

BAIF Experience in Field Data Collection

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Article Information

Received date: Jul 27, 2017

Accepted date: Jul 31, 2017

Published date: Aug 02, 2017

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Keywords Cattle development centre; Personal digital assistance

Abstract

The increasing availability and capabilities of mobile phones make them a feasible means of data collection. Personal Digital Assistance (PDA) systems have been used widely for public health monitoring and surveillance activities, collecting survey data, clinical studies but documentation of their use in complicated research studies requiring multiple systems is limited. This paper shares our experiences of designing and implementing a complex multi-component system for a technical livestock community to help other researchers planning to use PDA for collecting technical data related to livestock studies. We designed and implemented different versions of mobile phone data collection systems to collect information related to bovine insemination through Cattle Development Centers (CDC) operated by BAIF.

There was improvement in collecting field data by updating data logger's versions year by year. Following two to three days of training and piloting, data were collected from 170 field technicians over 5 years period from June 2010 to December 2015. Data logger was the one of easy solution for getting the technical, social and economic information of rural small farmer. Up to year 2015 project had collected the information enrolling of about 0.25 million families, out of that 95,000 families information about poverty index was collected and 0.67 million bovine insemination data, 0.46 insemination follow up records and information about 0.13 million female progeny born through the Project had collected. The PDAs were well accepted by technicians. The use of PDAs eliminated the usual time-consuming and error-prone process of data entry and validation. PDAs are a promising tool for field research in India.

Background

Survey & technical data are traditionally collected using pen-and-paper, with double data entry, comparison of entries and reconciliation of discrepancies before data cleaning can commence. We used Personal Digital Assistants (PDAs) for data entry at the point of collection, to save time and enhance the quality of data from livestock sector scattered rural livestock program in Uttar Pradesh, Bihar & Maharashtra States of India.

In an agro based developing country like India, natural resources provide basic livelihood support to rural people. Our rural families are dependent on land, water, livestock and forests for generating employment and for earning their livelihood. India possesses a good number of recognized breeds of cattle, which represent less than 15% of the total cattle population.

India has vast resource of livestock and poultry, which play a vital role in improving the socio-economic conditions of rural masses. There are about 300 million bovines, 65.07 million sheep, 135.2 million goats and about 10.3 million pigs as per 19th Livestock Census in the country. The species wise population of animals in Livestock and Poultry population during the last three Censuses was obtained from Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries Ministry of Agriculture & Farmers Welfare Government of India.

Dairying is an important sector in our country. We are the highest milk producer in the world, but productivities of our animals are low. To be competitive, we will have to increase productivity and efficiency of resource use. Besides building an infrastructure for making available quality semen, cattle feed, fodder seeds, vaccines etc. to farmers for improving the productivity and health of their animals, the modern tools of information technology and telecommunications will have to be welded with these services to provide reliable, easy-to-access and timely information to farmers, service providing organizations and policy makers for informed decision making at all levels.

Improving productivity of animals requires building of infrastructure for producing quality bulls through genetic improvement programmers, producing semen from high quality bulls and making it available to farmers at their door-step so that their animals are bred with high quality semen, building of infrastructure for producing cattle feed, feed supplements, fodder seed etc. so that it provides balanced nutrition to their animals, and building of infrastructure for creating facilities for veterinary treatment, disease diagnosis, vaccination, de-worming etc. so that it protects their animal against prevalent diseases.

Bhatia Agro Industry Foundation a Pune based Non Government Origination popularly known as BAIF. BAIF is operating more than 4267 Cattle Development Centers (CDC) in 13 states of the country. BAIF provides artificial insemination services to door step of dairy farmers. During year 2015-16 total 4 million artificial inseminations (A.I.) were carried out with conception rate of 52%



Figure 1: First model.



Figure 2: Second model.



Figure 3: Third model.

on physical basis. 2.58 million Cows and buffaloes born under BAIF programmer are in milk production producing 3.61 million tons of milk/annum contributing Rs 8500 crores to rural economy.

This is nevertheless the standard approach to data processing for most large-scale health surveys [1,2].

The development of Personal Digital Assistants (PDAs) and related software has made data entry at the point of field level collection i.e. Cattle Development Centers (CDC) a realistic prospect. CDC in charge enables instantaneous range, consistency and logical checks at the time of data entry, enhancing data quality and



Figure 4: Fourth model windows phones first generation.

