gender

It is revealed from Table 1 that a majority of the respondents (78.81%) were males, since decisions regarding farming, mobility outside the home, and ownership of mobile handsets were controlled by the male members of rural households, in accordance with Wambua *et al.* (2021).

Education

The data in Table 1 showed that High School was the single largest educational category (23.84%), while only 8.61 per cent of the respondents were illiterate, since a minimum amount of literacy is essential to operate a smartphone and understand the content of its application programs, a point of agreement with Huria *et al.* (2021) [4].

Family size

It is evident from Table 1 that the maximum number of respondents (62.25%) had medium-sized households, reflecting the prevalent structure of joint families in rural Madhya Pradesh (Kumar and Gupta, 2018) [7].

Farming experience

From Table 1 it is observed that almost half of the respondents (48.34%) had medium farming experience (7-16 years), a finding supported by Patel *et al.* (2021) [4], Tiwari *et al.* (2023) [18] and Kumbhar (2020) [8].

Annual farming income

The data in Table 1 showed that almost half of the respondents (49.01%) belonged to the medium annual farming income group, a finding supported by Nagesha *et al.* (2022) [9].

Land holding

It is revealed from Table 1 that small and marginal landholding farmers together constituted nearly two-thirds of the sample (31.13% and 34.44% respectively), indicating the ongoing process of fragmentation of farms through inheritance (Raza *et al.*, 2019) [14].

Network availability

The data in Table 1 indicated that almost one-half of the respondents (43.71%) reported good network connectivity, reflecting the gradual improvement of telecommunication infrastructure in rural areas (Kaur and Thapar, 2019) [5].

Data affordability

It is observed from Table 1 that around 45.70 per cent of the respondents considered mobile data affordable, a reflection of the comparatively lower cost of data packs currently offered in India (Kaur and Thapar, 2019) [5].

Attitude towards ICT

The data in Table 1 showed that nearly two-thirds of the respondents (65.56%) exhibited a moderately favourable

attitude towards ICT adoption, an indication that farmers acknowledge the practical value of ICT applications but do not yet trust digital media fully (Urvashi *et al.*, 2025; Reddy *et al.*, 2021) ^[19, 15].

Innovativeness

From Table 1 it is revealed that a similar proportion of respondents (68.21%) exhibited medium innovativeness, indicating that farmers would rather observe the results obtained by progressive neighbours before trying out a new

technology themselves (Reddy *et al.*, 2021) ^[15].

Exposure to extension services

The data presented in Table 1 showed that around 64.24 per cent of the respondents had a medium level of exposure to extension services offered via smartphones, with weather forecasts being the most widely received type of information, an indication that organized interaction such as trainings and webinars is yet to be institutionalized (Nakasone *et al.*, 2019) ^[10].

Table 1: Socio-personal, socio-economic, technological and psychological profile of farmers (N=151)

S.N.	Variable	Category	Frequency	Percentage (%)
1	Age	Young (≤ 32 years)	38	25.16
		Middle-aged (33-53 years)	96	63.58
		Old (above 53 years)	17	11.26
2	Gender	Male	119	78.81
		Female	32	21.19
3	Education	Illiterate	13	8.61
		Primary	28	18.54
		Middle	25	16.56
		High School	36	23.84
		Higher Secondary	27	17.88
		Graduation	18	11.92
		Post Graduation	4	2.65
4	Family size	Small (up to 4)	55	36.42
		Medium (5-10)	94	62.25
		Large (above 10)	2	1.32
5	Farming experience	Low (< 7 years)	30	19.87
		Medium (7-16 years)	73	48.34
		High (> 16 years)	48	31.79
6	Annual farming income	Low ($< ₹1.36$ lakh)	39	25.83
		Medium ($₹1.36-3.56$ lakh)	74	49.01
		High ($> ₹3.56$ lakh)	38	25.16
7	Land holding	Marginal (< 1 ha)	52	34.44
		Small (1-2 ha)	47	31.13
		Semi-medium (2-4 ha)	30	19.87
		Medium (4-10 ha)	17	11.25
		Large (> 10 ha)	5	3.31
8	Network availability	Poor	29	19.20
		Average	56	37.09
		Good	66	43.71
9	Data affordability	Low	30	19.86
		Moderate	52	34.44
		High	69	45.70
10	Attitude towards ICT	Less favourable	26	17.22
		Moderately favourable	99	65.56
		Highly favourable	26	17.22
11	Innovativeness	Low	26	17.22
		Medium	103	68.21
		High	22	14.57
12	Exposure to extension services	Low	24	15.89
		Medium	97	64.24
		High	30	19.87

Types of agricultural information received through smartphone

Farmers accessed agricultural information in seven broad categories — inputs, pest and disease management, integrated nutrient management, irrigation and water management, weather forecast, market price and marketing, and agricultural credit and government schemes — through five digital platforms: mobile applications, social media, agricultural websites, YouTube and video conferencing.

