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Knowledge management and monitoring of Farmer FIRST Programme through FFP Portal

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ABSTRACT

The Farmer FIRST (Farm, Innovations, Resources, Science and Technology) Programme (FFP) aims at enriching Farmers–Scientist interface, technology assemblage, application and feedback, partnership and institutional building and content mobilization. This programme has been initiated since October, 2016 to provide a platform to farmers and scientists for creating linkages, capacity development, technology adaptation and application, on-site input management, feedback and institution building. Presently fifty-two (52) projects are running in various ICAR Institutes and Agricultural Universities for implementing the FFP. Farmer FIRST is an opportunity for the researchers, extension professionals and farmers to work together and find appropriate ways through assessing different solutions. A lot of information and knowledge is being generated through 52 FFP projects on different aspects like resource management, climate resilient agriculture, production management including storage, market, supply chains, value chains, innovation systems etc. To manage this information and knowledge, a FFP portal (https://ffp.icar.gov.in/) has been developed during 2017–20 at ICAR Indian Agricultural Statistics Research Institute, and hosted in ICAR Data Center placed at ICAR-IASRI, New Delhi. The portal is developed using .NET framework and it is web responsive. It is a single window platform which provides basic and detailed information with respect to all FFP projects. The portal facilitates the lead centers of the respective projects to update and upload all types of related information so that the knowledge generated in FFP can be disseminated to the farming community. Agricultural Technology Application Research Institute (ATARI) and Agricultural Extension Division of ICAR monitor the project activities and progress under this programme through this portal.

Keywords: ATARI, Farmer FIRST, FFP, ICT, Intervention, Portal

Farmer FIRST initiative has been launched by Indian Council of Agricultural Research (ICAR) to move beyond the production and productivity; to privilege the smallholder agriculture; and complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientists interface. The basic concept is that the farmer is in a central role for research problem identification, prioritization, conduct of experiments and its management in farmers' field conditions. Information and communication technology (ICT) in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in India (Kumar *et al.* 2019). It has potential to contribute to achieve significant economic, social and environmental benefits **(**Gelb *et al.* 2008). The advancements in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture (Kumar and Sankarakumar 2013). The new ICT tools and techniques are evolving and the implications of that are clearly visible at the global scale.

In Indian context, various e-governance initiatives have been taken up in the field of agriculture by ICAR. Krishi Vigyan Kendra (KVK) Knowledge Network (https://kvk.icar.gov.in/), popularly known as KVK Portal (ICAR-IASRI 2016) helps in monitoring the functioning of KVKs at the National level and in providing timely information and advisory to the farmers. The aim of the portal is to transfer the technologies developed by the agricultural scientists to the farmers in a fast and effective manner using web and mobile technology (Pal *et al*. 2019). KRISHI (Knowledge based Resources Information Systems Hub for Innovations in Agriculture) Portal (https://krishi.icar.gov.in/)(ICAR 2016) is an initiative of ICAR to bring its knowledge resources to all stakeholders at one place. The portal is being developed as a centralized data repository system of

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ICAR consisting of Technology, Data generated through Experiments/Surveys/Observational studies, Geo-spatial data, Publications, Learning Resources etc. In view of the above to disseminate information generated from farmer FIRST programme, a web portal has been developed.This portal provides the details of all the projects under FFP. The managers can effectively monitor the progress of FFP projects through this portal.

MATERIALS AND METHODS

The FFP portal (https://ffp.icar.gov.in/) has been developed at ICAR-Indian Agricultural Statistics Research Institute during 2017–20. The portal is based on 3-Tier Architecture using the following technology

a. ASP.NET framework 4.5
b. SQL Server 2012 used for database
c. Visual studio 2013 as Integrated Development Environment (IDE)

The 3-tier architecture which is a form of client-server architecture, has been used to develop the portal in which the functional processes, viz. logic, data access, data storage and user interface are maintained as independent modules on separate platforms. It provides many benefits for production and development environments by modularizing the user interface, business logic, and data storage. In the present system, there are three layers, viz.

Presentation layer- the front end layer in the 3-tier system and consists of the user interface. This layer is built on web technologies, viz. HTML5, JavaScript and CSS.

Application layer- the functional business logic which drives the application's core capabilities. It has been constructed using C# language.

Data layer- this layer depicts the database/data storage system and data access layer. For the present work, Database Management System (DBMS) software Microsoft SQL Server 2012 is used.

