CHAPTER 16

Sustainable Information Resource Centre

ICT-BASED EXTENSION APPROACH FOR ANIMAL HUSBANDRY

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Introduction

> "Knowledge and information are essential for people to successfully respond to the opportunities and challenges of social, economic, and technological changes. But to be useful, knowledge and information must be effectively communicated to people." – Kofi Annan

It need not be overemphasized that information empowers farmers in many ways. Information is nowadays the most important input for any production system and especially for decision-making. Therefore, the information needs of the rural masses must be properly addressed for sustainable production. The continuing rapid development of telecommunications and computer-based information and communications technology (ICT) is probably the biggest factor for change in extension, and one which will facilitate and reinforce other changes. Be it production or marketing, a farmer has to be equipped with the right information at the right time and in the right place. On this front, the present extension system, more so in animal husbandry, leaves much to be desired. Therefore, the need of the hour is to adopt an ICT-enabled extension mechanism that will go a long way toward plugging the loopholes of the existing system to measure up to the expectations of farmers.

Animal husbandry is one of the major components of the Indian rural economy and moreover, it is an asset for the small and marginal farmers and landless laborers. This sector contributes around one-fourth of the total agricultural Gross Domestic Product (GDP) in India. Livestock extension information is an important component of the information needed at the village level, and knowledge dissemination plays a pivotal role in animal husbandry. Lack of information on various aspects such as scientific management of animals, balanced feeding, and animal health management ultimately results in production losses.

This chapter focuses on the status of animal husbandry extension in India, various limitations of conventional information dissemination methods, and the potential advantages of ICT in animal husbandry extension. Further, it explores ICT application in the form of the "Information System," and based on this, the National Institute of Agricultural Extension Management (MANAGE) has come up with the information dissemination model "Sustainable Information Resource Centre" (SIRC) in animal husbandry. The methodology, outcome, and utility of SIRC is shared in this chapter.

Status of Extension Services in Animal Husbandry

Various institutions are engaged in livestock extension services such as the State Department of Animal Husbandry (SDAH), producer cooperatives, feed and pharma companies, contract firms, print and television media, and nongovernmental organizations (NGOs). However, by and large, extension in animal husbandry continued to remain sporadic, casual, occasional, and highly unorganized and therefore, did not effectively meet the requirements of a vast majority of livestock keepers (Chander, 2013). As evidence, only 5.1% of farmer-households are able to access any information on animal husbandry but 40.4% can access information on crop farming.

The importance of extension policy has been sufficiently emphasized internationally and in Asian countries (Sulaiman & Hall, 2005, as cited in Chander, 2013); however, there is no policy for livestock extension in India. The SDAH is the major stakeholder in livestock development, having vast infrastructure including veterinary hospitals, dispensaries, personnel, and budget. However, its primary focus is on diagnosis and treatment of animals and breeding services for which it has a clear mandate.

The 12th Plan Sub-Group on Animal Husbandry constituted by the Planning Commission observed that extension services for livestock have so far been a nonstarter severely hampering its growth (Planning Commission, 2012, as cited in Chander, 2013). To address these challenges in livestock extension service delivery, the Planning Commission recommended "building up an exclusive cadre of livestock extension workers" with appropriate skills and knowledge (Vet Helpline India [P] Ltd, 2013). Accordingly, the states had to create a "separate wing" within the SDAH for livestock extension service delivery (Model-I) or some of the veterinary officers of SDAH had to be deputed exclusively for this purpose and known as *designated officers* (Model-II). So far, out of 28 states and eight Union Territories, only eight states created a separate wing. However, the number of extension personnel in the separate wing model is meager and placed mostly either at headquarters or the divisional level. The rest of the states have appointed designated officers for extension, but it has been observed that these officers are overburdened with multiple roles and therefore extension remained neglected (Kareem & Phand, 2018).

