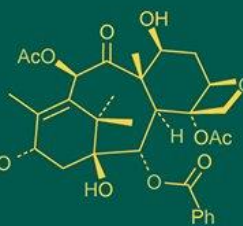
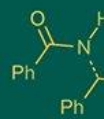


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Utilization of Information and Communication Technology (ICT) tools among dairy farmers of university-adopted and non-adopted villages in Mathura district, Uttar Pradesh

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Abstract

Access to reliable, timely information is a key determinant of decision-making among dairy farmers, and Information and Communication Technology (ICT) has emerged as an important instrument for bridging the gap between research and field-level practice. The present study was undertaken in ten randomly selected villages spread across five blocks of Mathura district, Uttar Pradesh, following an Ex-Post-Facto research design. From each block, one university-adopted and one non-adopted village were selected, and fifteen smartphone-owning respondents were randomly chosen from each village, making a total sample of 150 respondents (75 from adopted and 75 from non-adopted villages). Data were collected through a pre-designed interview schedule supplemented by focused group discussions and analysed using descriptive statistics, principally arithmetic mean, frequency and percentage. Results revealed that all respondents (100.00%) possessed a smartphone, while television (88.67%) was the second most commonly possessed ICT tool; ownership of radio, tablet, laptop and personal computer remained comparatively low. Internet-enabled applications, particularly WhatsApp and Internet access itself, recorded the highest extent of utilization (100.00%) in both categories of villages, followed by mobile telephony, YouTube and Facebook, whereas CD/DVD and radio were the least utilized. A majority of respondents (30.67%) had 15-20 mobile applications installed on their smartphones, followed by 28.67 percent with 10-15 apps. Respondents of university-adopted villages showed a marginally higher extent of ICT utilization than their counterparts in non-adopted villages, indicating a positive, though limited, effect of institutional linkage on technology uptake. The findings underscore the need to strengthen structured ICT-based extension services, particularly through smartphone applications and social media platforms, to enhance the dissemination of dairy husbandry information among farmers.

Keywords: ICT utilization, dairy farmers, smartphone, mobile application, extension, Mathura

1. Introduction

Dairying occupies a central place in the rural economy of Uttar Pradesh, providing supplementary income and nutritional security to millions of smallholder households. The productivity and profitability of dairy enterprises, however, remain closely tied to farmers' access to timely and accurate information on breeding, feeding, health management and market prices. Conventional extension mechanisms, constrained by an inadequate extension worker-to-farmer ratio, have often proved insufficient to meet this information demand. In this context, Information and Communication Technology (ICT) tools, ranging from radio and television to smartphones, mobile applications and social media platforms, have opened new avenues for the rapid, cost-effective and interactive dissemination of agricultural and animal husbandry knowledge.

The proliferation of affordable smartphones and inexpensive mobile data has particularly transformed the information landscape in rural India, enabling farmers to access advisory content, weather forecasts, market intelligence and peer networks through applications such as WhatsApp, YouTube and Facebook, often independent of formal extension channels. Universities and Krishi Vigyan Kendras (KVKs) have increasingly adopted specific villages for intensive technology transfer, which may also influence farmers' exposure to and

utilization of ICT tools. However, empirical evidence on the extent to which such institutional adoption translates into differential ICT utilization, as compared to non-adopted villages, remains limited for the dairy sector in western Uttar Pradesh.

Against this backdrop, the present study was designed with the objectives of assessing the possession and extent of utilization of various ICT tools by dairy farmers, examining the possession of mobile applications on their smartphones, and comparing these parameters between university-adopted and non-adopted villages of Mathura district.

2. Materials and Methods

Considering the objectives, this study was confined to ten randomly selected villages from five blocks of the Mathura district of Uttar Pradesh. An Ex-Post-Facto research design was used for the study, as the phenomenon under investigation, namely ICT utilization, had already occurred and was not subject to experimental manipulation.

From each block, one village that had not been adopted by the university and one village that had been adopted by the university were randomly selected, yielding a total of ten villages (five adopted and five non-adopted). For the purpose of this study, information was gathered from 15 randomly chosen respondents possessing a smartphone from every village, making a total of 150 respondents overall, comprising 75 respondents from university-adopted villages and 75 respondents from non-adopted villages.