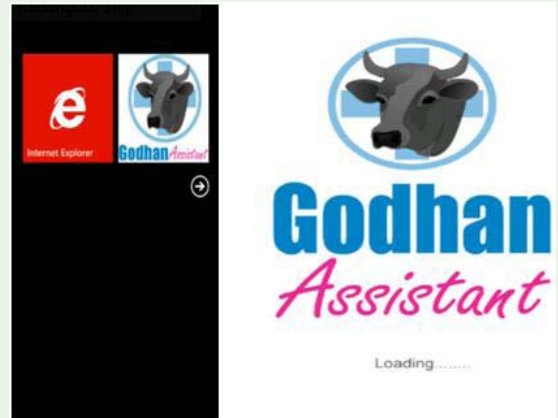


Figure 5: Godhan assistant.

dramatically reducing the time until data are available for cleaning and analysis. We report the development and use of Godhan/ Privet Assistant in the context of collecting technical information at rural livestock sector areas [3,4] (Figures 1-5).

The use of PDAs eliminated the usual time-consuming and error-prone process of data entry and validation. PDAs are a promising tool for field research in Africa [5]. Sarah Style et al. have successfully used mobile phones for data capture in large scale population trial in south Nepal [6].

Methods

Technical data collecting software was used to develop to record information on bovine management, poverty index, and house hold information. One hundred and seventy technicians very few with any prior computer experience, were trained using the PDAs. Different versions of software's were upgraded from different platforms. Logical checks were performed and skip patterns taken care of at the time of data entry. Data were downloaded to the laptop computers and summary reports produced to evaluate the completeness of data collection.

While working for rural livestock sector there is data collection from different parameters were involved. Traditional method of data capture involves much paperwork for data collection and recording. Due to huge paper work, the data processing is time consuming

affecting the time required for report generation. Due to delay in report generation, various important decisions get affected. The time required to process data increases exponentially as amount of data increases. The process of data entry on paper is very cumbersome on the field. As the data is collected, recorded and processed manually, the process introduces various errors at different levels. Due to this increased time in data processing, important decisions get delayed.

Low literacy status of the technician, unapproachable location at which he is working, the type of environment around him and lack of required facilities to avail the existing Information Technology tools, are constraints for his success. However since the data capture is necessary and important for attaining the efficiency desired, it would be necessary to fabricate a robust, down to earth electronic hand held device which will help to nearly no paper work, system for generating uniform, correct, accurate and permanent data with ease. The additional facilities like printing of cash receipts, fast communication and easy report generation will facilitate timely and correct decision making based on correct and accurate data and economical operation.

Although it is possible to import similar type of data loggers and use them in the country, it is not desired since the western system of data generation is not compatible and cannot be adopted as such in India. This is because of the differential culture, literacy standards, livestock rearing practices and implications of related aspects. It is therefore a requirement to evolve the system of generation of data, collection, evaluation and data management system in such a way so as to assist increase in the existing efficiency. The success achieved can be replicated and made available to other developing countries nearby or in Africa and where ever the situation is similar to that of ours. Thus there is potential to export the technology once it becomes useful within country.

BAIF has initiated to capture the reproduction data within BAIF programmer in the data logger during the year 2005 with the technical support from MDL Solution Ltd in selected CDC's of Maharashtra state. Being a first device many challenges were faced as device as bulky. There was limited scope of operation. Code based entry and display. Device was not user friendly. Battery backup period was short. Battery was outside the unit. Handling was difficult. Difficulty was faced in carrying the unit in field. Improvements were tried as shown in next model (Figures 6-8).

In second model the MDL upgraded the bulky device in initial model reduced down with changes like inbuilt battery, increased data handling capacity and handy device to carry along with AI technician. Still there were some challenges encountered which are as problems in display in day illumination. Battery problem could not be sorted out in related to backup time. Smaller data storage capacity due to less internal memory. BAIF has tried and endeavor third Model



Figure 6: Data logger training Maharashtra.



Figure 7: Data Logger Training Uttar Pradesh.

(PALM Mobile) to capture the livestock reproduction data in the mobile device for which decided to use mobile phones manufactured by PALM. The PALM model used was smart phone Palm Treo 680. Satellite Form was used as a developing tool.

