**Sustainability of Mobile application (Dairy Kannada) in Dissemination of Dairy information :An Empirical Evidence from Karnataka, India**

**Abstract**

The sustainability of the ICT based efforts in improving well-being of farming communities is a key to the effectiveness of rural ICT projects in India. In order to know the success of dairy app usage by farmers it is necessary to evaluate the sustainability of mobile application. In this view, a study was conducted to assess the sustainability of mobile application (Dairy Kannada) in dissemination of dairy related information in four divisions of Karnataka state. The data were collected from 120 dairy farmers who had already downloaded and were using the dairy app. The sustainability of dairy app was computed based on the five dimensions viz. technological appropriability, stability, productivity, local adaptability, accessibility and the economic viability. The study revealed that the economic viability was found the highest (88.34%) among other dimensions of sustainability followed by technological appropriability (87.50%), productivity (81.67%), stability (79.17%) and local adaptability and accessibility (78.33%). It was also found that the overall sustainability of dairy app was very high (77.00%) as reported by dairy farmers. This mobile App is an important tool in diffusing the scientific developments and also acts as a ready reckoner to refer through the information at any time.

**Keywords**: Dairy app, Dairy farmers, Dimensions, Sustainability

**Introduction**

To couple the fast-changing world with sustainable and innovative measures in the field of Animal husbandry, there is a need to think beyond the traditional extension approaches. ICT based livestock advisory services for knowledge dissemination to the farming communities for better and informed decision-making at the farm level, have become essential. (Gulati *et al.,* 2007). When it comes to identifying which ICT tool had provided best in delivering extension services, mobile phones showed the best potential (Choudhary *et. al.,* 2018).

Mobile apps used as an extension service delivery tool help in providing useful, relevant information and services to the farmers. With advent of smart technology at their fingertips, farmers can make improved decisions on aspects like selection of breeds, management, health care and marketing activities (Sarita *et. al.,* 2016). Thus, mobile apps could make a difference in the lives of poor farmers by accessing the latest required and timely information. In the context of ICT, sustainability of a project is defined as “Ensuring whether the results of the project will be sustained in the medium or even longer term without continued external assistance(IFAD Strategic Framework, 2007).

A number of innovative projects on mobile applications with specific localized services to farmers in local language to improve their productivity and one of the important among them is Dairy Kannada mobile application which was developed and diffused into the social system for effective dissemination of information to the dairy farmers by Department of Veterinary & Animal Husbandry Extension Education, Veterinary College, Bengaluru, KVAFSU (B) in the year 2016-2017. Development of dairy mobile App with an audio-visual Application in regional language designed is the most comprehensive yet most simple way to deliver the information while breaking literacy barrier (Vishwatej *et. al.,* 2014). This mobile App is an important tool in diffusing the scientific developments and also acts as a ready reckoner to refer through the information at any time (Satyanarayan *et.al.,* 2018). Hence an effort is attempted though the present study to assess the sustainability of mobile application (Dairy Kannada) use in dairy farming.

**Materials and Methods**

The study was undertaken in Karnataka state with a sample size of 120 respondents through administering a semi structured interview schedule. Out of the total respondents’ equal number (30) of dairy farmers from each of four administrative divisions of the state (Bengaluru, Mysuru, Kalburgi and Belagavi) who had already downloaded and were using the dairy app were selected randomly. Data were collected through personal interview schedule incorporating all relevant dimensions of sustainability. The sustainability of mobile use in dairying was studied using the sustainability index of Swaminathan (1991) with suitable modifications. The dimensions tested were technological appropriability, stability, productivity, local adaptability and acceptability and the economic viability. The responses for sustainability were studied in 5 different dimensions and the responses were assigned with a score of 3, 2 and 1 for ‘agree’, ‘undecided’ and ‘disagree’, respectively. The total sustainability score was obtained by summing up scores of all the 5 dimensions for each of the respondents and categorized into low, medium, high and very high categories. The interpretations are made utilizing Statistical tools (EXCEL and SPSS) and there by frequency and percentage were used to analyze the data.

**Results and discussion**

Sustainability of mobile app is attributed to assessed qualities that includes; technological appropriability, stability, productivity, local adaptability and accessibility and economic viability.