The shortage of human resources in the SDAH is already resulting in poor and inadequate veterinary services to the farmers. The limitation of the workforce hinders not only the input services but also the dissemination of the desired quantum of knowledge to the target audience. This approach has left the majority of the farmers uncovered by the present extension system. This gap remains a challenge for the extension system even today. To reach

over 120 million farmers, spread over more than 600 districts and over 6,000 blocks, is an uphill task. (A *block* is an administrative unit below a district.) The diversity of agro-ecological situations adds to this challenge further. Farmers' needs are much more diversified, and the knowledge required to address them is beyond the capacity of the grassroots-level extension functionaries. Moreover, veterinary officers are supposed to act as middle-level livestock extension professionals (Rama Rao et al., 2011; Anon., 2012; Anon., 2013; Sasidhar & Reddy, 2013; Rao et al., 2015, as cited in Sasidhar & Suvedi, 2016). Most of them have not undergone any extension management training and thus lack in extension techniques to disseminate technology to farmers (Matthewman & Ashley, 1996; Delgado et al., 1999; Ahuja et al., 2000; Chander et al., 2010; Hegde, 2010; SAPPLPP, 2012, as cited in Sasidhar & Suvedi, 2016).

The dairy cooperatives play a predominant role although it is confined to the geographical area with high growth in the sector. Similarly, the private dairies have been established over dairy cooperatives and operate with the farming community through a contract agreement in which they provide a variety of input services such as breeding, feed, treatment, disease prevention, and extension services to the farmers. The entire formal milk sector (consisting of cooperatives and private dairies) handles about 40% of the milk sold in the market. The remaining 60% of milk, which is handled by the unorganized sector (Department of Animal Husbandry, Dairying & Fisheries, 2018), are not addressed by the extension system effectively. The contract farming in the poultry sector has made inroads especially in southern states mainly because of the integration of the three types of services (supply of inputs, extension advisory, and technical service) provided by one agency. Due to assurance of the market, at the end of the production period, the farmer will get a fixed amount as rearing charges. Though considered exploitative, integrated poultry farming is gaining more popularity as the farmers are free from investment, production, and marketing risks (Rao et al., 2011).

The investment in terms of budget allocated as well as the expenditure incurred on livestock extension activities by most of the SDAH in general is very low (1% to 3% of the total SDAH budget).

The Global Consultation on Agricultural Extension recommended that

> in countries where more than 60% of the economically active population are engaged in agricultural production, approximately 1% to 2% of the AGDP (depending on the size of the country and factor costs) should be considered the minimum level of financial investment to achieve both human resource development and technology transfer goals of a public sector agricultural extension system. (Swanson, 1990, p. 26–27, as cited in Contado, 1996)

India is yet to attain this level of investment in agricultural extension services. In recent years, the Government of India has spent only about 0.14% of the agricultural GDP extension services funding (Chand et al., 2011, as cited in Chander & Prakashkumar, 2013).

To summarize, extension services in the animal husbandry sector provided by various institutions such as producer cooperatives, feed and pharma companies, contract firms, and NGOs are effective but limited in their reach. On the other hand, the SDAH has widespread coverage in the form of

veterinary clinics or dispensaries. The department has doorstep reach through their veterinarians and para-vets at the village level. However, their extension services are confined to the organization of a few health camps, training programs, exhibition, and Krishi Melas (three-day farmer education events) due to inadequate infrastructure, limited time, budget allocations, and human resources capacity. Presently, there is no mechanism in operation that will continuously address and sustain the changing information needs of livestock farmers.

Limitations of Conventional Extension Methods of Information Dissemination

The presently used conventional extension methods for dissemination of information have a number of lacunae, or gaps, due to which the information does not reach the end users. A discussion of the major lacunae follows.

Inherent Weaknesses

The conventional ways of information dissemination through folders, leaflets, pamphlets, newspapers, magazines, radio, and other forms of communication are not meeting the expectations of the farmers due to their inherent weaknesses. The conventional media don't have much scope for inclusion of interactive modules and are not effective enough to arouse learning senses, thereby failing to develop interest for active involvement of the audience. Most of the time, the information is of a general type based on the perceived needs of the farmers, which may not cater to the specific needs of all categories of farmers.