Third device was having data download facility, handling more convenient this device was more flexible than previous two models. Challenges faced were frequent failure of Power adapters (chargers), repairing problem and repairing cost. The experience gained from PALM mobile and subsequent unavailability of devices and service backup of PALM mobile as well as easy accessibility with affordable price of Windows smart phones, it was decided to switch over to Windows based software for capturing the data.

Fourth Model Windows phones First Generation was developed to examine Windows based software a suitable device with affordable price, HTC model P-3452 with Microsoft windows mobile operating system 6.1/6.5 was selected and used during initial project period.

This model was able to record data in the systematic fashion hence there was no need to validate the data once it is warehoused in servers. Software used an architecture in which all the scenarios and processes where simulated to an object model. This model used to replicate the real life scenario hence the data entered is pre-revalidated. On the other hand it gives intelligent responses and preemptive appointments



Figure 8: Data Logger Training Bihar.

and responses for possible scenarios. The system behaves like an interactive assistant to various levels like CDC in-charges (Paravet), area office, state office and Central office. As the technology became more advanced in the field of mobile computing windows mobile 6.1/6.5 operating system was phased out by Microsoft replacing with windows phone 7.1/7.8/8.0/8.1, hence the next generation of software app were developed with data, feature and functional continuity with previous generation software (Windows mobile 6.1/6.5).

Uses of data logger

The data logger helps CDC in charges for repeated entries on paper as it saves lot of time required for paper work. The master list includes (Village list within CDC, Village wise farmer, Farmer wise animals). Almost 80 % master lists are generated within 3 to 4 months of starting use on handheld devices (Smart-phones) using software. Once master list is generated further entry takes less time for entering subsequent information. Pending list of follow-up pregnancy and calving are automatically generated and reminder to AI technician, this helps to achieve 100% follow-up. Tracking of each and every participating dairy animal from Artificial Insemination till calving and further tracking of progeny born. Monitoring like open period, service period, Inter calving period is possible which helps to creating awareness among farmers for better management of animals. The timely captured data helps in planning the applied research which facilitates to generate management and research leads. The various management leads can help to take appropriate actions to make the project or programmed on track and the research outputs creates an opportunity to develop various research proposals in regards to livestock development.

Results

BAIF had monitored technical and financial performance of each CDC on monthly basis (off line mode) and had taken corrective actions to improve the performance of CDC at regular interval with use of accurate data of each and every aspect. In addition to this information about the poverty index of the smallholder farmers to get their economic status was also collected. Godhan Project experience demonstrated BAIF that the data logger is the one of easy solution for getting the technical, social and economic information of rural small farmer. Up to year 2015 project had collected the information

enrolling of about 0.25 million families, out of that 95,000 families information about poverty index was collected and 0.67 million bovine insemination data, 0.46 insemination follow up records and information about 0.13 million female progeny born through the Godhan Project had collected. The Godhan project findings realized the best financial and operating model that ensures sustainability for up scaling dairy livestock development program and Strengthen research, development and production capacity to ensure high quality genetic materials are available for up scaled dairy livestock program of BAIF.

Conclusions

The study demonstrated that a mobile-based system can be used for collecting technical information to run livestock development programmed. People who have not used smart phones or even computers previously can, in a short timeframe, be trained to fill out data and submit them from the device. Technology, including network connections, works sufficiently for livestock development programming rural parts of India. The data collected may be used to better understand management system in rural livestock.

Acknowledgements

Author is grateful to management team of BAIF for supporting in developing software module.

References

1. http://www.measuredhs.com/accesssurveys/data_processing_methodology.cfm
2. <http://www.childinfo.org/mics/Manuals/English/chap07.pdf>
3. Annual Report 2016-17. Department of Animal Husbandry, Dairying & Fisheries Ministry of Agriculture & Farmers Welfare Government of India.
4. BAIF Annual report 2015-16.
5. Shirima K, Mukasa O, Schellenberg JA, Manzi F, John D, Mushi A, et al. The use of personal digital assistants for data entry at the point of collection in a large household survey in southern Tanzania. *Emerg Themes Epidemiol.* 2007; 4: 5.
6. Style S, Beard BJ, Harris-Fry H, Sengupta A, Jha S, Shrestha BP, et al. Experiences in running a complex electronic data capture system using mobile phones in a large-scale population trial in southern Nepal. *Glob Health Action.* 2017; 10: 1330858.