International Journal of Advanced Biochemistry Research

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Utilization pattern of ICT tools among cotton growers in Marathwada region

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i9Sk.5609

Abstract
The present investigation was carried out to explore the association between the personal profile of farmers and their use of ICT tools in cotton cultivation within the Marathwada region of Maharashtra. The study was undertaken in Parbhani district, where two talukas Parbhani and Gangakhed were randomly chosen. From each taluka, three villages were selected, making a total of six villages. A sample of 120 respondents was drawn through random sampling. Data were collected using a pre-tested structured interview schedule and analyzed with the help of statistical measures such as frequency, percentage, mean, standard deviation, and Pearson's correlation coefficient.
The findings revealed that mobile phones (79.17%), internet (71.67%), and WhatsApp (60.83%) were the most frequently used ICT tools, while radio, Kisan Call Centres, and agricultural apps showed limited use. Overall, (70.83%) of respondents demonstrated a medium level of ICT utilization. Weather information, market prices, and government schemes were the most accessed areas, whereas crop insurance, quality standards, and post-harvest value addition were least utilized.

Keywords: Marathwada, cotton, cotton growers, utilization pattern of ICT tools

1. Introduction

India continues to be largely agrarian, with (41.49%) of its workforce employed in agriculture and allied activities (WDI, 2024). Although the industrial and service sectors contribute substantially to the nation's GDP, agriculture remains central to rural livelihoods, food security, and sustainable growth. In recent decades, rapid progress in Information and Communication Technology (ICT) has reshaped the way agricultural knowledge is shared and decisions are made. Farmers now obtain information through both conventional ICT channels such as radio, television, newspapers, and telephones as well as modern tools, including mobile applications, internet platforms, social media, multimedia, and AI-driven services. These innovations play a vital role in delivering timely and precise updates on weather, crop and pest management, markets, and government programs. By bridging research organizations, extension systems, and farming communities, ICT has enhanced technology transfer and increased the overall effectiveness of agricultural practices.

Cotton (*Gossypium* spp.) is among the most significant fibre and cash crops in India, with the nation ranking first in terms of area under cultivation and second in total production. During the 2024-25 season, global cotton production was recorded at 25.62 million tonnes, of which India contributed 32.5 million bales, representing (21%) of the world's output. However, this reflected a (7.84%) decline compared to the previous season, largely attributed to reduced acreage and unfavourable weather conditions. Maharashtra contributed (26.63%) of India's overall cotton production, with the Marathwada region particularly Parbhani district emerging as a key cotton-growing belt.

As per the first revised advance estimates released by the Directorate of Agriculture, Ministry of Agriculture, Government of Maharashtra (Anonymous, 2024-25) [1, 2], the data is presented in the following table.

Cotton is an important crop for India, but the sector still struggles with low productivity, changing weather, and limited knowledge of modern farming methods. In Marathwada, ICT shows both promise and challenges in agriculture. These tools can help farmers improve yields, connect to markets, and manage risks better. However, poor infrastructure, financial constraints, and lack of awareness often prevent farmers from using them effectively.

Table 1: District-wise area, production and productivity of cotton crop in Marathwada region (2024-2025)

District	Area (Ha.)	Production (Tonnes)	Productivity (Kg/ha)
Chhatrapati Sambhajinagar	3903.59	2640.66	115.00
Jalna	2872.35	3886.12	230.00
Hingoli	304.80	806.82	450.00
Parbhani	1902.45	5035.91	450.00
Latur	75.36	62.84	141.75
Dharashiv	6.52	5.56	145.00

Source: Directorate of Agriculture, Ministry of Agriculture, Government of Maharashtra, first revised advance estimate (Anonymous, 2024-2025) [1, 2].

2. Materials and Methods

An ex-post facto research design was employed for the study, with respondents selected through multistage random sampling. The investigation was carried out in the Marathwada region of Maharashtra, focusing on Parbhani district. From this district, two talukas Parbhani and Gangakhed were randomly chosen. Subsequently, three villages were selected at random from each taluka, resulting in a total of six villages. From every selected village, twenty farmers were randomly chosen, giving a sample size of 120 respondents ($20 \times 6 = 120$).