Primary data were collected using a pre-designed and pre-tested interview schedule, structured in accordance with the specific objectives of the study, and were supplemented with focused group discussions to obtain qualitative insights into farmers' ICT usage patterns. The data so collected were coded, tabulated and analysed using appropriate statistical tools, namely arithmetic mean, frequency and percentage; descriptive statistics were employed throughout to summarize and interpret the results.

3. Results and Discussion

3.1 Possession of ICT tools

The possession of various ICT tools by the sampled dairy farmers is presented in Table 1. The data indicate that all the respondents (100.00%) possessed a smartphone, which formed the basis for their inclusion in the sample. Television was the second most widely possessed ICT tool, owned by 88.67 percent of the respondents, reflecting its long-standing penetration in rural households as a source of entertainment and general information. Ownership of other ICT tools was comparatively low: laptop (14.67%), mobile phones of the simple/feature type (14.00%), radio (16.67%), tablet (7.33%) and personal computer (6.00%). This pattern suggests that the smartphone has effectively subsumed the functions earlier served by radio, simple mobile phones and, to some extent, personal computers, and now serves as the principal ICT gateway for rural dairy farmers.

Table 1(a): Distribution of respondents according to possession of ICT tools (n = 150)

S. No.	ICT Tool	Possessed (f)	Percentage (%)	Not Possessing (f)	Percentage (%)
1	Radio	25	16.67	125	83.33
2	Television	133	88.67	17	11.33
3	Mobile phone (simple)	21	14.00	129	86.00
4	Smartphone	150	100.00	0	0.00
5	Tablet	11	7.33	139	92.67
6	Laptop	22	14.67	128	85.33
7	Personal computer	9	6.00	141	94.00

A block/village-category-wise comparison (Table 1(b)) shows that the possession pattern was broadly similar between the university-adopted and non-adopted villages for the majority of ICT tools. Radio ownership was somewhat higher in non-adopted villages (21.33%) than in adopted villages (12.00%), whereas television ownership was marginally higher among adopted-village respondents (89.33%) compared to non-adopted-village respondents

(88.00%). Ownership of tablet (8.00% vs. 6.67%) and laptop (16.00% vs. 13.33%) was also slightly higher in adopted villages, which may be attributed to greater exposure to university personnel and technology demonstrations in these villages. Ownership of the smartphone was uniformly 100.00 percent in both categories, consistent with the sampling criterion adopted for the study.

Table 1(b): Distribution of respondents according to possession of ICT tools, adopted vs. non-adopted villages (n = 150)

S. No.	ICT Tool	Not Adopted (f)	Not Adopted (%)	Adopted (f)	Adopted (%)
1	Radio	16	21.33	9	12.00
2	Television	66	88.00	67	89.33
3	Mobile phone (simple)	11	14.67	10	13.33
4	Smartphone	75	100.00	75	100.00
5	Tablet	5	6.67	6	8.00
6	Laptop	10	13.33	12	16.00
7	Personal computer	5	6.67	4	5.33

3.2 Extent of utilization of ICT by the farmers

The extent of utilization of various ICT tools and applications by respondents of university-adopted and non-adopted villages is presented in Table 2. Internet access and WhatsApp emerged as the most extensively utilized ICT components, with 100.00 percent utilization recorded in

both adopted and non-adopted villages, ranking first. This was followed by mobile telephony, which recorded a slightly higher extent of utilization among adopted-village respondents (96.44%) than non-adopted-village respondents (95.56%), ranking second in both categories. YouTube (93.78% adopted; 92.89% non-adopted) and Facebook

(88.89% adopted; 86.22% non-adopted) occupied the third and fourth ranks respectively, underscoring the importance of video-sharing and social networking platforms as informal but influential sources of information for dairy farmers.