Social media platforms like WhatsApp and Facebook emerged as the most popular platform for accessing information regarding agricultural inputs (54.30%), pest and disease management (49.67%), and agricultural credit and government scheme information (43.05%), whereas YouTube was the most popular platform for accessing pest management (46.36%) and irrigation and water management (34.44%) information. Weather forecast information was accessed mostly through mobile applications like Meghdoot

and Kisan Suvidha (36.42%). Agricultural websites and video conferencing were hardly used in any category, together forming less than 10 per cent of the total responses across all categories.

This reflects the ease of access, low cost, and multimedia features of social messaging apps, as well as the ability to interact informally with fellow farmers and extension workers, which is also consistent with previous literature wherein social media emerged as the most popular digital source of agricultural information among farmers.

Extent of smartphone utilization by farmers

It is revealed that all the respondents (100%) accessed the internet through their phones, while 85.43 per cent accessed social networking applications, 60.93 per cent accessed weather forecasts, 58.28 per cent accessed agricultural information and education, 55.63 per cent used banking and payments, 54.97 per cent shared agricultural information, and 50.33 per cent captured farm pictures or videos. Fewer respondents used their smartphones for agriculture-oriented mobile applications (36.42%), for connecting with agricultural experts (36.43%), and for marketing agricultural produce (35.76%), indicating that farmers had adopted the smartphone primarily for general communication and had only gradually begun using it for agriculture-specific activities.

With regard to the overall extent of utilization, two-thirds of the respondents (66.23%) were categorized in the medium category, 17.21 per cent in the high category, and 16.56 per cent in the low category (Mean = 16.82, S.D. = 1.94), indicating that even under favourable network, affordability and attitude conditions, farmers had not yet translated the possession of smartphones into widespread agricultural usage, a trend that conforms to Singh *et al.* (2025) [16].

Relationship between profile of farmers and extent of smartphone utilization

Karl Pearson's coefficient of correlation was calculated to establish the relationship between the twelve profile characteristics and the extent of smartphone utilization (Table 2). Attitude towards ICT ($r = 0.491$), innovativeness ($r = 0.403$) and network availability ($r = 0.312$) were found to have a positive and highly significant relationship with utilization at the 0.01 level of probability. Age, gender, education, farming experience, annual farming income, data affordability and exposure to extension services were positively and significantly related at the 0.05 level. Family size ($r = -0.072$) and size of land holding ($r = 0.080$) were found to be non-significant.

The significant positive relationship of attitude towards ICT and innovativeness with utilization is conceptually consonant with Bhosale *et al.* (2021) [2], while the significant relationship with education finds agreement with Patel *et al.* (2021) [4] and Chaudhary and Gardhariya (2024) [3]. The significant relationship of network availability and data affordability finds agreement, on the adoption side, with the connectivity-based problems cited by Parvathy and Dolli (2019) [12] and Ahirwar *et al.* (2022) [1]. Notably, age and farming experience were found to have a significant positive, rather than negative, relationship with utilization, which stands in contrast to Bhosale *et al.* (2021) [2] and Patel *et al.* (2021) [4]; this may be attributed to the predominance of middle-aged, moderately experienced farmers in the present sample, who enjoy the compensatory advantages of better extension ties and higher purchasing power. The non-significant relationship of family size and land holding indicates that, in the present sample, smartphone use serves as much for communication and banking as for farm management, reducing the influence of these two variables.

Table 2: Relationship between profile characteristics of farmers and extent of smartphone utilization (N = 151)

S.No.	Independent Variable	Correlation Coefficient (r)
1	Age (years)	0.159*
2	Gender	0.194*
3	Education	0.191*
4	Family size	-0.072 NS
5	Farming experience	0.168*
6	Annual farming income	0.276*
7	Size of land holding	0.080 NS
8	Network availability	0.312**
9	Data affordability	0.189*
10	Attitude towards ICT	0.491**
11	Innovativeness	0.403**
12	Exposure to extension services	0.185*

*Significant at 0.05 level of probability; **Significant at 0.01 level of probability; NS – Non-significant

Conclusion

The result obtained in the present study leads to the conclusion that, even though the farmers of Gwalior district own smartphones and enjoy good network availability, data affordability and a favourable attitude towards ICT, the overall level of their agricultural use of smartphones is predominantly medium, and usage remains primarily restricted to general-purpose activities such as accessing the internet and social networking rather than agriculture-specific applications. Attitude towards ICT, innovativeness

and network availability proved to be the strongest determinants of agricultural use, whereas family size and land holding did not significantly influence it. Social media and YouTube were the major sources through which farmers obtained agricultural information, while video-conferencing platforms and agriculture-specific websites remained under-utilized.

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