Poor Communications Capacity

Most technical staff within the SDAH find it difficult to communicate with both the research system and the stakeholder groups due to weak linkages. First, the flow of information from research to extension tends to be top-down, rather than a two-way interactive process aimed at identifying and solving serious problems. Second, there is little use of up-to-date communications technology, including (a) the use of mass media to create farmer awareness for new technologies, (b) the use of print media to publish a regular newsletter to keep the field staff updated on technical and administrative developments, and (c) the effective use of electronic communications to improve feedback and technical support between research and extension personnel, and to facilitate administrative communications. Such technologies can increase the efficiency and effectiveness of extension in its technology dissemination functions. Very often it has been reported that not more than 30% of the technology reached the farmer.

Expensive

It costs a lot of money to produce and print extension materials and to train a whole chain of livestock extension personnel to understand the new technology and to answer the possible queries from the livestock owners.

Time-Consuming

For a message to pass from a research station or university to the livestock owners, many actors must understand and deliver the message to the next layer. The process takes a lot of time and effort on the part of livestock extension personnel.

Distortion

A number of evaluation studies of the training and visit system indicate that the quality of the extension message gets heavily distorted and eroded when it ultimately reaches the end users. The distortion increases as the number of actors and channels in the communication process increase.

Potential Advantages of ICT in Animal Husbandry Extension

There are many possibilities for the potential applications of ICT and social media in animal husbandry extension particularly for information dissemination ICT offers several advantages over conventional methods of extension for dissemination of information. A discussion of the advantages follows.

Savings of Money, Time & Effort

Scientists can prepare and update electronic versions of messages and on-farm research results themselves and load into computers, which saves money and time to reach curious end users instantly.

Steps in the Diffusion Process % Distortion Cut

Cyber outreach will remove a number of steps altogether from the traditional extension process. The information can be directly posted on the internet, which will be available to extension functionaries and farmers at the district, subdivision, and block and village level without any distortion. All the concerned will get the information immediately, and queries and clarifications will also be addressed quickly without involving a chain of extension functionaries.

Information Rich & Interactive

It appeals to the curious extension workers and analytical farmers and allows them to search and locate information they need.

Instant International Reach

Cyber extension will eliminate the time and distance barrier that gets in the way of knowing the latest information on any particular livestock problem from any part of the world. Discussions take place with the best scientist and experts in the field.

Continuous Availability

The key attribute of cyber extension is its availability all the time, 24 hours a day, and 365 days a year.

Better Control of Users

The farmers, as users, will have much greater control than over current information channels.

Concept of Information System

"An Information System can be defined technically as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making and control organization" (Chauhan, 2006).

The Information System helps mainly in three types of activities:

- To present relevant information for making the right decision in the organizations
- To control, implement, and analyze any problem in the organization
- To impart necessary information for producing new products

These three activities can be distributed into three parts: input, processing, and output. Through input, unevaluated facts and figures (data) are collected. Under processing, the collected data are changed into meaningful and useful context using text, graphics, and animations with the help of multimedia tools. Through output, the information is transferred to an individual or where it is needed. This timely and accurate information can act as an aid to decision-making.

Concept of Expert System

"An Expert System is a computer application that guides the performance of ill structured tasks which usually require experience and specialized knowledge i.e. expertise" (Davis & Olson, 2000).

An Expert System is a major subdiscipline of the field of artificial intelligence and can partially represent human knowledge and use it to solve complex problems within a specific domain. An Expert System attempts to capture the knowledge and experience of human expertise to make their expertise available on demand. It has a store of knowledge consisting of facts and rules. By prompting the right questions and then considering the user's reply, it decides which element of its knowledge and which facts and rules to use as the basis for furthering questions until a specified goal is reached. It operates in the same manner as a human expert. Using an Expert System, even a nonexpert can achieve performance comparable to an expert in that particular problem domain.

