Indian J Dairy Sci 78(5): 490-493
https://doi.org/10.33785/IJDS.2025.v78i05.013

RESEARCH ARTICLE

Analyzing determinants of mobile phone usage among dairy farmers in rural Uttar Pradesh

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Received: 05 August 2025 / Accepted: 06 October 2025 / Published online: 23 October 2025

Abstract: Farmers can obtain the required information with information and communication technologies (ICTs). Urban and rural communities are exposed to a vast spectrum of ICT tools. However, as people often utilize ICTs more for amusement and leisure, farmers' effective use of them to get agricultural information is the primary concern. Keeping this in view, the study was designed to examine the factors influencing the usage of livestock-oriented mobile applications among livestock owners of the Mathura district of Uttar Pradesh. The survey comprised a total of 150 respondents after information was gathered from 15 randomly chosen respondents from each village. Data was collected through a pre-designed structured interview schedule. Out of the 18 factors studied, which were further divided into three subcategories. The study revealed that security and privacy among respondents are major concerns before using mobile applications, followed by the application's popularity. The relative advantage of mobile applications over the available sources for livestock information is that the trialability and credibility of information provided by mobile applications were significant factors influencing livestock-oriented mobile application usage among farmers.

Keywords: Animal husbandry, ICT, Mobile Applications, Livestock-oriented

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Introduction

India's animal products sector is important to the country's economy, supported by its strong global standing in the production and export of various animal products. India, as the largest milk producer globally, accounted for 24% of the world's total milk production (FAO, 2024). India contributed approximately 7.25% to global egg production (FAO, 2024) and supported the largest population of milch animals, including 109.85 million buffaloes, 192.49 million cattle, and 148.88 million goats (20th livestock census, 2019). The Indian economy depends heavily on animal husbandry since it provides millions of people with productive jobs, enhances nutritional security, and supplements family income (Shanmathy et al. 2018). Dairy animal production must be improved to meet the rising national food demand and stop financial losses to the farmers. In this information age, offering need-based and timely information to dairy farmers is crucial. Using Information and Communication Technologies (ICT), organizations can develop business model capabilities and strategies that enable them to achieve various advantages, such as gains in productivity, cost-effectiveness, financial efficiency, and market penetration (Faisal and Kisman, 2020). Although ICT is of enormous benefit to the dairy industry, it has provided tools that relieve the burden and ease herd management, positively impacting the quality of life for producers across the nation (Tse et al. 2018). Also, they are believed to be indispensable in coordinating and managing dairy activities in the value chain (Walse, 2016). The adoption and use of mobile phones is complex and influenced by interrelated factors, such as performance expectancy, effort expectancy, social influence, and facilitating conditions (Ivanova & Kim, 2022; Peng, 2022; Rahmiati et al. 2022). Therefore, it is essential to use the possibilities of mobile phones and their application in spreading reliable information to farmers to optimize productivity at the lowest cost.

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. Ex-Post-Facto Research design was used for the study. From each block, one village is randomly selected, which is not adopted by the university, and another village is

university-adopted. For this study, information was gathered from 15 randomly chosen respondents from every village with a smartphone, totaling 150 respondents overall, including 75 respondents from each university-adapted and non-adapted village. Data was collected using a pre-designed interview schedule and focused group discussion per the study's objectives, and the results were analyzed using suitable statistical tools, such as arithmetic mean; descriptive statistics were used.

Results and Discussion

India has one of the cheapest internet packs around the globe. The financial expenses involved in the maintenance of mobile phones are one of the crucial factors affecting the usage pattern of mobile applications. The study revealed that most respondents (49.33%) spend nearly 151 to 226 rupees per month on mobile data, 34.67% of dairy farmers spend 227 rupees or more monthly, and 16.00% spend up to 150 rupees. The above findings aligned with the observations of Nyagango et al. (2023).

The WMS (Weighted Mean Score) scores were calculated for each category, which were then totaled, and rankings were assigned for each category. The Weighted mean Score was obtained from the frequency distribution for factors affecting the usage patterns of the livestock-oriented mobile applications among dairy farmers. The results are presented in Table 1. The factors influencing respondents' usage patterns were further subdivided into technological and user characteristics.

The degree to which an innovation outperforms a rival choice or the prior iteration of a product is measured by its relative advantage. Table 1 shows that the relative advantage is the most influential factor in both groups. This indicated that regardless of adoption status, users highly value mobile apps' benefits (like improved access to resources, time savings, or enhanced productivity). Its consistent top rank suggests it is a universal driver of adoption decisions. Improvements can be in one or several aspects, such as better service, enhanced interface, empowerment of users, etc. Trialability allows users to learn more about the application without signing up. The ability to experiment or test the app before full implementation is more valued by non-adopters. This suggests that a lack of trial options may hinder adoption. University adopters may already have had access to trials or no longer need them, reducing their perceived importance.

