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Profile and Constraints faced by the cotton growers towards utilization pattern of ICT tools in the Marathwada region of Maharashtra

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Abstract
The study was conducted to find out the Profile and constraints faced by the cotton growers towards utilization pattern of ICT tools in the Marathwada region of Maharashtra. Parbhani district was randomly selected, and within it, two talukas Parbhani and Gangakhed were randomly chosen. From each taluka, three villages were selected, resulting in a total of six villages. A sample of 120 respondents was drawn using random sampling. Data were collected through a well-structured interview schedule and analyzed using statistical tools such as frequency, percentage, mean, standard deviation, and Pearson's correlation coefficient. The study revealed that most respondents (69.17%) were middle-aged, with (53.83%) educated up to middle school. A majority had marginal landholdings (57.50%) and medium annual income (80.83%). Medium levels were also recorded for social participation (80.00%), source of information (70.83%), and extension participation (64.17%). Further, (96.67%) exhibited medium risk preference on farming, (83.33%) had medium knowledge about ICT technology, and (81.67%) possessed a moderately favourable attitude towards ICT tools. The most pressing constraint faced by cotton growers was the high cost of ICT equipment (90.00%), followed by high service charges (87.50%), lack of information about the use of ICT technology (86.67%), and unavailability of uninterrupted electricity supply (85.00%). Other major issues were lack of internet connectivity (82.50%), limited availability of content/messages in the local language (80.00%), no training for ICT skill development (76.67%), and non-availability of subsidies for ICT equipment (75.00%). Additional problems included low public awareness about ICT benefits (72.50%), slow internet speed (70.83%), absence of service centres in villages (68.33%), lack of nearby educational facilities (65.00%), shortage of basic facilities (61.67%), restricted access to markets with ICT spare parts (58.33%), and no fair price for produce (55.83%).

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

Introduction
India continues to maintain its agrarian character, with (41.49%) of the workforce engaged in agriculture and allied activities (WDI, 2024). Despite the growing contribution of the industrial and service sectors to the national GDP, agriculture remains fundamental to rural sustenance, food security, and sustainable economic growth. In recent decades, significant advancements in Information and Communication Technology (ICT) have revolutionized the dissemination and utilization of agricultural knowledge. Farmers now access information through both conventional ICT media, such as radio, television, newspapers, and telephones, as well as contemporary digital platforms, including mobile applications, internet-based services, social networking sites, multimedia tools, and artificial intelligence-driven applications. These innovations serve as crucial instruments in delivering timely and precise advisories on weather forecasting, pest and crop management, market intelligence, and government initiatives. By facilitating stronger linkages between research institutions, extension agencies, and farming communities, ICT has enhanced the effectiveness of technology transfer and contributed to the overall improvement of agricultural practices.
Cotton (*Gossypium spp.*) holds a pivotal position as both a fibre and cash crop in India, where the country ranks first globally in area under cultivation and second in total production.

During the 2024-25 season, global cotton production was estimated at 25.62 million tonnes, of which India contributed 32.5 million bales, accounting for 21% of the world's share. However, this reflected a 7.84% decline compared to the previous season, attributed largely to declining acreage and unfavourable climatic conditions. Within India, Maharashtra emerged as a leading contributor, producing 26.63% of the national output, with the Marathwada region particularly Parbhani district recognized as a major cotton-producing zone.

According to the first revised advance estimates issued by the Directorate of Agriculture, Ministry of Agriculture, Government of Maharashtra (Anonymous, 2024-25), the data are summarized in the table below.

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).

Despite its significance, the cotton sector in India continues to face persistent challenges such as stagnating productivity, climatic uncertainties, and limited awareness of advanced production technologies. The Marathwada region reflects both the potential and the limitations in adopting Information and Communication Technology (ICT) in agriculture. Although ICT tools offer considerable opportunities for enhancing productivity, market accessibility, and risk management, their widespread utilization remains constrained by infrastructural shortcomings, socio-economic barriers, and lack of awareness.

Materials and Methods

An ex-post facto research design was employed in the present study, applying multistage random sampling. The research was carried out in the Marathwada region of Maharashtra, with Parbhani district selected randomly. The objective of the study was to examine the profile and constraints of cotton growers regarding the utilization pattern of ICT tools in the Marathwada region of Maharashtra. Two talukas Parbhani and Gangakhed were chosen randomly, and three villages from each taluka were selected through random sampling, resulting in a total of six villages. From each village, twenty farmers were randomly chosen, yielding a sample of 120 respondents (20 × 6 = 120) for the study. In the present study, the utilization pattern of ICT tools was considered the dependent variable and was measured using a systematically developed schedule. The study examined ten independent variables: age, education, landholding, annual income, social participation, source of information, extension participation, risk preference on farming, knowledge about ICT technology and attitude towards ICT tools. In addition, the research aimed to identify the primary constraints hindering the utilization of ICT tools among farmers and to record their suggestions for addressing these challenges.

An interview schedule was developed in alignment with the objectives of the study, pre-tested for reliability, and translated into Marathi to enhance respondent understanding. Data were collected using this structured instrument, and the information obtained was classified, tabulated, analyzed, and interpreted to derive meaningful conclusions. Statistical tools, including percentage, frequency, mean, standard deviation, and correlation coefficient, were employed for the analysis.

