

REVIEW PAPER

Rural Telecentres as Innovation Brokers in Livestock Innovation System in India: A Review

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ABSTRACT

Livestock extension services in India are delivered by multifarious agencies among which public extension services is the major stakeholder, but has failed in its activities and functions due to lack of human resource, infrastructural, budgetary constraints etc. Today, extension services have been questioned for its linear understanding of knowledge and technology transfer or brokering from researchers to farmers. In this context, intermediary or broker agencies or organizations is very relevant to play a role in bridging, bonding, and linking social capital which differs from traditional extension and R&D. "Innovation intermediary or broker" is defined as an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties which include multitude of intermediary activities in innovation system. Although, several types of innovation brokers operate at different levels in different sectors, the authors have focused on the role of rural telecentres as brokers in Livestock Innovation System (LIS). The paper includes the role and importance of telecentres by highlighting their activities as effective innovation brokers to bridge the gap between multi-stakeholders. Further, few experiences of telecentres in livestock sector has been drawn to understand the effectiveness of different innovation brokerage mechanisms. An attempt has also been made to emphasize the strengths, weaknesses, opportunities and threats (SWOT) of telecentres as innovation brokers in India for effective LIS. The paper concludes that although, telecentres are effective to a great extent for implementation of LIS in India, there is a need to focus on stimulating and enabling the institutional innovations needed to allow these telecentres to emerge and grow organically in context-specific ways. Since these innovations brokering models cannot be directly copied from one context to the other as best-fit solutions, need based and context specific innovation brokers must be developed for agricultural and animal husbandry development in India and other developing countries.

Key words: Livestock extension services; Public extension services; Livestock Innovation System (LIS); Telecentres;

Over the years, extension services are delivered by multifarious agencies in the form various extension models like public extension model, NGO model, private-sector model, farmer field school model etc. but the reality is that a pluralism of models is used in most countries in Asia including India (Davis, 2006; Birner and Anderson, 2007). Although, public extension services are considered to be the major stakeholder in providing the services, it has failed in its activities and functions due to lack of human resource, infrastructural, budgetary constraints etc. (Sulaiman et al., 2005; Swanson, 2006, Chander et al., 2010; Chander and Rathod, 2013; Babu et al., 2013). The role of private and non-voluntary organizations in extension activities

is very negligible due to the profit motive nature of these organizations (Glendenning et al., 2010; Goyal, 2010) even leading to market monopoly (Dangi and Singh, 2010). Traditionally, extension services were considered the main intermediary actor in supporting agricultural and allied sector innovations focusing on knowledge and technology transfer or brokering from researchers to farmers. The effectiveness of this approach has been questioned for its linear understanding of innovation processes (Kilelu et al., 2011).

Few studies have highlighted the important role of networks and the need to build linkages among the diverse actors to enhance innovation and have pointed

out that weak interactions and fragmented links between different actors at different system levels continue to constrain innovation capacity affecting the agriculture development (Odame et al., 2009; Keskin et al., 2008). In this context, the role of extension services needs to be redefined from that of messengers to knowledge brokers, resource connectors, and facilitators (Anandajayasekeram, 2011) to find a solution for the critique that research results are not being translated into tangible benefits to improve the livelihoods of the poor (Clark, 2001; Hall et al., 2001). Further, Rivera and Sulaiman (2009) have indicated that public-sector extension agencies and extension workers are finding it difficult to translate their roles from the classical model of agricultural extension to the innovation system perspective. With this theoretical orientation, the authors have made an attempt to highlight the role of innovation brokers or intermediaries, its types, role and functions in innovation system. Further, the study has focused broadly on the role of rural telecentres as innovation brokers in Livestock Innovation System (LIS) along with its Strengths, Weaknesses, Opportunities and Threats (SWOT) in India.

