INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,

BENGALURU

EVALUATION OF RKVY PROJECTS

OF

UNIVERSITY OF AGRICULTURAL SCIENCES,

BENGALURU

"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"

INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,

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EXECUTIVE SUMMARY

Over 60 per cent of the Indian population continue to depend on agriculture and allied activities for their livelihood. Hence, growth of this sector is an essential perquisite for overall economic growth. Globally, India is the third largest producer of cereals, with only China and the USA ahead of it. India is 2nd in rice, wheat and production of other cereals. It is the largest exporter of cereal products and offers huge opportunity for milling technology, up-gradation, automation, integration, fortification etc. India is 2nd largest global producer of fruits and vegetables with 254 MT production. Adoption of innovative technologies like protected cultivation, hydroponics and aeroponics have contributed to improvement in quality of horticultural produce.

There are several domains which are of an interest to a farmer. A farmer might need information about the listed categories:

- crop planning (when to grow the crop, which crop to grow, seed variety related to the soil type, the time of harvest);
- buying seeds, pesticides, farm-equipment, and fertilizers, contact with the respective dealers;
- marketing applications (the available price in the current market);
- information applications (about the latest schemes, weather forecast, soil type, new techniques and tricks to increase productivity);
- for contacting farm specialists;
- for checking the available storage facilities;
- for post-harvest technologies.
- Access to weather information
- Outbreak of pests and diseases
- Demand/ supply of produces
- Availability of farm equipment

To support this sector, Central and State governments have been launching new reforms, schemes and policies every year. New techniques and inventions are made to help the agriculture domain. However, the main problem is in the dissemination of the information down to farmers' level. Though, data is available in the forms of printed media, audio and visual forms, newspaper, Internet, etc., yet it is not available at the same place. The formats and structures of the available data are also dissimilar. For a typical farmer, it becomes very hard to understand and make usage this information.

The need for timely access to information for decision making in agriculture and allied sectors needs no emphasis. Keeping this is view, various options have been explored for transferring information to farmers in a timely and cost-effective manner. The potential of Information and Communication Technologies (ICTs) in enabling access to and exchange of information for farmers is evident. Among ICTs, there has been increasing use of mobile phones which is changing the agricultural communication process. The introduction of mobile phones has resulted in new services and applications. In the agriculture sector, these include access to market information, weather information, monitoring plant health, education, other services etc.

In the recent years, the usage of smartphones and Internet connectivity has largely increased in rural areas which shows their potential in spreading the agriculture-based information to the people. Smartphones have penetrated in almost all the environments where people carry out their everyday activities, and perform tasks that are normally run on personal computers. Also, mobile literacy is higher than computer literacy, even though mobile devices might have inconvenient user interfaces. Hence mobile applications are an amiable option for transmitting information to the people in villages and rural areas.

The growth of mobile communication technology is creating a number of opportunities for social empowerment, and grassroots innovation in developing countries. One of the areas with potential impact is in the contribution of mobile applications to Agricultural and Rural Development (ARD), by providing access to information, markets, and services to rural inhabitants (World Bank, 2012).

Studies reveal that mobile phones have a positive impact on sustainable poverty reduction and identify accessibility as the main challenge in harnessing the full potential (Bhavnani et al., 2008). Today farmers are receiving diverse facts or information about faming like seeds, crop selection, crop processes weather, fertilizer, pesticides etc. from various resources which are distributed on many different locations according to its origin, its processors, producers or vendors. It is true that the information is available by means of several applications, videos, images, but the problem lies in the fact that the information is not available at the same platform- a system which covers all the important information about all the domains of agriculture, and available at their location.

The advantages of mobile phones include: affordability, wide ownership, voice communication, and instant and convenient service delivery. Due to these, there is explosion across the world in the number of mobile apps, facilitated by the evolution of mobile networks and by the increasing functions and falling prices of mobile handsets (World Bank, 2012).

The introduction of mobile phones has led to the development of new services and applications in agriculture for the benefit of farmers and other stakeholders. Services that started with occasional messages have evolved to multimodal and multimedia delivery of advisory and to m-agriculture applications for smartphones. These services are addressing the information and communication gap between farmers and extension personnel and giving a bargaining position to farmers (Saravanan, 2014). Access to information on new varieties, inputs such as seed, fertilizers, machinery, price information, weather, pests and diseases, nutrient management at the right time can help farmers get access to crucial information to support activities from production to marketing.

There is an increasing number of mobile apps providing access to agriculture and allied sector information. A mobile application is a software on a mobile phone handset or tablet computer that enables a user to access specific information; make payments and other transactions; send messages; etc. The application (app) is downloaded (for free or for payment) from a wireless network from an online store and may require a live connection to function effectively.

Farmers need timely information in response to their specific needs. There are mobile applications that provide latest agricultural information about trends, equipment, technologies and methods being used, help identify pests and diseases, provide real-time data about weather, early warnings about storms, local markets offering best prices, seeds, fertilizers etc. In addition, farmers can also interact and get guidance from agriculture experts across the country via the apps. These apps help in providing market information, facilitating market links, providing access to extension services, farm related information etc.