**Table 1: Distribution of dairy farmers towards the sustainability of mobile application use in dairy farming**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.**  **No.** | **Dimensions** | **Bengaluru division**  **(n=30)** | | **Mysuru division**  **(n=30)** | | | **Belagavi division**  **(n=30)** | | **Kalburgi division**  **(n=30)** | | **Total**  **(N=120)** | |
| **F** | **%** | **f** | **%** | | **F** | **%** | **f** | **%** | **f** | **%** |
| **1.** | **Technological appropriability** | | | | | | | | | |  |  |
| Low (9-14) | 1 | 3.33 | 1 | | 3.33 | 2 | 6.67 | 3 | 10.00 | 7 | 5.83 |
| Medium (15 - 20) | 1 | 3.33 | 2 | | 6.67 | 3 | 10.00 | 2 | 6.67 | 8 | 6.67 |
| High (>20) | 28 | 93.34 | 27 | | 90.00 | 25 | 83.33 | 25 | 83.33 | 105 | 87.50 |
| **2.** | **Stability** | | | | | | | | | |  |  |
| Low (9-14) | 2 | 6.67 | 1 | | 3.33 | 3 | 10.00 | 4 | 13.33 | 10 | 8.33 |
| Medium (15 - 20) | 4 | 13.33 | 3 | | 10.00 | 4 | 13.33 | 4 | 13.33 | 15 | 12.50 |
| High (>20) | 24 | 80.00 | 26 | | 86.67 | 23 | 76.67 | 22 | 73.34 | 95 | 79.17 |
| **3.** | **Productivity** | | | | | | | | | |  |  |
| Low (14 - 22) | 1 | 3.33 | 1 | | 3.33 | 3 | 10.00 | 4 | 13.33 | 9 | 7.50 |
| Medium (23 - 31) | 4 | 13.33 | 3 | | 10.00 | 3 | 10.00 | 3 | 10.00 | 13 | 10.83 |
| High (>31) | 25 | 83.34 | 26 | | 86.67 | 24 | 80.00 | 23 | 76.67 | 98 | 81.67 |
| **4.** | **Local adaptability and accessibility** | | | | | | | | | |  |  |
| Low (9 - 14) | 2 | 6.67 | 1 | | 3.33 | 3 | 10.00 | 2 | 6.67 | 8 | 6.67 |
| Medium (15 - 20) | 4 | 13.33 | 3 | | 10.00 | 6 | 20.00 | 5 | 16.66 | 18 | 15.00 |
| High (>20) | 24 | 80.00 | 26 | | 86.67 | 21 | 70.00 | 23 | 76.67 | 94 | 78.33 |
| **5.** | **Economic viability** | | | | | | | | | |  |  |
| Low (7 - 11) | 1 | 3.33 | 1 | | 3.33 | 2 | 6.67 | 1 | 3.33 | 5 | 4.16 |
| Medium (12 - 16) | 2 | 6.67 | 1 | | 3.33 | 3 | 10.00 | 3 | 10.00 | 9 | 7.50 |
| High (>16) | 27 | 90.00 | 28 | | 93.34 | 25 | 83.33 | 26 | 86.67 | 106 | 88.34 |

* 1. **Technological Appropriability**

Technological appropriability as per Table 1 indicated that majorityof the dairy farmers from Bengaluru division expressed their opinion on dairy app with high level of technological appropriability (93.34%) and equal number of medium (3.33%) and high (3.33%) categories. Similarly, in case of Mysuru division, majority of respondents also opined on dairy app with high level of technological appropriability (90.00%) followed by medium (6.67%) and low (3.33%) levels of technological appropriability. In case of Belagavi division, majority of the respondents expressed their opinion on dairy app with high level of technological appropriability (83.33%), followed by medium (10.00%) and low (6.67%). Majority of the respondents from Kalburgi division expressed their opinion on dairy app with high level of technological appropriability (83.33%) followed by low (10.00%) and medium (6.67%) levels of technological appropriability. The results were in consonance with that of Wadkar (2014) and Rathod *et al.* (2016), who reported that perception of dairy farmers was medium favourable towards sustainability of mobile use in dairying.

**Table 2: Items assessed for response in relation to technological appropriability**

|  |  |
| --- | --- |
| **S.No.** | **Items** |
| 1. | Dairy mobile app is user friendly |
| 2. | Information in the app is relevant and an essential intervention |
| 3. | App provides scientific information based on the needs of the farmers |
| 4. | Information in the app helps to clear the doubts on animal husbandry practices |
| 5. | App provides need-based information |
| 6. | Mode of presentation of information through the app is appropriate |
| 7. | Audio-visual mix of presentation in the app makes the farmers to retain the information for a longer period |
| 8. | Picture presentation in the app helps to understand the information very clearly |
| 9. | Understanding the information about dairying through the app is convenient and easy |

The sustainability of dairy app in terms of technological appropriability was found high (87.50%) among dairy farmers followed by medium (6.67%) and low (5.83%).

