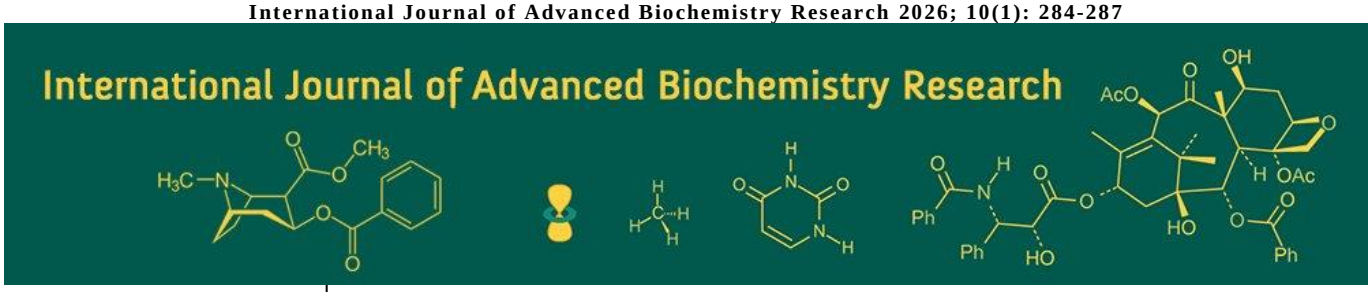

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Utilization pattern of ICT tools regarding dairy farming in Haryana

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Abstract
A study was conducted in the Hisar and Karnal districts of Haryana to assess dairy farmers' attitudes toward using Information and Communication Technology (ICT) tools. A sample of 160 farmers was selected using a multi-stage sampling approach. Specifically, two blocks were chosen from each district, and then two villages were selected from each block. Twenty respondents were surveyed from each village. Data were collected using a structured interview schedule designed to align with the study's objectives. The collected data were then analysed, classified, and tabulated. Statistical tools such as frequency, percentage, mean, standard deviation, and correlation coefficient were employed to interpret the findings and draw conclusions. The results indicate a near-universal reliance on mobile phones (96.87%), driven largely by their widespread accessibility. However, despite high ownership, actual utilization remained largely intermittent (81.25%). While platforms such as WhatsApp and YouTube were the most frequently engaged, the adoption of computers and tablets remains negligible, primarily due to persistent barriers such as poor connectivity and a lack of technical proficiency.

Keywords: Utilization pattern, dairy farmers, ICT

Introduction
The dairy industry is a cornerstone of global agriculture, playing a vital role in ensuring food security, fostering rural employment, and driving economic development. As global demand for dairy products continues to surge, the integration of Information and
Communication Technology (ICT) has transitioned from a luxury to a necessity for modernizing farm operations. By leveraging advanced tools—such as specialized farm management software, mobile applications, and automated milking systems (AMS)—producers can now access real-time data and critical market insights. These technologies empower farmers to implement data-driven best practices, significantly optimizing productivity, operational efficiency, and long-term profitability (Sahu *et al.*, 2025) [13].
In the modern era, ICT tools have become an indispensable facet of daily life. The synergy between traditional media—such as radio, television, and newspapers—and contemporary digital tools like mobile technology is fundamentally revolutionizing agriculture and its allied sectors (Patil *et al.*, 2019) [11]. By bridging the information gap, ICT tools allow dairy farmers to make data-driven decisions and secure higher profits in the right markets. More broadly, these technologies are poised to revolutionize India's agrarian landscape, offering a digital lifeline to the livestock sector and rural craftspeople alike (Bharath *et al.*, 2025) [2].
In the current information era and evolving extension paradigm, Information and Communication Technology (ICT) has emerged as a crucial tool for delivering timely, cost-effective, and relevant information to rural populations in general, and the farming community in particular, resulting in a transformed agricultural landscape (Monikha *et al.*, 2021) [9]. In fact, ICTs have effectively shrunk the world through the use of various devices such as smartphones, computers, tablets, and similar technologies. (Kashem *et al.*, 2010) [5]. Furthermore, ICT tools serve as a critical lifeline for coastal farmers, providing essential communication and data during natural calamities (Mallick *et al.*, 2023) [8].
For dairy farmers, ICT tools have enabled improved management practices by providing detailed information on milk production, animal health, and breeding, ultimately improving profitability and productivity (Bharat, 2021) [3].

Rural farmers currently grapple with significant challenges, including shortages of feed and fodder, low livestock productivity, and inadequate infrastructure for marketing and value addition. However, the most critical constraint remains the lack of timely access to information. Addressing these concerns necessitates the delivery of relevant, need-based, and punctual data. By integrating ICT, the agricultural extension system can be significantly fortified, enabling line departments to fulfil farmers' information requirements with unprecedented speed and precision. This study aims to assess farmers' knowledge of ICT tools, examine their usage patterns, and determine their primary sources of information.