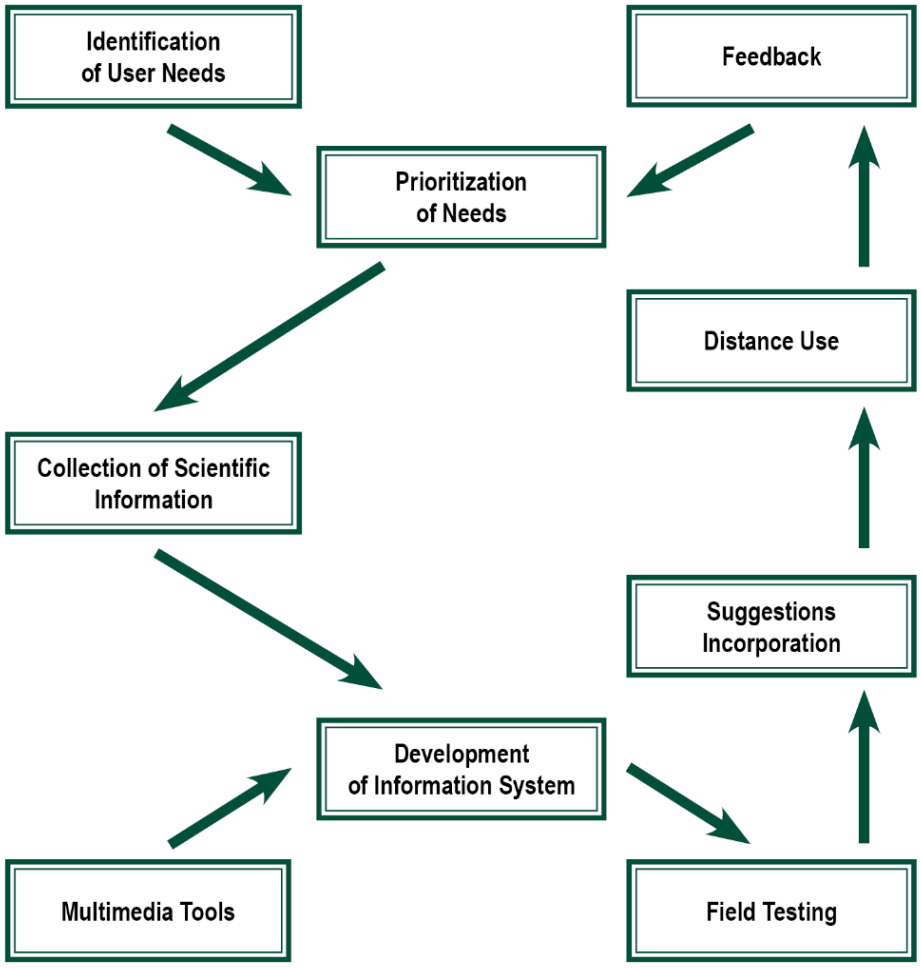
Feasibility of Information System Versus Expert System in Animal Husbandry

The Information System as well as the Expert System both are basically decision support systems, but there is a difference in terms of their role in decision-making. The Information System imparts the comprehensive scientific information on a particular topic that will be helpful to users for solving a problem by choosing appropriate options available in the situation. On the contrary, the Expert System provides the ready-made solutions (one or a few) on a particular problem, which are suggested by the expert. Thus, the Expert System can be considered an instant decision support system. However, it may happen sometime that the advice or solution given by the Expert System is difficult to follow in the user's situation. For example, suppose a calf is suffering from diarrhea due to a parasitic infestation and an Expert System advises the user to give a particular anti-parasitic drug, which sometimes may not be available to the user. In such a situation, the user may be unable to follow the given advice. On other hand, the Information System has given scientific information on the same problem with respect to its causes, first aid, and preventive measures and all possible means to solve the problem. In such situations, it may be possible that the user finds information on an indigenous drug (such as the juice of *neem* leaves), which is more useful since the inputs for that piece of information are readily available. Then, in that situation, the Information System is better than the Expert System in animal husbandry.

Further, animal management is a complex task and entirely different from crop management. In cases of animal diseases, particularly of acute diseases, the role of users (livestock owners) is to identify the disease tentatively in the initial stage with the help of information given by the Information System and to make a quick decision to call a veterinarian since users are not supposed to treat animals by themselves. In such situations, if the Expert System diagnosed the particular disease and advised a particular drug with respect to its dose and route of administration, then also the user will not be in a position to treat the animal as livestock owners don't have the required skill of drug administration. Further, if somehow the user manages to give the recommended drugs to his animal, still there are chances of a wrong diagnosis by the Expert System as its biological science and confirmative disease diagnosis can be done only through laboratory tests. An expert or trained person such as a veterinarian who can make an appropriate decision by examining the animal is needed and not the Expert System that delivers expert advice but is located distantly from the user situation.

