e-Extension Services of SAUs in Indian Agriculture: Challenges and Management Strategies

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Agricultural extension in India: Role of State Agricultural Universities

A discussion paper of the International Food Policy Research Institute (IFPRI) opened with a question: are farmers' information needs being met? (Glendenning *et al*. 2010). In fact, our agricultural extension system has several parallel channels of information to farmers. State Agricultural Universities (SAUs) are one of them. These are important because they are backbone of the agricultural technology development. They are also expected to perform an effective role in extension of these technologies. The question is how do they do it?

The SAUs ideally develop technologies and generate content. They provide extension education service through training of trainers. The scientific and technical staff of SAUs is mandated with extension. But it is just one of the mandates along with research and education which consume more of their time. The SAUs do provide limited extension through Agricultural Technology Information Centres which attract visitors. They also provide wider extension through Krishi Vigyan Kendras (KVKs) which depend on SAUs for technology and depend on ICAR for actual delivery through various channels (Adhiguru *et al.* 2009) (Figure 1).

All agricultural education and research, ultimately aims at increased productivity and economic well-being of farmers. This is possible only when there is a minimum gap between lab and land. This gap is bridged by agricultural extension. But human capacity, content of the information, processes of delivery and technology determine effectiveness of extension services (Glendenning *et al*. 2010). Some of the parameters of these factors are keeping the effectiveness of agricultural extension perhaps at a low (Figure 2).

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Why e-Extension (eE)

Non availability of sufficient extension personnel is a major constraint. The SAUs do not have adequate extension personnel to reach out to the wider farming community. And as detailed earlier, they are burdened

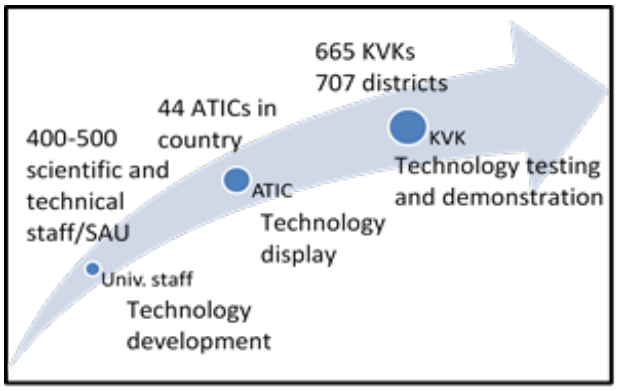

Figure 1. Agricultural Extension in India: Role of SAUs (The dimension of the circle indicates relative contribution to agricultural extension)

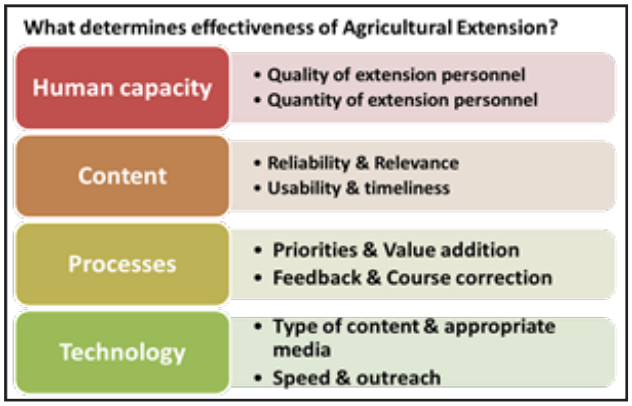

Figure 2. Agricultural Extension in India : Effective extension. Lack of personnel and outdated technology are major contraints.