Methodology

The present study was conducted in Haryana. The Haryana state comprises of 22 districts. Out of which 2 districts namely Hisar and Karnal were selected purposively for the study. Two blocks from each randomly selected district were selected randomly viz., Assandh and Nissing from Karnal district whereas Barwala and Agroha from Hisar district. Thus, a total of four blocks were studied. From each selected block, two villages were selected randomly. Mundh and Chagama from Assandh block, Agondh and Gonder from Nissing block, Durzanpur and Chikanwas from Agroha block, Kharakpunia and Panihari from Barwala block, constituted the study area. From each selected village, a sampling frame comprising the list of dairy farmers was prepared with the help of veterinary officer and from the listed farmers, 20 dairy farmers were selected randomly. Hence, 20 farmers from each village were selected randomly to arrive at a total sample size of 160 farmers.

Utilization pattern was operationalized as the extent to which ICTs are employed to acquire the latest information across various agricultural domains. This variable was assessed using a specifically developed research schedule. The extent of utilization was measured on a four-point Likert-type scale, ranging from frequently (4) to never (1), across thirteen distinct ICT tools. Quantitative analysis involved calculating frequencies and percentages for each category, with observed scores ranging from a minimum of 19 to a maximum of 48. Data were gathered through structured interviews and subsequently analyzed, tabulated, and interpreted. To ensure robust findings, statistical techniques—including mean, standard error, correlation, and ANOVA—were applied in consultation with a statistician.

Results and Discussion

The term 'utilization pattern of ICT tools' encapsulates the core objective of this study, which is to systematically analyze how farmers engage with and employ various ICT tools in their farming practices.The schedule consisted of 13 ICT tools with minimum and maximum possible scores of 19 and 48, respectively. The minimum score obtained by the respondents was 19 while the maximum was 48 indicating a high degree of variance. Most of the respondents (81.25%) utilized ICT tools occasionally, followed by 14 per cent rarely and only 4 per cent utilized ICT tools frequently.

Table 1: Utilization pattern of ICT tools by respondents

Utilization pattern	Frequency	Percentage	Mean ± SD	F (calculated)
Rarely (19-29)	23	14.37	26.43[a]	151.29**
Occasionally (30-40)	130	81.25	35.05[b]	
Frequently (41-48)	7	4.37	43.14[c]	
Mean ± SD	34.16±4.41			

Mean with different superscript in a column differ significanlty ** signifcant at 1% level

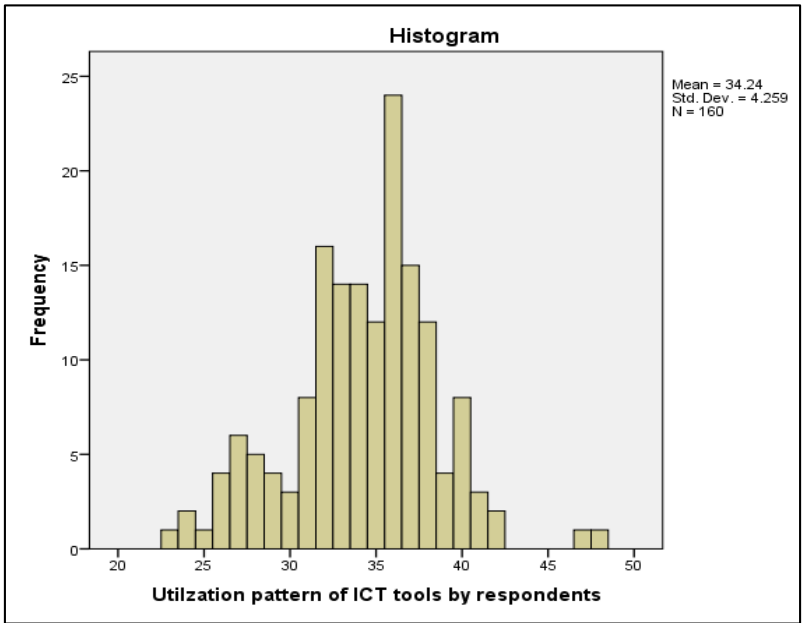

Fig 1: Histogram depicting Frequency distribution of respondents' score about utilization pattern of ICT tools

Utilization pattern of different ICT tools

The findings presented in Table 2 underscore that mobile phones have emerged as the primary ICT tool among farmers, signaling a rapid surge in adoption even at the state level. This trend is largely driven by the increasing affordability and accessibility of mobile hardware, which allows even those with limited literacy to utilize essential functionalities effectively. These findings regarding high awareness levels are corroborated by the studies of Shehrawat *et al.* (2024) [14], Bahubalendra and Mohapatra (2024) [1], and Patel and Mallappa (2022) [10].