Selection of variables and their measurement

Table 2: Variables and their empirical measurements

Sr. No.	Variables	Empirical Measurements
I).	**Independent variables**	
1	Age	Actual Chronological age of the respondents at the time of interview.
2	Education	Formal education obtained by the respondents.
3	Land holding	Classification as per state government of Maharashtra.
4	Annual income	Income in rupees of the farmers family derived from all the sources in year.
5	Social participation	Scale developed by Nirban (2004) with slight modification was used.
6	Source of information	Schedule was developed
7	Extension participation	Schedule was developed
8	Risk preference on farming	Schedule was developed
9	Knowledge about ICT technology	Schedule was developed
10	Attitude towards ICT tools	Schedule was developed
II).	**Dependent Variable**	
1	Utilization pattern of ICT tools	Schedule was developed

Constraints given by the cotton growers about utilization pattern of ICT tools

Constraints refer to the difficulties faced by cotton growers in utilizing ICT tools. Respondents' views were collected through an interview schedule, compiled, and converted into frequencies and percentages. Based on these percentages, ranks were assigned to identify the major constraints.

Results and Discussion

Profile of cotton growers

Table 3: 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

Table 3 revealed that most respondents were middle-aged (69.17%) with education up to middle school (53.83%) and marginal landholdings (57.50%). A majority reported medium annual income (80.83%), medium social participation (80.00%), moderate source of information (70.83%), and medium extension participation (64.17%). Most farmers exhibited a medium risk preference on farming (96.67%), medium knowledge about ICT technology (83.33%), and a moderately favourable attitude towards ICT tools (81.67%).

Distribution of respondents according to the Constraints given by the cotton growers about utilization pattern of ICT tools

The schedule included potential constraints that may hinder the utilization of ICT tools among cotton growers. Respondents' views were recorded in the schedule, and the frequency and percentage of each constraint were calculated. Based on these percentages, ranks were assigned to identify the most significant barriers to the utilization of ICT tools.

Table 4: Constraints faced by the cotton growers towards utilization pattern of ICT tools (N=120)

Sr. No.	Constraints	F	%	Rank
1	High cost of ICT equipment.	108	90.00	I
2	Lack of basic facilities.	74	61.67	XIII
3	No training provided for skill development in using ICT tools.	92	76.67	VII
4	Lack of educational facilities in the village vicinity.	78	65.00	XII
5	Internet connectivity not available.	99	82.50	V
6	Unavailability of uninterrupted electricity supply.	102	85.00	IV
7	Lack of information about the use of ICT technology.	104	86.67	III
8	Lack of public awareness about the benefits of using ICT technology.	87	72.50	IX
9	Lack of service centres in villages.	82	68.33	XI
10	High service charges.	105	87.50	II
11	Lack of availability of more content/messages in local language.	96	80.00	VI
12	Lack of access to large markets where it contains spare parts of ICT devices.	70	58.33	XIV

13	Low internet speed.	85	70.83	X
14	No fair price for their produce.	67	55.83	XV
15	Lack of availability of subsidies for ICT equipment.	90	75.00	VIII

F: Frequency, %: Percentage

Table 4 showed that the high cost of ICT equipment was the most pressing constraint, reported by (90.00%) of respondents (Rank I), indicating that financial barriers limit access to essential digital tools for farming. This was followed by high service charges (87.50%, Rank II), lack of information about ICT use (86.67%, Rank III), unavailability of uninterrupted electricity supply (85.00%, Rank IV), and lack of internet connectivity (82.50%, Rank V). Lack of content in local languages was reported by (80.00%, Rank VI), and no training for skill development by (76.67%, Rank VII).

Other significant constraints included lack of subsidies for ICT equipment (75.00%, Rank VIII), lack of public awareness about ICT benefits (72.50%, Rank IX), low internet speed (70.83%, Rank X), lack of service centres in villages (68.33%, Rank XI), lack of educational facilities nearby (65.00%, Rank XII), and lack of basic facilities (61.67%, Rank XIII). Additional issues were lack of access to large markets for ICT spare parts (58.33%, Rank XIV) and no fair price for produce (55.83%, Rank XV).

Similar findings were reported by Balu *et al*. (2018) [4].

Conclusion

The study concluded that most cotton growers in the Marathwada region were middle-aged (69.17%), educated up to middle school (53.83%), with marginal landholdings (57.50%) and medium annual income (80.83%). A majority also reported medium levels of social participation (80.00%), source of information (70.83%), and extension participation (64.17%). Further, almost all had medium risk preference on farming (96.67%), medium knowledge about ICT technology (83.33%), and a moderately favourable attitude towards ICT tools (81.67%). However, several constraints restricted effective utilization of ICT. The most pressing were high cost of ICT equipment (90.00%), high service charges (87.50%), lack of information about ICT use (86.67%), and unavailability of uninterrupted electricity supply (85.00%). Other major barriers included poor internet connectivity (82.50%), lack of localized content/messages (80.00%), no training for skill development (76.67%), lack of subsidies for ICT equipment (75.00%), inadequate public awareness (72.50%), and low internet speed (70.83%). Additional challenges were lack of service centres in villages (68.33%), lack of educational facilities nearby (65.00%), and lack of basic amenities (61.67%). Market-related issues such as limited access to ICT spare parts (58.33%) and absence of fair price for produce (55.83%) were also reported.

Overall, the findings highlight that while cotton growers are inclined towards ICT use, their utilization is significantly constrained by financial, infrastructural, technical, and institutional barriers. To promote wider utilization, efforts must focus on reducing equipment and service costs, ensuring reliable electricity and internet connectivity, providing farmer-centric training and localized content, offering subsidies, strengthening rural infrastructure, and improving market access. Such interventions are essential for enhancing ICT utilization and, in turn, improving productivity and livelihoods of cotton growers in the region.

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