Government of India has launched a number of web and mobile based applications (Annexure I) for dissemination of information on agriculture related activities, free of cost, for the benefit of farmers and other stakeholders (Bhasker and Lakshmi Murthy, 2017). There are apps also developed by agricultural institutions, private sector, NGOs. These apps are disseminating information from agricultural research and extension to farmers and other stakeholders and facilitating exchange of information among stakeholders.

Among the various input based technologies for improving crop production, Seed has emerged as an important input, which has a great bearing on yield of the crop. Most of the technological innovations aimed at improving crop yields are still seed oriented. Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 – 20% depending upon the crop and it can be further raised up to 45% with efficient management of other

inputs. Efforts are continuously made to increase crop yields by genetic manipulation of the seed aimed at sustained expression of its vigour. The efforts presuppose availability of such genetically superior seeds to farmers for commercial production. This can be achieved by scientific seed production techniques. The earlier times when farmer used to make use of his own seeds is no longer valid after the arrival of hybrid varieties, which can be used for one generation only. To make available quality seeds to the farmers, seed production and processing have emerged as important activities in all crops.

Keeping the above in view, the project **"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"** was taken up by University of Agricultural Sciences, Bengaluru with Rashtriya Krishi Vikas Yojana funding. The project was implemented from 2017-18 to 2020-21. The details of the project are as under:

1.	**Title of Project**	**:**	**"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"**
2.	**Nodal officer and Principal Investigator**	**:**	**DR. S. RAJENDRA PRASAD** Vice Chancellor, University of Agricultural Sciences, GKVK, Bengaluru
3.	**Implementing Institution (S) and other collaborating Institution (s)**	**:**	Dr. K. Vishwanath, Associate Professor, Dr. Parashivamurthy
4.	**Date of commencement of Project**	**:**	2017-18
5.	**Approved date of completion**	**:**	2020-21
6.	**Actual date of completion**	**:**	2020-21
7.	**Project cost**	**:**	Rs. 81 lakhs

The objectives of the project are as follows:

1. To provide a common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system.
2. To develop and update the data base of all the private and public sector seed producers, organizations and their products (Varieties/ Hybrids) details/ performance etc.
3. To have data base of region-wise and season-wise growers/ cultivators/ different stakeholders of seed.
4. To establish linkages with seed producers, growers, seed dealers and all seed stakeholders including farmers.

5. To arrange interaction meetings at periodical intervals for effective functioning.
6. To arrange technical knowhow, do-how, timely guidance and technical expertise/ inputs for successful crop harvest.
7. To provide market information on regular basis.
8. To promote formation of Farmers' Producer Organizations/ companies for easy access of seeds to the end users.
9. Any such other objectives as deem fit for smooth functioning of the platform.

The project was implemented from 2017-2020 at National Seed Project, University of Agricultural Sciences, Bengaluru to strengthen the seed delivery system and improve the socio-economic status of the farmer.

The project was implemented in systemic manner by gathering information from farmers, seed and other inputs dealers, private and public seed producing companies/ agencies. Based on the information obtained, a web page and a mobile app named as "BEEJ AADHAR" were designed and developed in both Kannada and English languages. Information collected and updated from private and public seed companies (NSC, KSSOCA, Agricultural department, All agricultural universities etc.,) included company name, place, category, crop, variety, features, class of seeds, quantity of seeds, region, season, cost of seeds per quintal, seed rate, package of practices, source of seeds/ dealers, contact person, supplying area of seeds, seed production area etc. Information collected and updated on farmers producing seeds included farmer name, address, seed category, crop, variety, growing since, season, to whom they produce, post harvesting methods, procurement cost etc. Similarly information on seed dealers viz., dealer name, address, seed category, crop, variety, class of seed, cost of seed etc., were collected and updated to the app and also information of farmers who are cultivating and maintaining tradition varieties were also collected and updated viz., farmer name, address of farmer, location, state, area, crop group, variety, season, available for sale, quantity of seed available, cost, methods followed for germination, seed storage techniques, award name etc.,

Package of practices are very important for farmers to produce quality seed. Hence, in addition to seed stake holder's details, this app also contains the details about package of practices and advance technologies recommended by University of Agricultural Sciences, Bengaluru. The package of practices includes information like introduction of crop, method of cultivation and management, mechanization, insect and disease management, harvest and post-harvest management etc. Information related to traditional variety conservers and awardees were also updated in the app.

The updated app was launched during Krishi mela, 2018 of University of Agricultural Sciences, GKVK, Bengaluru by former Chief Minister of Karnataka Mr. H. D. Kumara Swamy.

SALIENT FEATURES OF BEEJ AADHAR APP

Beej Aadhar is a mobile app which provides common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system. It provides information on all hybrids/ varieties developed, land races, etc., field tested and being distributed from all type of seed producers to the farmers or farmer's organizations, availability, cost of seeds also establishes organic linkages between seed producers and growers besides providing information of package of practices and advanced technologies.