Livestock Innovation system : On the lines of Agricultural Innovation System (Anandajayasekeram, 2011), LIS could be a collaborative arrangement bringing together several organizations or multi-stakeholders working towards technological, managerial, organizational and institutional change in livestock sector. Such a system may include the traditional sources of innovations (Indigenous Technical Knowledge); the modern actors (National Agricultural Research System and international agricultural research institutes); private sectors (including local, national, and multinationals), agro-industrial firms and entrepreneurs; civil society organizations (NGOs, farmers and dairy cooperatives, livestock interest groups, consumer organizations and pressure groups); and those institutions (laws, regulations, beliefs, customs, and norms) that affect the process by which livestock innovations are developed and delivered. Further, based on the AIS definition of Spielman (2005), LIS can be defined as the set of interrelated agents, their interactions, and the institutions that condition their behaviour with respect to the common objective of generating, diffusing, and utilizing knowledge and/or technology of livestock. The success of LIS can be attributed to various factors

among which role of innovation intermediary or brokers are also very important in the existing situation.

Meaning and Need for Innovation brokers: Howells (2006) defined “innovation intermediary” as an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties. Such intermediary activities include providing information about potential collaborators, brokering a transaction between two or more parties, acting as a mediator for bodies or organizations that are already collaborating and helping them find advice, funding and support for the innovation outcomes of such collaborations”. Further, Winch and Courtney (2007) defined an innovation broker as “an organization acting as a member of a network of actors that is focused neither on the organization nor the implementation of innovations, but on enabling other organizations to innovate”.

The concept of “innovation broker” is derived from the notion of an “honest broker,” who brings people together mainly for altruistic purposes (Obstfeld, 2005). The role of the honest broker resembles a broadened notion of the role of a process facilitator (Klerkx and Leeuwis, 2009). In other words, innovation brokers are facilitators of interaction and cooperation in innovation systems, and their activities extend throughout innovation processes (Klerkx and Gildemacher, 2012). As a whole, innovation brokers are in charge of linking public, private and civil organisations, input suppliers, producers, transporters, traders, and international agri-food firms (Klerkx and Leeuwis, 2009; Klerkx et al., 2009). This ultimately expands the role of extension from that of a one-to-one intermediary between research and farmers to that of an intermediary that creates and facilitates many-to-many relationships (Howells, 2006; Klerkx and Gildemacher, 2012). However, in this paper, the authors operationally define an innovation broker as an organization formally engaged in coordinating and facilitating innovation processes between two or more parties and possibly providing a variety of other functions relating to different aspects of innovation and its dissemination.

The importance of having intermediary or broker organizations in developing countries is becoming increasingly apparent (Fisher and Vogel, 2008; Szogs, 2008) since they play a role in bridging, bonding, and linking social capital (Hall, 2006). As an organization

and function, innovation brokering differs from traditional extension and R&D because it represents the institutionalization of the facilitation role, with a broad systemic, multi actor, innovation systems perspective (Klerkx and Gildemacher, 2012). Although mentioned as a solution to innovation system fragmentation and underperformance, and researched in preliminary studies (Spielman and Von Grebmer, 2006; Hartwich et al., 2007; Van Mele, 2008; Kristjanson et al., 2009), the topic has been less explored in the agricultural and livestock sector. This reflects the fact that, in the agricultural sector, innovation brokers have only recently emerged as distinct from the traditional agricultural intermediary organization, namely, the public extension services (Klerkx et al., 2009). So far, the agricultural sector has relied mainly on public sector intermediaries such as agricultural extension services, often with questionable effectiveness with a limited mandate (Sulaiman et al., 2005). Hartwich et al. (2007) states that third-party catalyzing agents like brokers are necessary to bring partners together, motivate them, provide information, and organize space for negotiations to build appropriate linkages in innovation systems and facilitate multi-stakeholder interaction in innovation.

Functions and Types of Innovation brokers: A comprehensive review of innovation brokers or intermediaries in supporting and managing innovation processes (Howells, 2006; Kristjanson et al., 2009), depicts six broad functions viz., Demand articulation/stimulation, Network building, Knowledge brokering, Innovation process monitoring, Capacity building and institutional support.