In this study, the utilization pattern of ICT tools was designated as the dependent variable, assessed through a systematically developed schedule. Ten independent variables were taken into account, namely: age, education, landholding, annual income, social participation, source of information, extension participation, farming risk preference, knowledge of ICT technology, and attitude towards ICT tools. Furthermore, the investigation sought to identify the key constraints impeding the use of ICT tools among farmers and to document their recommendations for overcoming these limitations.

An interview schedule was prepared in line with the objectives of the study, pre-tested to establish reliability, and translated into Marathi to enhance clarity and understanding among respondents. Data were gathered using this structured schedule, and the collected information was systematically classified, tabulated, analyzed, and interpreted to derive meaningful insights. For the purpose of analysis, statistical techniques including percentage, mean, standard deviation, and correlation coefficient were employed.

3. Results and Discussion
3.1 Profile of cotton growers

Table 2 highlights that the majority of respondents (69.17%) were categorized as middle-aged. Over half (53.83%) had attained education up to the middle-school level, while (57.50%) were marginal landholders. A substantial proportion reported a medium annual income (80.83%) and medium levels of social participation (80.00%). Likewise, most respondents exhibited moderate source of information (70.83%), moderate extension participation (64.17%), and a medium degree of risk preference on farming (96.67%). In addition, (83.33%) possessed medium knowledge about ICT technology, whereas (81.67%) demonstrated a moderately favourable attitude towards towards ICT tools.

3.2 Utilization patterns of ICT tools

The utilization pattern of ICT tools refers to the extent and frequency with which cotton growers employ different information and communication technologies in their farming practices. These include mobile phones, SMS alerts, agricultural apps, internet services, YouTube, television,

radio, and Kisan call centres. In this study, utilization was assessed based on the frequency of use (frequent, occasional, rare, or never) for agricultural purposes such as accessing weather updates, market prices, crop advisories, pest and disease management, and input recommendations.

Table 2: Distribution of respondents according to their profile

Sr. No	Category	Frequency	Percentage
	A. Age		
1	Young (Up to 30)	15	12.50
2	Middle (31 to 54)	83	69.17
3	Old (55 & above)	22	18.33
	B. Education		
1	Illiterate	01	0.83
2	Can read only	03	2.50
3	Can read and write	02	1.67
4	Primary school (1st std to 4th std)	15	12.50
5	Middle School (5th std to 10th std)	67	55.83
6	Higher Secondary (11th std & 12th std)	21	17.50
7	Graduate (Degree)	11	9.17
	C. Land holding		
1	Marginal (up to 1 ha.)	69	57.50
2	Small (1 to 2 ha.)	36	30.00
3	Semi medium (2.01 to 4.00 ha.)	14	11.67
4	Medium (4.01 to 10.00 ha.)	01	0.83
5	Large (10.01 ha. and above)	00	0.00
	D. Annual income		
1	Low (up to Rs. 40,849)	03	2.50
2	Medium (Rs. 40,850 to Rs. 2,85,899)	97	80.83
3	High (Rs. 2,85,900 and above)	20	16.67
	E. Social participation		
1	Low (up to 3)	07	5.83
2	Medium (4 to 8)	96	80.00
3	High (9 and above)	17	14.17
	F. Source of information		
1	Low (up to 16)	18	15.00
2	Medium (17 to 26)	85	70.83
3	High (27 and above)	17	14.17
	G. Extension participation		
1	Low (up to 5)	16	13.33
2	Medium (6 to 11)	77	64.17
3	High (12 and above)	27	22.50
	H. Risk preference on farming		
1	Low (up to1)	04	3.33
2	Medium (2 to 3)	116	96.67
3	High (4 and above)	00	0.00
	I. Knowledge about ICT technology		
1	Low (up to 8)	04	3.34
2	Medium (9 to 13)	100	83.33
3	High (14 and above)	16	13.33
	J. Attitude towards ICT tools		
1	Less favourable (up to 44)	14	11.67
2	Moderately favourable (45 to 51)	98	81.67
3	Highly favourable (52 and above)	08	6.66