Therefore, in the field of animal husbandry, the Information System rather than the Expert System is needed. On the other hand, the Expert System is more appropriate in the field of agriculture, and feasible to some extent in animal husbandry particularly on feeding, housing, and other areas where there is involvement of qualitative and quantitative parameters.

Figure 16-1 Suggested model for development of the Sustainable Information Resource Centre.



Conceptual Model of SIRC

Much information on animal husbandry is generated at research and educational institutions in the form of textbooks and journals. However, many times it is not given in the local language and therefore, cannot be useful even to literate farmers. Moreover, scientific information available in such textbooks and journals is mere data for the farmers and not useful information. Further, for information to be useful, it should be demand driven rather than supply driven. It should be timely and readily available to end users so it can be used as per their need, convenience, and pace. The information available through such a system should be simple, relevant, and precise and in the local language. The users should have enough choices and control over the mechanism of information delivery. Moreover, information should have certain features such as a combination of text, pictures, animation, videos, and audio backup in the local language so it will hold the learner's attention and interest. Is there any method by which individual information needs can be addressed? Can there be any mechanism by which a user can give feedback directly to researchers? Further, the field level trial is an essential step for the development of any technology. Therefore, such mechanisms and systems should also have enough scope for testing and refining. Finally, it should have not any distance barrier for its use. The

concept of the SIRC is mainly aimed to address all these issues by taking advantage of potential applications of ICT particularly for information dissemination.

Development & Implementation of SIRC

Computer-based educational aids have a great scope of incorporating all such features discussed in the previous section. The conceptualized model of SIRC has tried to incorporate all these features. A description of the steps in the development process follows.

The identification of the information needs of livestock owners was the first and foremost step considered important to make the SIRC need based. After identification, the information needs were prioritized to address the maximum number of users with the most needed information. Scientific information was collected from reliable sources and made relevant, simple, and precise. Further, it was translated into the local language in the form of text as well as audio to be understood easily even by illiterate users. Further, that information was used to develop SIRC by incorporating various multimedia features to hold the learner's attention and interest. To update the information in SIRC, an inbuilt feature was incorporated to record a brief socioeconomic profile as well as users' feedback. After development of SIRC, it was tested in the field for six months to assess its effectiveness and lacunae. After field testing, the SIRC was placed at veterinary clinics for its regular use. Thereafter, with a regular interval, users' feedback was collected from SIRC's inbuilt feedback record features and information was updated in SIRC for its sustainable use.

Among all the institutional arrangements for the animal husbandry sector, a veterinary clinic was selected for installation of SIRC. The present network of veterinary clinics or dispensaries proves to be a promising solution for various extension activities because of its physical presence and reach through veterinarians and para-vets at the village level. On average, each veterinary clinic has four to five staff; however, there is ample scope to realize the full potential of this dispensation with the help of ICT. There is much scope for the utilization of these institutions as SIRC to address the changing information needs of livestock farmers.

The SIRC can be installed in the veterinary clinics and dispensaries where farmers frequently visit for various livestock-related services. The basic idea behind the concept is to educate farmers with the new knowledge and skills of various aspects of animal husbandry and thereby improve their livelihood. Extension plays an important role in changing the knowledge and skills in management practices and attitudes toward newer livestock technology. Bringing change at the right time will result in improved livestock farming practices. When a farmer comes to a veterinary clinic to resolve some problem (treatment of an animal or other services), he is psychologically well prepared to learn a permanent solution to avoid repetition of the same problem in the future. The mindset of the farmer at this time should be utilized for important dissemination as it is the best moment for him to learn.