Different types of innovation brokers have been observed, working at different levels of the innovation system and varying in their level of ambition and thematic scope. Leeuwis and van den Ban (2004) refer to communicative functions that are cognizant of multiple actors and relations that need to be negotiated in innovation processes. These diverse functions and accompanying tasks point to the complex and multilayered nature of innovation processes. Further, there can be hybrids of different types of innovation brokers within a single organization, as well as involvement of different types of innovation brokers within a project. Klerkx and Leeuwis (2009) have pointed out that, among various innovation brokers, telecentres are internet-based portals, platforms, and

databases that disclose relevant knowledge and information to the audience. Rural telecentres use ICT and social media to build awareness about innovations and can be considered as hybrids of an innovation consultant, a peer network broker, and an ICT-based platform that helps to articulate demands and build networks.

Rural Telecentres: Telecentre is a generic term which has acquired variety of names depending on the type of use like 'knowledge centres', 'information centres', 'Village Rural Centres', 'Common Service Centres', 'Information kiosks', 'cyber dhabas' etc. The volunteers working or disseminating information are referred as Knowledge Worker, Village Level Entrepreneurs etc. A typical telecentre consists of ICT devices (computer, printer, web-camera, speakers, telephone and Internet connectivity), print media (newspaper, booklet), backup facility, training and discussion rooms and digital media (CDs) on agriculture and allied aspects. These centres are often established in the building of schools, Panchayat, village youth club, Anganwadi centre etc. to have capacity building programmes also for the villagers.

The telecentres perform variety of activities through which they can act as effective innovation brokers to bridge the gap between multi-stakeholders. They serve as a multipurpose community centre to serve as communication hub- providing multiple telephone and communication services to the villagers, virtual academy and training centre, support centre for rural entrepreneurship, banking, financial & insurance services outlet, social empowerment outfit, support centre for providing health, education and livelihood and access to entitlements etc. Very recently the government initiatives in the form of CSCs offer additional services like agricultural services, RTI Services, postal products, land records, issuance of birth and death certificates, electoral services, transport service information, grievances, e-District services, etc. The above functions in agricultural sector have fulfilled the role of telecentres as innovation brokers but, from a policy perspective it is important to understand the effectiveness of these telecentres in innovation brokering process.

Can Rural Telecentres act as Innovation brokers?: Any advisory service or related individual or organization can act as broker, connecting farmers to different service providers and other actors in the agricultural

food chain. Examples include various stakeholders like research organizations, NGOs, consultancy firms, government programmes and farmers' organizations (Klerkx et al., 2009). These brokers can also be independent, specialized organizations with a skill set especially tailored to innovation brokering (Klerkx and Gildemacher, 2012). Although public organizations such as extension services and research organizations could perform innovation brokering as part of their mandates, many retain a linear, transfer-of-technology mindset and lack the capacity to fulfill this role (Rivera and Sulaiman, 2009; Devaux et al., 2009). Several types of innovation brokers operate at different levels in different areas like agriculture, dairy etc. to build awareness about innovations and promote their role in India. In this section, the criteria proposed by Klerkx et al., (2009) to determine whether an organization can play a role in brokering is applied for rural telecentres.

- The organizations to act as innovation brokers must have a trusted position and reputation that instills a degree of independence and credibility to be relatively neutral "honest broker" in an innovation system. Few of the times, during certain critical situations these brokers have to bypass the vested interests of few people for the betterment of the community.
- Sufficient technical knowledge of organizations can be considered as another criteria to act as innovation brokers. As most of the telecentres have sufficient information for the farmers, they can play a role of brokering to the greater extent.
- Innovation brokering is considered to be effective with a durable source of funding in the form of adhoc project basis or government support. Further, Klerkx and Leeuwis (2008) have depicted that innovation brokering services are often discontinued, despite high client satisfaction in times of fiscal austerity. Hence, these brokers have to justify financial sustainability with detailed documentation of the activities for assessing their impact.
- Beyond the level of the single project, innovation brokers fulfill a catalyst role (to bring about change and stimulate cooperation), a liaison role (e.g., to inform policy) within the agricultural innovation system, and also an innovation capacity building role (Klerkx et al., 2009).
- Innovation brokers can integrate small farmers in

vertical and horizontal activities of the chain, adding value not just in terms of quality of products and earnings, but also in adding value to social processes (value chain-network innovation) (Perdomo et al., 2010).