FFP database: A relational data model has been used to develop the database for FFP Portal. A number of tables have been used to build this relational database (Table 1).

FFP Portal workflow: FFP portal is operational in a workflow manner. Role of different users in the portal has been well defined. Data (Fig 1) depicts the context diagram of the portal.This diagram depicts the accessibility of various functionalities in the portal of different users, viz. FFP centres (State Agricultural Universities/Institutes), ATARIs, farmers, Subject Matter Division (Agricultural Extension) of the Council (ICAR) and general users/non-registered users of the portal.

RESULTS AND DISCUSSION

Uploading of information on FFP Portal: Several input forms have been developed to upload data in FFP portal. There are three types of users in the hierarchy – i) Project Investigators at lead centers and collaborative centers who upload the information in the portal; ii) ATARI – under each ATARI, a number of projects are running on within a zone; iii) Extension Division of ICAR. Individual ATARI is responsible of monitoring the projects which are running under it at different locations (universities/institutes). The information is thus collated at the ATARI level, and the ATARI wise information is collated at council level. Thus, Extension Division of ICAR is responsible for overall monitoring of all the projects which are running at different locations throughout India under FFP. Other than these three types of users, farmers can also register in the portal to post farm related queries and get the solutions of their problems. Following are the different modules through which information is uploaded in the portal.

Table 1 Major database tables in FFP Portal

Table name	Description
ffp_budget	Contains records of component wise budget (sanctioned and expenditure) under FFP projects
ffp_intervention_category	List of categories for interventions
ffp_pdfUpload	Records of pdf uploaded under different categories such as brochure, leaflets,bulletin etc.
ffp_proj_colla	Records of collaborative organizations under FFP projects
ffp_project	Details of FFP projects with respect to the organizations
ffp_project_intervention	Records of interventions under FFP projects
ffp_training_detail	Records of trainings under different categories organized in FFP projects
ffp_uploadImage	Records of media files (image/video) uploaded under different categories with respect to FFP projects
Organization	Records of organizations (Institutes/ SAUs)
user_category	List of user categories (for role based access of information)
user_details	User details of FFP Portal
state_district	List of states and districts

Intervention module: All the project related activities under FFP have been categorized into a number of interventions, viz. Agriculture Science, Animal Science, Enterprise based, Horticulture Science, Integrated Farming System etc. Project investigators are responsible to fill the details of the interventions which have taken place under respective projects. The user can enter the year-wise intervention in the portal. Provisions are there to update the uploaded information at any point of time (Fig 2).

Project report module: To capture the progress of the projects at different centers, the project report module has been developed so that users can upload their respective annual reports into the portal. The module is divided into five sections, viz. background information, technical progress, project outputs, other achievements and list of publications. The report is to be submitted year wise by the respective center. Similar type of online report submission module