**3.2. Stability**

It could be observed from Table 1 that majority (80.00%, 86.67%, 76.67% and 73.34%) of the respondents from Bengaluru, Mysuru, Belagavi and Kalburgi divisions opined dairy app with high level of stability followed by medium (13.33%,10.00% and 13.33%) and low (6.67%, 3.33% and 10.00%) in case of Bengaluru, Mysuru and Belagavi divisions. With regard to Kalburgi division, equal number (13.33%) of respondents expressed their opinion on dairy app with medium and low levels of stability.

The sustainability of dairy app in terms of stability was found high (79.17%) among all the dairy farmers followed by medium (12.50%) and low (8.33%).

**Table 3: Items assessed for response in relation to stability**

|  |  |
| --- | --- |
| **S.No.** | **Items** |
| 1. | Easy to install the app |
| 2. | Once the app is installed on the mobile, it can be accessed any number of times |
| 3. | Once app is downloaded, there is no need of internet to access the information |
| 4. | Information is available 24×7 |
| 5. | Ability to access instant and specific information on dairying from any geographical area |
| 6. | App can be easily shared to other farmers through Shareit service |
| 7. | App provides timely information as per the need of the farmer |
| 8. | Information available through app is credible in nature |
| 9. | Information on dairy farming will always be on our finger tips. |

**3.3. Productivity**

On perusal of Table 1, it is depicted that majority (83.34%, 86.67%, 80.00% and 76.67%) of the respondents from Bengaluru, Mysuru, Belagavi and Kalburgi divisions expressed their opinion on dairy app with high level of productivity followed by medium (13.33% and 10.00%) and low (3.33% and 3.33%) in Bengaluru and Mysuru divisions. Equal number of respondents (10.00%) from Belagavi division expressed their opinion on dairy app with low and medium level of stability. The remaining respondents from Kalburgi division expressed their opinion on dairy app with low (13.33%) and medium (10.00%) levels of stability.

The sustainability of dairy app in terms of productivity was found high (81.67%) among dairy farmers followed by medium (10.83%) and low (7.50%).

**Table 4: Items assessed for response in relation to productivity**

|  |  |
| --- | --- |
| **S.No.** | **Items** |
| 1. | The criteria given in the app for selection of dairy animals helps to purchase high yielding animals |
| 2. | Clear information on breeding practices in the app helps to get a calf a year |
| 3. | Hygienic practices of the cattle shed elicited in the app help to keep the animals healthy |
| 4. | Methods for proper utilization of surplus fodder is clearly known through this app |
| 5. | Information on preparation of concentrates with locally available materials helps in reducing feed cost |
| 6. | Calf management practices provided in the app helps to get a good productive heifer |
| 7. | Information on balanced feeding leads to maximum production |
| 8. | Maximum milk yield from lactating cows can be obtained by adopting the management practices provided in the app |
| 9. | Instructions on management of pregnant animals provided in app helps the farmer in getting a healthy calf |
| 10. | Awareness on disease symptoms provided in app help the farmers to identify the diseased animals in the farm easily |
| 11. | The detailed information on important diseases in app help the farmers to take precautions to avoid the diseases |
| 12. | Information on vaccination schedule provided in the app can help the farmers to follow the vaccination schedule |
| 13. | Quality milk can be produced through clean milk production practices mentioned in the app |
| 14. | Information on stages of Reproduction cycle can help the farmer to adopt better breeding practices |

**Local adaptability and Accessibility**

Results observed from Table 1 indicated that majority of the respondents (80.00%, 86.67%, 70.00% and 76.67%) expressed their opinion on dairy app with high level of local adaptability and accessibility followed by medium (13.33%, 10.00%, 20.00% and 16.66%) and low (6.67%, 3.33%, 10.00% and 6.67%) levels of local adaptability as well as accessibility from Bengaluru, Mysuru, Belagavi and Kalburgi divisions.

The sustainability of dairy app in terms of local adaptability and accessibility was found high (78.33%) among dairy farmers followed by medium (15.00%) and low (6.67%).