Experiences of Rural Telecentres in India : Some experiences of innovation brokers already exists in the agriculture and livestock sector, from which lessons can be drawn. From a policy perspective, it is important to understand the effectiveness of different innovation brokerage mechanisms (Hall, 2006). In the sphere of network building, there are numerous examples where innovation brokers have helped farmers, and others that want to initiate innovation projects (innovation champions), to get in touch and negotiate with project partners and other relevant stakeholders from the policy, market, and civil society domain, as well as with suitable knowledge providers who could assist them in orienting towards new activities, including more than just the traditional research and extension providers (Klerkx et al., 2009). It is equally important to understand the process that governs the emergence and evolution of these mechanisms in specific contextual settings (Hall, 2005), because the efforts to transplant organizational blueprints from one context to another are unlikely to be effective. The authors have depicted few case studies of telecentres which can be further explored for effective information dissemination.

Among several initiatives, Honeybee Network and Villager Network, which scout for innovations for their databases and connect innovators to support agencies such as India's National Innovation Foundation? The networks also help participants to patent innovations and find investors to develop products. Sustainable inventions from the Honey Bee database comprise 34 categories, including agricultural tools and techniques, water conservation, health, education innovation, food and nutrition, traditional medicine, and industrial and household goods. Still other efforts use ICT-based brokering instruments (infomediaries) to share operational (market and production) information (rather than strategic information) for innovation (Gupta et al., 2003; Murthy, 2010).

In another case, MSSRF's Info Village emphasizes informational services which is mostly derived from the internet and broadcast in innovative ways, such as the public address system at fishing villages or the siren

that awakes fishermen when it is time for them to begin the fishing day. Local language newspapers and signboards outside the centers are also an effective way to spread knowledge. People in the Info Village communities have reported a high level of satisfaction (*Dossani et al., 2005*). The project staff has implemented many locally useful databases and much of the information is accessed from local sources, on the web or otherwise. All of them are transformed into locally useful material, in various formats (voice/digital audio, in some cases) and in the local language, Tamil. The centres receive an average of 12 visitors per day while about 18% of the users are women (*Harris, 2001*). There have been many instances where local residents have derived benefits from the use of data and information derived from this network (*Harris, 2001*).

n-Logue is India's largest operator of for-profit rural kiosks, under the "Chiraag" brand, focusing on fee-based transactional services. Examples include communication, digital photography, online banking, and provision of loans and insurance and entertainment services. Chiraag kiosks provide a substantial number of informational services using content that is localized and stored on site. Basic informational offerings include agriculture, education, health, government programs, and local news.

The Centre for Electronics Governance at the Indian Institute of Management, Ahmedabad (CEG-IIMA) has invested significant resources in conceptualizing, developing and implementing Dairy Information Services Kiosk (DISK) and Dairy Portal (DP). The Amul Dairy has offered support to pilot test these proof-of-concept products and the results are very encouraging. The application aims at helping the dairy farmers with timely messages and educating them on the care for their milch cattle and enhances the production of quality milk. It also aims at assisting the dairy unions in effectively scheduling and organizing the veterinary, artificial insemination, cattle feed and other related services. The application uses personal computers at the milk collection centres of the Dairy Cooperative Societies (DCS) having connectivity to an Internet Service Provider (ISP). The application includes two components - a Dairy Portal (DP) and a Dairy Information Services Kiosk (DISK) (*Rama Rao, 2001*).

Often on a more operational level (market/

production information) than for strategic (innovation) purposes, a range of ICT-based brokerage instruments have been applied to act as "infomediaries" (*Rao, 2007*), such as information kiosks through which farmers access cattle health information (*Ramkumar et al., 2007*). The information kiosk developed by Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry is an ICT device, designed to provide access to cattle keepers to improve their knowledge. This device is an ordinary computer made interactive through the touch screen facilities which include demand driven information presented in easily understandable local language added with graphics like animations. It has about 185 screens and each screen has the facility of recorded voice which explains the content in the screen to even illiterate users (*Rao et al., 2011*). The farmers have mentioned that there was an improvement in the health of the cattle (eg. less cases of mastitis, repeat breeding and tick infestations) after utilizing the information accessed from the kiosk and other extension media (*Ramkumar et al., 2004*).