On the other hand, when the farmers are compelled to wait for their turn to get their animal treated by the veterinarian, they can utilize the SIRC to explore the information available with the help of a trained operator available at the veterinary clinic. As such, the waiting time is converted to value-added time and the farmer's needs may be addressed during this time. Once farmers become familiar with using the interactive touch screen, they help their fellow colleagues to learn. Moreover, nowadays, most of the mobiles available in the Indian market are of touch-screen type, so the users, including livestock farmers, are well-acquainted with operating touch-screen-type electronic gadgets. The same content will also be developed in the form of leaflets, pamphlets, posters, and other print publications and distributed to the SIRC users (livestock farmers), which will reinforce the learning activity. In this way, the problem of limitation of time with the veterinarian and para-vets for information delivery can be addressed to some extent.

Once the farmers start using SIRC, a detailed database of visiting farmers can be collected in the form of feedback at the center with respect to socioeconomic profile, herd size, information needs, contact information, and other data. Moreover, the veterinarians and para-vets can collect the contact numbers of different farmers during their field visits. These can be used for dissemination of information through short message service (SMS) voice messages by connecting to the prevailing public and private services of various companies that are providing mobile-based advisory services to the farmers in a cost-effective manner.

Thus, the basic concept of SIRC is to supplement and complement the potential of animal husbandry institutions veterinary clinics and their human resources with the help of modern ICT tools. Further, the SIRC will create a learning atmosphere for the farmers to find solutions for pressing problems relating to animal health and to adopt scientific management practices to enhance production and productivity.

With the frequent assessment of information needs through feedback, observation, and close contact of farmers, the SIRC can be updated with locally relevant information from time to time with the help of various educational and research institutions of the states. Thus, a successful implementation of the SIRC concept will go a long way toward emerging sustainable development in the animal husbandry sector.

The present model of SIRC was implemented by MANAGE at the District Veterinary Dispensary, Bhongir, one of the districts of Telangana state in India, 70 km from MANAGE headquarters. The District Veterinary Dispensary was selected purposefully to install SIRC, since along with the Veterinary Dispensary, there were other units associated with farmers such as the Farmers Training Centre and the Animal Disease Diagnosis Laboratory, which ensured the continuous flow of farmers. For the development and upgrade of the content (information) for SIRC, MANAGE had collaborated with P. V. Narasimha Rao Telangana State University for Veterinary, Animal and Fisheries Sciences, Hyderabad. The developmental work of the SIRC, which includes the software development, programming, and use of multimedia was outsourced by MANAGE.

Figure 16-2. Sustainable Information Resource Centre (SIRC) illustration. User interface-1.

Figure 16-3. User interface-2.

Figure 16-4. About the SIRC.

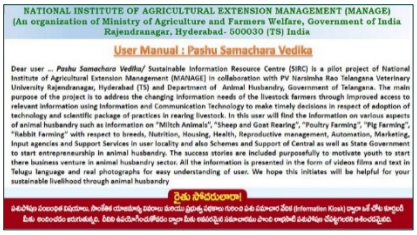


Figure 16-5. Steps to access the SIRC.

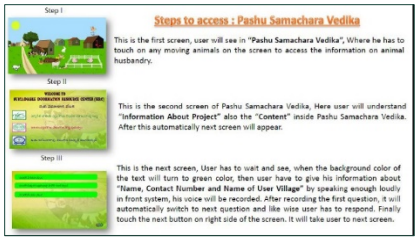


Figure 16-6. Steps to access the SIRC.

Figure 16-7. Steps to access the SIRC.

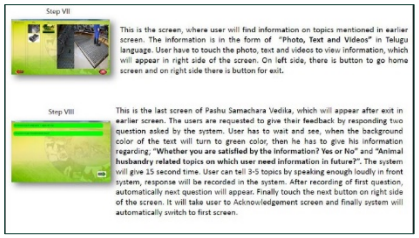


Figure 16-8. Index of the SIRC website.

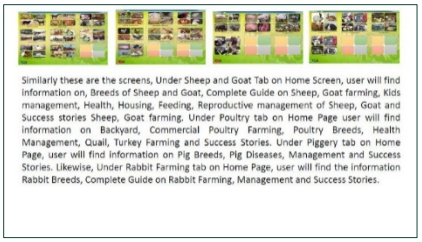


Figure 16-9. Acknowledgment page.