Beyond basic telephony, digital platforms such as WhatsApp, YouTube, and general internet services have seen significant uptake. This engagement is predominantly observed among the younger, more educated demographic, who benefit from the seamless integration of these applications on mobile interfaces. In stark contrast, the majority of respondents reported a complete lack of engagement with computers, laptops, or tablets. The steep learning curve associated with these devices often acts as a barrier to entry, whereas the intuitive nature of mobile phones offers a more practical and accessible alternative for daily agricultural requirements. These results are consistent with the findings of Madhuri *et al.* (2021) [15], both of whom identified mobile technology as the most pervasive ICT tool in the farming community.

Table 2: Utilization pattern of different ICT tools

S. No.	ICT tools	Frequently (4)	Occasionally (3)	Rarely (2)	Never (1)	Mean	Rank
		Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)		
1	T.V.	117 (73.12)	36 (22.5)	7 (4.37)	0 (0.0)	3.68	5
2	FM Radio	1 (0.62)	25 (15.62)	82 (51.25)	52 (32.5)	1.84	8
3	Internet	140 (87.5)	20 (12.5)	0 (0.0)	0 (0.0)	3.87	3
4	Call centre	2 (1.25)	21 (13.12)	58 (36.25)	79 (49.37)	1.66	10
5	Mobile phone	155 (96.87)	5 (3.12)	0 (0.0)	0 (0.0)	3.96	1
6	WhatsApp	143 (89.37)	16 (10)	1 (0.62)	0 (0.0)	3.88	2
7	Computer	10 (6.25)	8 (5)	16 (10)	126 (78.75)	1.38	12
8	SMS	4 (2.5)	38 (23.75)	76 (47.5)	42 (26.25)	2.02	7
9	Google	117 (73.12)	33 (20.62)	7 (4.37)	3 (1.87)	3.65	6
10	KCC	1 (0.62)	8 (5)	69 (43.12)	82 (51.25)	1.55	11
11	Laptop	15 (9.37)	29 (18.12)	12 (7.5)	104 (65)	1.71	9
12	Tablet	6 (3.75)	5 (3.12)	5 (3.12)	144 (90)	1.20	13
13	You tube	127 (79.37)	31 (19.37)	2 (1.25)	0 (0.0)	3.78	4

Relationship between dependent and antecedent variable score of respondents

Table 3 presents the correlation estimates between the utilization patterns of ICT tools and various independent variables. The analysis reveals that education, social participation, dairy income, economic motivation, scientific orientation, and mass media utilization are positively and significantly correlated with ICT adoption. Additionally, occupation, landholding, milk production, and information-seeking behaviour also exhibit a positive association with ICT usage. Conversely, age and dairy farming experience show a highly significant negative correlation, while, herd size and family size demonstrate a general negative relationship with the utilization of these tools.

The outcomes of this study align with the findings of Kafura *et al.* (2016) [4], Kumar *et al.* (2023) [6], who observed that educational attainment is positively and significantly correlated with the extent of ICT utilization. In contrast, age was found to have a significant negative relationship with the adoption of these tools.

Table 3: Correlation coefficient between score of respondents in dependent variables and antecedent variables.

S. No.	Variable	Utilization pattern of ICT tools
1	Age	-.457**
2	Education	.431**
3	Family size	-0.017
4	Social participation	.365**
5	Occupation	0.051
6	Land holding	0.04
7	Herd size	-0.007
8	Total milk production	0.073
9	Income from dairy farming	-0.006
10	Information seeking behavior	0.133
11	Economic motivation	.285**
12	Scientific orientation	.272**
13	Experience in dairy farming	-.297**
14	Mass media utilization	.404**

**Correlation is significant at the 0.01 level, *correlation is significant at the 0.05 level

Conclusion

The study indicates that a vast majority of respondents (81.25%) utilize ICT tools on an intermittent basis, with mobile phones emerging as the most widely adopted technology among dairy farmers. While digital platforms such as YouTube, WhatsApp, and the internet are used to a moderate extent, there is a distinct preference for WhatsApp and specialized internet searches. Statistical analysis reveals that education, dairy income, economic motivation, scientific orientation, and mass media exposure share a highly significant and positive correlation with the frequency of ICT adoption. To capitalize on this, it is essential to bolster the technical capacity of both dairy farmers and extension workers. Targeted training programs should be implemented to highlight the strategic importance of ICT in dairy management and to simplify the integration of digital solutions into everyday farming operations, ultimately driving higher productivity.

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