Strengths of Rural Telecentres : Although brokering would appear to be a pervasive activity, there are both strengths and weaknesses apparent in each category observed. The roles of innovation brokers go beyond implementation of pre-designed technologies and predetermined outcomes. The ICT mediated approaches are not passive brokers (like displaying available information), but fulfil an active role in connecting people (*Perdomo et al., 2010*). The strengths in the form of benefits of telecentres as innovation brokers is depicted below:

- Increase of knowledge on various farming activities like agriculture, dairying etc. (*Shamna et al., 2013 a*). And learning through these centres is equivalent to face to face interaction (*Shamna et al., 2013 a*). Further, *Sharma et al. (2012)* have also pointed out that majority of the farmers had favourable attitude towards *Kisan Mandals* and *Kisan Seva Kendras*.
- Important programmes could be repeated on request since the telecentres are located in the same village and is almost community friendly.
- Substantial saving in expenditure due to saving in travel /logistics
- Make more social interactions and improvement in social status

- Time saved in traveling to research stations/ universities for information.
- Credible & trustworthy information and other services available in time (*Shamna et al., 2013 b; Senthilkumar, 2006*). A study conducted by *Kaur and Rathore (2012)* indicated that an e-booklet entitled “Dairy evam Pashudhan Vikas” had quality parameters which were perceived quite high by a large majority of judges and was found to be valid in terms of its content and format, which were found reliable and applicable in the field.
- *Chauhan (2010)* indicated that access to learning resources in local adaptable places was most preferred by the farmers through a study of Community Internet Center (CIC) in India. The author also depicted that farmers’ preferred such centres to be placed in Panchayat office of the villages.
- Timely weather forecast information to take right decisions (*Shamna et al., 2013b*)
- The telecentres have helped to know the best markets and prices for different commodities. Further, effective natural resource and water management practices can be explored through these centres.
- In a recent initiative, Special Purpose Vehicle (SPV) has been introduced by GOI to oversee the functioning of these centres (*Shadrach and Sharma, 2013*).
- Various internet connectivity technologies like cable, broad band, WiFi, direct satellite communication etc. exists in India. However, the connectivity varies in different parts of rural India indicating connectivity as another major obstacle which needs to be emphasized (*Senthilkumar, 2006*).
- The other basic facilities like power supply, lack of staff, poor funding is also observed in effective functioning of telecentres.
- Village level volunteers or knowledge workers lack effective capacity building to updation of knowledge and hence fail to work efficiently (*Shadrach and Sharma, 2013*).
- There is no formal or informal network of volunteers or knowledge workers at national or state level to share their experiences and learn from each other.

Opportunities for Rural Telecentres: The vision of telecentres are fulfilled to some extent for sustainability in terms of financial, social, organizational and policy related matters but, India still needs to develop strategies for effective functioning of rural telecentres as innovation brokers.

Weaknesses of Rural Telecentres : The telecentres functioning in India as innovation brokers, also face various weaknesses in their effective functioning. Few of the major weaknesses include:

- In a few situations the farmers suffer from socio-personal and socio-cultural problems leading to poor accessibility of information through the telecentres (*Senthilkumar, 2006; Senthilkumar et. al., 2013*).
- Although the telecentres provide an access for information, few of such information is unsuitable or incomprehensible to Indian villagers which indicates that information must be more relevant for farming community.
- The information available on intranet may require certain editing and simplification for local conditions and be presented in local language.
- Among the forty odd telecentre nations around the world, India is tipped as the world’s largest telecentre scale-up, implemented under a Public Private Partnership (PPP) model in India (*Shadrach and Sharma, 2013*). In this context, the services in the centres may be charged to generate funds for the operation and viability as *Senthilkumar (2006)* has reported that farmers are ready to pay for good and updated services. This can solve the problem of financial constraints to certain extent.
- The rural telecentres are operated by multifarious agencies like government, non-governmental and private agencies to promote various agriculture and animal husbandry related information (*Senthilkumar, 2006*). Since telecentres are directly linked with their operating agencies, the innovation brokering functions can be carried out effectively at an affordable cost in a sustainable manner.
- Delivery of more value added services in the form of package of practices can support the community to attain development and sustainability. The

advanced services like Geographic Information System (GIS) can be introduced in a cost effective manner for multiple uses as an information tool.