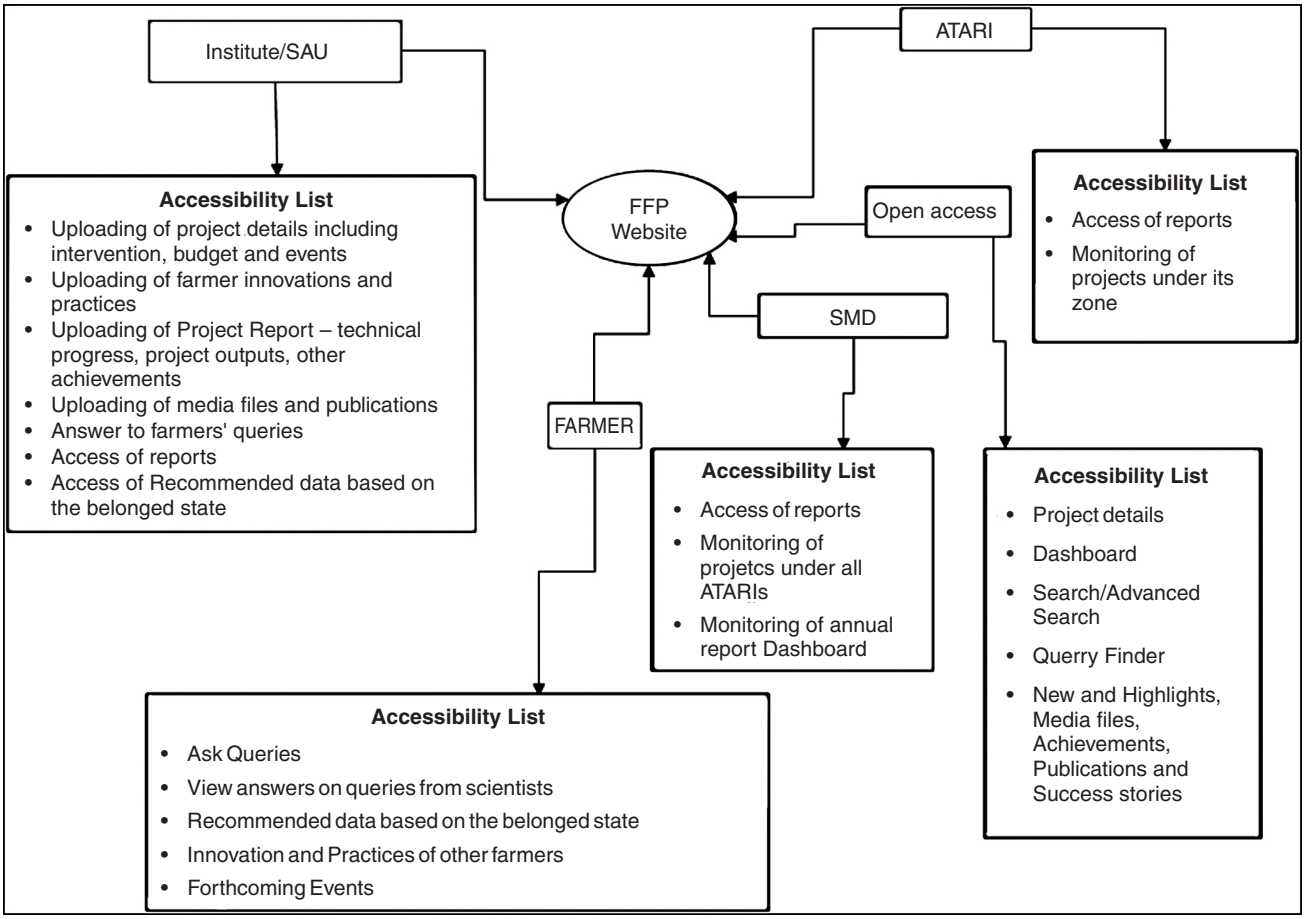


Fig 1 Context diagram of FFP Portal.

was reported in Results Framework Document Management System (RFDMS) (Rao *et al.* 2016) for preparing and reporting the RFDs by the ICAR Institutes to the respective subject matter divisions (SMD) of ICAR.