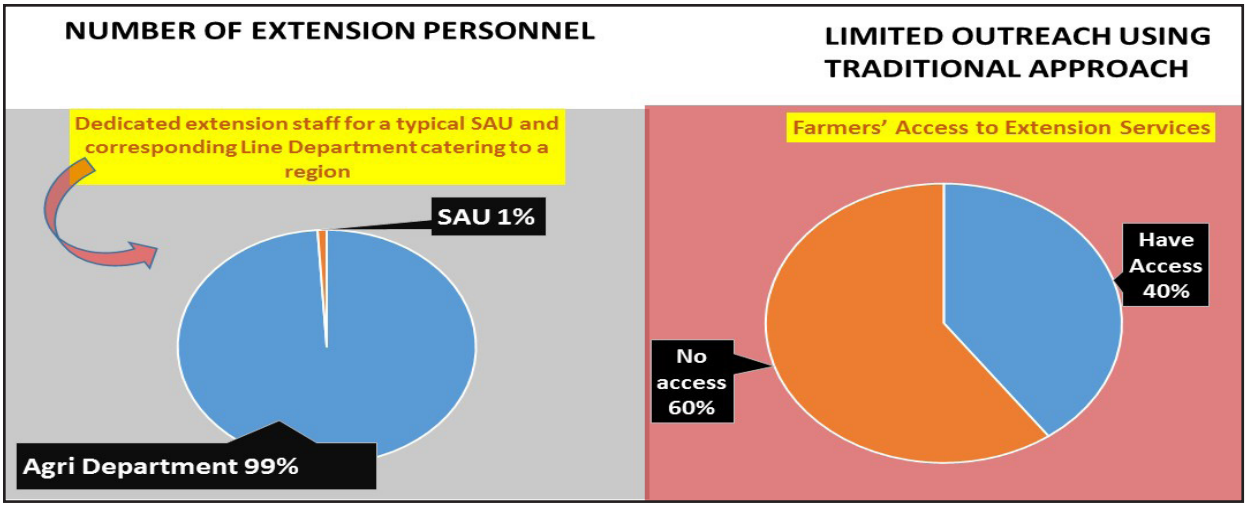

Fig. 3: Forces pushing for e- Extension in India. Lack of dedicated extension staff with SAUs and farmers' lack of access to extension services rendered through traditional means have made it imperative to go for e-Extension. The staff data is sourced for Konkan region from DBSKKV, Dapoli and Department of Agriculture, Government of Maharashtra. Data for access to extension services from Anon. 2016.

with other duties. On the other hand, the state agriculture department (a line department) catering to the same area as the jurisdiction of a SAU may have relatively large number of extension personnel. For example, in Konkan region of Maharashtra, the extension workers in the agriculture department are nearly 100 times more than the university extension workers. Moreover, the state department has wider presence than any SAU. Indeed, even the agriculture departments are under severe staff crunch in most Indian states (Sajesh and Suresh 2016). Another constraint is the limited reach of traditional extension approaches. Only about 40% of our farmers gain access to any kind of extension services either public or private. To overcome these shortcomings, e-Extension (eE) is the alternative as shown in Figure 3 (Anon. 2016, Ghimire *et al*. 2014, Anon. 2009).

How to go for e-Extension (eE)

Overall reach of extension media has been reported to be 35-40 per cent farm household (Anon. 2016). Major farmers who adopted technology mediated by extension services reported the methodology and other details of innovations useful. The important extension media were progressive farmers, mass media, SAUs and KVKs. However, the pattern of access differed. The mass media was accessed routinely to provide general information. On the contrary, the SAUs and KVKs provide design, crop and even farm- specific advisory. With the use of internet and e-services, progressive farmers, SAUs, KVKs and extension workers can be empowered to reach the maximum number of farmers.

The eE is envisaged to operate mainly through web portals, social media and mobile apps and therefore has several benefits over the traditional extension approaches. The methodologies are portable, cost effective and can reach to the larger section of people in real time. Most of these technologies are interactive with stakeholders connecting online or offline and permit quick feedback (Saravanan and Bhattacharjee 2015; Saravanan et al. 2015). The major benefit of e-Extension is that it has the capacity to integrate various farms and extension media such as texts, pictures, videos and animations. The eE provides opportunities for improving weak and vulnerable sections of society including women and unemployed youth. There is a scope to foster public-private and farmers-experts partnerships through eE. Resources including finance and insurance can also be mobilized greatly through this technique. The eE stands on four inter-connected bonds *viz* e-learning, e-extension, e-farming and e-trading (Figure 4).