- Streamlining the efforts of existing government departments through convergence of resources and expertise to achieve programme goals (*UNICEF, 2011*).
- Telecentres must involve human resources from the native place to have effective interactions and knowledge sharing. Further, involvement of women and youth as knowledge workers may provide effective response for carrying out various activities (*Shadrach and Sharma, 2013*).
- Local level R&D activities to stimulate local innovations may be encouraged to upscale them and communicate the need based issues to research organizations for a detailed study on the same. This may include outcome mapping exercise to establish credibility and long-term sustainability of innovations.
- A continuous professional development for stakeholder's viz., policy-makers, network managers, knowledge workers and rural communities at various levels on priority basis can support for effective functioning of telecentres.
- The success of telecentres involve the investments for five 'C' approach viz. Connectivity and low-cost access devices; need and demand-based content and services; capacity building for different stakeholders; coordination of services at the local level; and, care and management and design of business model as per local conditions (*Shadrach and Sharma, 2013*).
- Setting up of centres in most remote places like coastal and tribal, natural disasters prone area for giving early warning and building preparedness may be planned in the remotest corners of the country.
- The National Commission on Farmers of India government (*GoI, 2007*) has stressed on the introduction of "Village Knowledge Centre Movement" to empower rural men and women by promoting and enhancing literacy and awareness at grassroots level especially on new and appropriate farming systems and season specific technologies, prices and marketing of inputs and agricultural produce and products and on disaster management and mitigation. Hence, the scope for effective

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functioning of telecentres can be considered very bright.

- As ICT is a growing sector in India, different ICT technologies, such as e-agriculture, whereby agricultural information can be presented in multimedia formats to improve knowledge sharing in local cultural context can be promoted for innovation brokering in India.

Threats for Rural Telecentres: With the help of previous literature, the authors have made an attempt to highlight the threats in functioning of telecentres in India.

- Although more than 90,000 centres are operational with heavy investments, the services offered at the centre limit its access by only a small number of population (*Shadrach and Sharma, 2013*). Further, this may force the village volunteers or knowledge workers to explore other means to achieve their daily living and financial sustainability.
- In India, neither the political nor the bureaucratic leadership is courageous enough to assume the responsibility for envisioning a much transparent future like in the case of other countries viz. Chile, Colombo, Sri Lanka, Brazil etc. where these citizen-centred initiatives have been led by the Presidents and the Prime Ministers themselves (*Shadrach and Sharma, 2013*).
- There is lack of ownership in such initiative for example- CSC's are under the control of central and state government both for various different aspects like funding, design etc. (*Shadrach and Sharma, 2013*). Hence, the power must rest with any single agency for effective functioning. Further, the implementation machinery must have enough financial and human resources.
- To widen awareness of brokers' potential role in innovation and show that an investment in their role is justified, more structured documentation of successes and failures is required, followed by the publication and promotion of the outcomes.
- A system overview is required to permit stakeholders to understand and "translate" between each stakeholder through the telecentres which is very essential for effective functioning.
- Traditional research and extension organizations must "retool" if they are to develop their innovation brokering capacity and abandon a mere transfer-

of-technology paradigm (Devaux *et al.*, 2009). If not, the innovation system approach cannot be achieved in the long run for agricultural and allied sector development.

CONCLUSION

The paper concludes with a wider discussion on rural telecentres as innovation brokers in effective implementation of LIS for developing countries like India. There is a need to focus on stimulating and enabling the institutional innovations needed to allow these telecentres to emerge and grow organically in

context-specific ways. Although, innovation brokering models cannot be directly copied from one context to the other as best-fit solutions, need based and context specific innovation brokers have to be developed. The telecentres can act as effective tool depending on asset positions, production environments, gender issues etc. indicating that detailed understanding of telecentres as innovation brokers is essential for agricultural and animal husbandry development in India and other developing countries.

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