3.2.1 Extent of utilization of ICTs by the farmers
Details of the extent of utilization of ICTs by the farmers were summarized in Table 3

Table 3: Extent of utilization of ICTs by the farmers

(N=120)

Sr. No.	ICTs	Frequently		Occasionally		Rarely		Never	
		F	%	F	%	F	%	F	%
1	Mobile Phone	95	79.17	13	10.83	8	6.67	4	3.33
2	Television	70	58.33	26	21.67	17	14.17	7	5.83
3	Radio	6	5.00	6	5.00	12	10.00	96	80.00
4	Internet	86	71.67	13	10.83	15	12.50	6	5.00
5	Kisan call centre	0	0.00	13	10.83	16	13.33	91	75.83
6	Multimedia	40	33.33	29	24.17	21	17.50	30	25.00
7	Laptop/Personal Computer	6	5.00	9	7.50	7	5.83	98	81.67
8	SMS	51	42.50	26	21.67	23	19.17	20	16.67
9	World Wide Web	8	6.67	22	18.33	14	11.67	76	63.33
10	WhatsApp	73	60.83	15	12.50	12	10.00	20	16.67
11	Agril. Mobile App	0	0.00	10	8.33	19	15.83	91	75.83
12	News	30	25.00	35	29.17	34	28.33	21	17.50
13	DVD	0	0.00	9	7.50	12	10.00	99	82.50
14	Instagram	18	15.00	22	18.33	29	24.17	51	42.50
15	Google	55	45.83	31	25.83	13	10.83	21	17.50
16	YouTube	48	40.00	28	23.33	24	20.00	20	16.67
17	Wikipedia	0	0.00	11	9.17	16	13.33	93	77.50
18	Facebook	16	13.33	31	25.83	22	18.33	50	41.67
19	E-books/E-magazines	0	0.00	5	4.17	9	7.50	106	88.33
20	Multimedia CD	0	0.00	7	5.83	9	7.50	104	86.67

F: Frequency,%: Percentage

As shown in Table 3, farmers reported the highest use of mobile phones (79.17%), followed by the internet (71.67%) and WhatsApp (60.83%), with moderate use of television (58.33%), Google (45.83%), SMS (42.50%), and YouTube (40.00%).

Less frequently used tools included radio, Kisan Call Centres, agricultural apps, and laptops, while digital resources like Wikipedia and e-magazines showed minimal use due to language and access barriers. Farmers largely preferred mobile-based ICT platforms that are simple, accessible, and provide timely, locally relevant information, aligning with findings of earlier studies Kumar & Philip (2020) [6], Madhuri *et al*. (2021) [8], Jha *et al*. (2021) [5], Bansal *et al*. (2022) [3], Kumar *et al*. (2023) [7].

Table 4 revealed that most respondents (71.67%) fell under the medium category in terms of ICT utilization, while (16.67%) and (11.66%) fell into the low and high categories, respectively, indicating a moderate extent of ICT usage among the farmers.

Table 4: Distribution of respondents according to their extent of utilization of ICTs

(N=120)

Extent of utilization of ICTs by the farmers			
Sr. No.	Category	Frequency	Percentage
1	Low (up to 33)	20	16.67
2	Medium (34 to 53)	86	71.67
3	High (54 and above)	14	11.66
	Total	120	100.00

3.2.2 Utilization pattern of ICTs for specific information
Details of the utilization pattern of ICTs for specific information were showed in Table 5.