**Table 5: Items assessed for response in relation to local adaptability and accessibility**

|  |  |
| --- | --- |
| **S.No.** | **Items** |
| 1. | App is adaptable by the farmer in any socio-economic conditions |
| 2. | Locally available resources could be utilized in a better way through the information available in the app |
| 3. | Both literates and illiterate farming community can understand the information in the app |
| 4. | App technology can be utilized even amongst socially and economically weaker sections of the society |
| 5. | Women farming community can also access the information through this app |
| 6. | Feeding chart in the app provides feed requirement in terms of quantity based on the local availability of fodder |
| 7. | App fits with the traditional values of the farmers |
| 8. | Dairy app is a socially acceptable technology |
| 9. | Information in the app is suited for both small as well as large farmers |

**3.5. Economic viability**

Results from table 1 indicated that majority of the farmers expressed their opinion on dairy app with high level of economic viability (90.00%) followed by medium (6.67%) and low (3.33%) levels of economic viability in Bengaluru division. Majority of the Mysuru division farmers expressed their opinion on dairy app with high level of economic viability (93.34%) and equal number (3.33%) of respondents expressed their opinion on dairy app with low and medium levels of economic viability. In case of Belagavi division farmers, about 83.33 per cent expressed their opinion on dairy app with high level of economic viability followed by medium (10.00%) and low levels of economic viability (6.67%). With respect to Kalburgi division farmers, majority expressed their opinion on dairy app with high level of economic viability (86.67%) followed by medium (10.00%) and low (3.33%) levels of economic viability.

The sustainability of dairy app in terms of economic viability was found high (88.34%) among dairy farmers followed by medium (7.50%) and low (4.16%) levels.

**Table 6: Items assessed for response in relation to economic viability**

|  |  |
| --- | --- |
| **S.No.** | **Items** |
| 1. | Using a dairy mobile app is cost effective |
| 2. | Android mobile phone is a common possession among dairy farmers |
| 3. | Better utilization of information provided in the app helps in increasing dairy production |
| 4. | App has more relative advantages compared to traditional ICT tools like Radio, TV etc |
| 5. | Time, energy and money in accessing the information on dairy farming can be saved through the app |
| 6. | Sufficient knowledge on dairy farming is obtained from app |
| 7. | Mobile app technology helps the dairy farmers to manage their farms effectively |

**Fig .1 Responses of Farmers in relation to economic viability**

**Table 7: Overall sustainability of Android Mobile Dairy App**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Category** | **Bengaluru division** | | **Mysuru division** | | **Belagavi division** | | **Kalburgi division** | | **Overall sustainability** | |
| **F** | **%** | **f** | **%** | **f** | **%** | **f** | **%** | **f** | **%** |
| **Low sustainability (48–72)** | 1 | 3.33 | 1 | 3.33 | 2 | 6.67 | 2 | 6.67 | 6 | 5.00 |
| **Medium sustainability (72–96)** | 1 | 3.33 | 1 | 3.33 | 3 | 10.00 | 2 | 6.67 | 7 | 6.00 |
| **High sustainability (96–120)** | 3 | 10.00 | 2 | 6.67 | 5 | 16.67 | 4 | 13.33 | 14 | 12.00 |
| **Very high sustainability (120–144)** | 25 | 83.34 | 26 | 86.67 | 20 | 66.66 | 22 | 73.33 | 93 | 77.00 |

**Overall sustainability**

Observations made on the overall sustainability of Dairy Mobile App as depicted in Table 7 revealed that majority of respondents from all divisions namely, Bengaluru (83.34%), Mysuru (86.67%), Belagavi (66.66%) and Kalburgi (73.33%) expressed their opinion on dairy app with very high sustainability followed by high (10.00%, 6.67%, 16.67% and 13.33%), medium (3.33%, 3.33%, 10.00% and 6.67%) and low (3.33%, 3.33%, 6.67% and 6.67%) level of sustainability. Among the total respondents, three fourth of respondents expressed their opinion on dairy app with very high level of sustainability (77.00%) followed by high (12.00%), medium (6.00%) and low (5.00%) levels of sustainability.

Observations made on sustainability of Dairy Mobile App from the Table 1 revealed that majority of the respondents of study area expressed their opinion on dairy app with high level of technological appropriability (87.50%), high level of stability (79.17%), high level of productivity (81.67%), high level of local adaptability and accessibility (78.33%) and high economic viability (88.34%).

Observations made on the overall sustainability of Dairy Mobile App as depicted in Table 7 revealed that, a majority of the respondents from all divisions namely, Bengaluru (83.34%), Mysuru (86.67%), Belagavi (66.66%) and Kalburgi (73.33%) expressed their opinion on dairy app with very high level of sustainability.

**Conclusion**

Information is a key ingredient for success of any individual, same is true in the case of farmers as well. Ready availability of information at right time and in right form will enhance the success rate of farmers. To a considerable extent, dairy App made the farmers to know, remember and to recollect the things learnt and experienced and finally seek knowledge on the practices (Belakeri *et. al.,* 2017). This mobile App is an important tool in diffusing the scientific developments in the field of dairy production and management and also acts as a ready reckoner to refer through the information at any time (Sabapara *et. al.,* 2016).