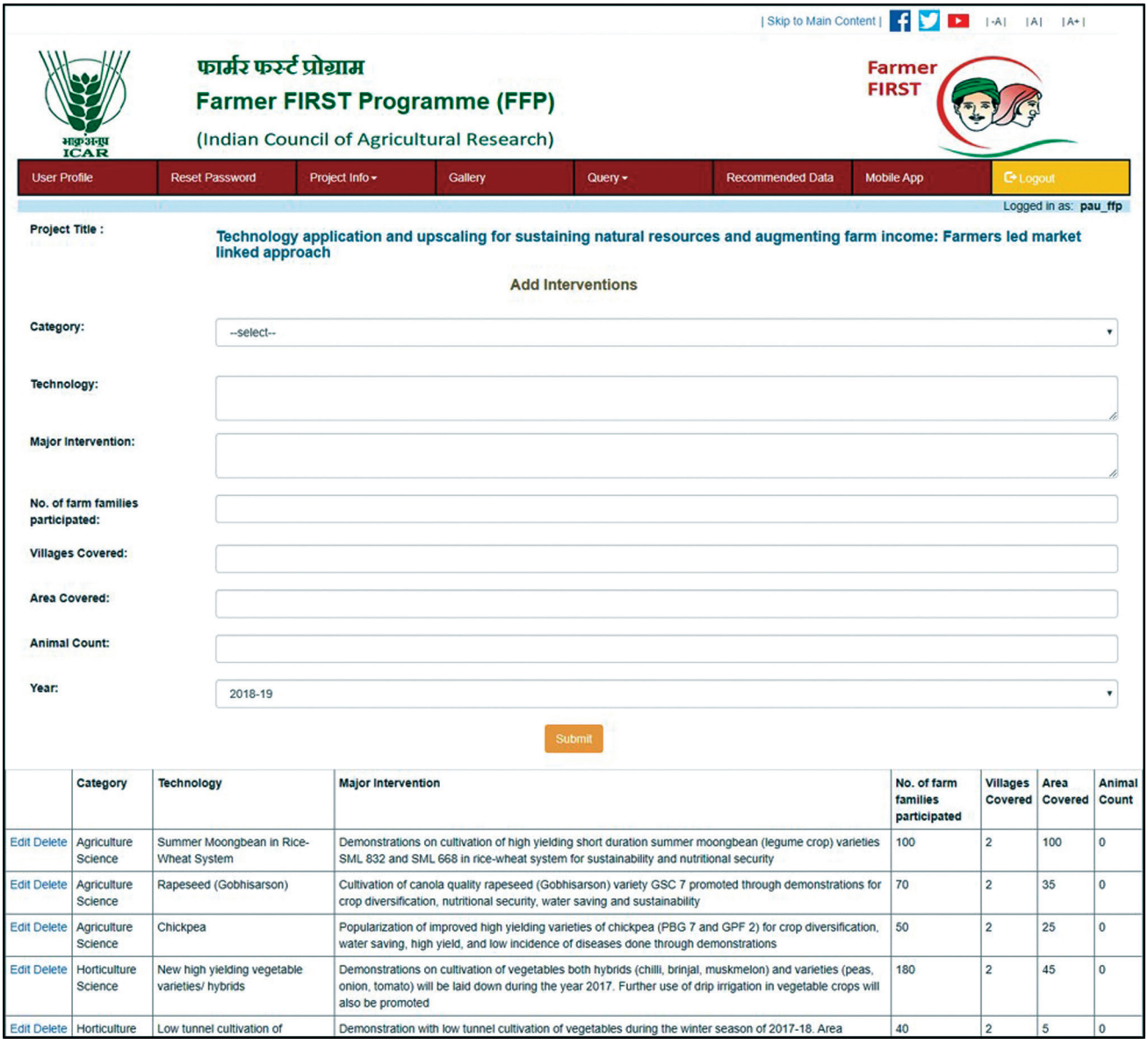
Budget module: The lead center can add and update budget year wise and month wise. The collaborative center can as well upload the budget on the portal. The budget is uploaded component-wise where sanctioned and expenditure amount are to be filled-up against each budgetary head.

Farmer innovation and practices module: Farmer innovation and practices database has been developed in the portal. This feature is introduced to keep record of new innovative ideas which are practiced by the farmers in diversified farm conditions at different places. Project Investigators are given responsibility to upload this information in the portal. This knowledge base can further be referred by all the farmers who are registered in the portal.

Apart from the above input forms, the detailed information related to various extension activities, viz. field day, Kisan Mela, Kisan Goshthi, exhibition can also be uploaded. Provision is also there in the portal to upload media files (image, video) of various demonstration/training related activities.

Query module: A blog window has been developed in the portal for interaction among scientists and farmers. Registered farmers are facilitated to send query and answer of the respective query can be given by the experts associated with FFP Project. The query is automatically sent to many experts based on intervention and any one can reply. It is like chatting between a farmer and multiple experts associated with the intervention selected by the farmer for query. Similar type of query resolution mechanism was observed in KVK mobile app (Pal *et al.* 2019) where farmers' query are routed automatically to the KVKs and the Subject Matter Specialist(s) in the KVK used to provide the solution for the same.

Knowledge management through FFP Portal: Based on the role defined for different categories of users, various type of information can be extracted from the portal. For information uploading and monitoring in the portal, role based access have been provided to the respective stakeholders, whereas the knowledge dissemination part has been kept in open access for all users and these information are available through direct links from Home page of the portal.The information include details of all projects under FFP, interventions, events, publications, news and highlights, success stories, media coverage, images and videos. Most of these information can also be accessed through a dashboard which can be used by the managers as well to check, at a glance, the amount of information that have been uploaded in the portal by the project investigators. Following are the different modules through which knowledge management



	Category	Technology	Major Intervention	No. of farm families participated	Villages Covered	Area Covered	Animal Count
Edit Delete	Agriculture Science	Summer Moongbean in Rice-Wheat System	Demonstrations on cultivation of high yielding short duration summer moongbean (legume crop) varieties SML 832 and SML 668 in rice-wheat system for sustainability and nutritional security	100	2	100	0
Edit Delete	Agriculture Science	Rapeseed (Gobhisarson)	Cultivation of canola quality rapeseed (Gobhisarson) variety GSC 7 promoted through demonstrations for crop diversification, nutritional security, water saving and sustainability	70	2	35	0
Edit Delete	Agriculture Science	Chickpea	Popularization of improved high yielding varieties of chickpea (PBG 7 and GPF 2) for crop diversification, water saving, high yield, and low incidence of diseases done through demonstrations	50	2	25	0
Edit Delete	Horticulture Science	New high yielding vegetable varieties/ hybrids	Demonstrations on cultivation of vegetables both hybrids (chilli, brinjal, muskmelon) and varieties (peas, onion, tomato) will be laid down during the year 2017. Further use of drip irrigation in vegetable crops will also be promoted	180	2	45	0
Edit Delete	Horticulture	Low tunnel cultivation of	Demonstration with low tunnel cultivation of vegetables during the winter season of 2017-18. Area	40	2	5	0