Outcome & Lessons Learned From SIRC

The SIRC was inaugurated on July 2017 at District Veterinary Polyclinic, Bhongir, Telangana. It was kept for pilot testing for a period of six months (October 2017 to March 2018), and after that, users' suggestions were considered, mainly related to its accessibility and operational issues. Finally,

SIRC was placed for its regular use for a period of 1.5 years up to September 2019. During this period, more than 1,000 farmers visited SIRC for information. The structured interview schedule was developed for collection of data. Among the total visitors, 60 farmers were selected randomly to assess the effectiveness and perceived utility of SIRC on the following variables. The variables are listed and then explained further.

- Effectiveness of the system in enhancing knowledge
- Opinion of respondents about SIRC
  - Relevance of content
  - Preciseness of content
  - Simplicity in understanding of information
  - Visual quality
  - Audio quality
  - Arousal of curiosity and interest
- Perceived utility
- Perceived problems in accessibility

Figure 16-10. Inauguration of Sustainable Resource Information Centre (SIRC) on 21 July 2017 at District Veterinary Dispensary, Bhongir, by Director General, MANAGE and District Collector, Bhongir.

Effectiveness of the System in Enhancing Knowledge

The assessment showed that 56.67% of respondents perceived the SIRC to be “very effective” in enhancing knowledge regarding animal health management, while 43.33% reported it is “effective.” Not a single respondent felt that it is “not effective” for knowledge enhancement.

Opinion of Respondents About SIRC

Many research and experiences have shown that for effective learning, the learner’s interest and attention is important, and selection and presentation of content play a vital role. The content should have relevancy with the subject, preciseness, and simplicity. Similarly, to hold interest and arousal of curiosity, the content should be presented with the help of multimedia features incorporating text, graphics, pictures, animations, and audio and videos in the local language. During the data collection, respondents were asked their opinion on these aspects of SIRC and the results follow.

Relevance of Content

The assessment showed that 61.67% of respondents were of the opinion that the content of the SIRC is "appropriate" to the topic presented, followed by 35% who said it was "relevant." However, only 3.33% of respondents felt it was "not relevant" to the topic, which may be due to their higher knowledge level and their need for more detailed information about certain aspects of the topic.

Keniston (2002) reported that the development of locally relevant content is essential; whatever the mode of communication, the need to present locally relevant information intelligibly both in terms of language and in terms of the level of explanation is imperative. Czech (2006) in his evaluation study pointed out that most of the information provided through Drishtee (an India-based business) portals was highly relevant to users; otherwise, operators would not be able to make a profit and people would not pay for the services.

Preciseness of Content

The preciseness of content is important for better understanding of users. Of the total evaluated sample size, 59.17% of respondents felt that the content of SIRC had been presented in a "precise" way, while 36.67% felt it is "very precise" that is, not enough to understand the topic and seek more information. Similarly, 4.17% of respondents were of the opinion that the content can be further precise ("not precise").

Simplicity in Understanding of Information

To understand the subject, the content should be present in simple and common language. The respondents were asked their opinion about the simplicity of the content of SIRC. The result shows that 61.67% of respondents felt that it was "very simple" to understand, and 33.33% of respondents felt it was "simple." But only 5% of them reported it was "difficult" and needs more simplification.

Raju and Rao (2006) have developed the Poultry Expert System (PES) and its perceived complexity was tested among 60 veterinarians and veterinary students through laptop computers. They reported PES was easy in its operation, navigation, and understanding of the content through simple language, compared to the traditional way of using a knowledge system.

Visual Quality

A visual appeal is necessary to hold attention and interest of the learner. Regarding the SIRC, 90% of respondents reported that it had "very good" ability to hold interest, and 10% considered it was "good." Not a single respondent reported that it was not enough to hold attention ("poor").

Raju and Rao (2006) reported that the user-centered design of PES has ensured the users to identify themselves with the system, which was developed for them only. User interactiveness of the PES satisfied the end users' basic instinct to interact, be it with the computer or human beings.