Video-based content in general was utilized by 84.00 percent of adopted-village and 80.44 percent of non-adopted-village respondents (rank 5), while television utilization stood at 67.11 and 76.00 percent, respectively (rank 6). Utilization of the web portal was higher among non-adopted-village respondents (42.67%) than adopted-village respondents (35.11%), a finding that may reflect a relatively greater reliance on generic web resources in the absence of intensive institutional contact. Formal digital extension tools, namely KCC (Kisan Call Centre), e-mail, e-learning platforms, e-books, Zoom and laptop-based access, along with radio and CD/DVD, recorded comparatively low utilization (ranks 7 to 15) in both village categories, indicating that these channels remain underexploited despite their potential.

On the whole, the pattern of ICT utilization was broadly consistent between the two village categories, with respondents from university-adopted villages showing a marginal edge in the utilization of mobile telephony, internet-based social media and video content, while non-adopted-village respondents showed slightly greater reliance on the web portal and CD/DVD. This suggests that while village adoption status confers some advantage in ICT uptake, the near-universal penetration of smartphone-based applications, particularly WhatsApp and YouTube, has considerably levelled the information landscape across both categories.

Table 2: Comparison of respondents according to extent of ICT utilization, adopted vs. non-adopted villages (n = 150) (figures in percent)

S. No.	ICT Tool/Platform	Not Adopted (%)	Rank	Adopted (%)	Rank
1	Radio	9.33	14	4.44	15
2	Television	76.00	6	67.11	6
3	Mobile telephony	95.56	2	96.44	2
4	Laptop	11.56	13	15.11	13
5	Internet	100.00	1	100.00	1
6	WhatsApp	100.00	1	100.00	1
7	Facebook	86.22	4	88.89	4
8	YouTube	92.89	3	93.78	3
9	Video	80.44	5	84.00	5
10	E-mail	26.67	9	24.00	9
11	CD/DVD	5.78	15	6.67	14
12	E-book	23.56	10	20.44	11
13	KCC	27.11	8	29.33	8
14	Web portal	42.67	7	35.11	7
15	E-Learning	20.00	11	21.33	10
16	Zoom	18.67	12	18.67	12

3.3 Possession of mobile applications

Table 3 presents the distribution of respondents according to the number of mobile applications installed on their smartphones. The data reveal that the largest proportion of respondents (30.67%) had 15-20 mobile applications, closely followed by 28.67 percent with 10-15 applications and 26.66 percent with 5-10 applications. A smaller share of respondents had either a very high or a very low number of installed applications: 8.00 percent possessed more than 20 mobile applications, while only 6.00 percent had 1-5

applications. This distribution indicates that the majority of dairy farmers in the study area maintain a moderate-to-high number of mobile applications, reflecting an increasing comfort and familiarity with smartphone-based digital tools, which augurs well for the future scaling-up of app-based dairy advisory and extension services.

Table 3: Distribution of respondents according to possession of mobile applications (n = 150)

S. No.	Number of Mobile Applications	Frequency (f)	Percentage (%)
1	1-5	9	6.00
2	5-10	40	26.66
3	10-15	43	28.67
4	15-20	46	30.67
5	> 20	12	8.00

4. Conclusion

The study demonstrates that the smartphone has become a near-universal ICT tool among dairy farmers of Mathura district, effectively displacing radio and simple mobile phones as the primary channel of communication and information access. Internet-based applications, particularly WhatsApp and YouTube, dominate the extent of ICT utilization in both university-adopted and non-adopted villages, while formal digital extension platforms such as e-learning, KCC and Zoom remain underutilized. Farmers in university-adopted villages exhibited a marginally higher extent of utilization of mobile telephony and social media platforms compared to those in non-adopted villages, suggesting a modest positive influence of institutional adoption on technology uptake, although the overall gap between the two categories was not large. A sizeable majority of respondents had installed a moderate-to-high number of mobile applications, reflecting growing digital readiness among rural dairy farming households. These findings suggest that extension agencies and universities should focus on strengthening app-based and social-media-based advisory services, given their already high level of adoption, while simultaneously promoting awareness and utilization of formal digital platforms such as Kisan Call Centre and e-learning modules, in order to further enhance the reach and effectiveness of dairy extension services in the region.

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