FAO suggested 15 points strategy to modernize extension systems at lower levels (Table 1). Other than many, the point which flags performing extension services with less number of staff appears as the common scenario in most of the SAUs. Outsourcing is an important option. It also insists to make use of information technology tools and media, but with educated human back-stopping

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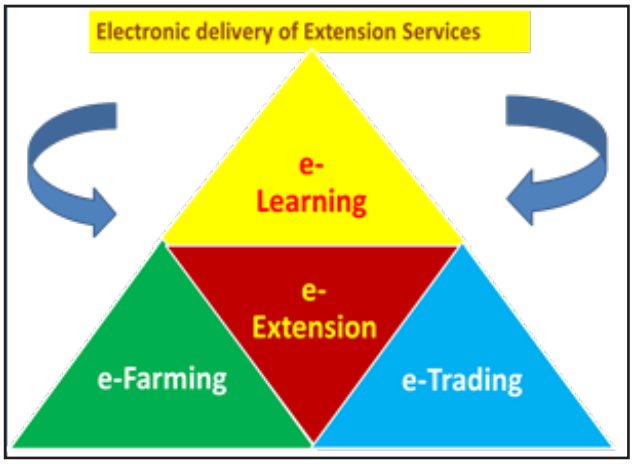

Figure 4. The inter-connected bonds of e-Extension (Source: Saravanan and Bhattacharjee 2015; Saravanan *et al*. 2015).

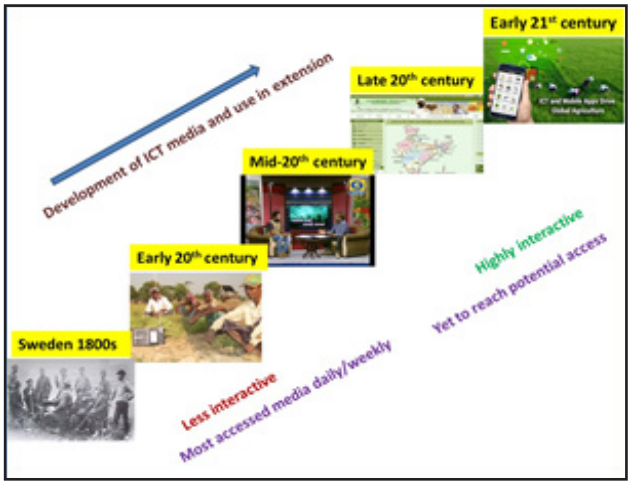

Figure 5. Evolution of e-Extension (Source: Anon. 2016)

Figure 6. Selected initiatives of agricultural e-Extension in India (Source: Various web portals)

which is all about e-extension. Treating extension finance and extension delivery would be two separate functions (FAO 2005).

The history of information and communication technology (ICT) for extension in agriculture dates back to the use of radio and much before that by just personal communication (Figure 5), as an example in Sweden during 1800s. These channels help mostly in one-way dissemination of topical and general information. Farmers need farm and season-specific information. Attempts to make radio and television more interactive have proved successful. As per the national sample survey office (NSSO) report (Anon. 2016), these media are routinely accessed by the farmers. But it is the IT revolution, which has really brought mobile and internet in the hands of the farmers (Rajkumar *et al.* 2016). The potential of IT found to be harnessed by government and different organizations for the best results (Kaegi 2015). Several initiatives have been taken up by the government departments for advancing e-E. The M-Kisan portal provides SMS based advisory as a value added services. Service apps including Kisan Suvidha, and Gujarat Sarkar Khedut Mitra. The Shetkari Masik of the Government of Maharashtra. Many of these can now be installed on smart phones and the relevant advisory information can be obtained by the farmers (Figure 6). Even the Tata Chemicals supported Kasturi initiative which relies on in-person exposure of women agripreneurs travelling countrywide to various SAUs on a special train also relies on continuous digital learning all along (www.mykasturi.org).

The Indian Council of Agricultural Research (ICAR) has initiated several schemes for enhancing extension of agricultural technology. To increase electronic communication, the ICAR has facilitated development of network of Krishi Vigyan Kendras (KVKs) as stakeholders. To involve the farmers more proactively in dissemination of experiments and success stories, ICAR has also initiated farmers' blogs. It has launched mobile apps like Rice Expert which has a support system for the farmers through electronic interface (Figure 7). It is in this connection, the collaboration between Indian Farmers' Fertilizer Cooperative (IFFCO), Bharati Airtel and Star Global Resources Ltd. needs to be mentioned. It provides value-added services through the network of Airtel. They involved village co-operative societies as mediators. Information-driven apps are available on web portal and on smart phones. Real time, predictive, weather and market information are also available. Many Non-Government Organizations (NGOs) have

Table 1. Methods of e-Extension (Adapted from FAO 2005)