Audio Quality

The content of the SIRC is supported by the voice backup in the local language (Telugu), so that even nonreaders can understand. The

respondents were asked about the audibility of voice in terms of its clarity, pitch, and pronunciation. The results reveal that 60% of respondents reported the voice quality of SIRC is "very good," followed by 36.67% who informed as "good," but only 3.33% of respondents reported it needed improvement ("poor").

Arousal of Curiosity & Interest

The learners' psychology plays an important role in learning, arousing curiosity, and sustaining interest to facilitate learning. Of the respondent, 81.67% reported that SIRC was "effective," having the ability to arouse curiosity and interest, which is mainly due to use of real pictures, animations, and graphics in the system, while 18.33% felt it was "very effective." None of the respondents felt it was "not effective."

Rafea et al. (1995) reported that integration of multimedia tools such as graphics, images, animations, video clips, and sound backup are essential components for the development of expert systems on disease diagnosis.

Perceived Utility

SIRC was developed with the intention of providing information on various management aspects of livestock such as housing and feeding management, and animal diseases and reproductive management of all livestock species such as cattle, buffalo, sheep, goats, pigs, rabbits, and poultry. Apart from that, the development programs of state and central government were included in SIRC with respect to subsidy, eligibility of beneficiaries, and the block-wise contact number of related animal husbandry officers to avail the programs. To motivate the rural youth to take up entrepreneurship in the livestock sector, various success stories in this subject were included in the form of videos. After showing the system to the respondents, their opinions were asked about the overall utility of SIRC.

The result shows that 85% of respondents perceived SIRC as "very useful," and 15% reported it was "useful" to them for decision-making. No one felt it was useless ("not useful").

Raju and Rao (2006) reported that PES was perceived more useful in making poultry farming decisions, especially when experts are not available; resulting in saving of time, money, and effort.

Perceived Problems in Accessibility

Dissemination of knowledge through modern communication technologies demands availability of secondary inputs such as computers and electricity along with knowledge of handling of these electronic devices on the part of users. The respondents were asked their perception about these problems.

It was observed that 21.67% of respondents know how to operate a computer and 10% have a computer at their home. The computer is a new technology for the rural masses and to gain proficiency, formal training will be needed. However, 96.3% of respondents reported that they don't have any problem accessing the SIRC, which is mainly due to private milk processing units that provide computers at their milk collection centers in villages. Similarly, most of the villages' *Gram Panchayats* (village councils) and dairy cooperatives have computers in their offices, where farmers need to go frequently and can access the information with the help of trained

persons. Moreover, this situation helps overcome the problem of computer illiteracy as it is being operated by technical persons. This could be the reason that 96.3% of respondents reported they don't have any problem accessing SIRC.

A panchayat model of the *Gyandoot* ICT project in Madhya Pradesh Gram Panchayat provides the physical space, and pays for the hardware and other infrastructure and electricity costs. Czech (2006) and Singh (2006) emphasized there is a strong need to establish joint ventures with the private sector and NGOs to enrich ICT resources in terms of both hardware and software, and the relevant content creation.

Rural India faces electrical power interruptions and the situation needs to improve by ensuring an uninterrupted power supply to villages.

Cecchini and Raina (2002) reported that in rural India, illiteracy, a low level of infrastructure facilities, and lack of education are powerful obstacles to computer and other ICT tool use. Lack of local content and inadequate power supply caused problems in information kiosks. A report of a task force on information kiosks emphasized that assured power supply in the villages, "Right to Information," and enhancing the human capital of the stakeholders should be viewed as preconditions to ensure optimal usage of the information kiosks and knowledge centers in rural India (Swaminathan, 2004).

Conclusion

The study concluded that the conceptual model of SIRC was found effective in disseminating information. The demand-driven approach of developing information content in the form of a computer-based interactive Information System will be the most convenient, cheapest, and effective future mode of information dissemination. The multimedia tools of ICT possess high capabilities for presentation of information particularly on diseases in formats that are appropriate and meaningful to end users (farmers). However, the help of grassroots-level agencies such as Gram Panchayats and dairy cooperatives to ensure secondary inputs computers, power supply, and human resources will play a big role in the popularity of the cyber extension.

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