Majority of the respondents of study area expressed their opinion on dairy app with high level of technological appropriability, stability, productivity, local adaptability and high economic viability (Jadhav *et. al.,* 2021). This had resulted in very high level of sustainability of dairy app as a tool of information dissemination among the respondents (Rajoria *et. al.,* 2018).

Many such efforts can be made in near future to harness the advent of technologies to disseminate the knowledge/information to farming community on different animal husbandry concepts. Mobile app is a new tool for effective transfer of technology. The scientific community should take the initiative to create awareness and publicize the ICT tools along with timely updation of new technologies and practices (Kailash *et. al.,* 2017).

**Consent**

As per international standards or university standards, respondents’ written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

1.

2.

3.

**References**

1. Belakeri, P., Satyanarayan, K., Jagadeeswary, V., Yathiraj, S., Veeranna, K.C. and Rajeshwari, Y. B.,2017. Effectiveness of Mobile *App* on Fodder Production in Terms of Knowledge Gain among Livestock Farmers of Karnataka. *Indian Res. J. Ext. Edu., pp* 10 – 15. Check year in the passage …2016

2. Choudhary, R., Rohitash kumar and Vinay kumar, 2018. Socio-Economic Personal Antecedents of Dairy Farmers of Jaipur District of Rajasthan, India. *Int. J. Curr. Microbiol. App. Sci.,*7(9): 3471-3476

3. Gulati, A., Minot, N., Delgado, C. and Bora, S., 2007. Growth in high-value agriculture in Asia and the emergence of vertical links with farmers. In: J.F.M. Swinnen, Editor, Global Supply Chains, Standards and the Poor: How the Globalization of Food Systems and Standards Affects Rural Development and Poverty, CABI, Wallingford, UK, *pp* 91–108

4. IFAD STRATEGIC FRAMEWORK, 2007. Enabling the rural poor to overcome poverty. *EB 2006/89/R.2/Rev.1. 89th Session*, Rome.

5. Jadhav, K., Kolhe, S., Nande, M., Khanvilkar, A., & Doiphode, A. (2021). Utilization of Mobile Based ICT Tools by the Dairy Farmers of Satara and Pune Districts of Maharashtra. Asian Journal of Agricultural Extension, Economics & Sociology, 39(6), 35–43. https://doi.org/10.9734/ajaees/2021/v39i630591

6. Kailash, Om Prakash Mishra, Lokesh kumar and Shani Kumar Singh, 2017. Utilization Pattern of Mobile Phone Technology (Smart Phone) among the farmers of Nagaur District in Rajasthan. *Indian Res. J. Ext. Edu.,* 17(4): 117 – 121

7. Rajoria, S., Sanjay Kumar Rewani, Virendra Singh, Manisha Singodia, Brijesh Nanda and Harshita Bhumra, 2018. Attitude of Livestock Farmers towards the ICT based Livestock Extension Services in Jaipur district of Rajasthan, India.*Int.J.Curr.Microbiol.App.Sci.,* 7(2):1014-1021

8. Rathod, P., Mahesh Chander and Bardhan, D., 2016. Adoption Status and Influencing Factors of Mobile Telephony in Dairy Sector: A Study in Four States of India**.** *Agricultural Economics Research Review,* 29(1): 15-268. Sabapara, G.P., Fulsoundar, A.B. and Kharadi, V.B., 2016. Profile of Dairy Farmers and Relationship with Adoption of Improved Dairy Husbandry Practices in Southern Gujarat, India. *Livestock Research International,* 4*(*1): 36-40

9. Sarita, S.P., Singh, Anika Malik, Monika Sharma and Rakesh Ahuja, 2016. Socio-economic and psychological characteristics of dairy farmers of Hisar district. *International Journal of Science, Environment and Technology,* 5(5): 3466 – 3472

10. Satyanarayan, K., Jagadeeswary, V., Pavan, K., Yathiraj, S. and Anand Babu, 2018. Develop and Evaluate Use of Mobile Application for Cattle Farming: A New Generation Technology Transfer for Sustainable Dairy Production. *International Journal of Livestock Research,* 8(12): 224 – 232.

11. Swaminathan, M. S., 1991. Toward sustainable agriculture: Dimensions and components. Employment News, New Delhi, 20(34): 32

12. Vishwatej, R., Patil, S.B. and Angadi, J.G., 2014. Accessibility of information and communication technologies (ICTs) to the farmers of north Karnataka. *Agric. Update,* 9(2): 213-216.

13. Wadkar, S.K., 2014. Impact assessment and Sustainability of the e – agriservice for dairy farmers of Maharashtra. Ph.D. Thesis, National Dairy Research Institute, Deemed university, Karnal, India.