Sl No	Particulars	Details
1.	Existing extension organization	• Assessment • Farmers' needs • Strengthening and/or restructuring
2.	Decentralize extension	• Capacity-building of the staff and • Orientation of officials
3.	Technical mandate of extension	• Broadening • Development of rural human resources
4.	National policy	• Formulation • political and financial commitment
5.	Status of extension profession	• long overdue • Consider other agricultural disciplines
6.	Pre-service education in agricultural extension	• Modernization • Development of national extension system
7	Pluralism	• Involve public, private, and civil society institutions
8	Privatization	• extension Partial privatization • Complete privatization • Social and economic feasiblilty analysis
9	Information technology (IT)	• Development and application of IT tools • IT Training extension workers
10	Site-specific extension methodologies	• Development of original, location-specific, participatory, gender-sensitive and inexpensive methodologies • Apply modern techniques
11	Orientation	• Major food security • Global developments • Rural livelihoods
12	Empowering farmers	• Organizing legal associations • Forming strong farmers' lobby
13	Bottom-up approach	• Encouraging grassroots extension • Involvement of farmers for conservation of natural resources and environment protection • Demand-driven extension
14	Poor manpower	• Outsourcing • IT and media • Merging overlapping staff positions • Delivery responsibilities • Contractual short-term staff • Progressive farmers as facilitators • Move bulk of extension staff from central level to sub-district level and village level • Treating extension financing and extension delivery as two separate functions • Avoiding individual farmer contact: Group extension approach
15	Operational linkages	• Effective organic relation between extension, research and other relevant institutions

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initiated agricultural education programmes. One of the examples is Digital Green. It is a platform which acts as repository of locally produced videos. The NGOs use these information to disseminate knowledge to the farmers using extension channels, their integrated approach has been reported to be effective (Gandhi *et al*. 2009) (Figure 8). Some SAUs have taken up e-Extension in a mission mode. Tamil Nadu Agricultural University is an example. Their content is streamlined and made available on a web portal. Group specific expert concept is also made available through mobile apps (Figure 9).

e-Extension in Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth

In Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra several initiatives have been taken to popularize e-Extension. The scientists and professors have developed and supervised development of a small village called Rajwadi through profitable vegetable cultivation. There was a great role of e-Extension approach at every stage of their success story from the farmers' group through to the university professors; electronic media were used as the medium of interaction which was inter-woven with traditional extension methodology. The group then took the benefit of social media further to build the clients groups for harvesting, packaging, transport and delivery through social media. The group is now growing with 250 members and earnings have grown multifold (Figure 10).

e-Extension: Road to precision farming

The e-Extension has the potential to transform traditional farming into precision farming. Most developed countries rely on precision farming for increased productivity and profitability. Precision farming has

Figure 7. Indian and ICAR initiatives of e-Extension (Source: ICAR website and several brochures).

Figure 9. SAU Initiatives: Tamil Nadu Agricultural University as an example (www.tnau.ac.in/dee/eextension).