The app has been developed in both English and Kannada. The user has to register for use of the app. The registration is done by providing the mobile phone number and a password. The category of the user, viz., farmer, seed producer, academic etc., is also recorded at the time of registration. After registering the user can log in to the app by using his mobile number and password. By selecting any one of the above options, information relevant to that topic can be accessed. By accessing "Public Seed Companies", all the information on different crop seeds produced and marketed by the public seed companies like Karnataka State Seeds Corporation can be obtained. By accessing "Private Seeds Companies", information on crop seeds produced by different private seed companies can be obtained. Similarly, information on farmers producing seeds and dealers marketing seeds can be obtained.

In addition, information on package of practices for different crops, farmer varieties registered under PPV and FRA, farmer awardees recognized by PPV and FRA, advanced technologies for different crops, and service links to several services like seed testing labs, soil testing labs etc can be accessed.

For the popularization and further improvement of the app, one day workshop (Seed day cum) was conducted on 26th April 2019 at University of Agricultural Sciences, GKVK, Benagaluru. On this occasion seeds were distributed to progressive farmers to encourage them for quality seed production and also organized exhibition for traditional variety maintainers to showcase their products for encouraging other farmers and NGO's. Leaflet on information about Beej Aadhar app was released at this workshop.

To create awareness about Beej Aadhar app among seed producing farmers and dealers, training programmes were organized at all the Krishi Vignyana Kendras of University of Agricultural Sciences, GKVK, Bengaluru and also at J.S.S. Institute of Engineering, Mysore in collaboration with Raitha Snehi Farmers Producers company. The suggestions given by the seed stakeholders were also considered for further improvement of the app.

It is observed that the app provides information on crop seeds developed by 12 public sector, 21 private sector companies besides 112 seed dealers and 104 farmers producing seeds. The crop seeds today are available from more than 500 government and private seed companies and more than 7,00,000 dealers network in the country. Of these 208 private seed companies including 21 seed companies producing vegetable seeds exclusively have more than 80% share in the country's seed production. Most of these companies are not included in the app. The lists of dealers and farmers are also very less compared to the total number of seed dealers in the state and farmers selling their own seeds. There is need to include all the seed companies in the state for the app to be meaningful and useful to the farmers. Lists of public and private seed companies can be collected from the State Seed Producers' Association.

The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

The app is user friendly and can be easily accessed. There are more than 145 apps dealing with various agricultural activities in the country. The mobile apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan are comprehensive and contain complete information on all aspects covered by the apps. There is need to improve the Beej Aadhar app on similar on similar lines. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.

While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.

There is need to incorporate information on month-wise market rates of the crop produce to enable the farmers to decide on the choice of crops to be grown. This will also, to some extent, solve the problems of gluts in markets as farmers tend to grow crops which his neighbour normally grows.

While the app is useful to the seed producers as it provides a single platform for introducing new varieties/hybrids to enhance varietal replacement rate, the varieties and hybrids of all crops available from seed companies will be made known to farmers, seed companies are able to access for progressive farmer who are willing to take up quality seed production and there is encouragement for enrollment of more number of dealers which will facilitate to connect large number of farmers, unless information on all the seed producers are available, the information that is culled from the app will be skewed and does not provide comprehensive advantage to the seed producers.

While seed dealers can access information about seed availability from seed companies to meet the farmers demand and information on new varieties/Hybrids which are released by public/private sector, they can supplement the technical information to their customers/ farmers. However, this will be of limited use in the absence of complete information of all seed companies.

In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.

REFLECTIONS AND RECOMMENDATIONS

1. The Beej Aadhar app developed by the University of Agricultural Sciences, Bengaluru is comprehensive, user friendly and fairly complete. It compares well with similar apps developed for seeds in different states.
2. There is need to include information on all public and private seed producers, seed dealers and farmers producing seeds for the app to be useful to the users.
3. There is need to improve the Beej Aadhar app on lines similar to apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.
4. Most of the private seed companies having more than 80% share in the country's seed production are not included in the app.
5. The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays.
6. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

7. While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.
8. There is need to incorporate information on month-wise market rates of the crop produce to enable the farmers to decide on the choice of crops to be grown. This will also, to some extent, solve the problems of gluts in markets as farmers tend to grow crops which his neighbour normally grows.
9. In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.
10. There is need for mechanism to upgrade the technical knowledge/ knowhow/ do-how etc on regular basis/ from time to time.
11. There is need to include contingent crop planning for seed production.
12. Protocols need to be developed for forest and horticultural seedlings.

ACTION POINTS

Researchable issues:

1. There is need for in depth research on establishment of seed zones in Karnataka for different crops and agricultural zones.
2. There is need for development of prediction model for the future seed demand to improve the SRR & VRR
3. Developing and expanding similar services through innovative models for planting materials including forest and horticultural crops.
4. Protocol development to reuse the identified varieties which will have the potential for higher yield and resistance to biotic/abiotic factors.

Policy issues:

1. Expansion of the platform through the government policies for compulsory updation of seed stock by all seed producers, dealers, farmers to avail seed services in their location/zones.
2. Convergence of all seed stakeholders for successful and effective implementation of Beej Aadhar app.
3. Integration of Raitha Samparka Kendras (RSK's) for popularization and implementation of Beej Aadhar app for up scaling the technology.