Besides this, the flexibility of learning and information seeking regarding the time, location, and instruction speed provides farmers with opportunities. Although both groups rate flexibility similarly in score, it is ranked higher (second) among adopters, indicating that the value of time flexibility becomes more apparent after adoption. This might reflect real-life benefits experienced by adopters, such as access to educational content anytime. However, observability helps ensure the reliability, performance, and security of applications and infrastructure; non-adopters value seeing the results or benefits of the technology in practice. They may be influenced by visible success in other universities. Complexity is slightly more concerning to non-adopters, suggesting they may perceive the technology as difficult to use or integrate. Adopters might have found solutions to overcome initial complexity or received training, lowering the perceived barrier. The compatibility of livestock-oriented mobile applications enhances usage. These findings were consistent with the study of Barrios et al. (2023). Compatibility is more appreciated by adopters, possibly because they have seen how well the apps integrate with existing systems and devices. Low compatibility scores may reflect uncertainty or skepticism about seamless integration for non-adopters. Understanding these differences can help develop strategies to encourage adoption, such as offering demos (enhancing trialability) or sharing case studies (enhancing observability).

Data from Table 2 further reveal that credibility is both groups' most influential user characteristic. This reflects that users value the trustworthiness and reliability of the app (or its provider) as the primary consideration. Higher scores among adopters indicate that experiencing the app may reinforce trust, further justifying its importance in driving adoption, and a credible source of information was necessary to overcome the peer circle. Innovativeness is equally ranked in both groups, suggesting that users open to new technology are more inclined to explore mobile apps. This trait remains a steady predictor of adoption, reflecting a consistently important personal quality across contexts. It also helps in reducing the technophobic nature of late adopters. Equal WMS and rank in both groups show that

Table 1: Distribution of respondents as per technological factors influencing usage patterns [N=150]

Category	University Not adopted (N=75)		University Adopted (N=75)	
Technological factors	WMS	Rank	WMS	Rank
Compatibility of mobile apps	44.67	5	48.67	4
Trialability	58.00	2	49.33	3
Observability	51.33	3	46.00	6
Complexity	50.00	4	46.67	5
Relative advantage	74.67	1	72.00	1
Flexibility (in terms of time)	50.00	4	50.00	2

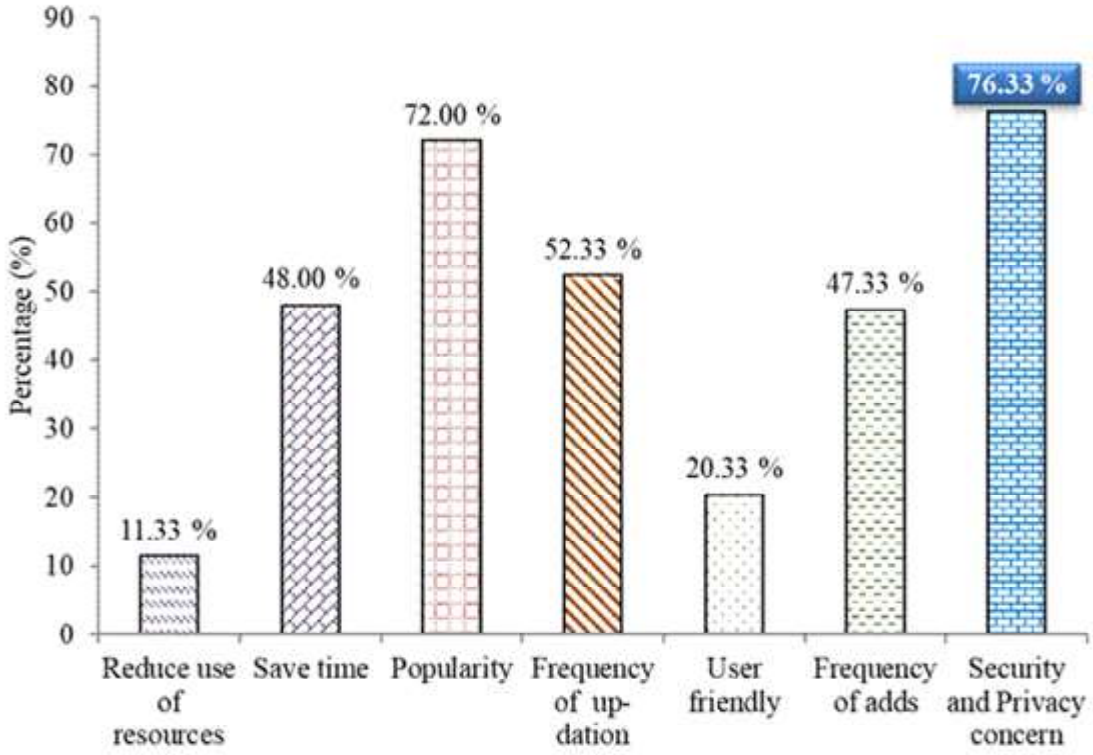

Fig. 1. Distribution of respondents (in percentage) across various factors influencing the usage pattern of mobile applications, with the Y-axis representing the percentage of respondents and the X-axis denoting the influencing factors