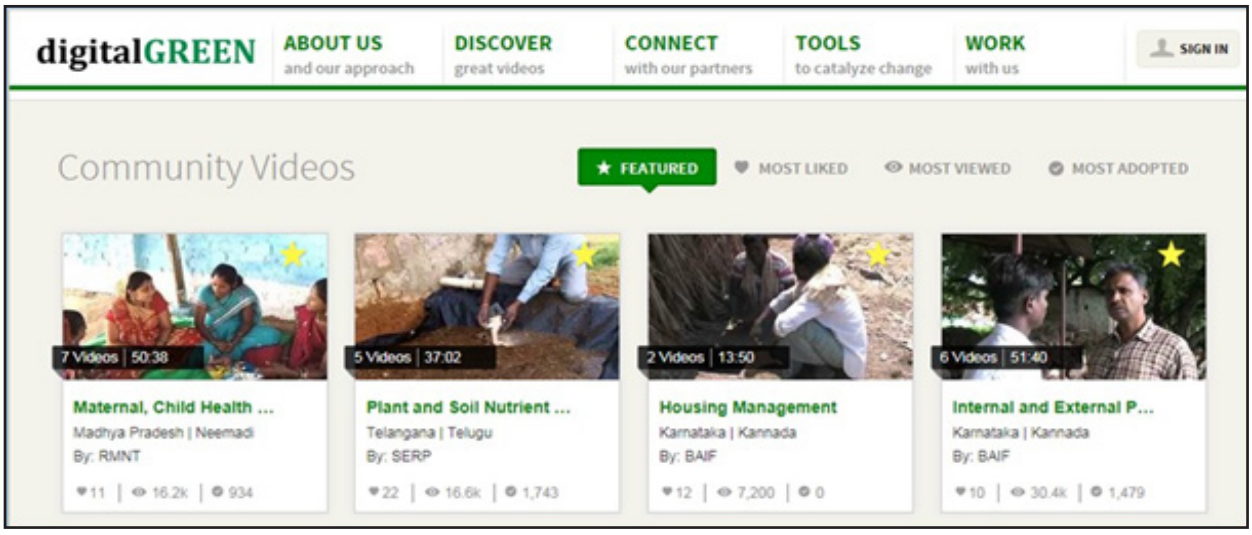

Figure 8. Digital Green: an NGO Initiative (www.digitalgreen.org).

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economic, social and environmental benefits as is the case in Israel. Precision farming requires adoption of advanced technology. In most of the cases, technology is available, but its rate of adoption is slow. To enhance the adoption rate of technology, e-Extension can play a crucial role. In Israel, e.g. the number of extension personnel is just in 100s. But they have ensured very high rate of technology adoption. The e-Devices and softwares ensure data logs from sensors and through feed-back. Management and analysis of these logs lead to improved technology which further enhance access to technology, inputs and advisory to improve the rate of adoption (Figure 11).

e-Extension: Opportunity for State Agricultural Universities

The SAUs are poised to take advantage of advanced technology for e-Extension. The limited and over-burdened manpower can be shifted to social media platform for productive interaction with farmers' groups. The newly-evolved Students-READY (Rural Entrepreneurship Awareness Development Yojana) Programme under the Vth Deans' Committee syllabus offers an unique opportunity to involve students as extension intermediaries (Bhattacharyya *et al*. 2018). Information and communication technology is also an integral part of agricultural education. A wide range of mobile apps are available for recording data, monitoring crops and environment (Antle *et al*. 2017). Similarly smartphone capabilities enable video making and better photography using Geo-tagging information. Social media is already being used to informally supplement the formal class-room, laboratory or field learning. SAUs can develop local diagnostic and responsive apps and reach an unprecedented number of farmers through their students.

Therefore, SAUs should decide that they need not lag behind in providing extension services due to lack of manpower. Moderated social media can be successfully used for protective farming and at every stage of the value chain. The e-Extension further reduces time lag between need and application of farming technology. It also helps in cost reduction and waste reduction. It empowers farmers by opting as a part of decision support system. The e-Extension can be harnessed to improve traceability of farm products which is a crucial parameter in the era of food certification. All these benefits together can contribute immensely to doubling farmers' income (DFI).

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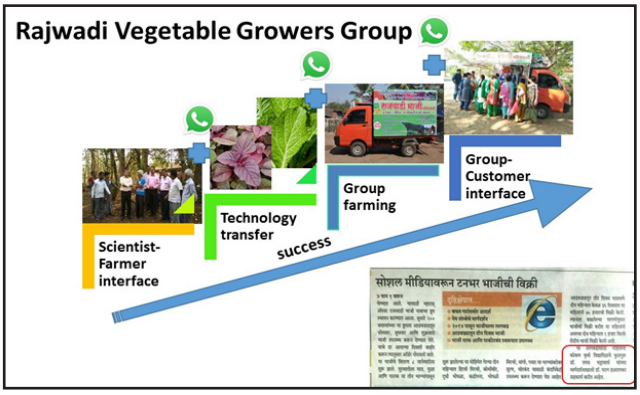

Figure 10. SAU Initiatives: Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli: (www.dbskkv.org).

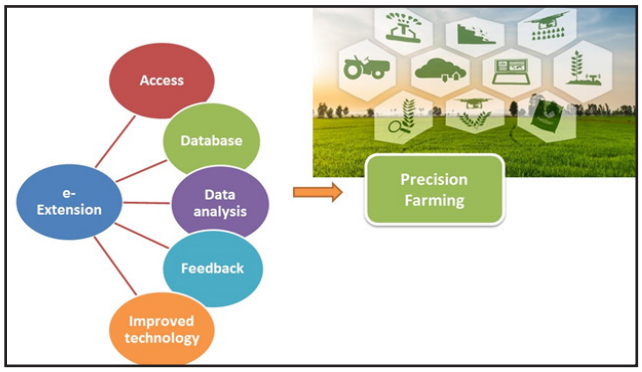

Figure 11. e-Extension: Road to precision farming.

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