Table 5: Utilization pattern of ICTs for specific information

(N=120)

Sr. No.	Area of information	Always		Sometimes		Never		Mean Score	Rank
		F	%	F	%	F	%		
1	Quality standards for exports	26	21.67	36	30.00	58	48.33	0.73	IX
2	Latest package of practices	40	33.33	43	35.83	37	30.83	1.02	V
3	Water Management	37	30.83	34	28.33	49	40.83	0.9	VI
4	Disease and pest management	48	40.00	41	34.17	31	25.83	1.14	IV
5	Commercial Agriculture	21	17.50	39	32.50	60	50.00	0.67	XI
6	Post harvest technology & value addition	19	15.83	39	32.50	62	51.67	0.64	XII
7	Market Information & price trends	59	49.17	37	30.83	24	20.00	1.29	II
8	Dairy & poultry management	29	24.17	38	31.67	53	44.17	0.8	VIII
9	Facilities of land records	16	13.33	36	30.00	68	56.67	0.56	XIII
10	Crop Insurance	24	20.00	35	29.17	61	50.83	0.69	X
11	Weather Information	61	50.83	44	36.67	15	12.50	1.38	I
12	Government schemes & programmes	55	45.83	39	32.50	26	21.67	1.24	III
13	Integrated nutrient management	31	25.83	35	29.17	54	45.00	0.808	VII

Table 5 shows that weather information was the most accessed area through ICT tools (50.83%), followed by market and price information (49.17%) and government schemes (45.83%), highlighting farmers' reliance on ICTs for timely forecasts, market decisions, and support services.

Disease and pest management ranked fourth, followed by the latest package of practices (V), water management (VI), integrated nutrient management (VII), and dairy & poultry management (VIII). Quality standards for exports (IX), crop insurance (X), commercial agriculture (XI), post-harvest technology & value addition (XII), and land records (XIII) were least accessed, indicating gaps in awareness and access.

These results are consistent with the findings of Dhaka and Chayal (2010) [4].

Table 6: Distribution of respondents according to their utilization pattern of ICTs for specific information

(N=120)

Utilization pattern of ICTs for specific information			
Sr. No.	Category	Frequency	Percentage
1	Low (up to 17)	26	21.67
2	Medium (18 to 31)	77	64.17
3	High (32 and above)	17	14.16
	Total	120	100.00

Table 6 shows that most cotton growers (64.17%) had a medium level of ICT use for accessing agricultural information, while (21.67%) reported low use and only (14.16%) reported high use.

3.2.3 Overall utilization patterns of ICT tools
The analysis of the overall utilization patterns of cotton growers towards ICT tools is presented in Table 7.

Table 7: Distribution of respondents according to their overall extent of utilization of ICTs and utilization pattern of ICTs for specific information

(N= 120)

Overall Utilization patterns of ICT tools			
Sr. No.	Category	Frequency	Percentage
1	Low (up to 52)	24	20.00
2	Medium (53 to 84)	85	70.83
3	High (85 and above)	11	9.17
	Total	120	100.00

As shown in Table 7, most cotton growers (70.83%) fell into the medium category of overall ICT utilization, reflecting moderate use of ICT tools in agriculture. A smaller proportion (20.00%) reported low utilization, while only (9.17%) exhibited high utilization. These results indicate that although ICT utilization exists, there is considerable potential to strengthen its effective application among cotton growers.

Similar findings were reported by Naik and Bannoth (2018) [9] and Shreya (2022) [10].

4. Conclusion
The research entitled "Utilization Pattern of ICT Tools Among Cotton Growers in Marathwada Region" revealed that, cotton growers in the Marathwada region moderately utilize ICT tools, with mobile phones, internet services, and WhatsApp being the most frequently used platforms. Farmers primarily depend on ICTs for accessing weather forecasts, market prices, and government schemes, which directly influence timely decision-making in farming. However, the use of ICTs for advanced agricultural practices such as post-harvest technology, crop insurance, quality standards for exports, and commercial agriculture remains relatively low, reflecting gaps in awareness, accessibility, and relevance.

Overall, the findings indicate that while ICT utilization is present at a moderate level, there exists substantial scope to enhance its effective use, particularly through localized content, skill development, and awareness programs. Strengthening the dissemination of information via ICT platforms could significantly improve farmers' knowledge and decision-making capabilities, ultimately contributing to more sustainable and profitable cotton cultivation.

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