Table 2: Distribution of respondents as per User characteristics influencing usage patterns [N=150]

Category	University Not adopted (N=75)		University Adopted (N=75)	
User characteristics	WMS	Rank	WMS	Rank
Readiness	43.33	4	46.00	4
Innovativeness	48.00	2	48.00	2
Motivation	47.33	3	47.33	3
Credibility	66.67	1	70.00	1
Technophobia	48.00	2	48.00	2

WMS: Weighted Mean Score

Table 3: Distribution of respondents as per factors influencing usage patterns [N=150]

Category	University Not adopted (N=75)		University Adopted (N=75)	
Others	WMS	Rank	WMS	Rank
Reduce the use of resources	12.67	7	10.00	7
Save time	46.67	4	49.33	4
Popularity	72.67	2	71.33	2
Frequency of updation	52.00	3	52.67	3
User friendly	22.00	6	18.67	6
Frequency of ads	46.00	5	48.67	5
Security and Privacy concerns	74.67	1	78.00	1

(WMS: Weighted mean score)

fear or anxiety around technology is present regardless of adoption. Motivation and readiness are slightly lower among non-adopters, suggesting a need for initiatives to increase awareness, training, and support to build confidence. The above findings aligned with the observations of Huseynov (2020). To improve adoption rates, institutions should enhance the

credibility of their apps through testimonials, certifications, and transparency. Identify and support less motivated or ready users with tailored outreach design for technophobia reduction through simple, user-friendly interfaces and ongoing guidance.

These factors are not strictly technological or user-based but relate to user experience, external perceptions, and operational aspects of mobile apps. Table 3 presented the university-adopted and non-adopted villages, and Figure 1 depicted the distribution of respondents across various factors influencing the usage pattern of mobile applications show that security and privacy concerns are the most critical concerns for both groups. Their even higher importance among adopters suggests that real-life usage increases awareness of data security and privacy risks.

In the digital world, a disproportionate amount of user data is gathered, processed by algorithms, and used for commercial purposes on too many social media platforms. Unauthorized access to data leads to security and privacy concerns; institutions should prioritize robust privacy policies and clear communication to build user trust. Popularity significantly influences perception, suggesting users are swayed by peer use, word-of-mouth, or social proof. It can be a powerful motivator for first-time users and a valuable promotional angle for increasing adoption. Regular updates signal ongoing support, new features, and bug fixes, essential for user satisfaction and trust. Ads are a notable concern, especially if they disrupt the user experience. Interestingly, adopters rate it slightly higher, suggesting actual exposure to intrusive ads can lead to frustration. Developers should consider minimizing ad interruptions or providing ad-free versions. The results align with the observation of Patel et al. (2022). Surprisingly low scores for user friendliness may indicate that other factors are perceived as more pressing, or users assume basic usability is a given. However, it remains essential, especially for less tech-savvy users.

Conclusion

Mobile applications are transforming agriculture and supporting farmers, yet they still face notable shortcomings that must be addressed. The dissemination of information through mobile devices can positively impact the country's production systems. In the Mathura district, internal motivation and external factors influence dairy farmers' adoption of livestock-based mobile applications. Although farmers recognize the potential benefits of these technologies, barriers such as relative advantage, lack of trialability, and inadequate support systems hinder widespread usage. Many dairy farmers remain unfamiliar with existing dairy apps, which are not as popular or visible as they should be.

To enhance ICT usage among dairy farmers, relevant dairy information must be made available in regional languages to ensure effective access and understanding. Livestock-focused mobile apps should be promoted through social media to help farmers receive timely and reliable information. Additionally, focused training programs, increased technical support, and strengthening social networks within farming communities can further boost adoption. Government support is also crucial through financial aid and infrastructure development to effectively integrate mobile technology into dairy operations. These efforts can significantly improve efficiency and productivity in dairy farming.

Acknowledgments

I acknowledge the College of Veterinary Science and Animal Husbandry, DUVASU, Mathura, for providing me with the opportunity and technical support to complete the research quickly.

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