Fig 2 Intervention entry form in FFP Portal.

part is taken care in the portal.

Search module: Enriched search functionality has been developed in FFP Portal. It facilitates the user to search information by entering keyword and displaying the results under different categories where the keyword is matched. An advance search functionality has also been developed. In this module, the user can select the options viz. Project, Intervention and Training for search and then select state and district where FFP programme is being conducted. The user can also select the category and put keyword for more precise result.

Query search module: This module facilitates the users to view all queries (asked by the farming community) and the corresponding solutions as provided by the experts associated with different FFP projects in the area of intervention selected by the farmer while raising the query.

Recommender module: With the knowledge base developed in the portal, a recommender system has been developed for the registered farmers. By default, it provides all the information pertaining to the district in which the farmer belongs. In advance, farmer can search for the particular information by providing keyword that matches with the information related to that district.

Apart from these modules, the portal also provides information on latest publications, success stories, salient achievements, upcoming trainings and past events organized under FFP projects. The user can view the interventions related to crop, horticulture, animal husbandry, fishery etc. provided to the beneficiaries. The portal plays significant role in disseminating knowledge through a large number of videos uploaded by different FFP project centres on various aspects like machine transplanting, vermicomposting, duck farming, backyard poultry farming, goat rearing etc.

Project monitoring through FFP Portal: Monitoring of FFP projects can be done through FFP Portal at two levels. The ATARI can monitor the projects which are

going on under its zone, whereas at the council (ICAR) level, monitoring of all the 52 FFP projects can be done through live reports. This report is consisting of project details and annual project report. Project details include objectives and interventions uploaded by respective lead center. It also includes details of various events organized, financial year wise budget, image gallery, video gallery and details of farmers' practice uploaded by the project investigator in the portal through various input forms. Annual project report includes all the year wise information that is uploaded by the center. For effective monitoring of annual report, Dashboard facility is also provided at the council level so that the user can see year-wise count for the number of annual report submitted by the centers. The count is further linked to the name of organizations who have submitted the reports for that particular year. Similar kind of dashboard functionality was observed in the DBT DARE MIS (Pal *et al.* 2020) where Direct Benefit transfer (DBT) Scheme Managers are facilitated with the data uploading status of the DBT on boarded schemes in the Management Information System (MIS).

Farmers' innovation, resources and technology have been introduced in formulating and execution of research project with farmer-scientist interface through FFP programme.This programme can effectively be managed through FFP Portal. The portal provides various information related to FFP projects presently conducted at 52 different locations of India. Additionally, this portal also provides information on farmers' innovation and practices. Blog/ query module can help for more effective interaction among the stakeholders.This portal can be referred as a tool for extension workers and researchers in Indian agricultural context. In future, this system can be scaled up further by introducing more reports for e-governance and thus may be useful for the policy makers in the domain of agriculture extension.

REFERENCES

Gelb E, Maru A, Brodgen J, Dodsworth E, Samii R and Pesce V. 2008. Adoption of ICT enabled information systems for agricultural development and rural viability. (In) *Pre-Conference workshop summary on ICT Adoption Workshop at the IAALD-AFITA-WCCA Conference*, Atsugi Japan, August, pp. 1-26.

ICAR. 2015. Knowledge based resources information systems hub for innovations in agriculture. Retrieved from https://krishi.icar.gov.in/.

ICAR-IASRI. 2016. Krishi Vigyan Kendra Knowledge Network. Retrieved from https://kvk.icar.gov.in.

Kumar M, Bharadwaj A, Pal S, Jain R, Kumar S, Gupta C, Rama and Chahal V P. 2019. FFP Portal: A tool for knowledge dissemination. *Indian Farming* **69**(05): 21–24.

Kumar G and Sankarakumar R. 2013. Role of information and communication technology in agriculture – Perception of the farmers in Ramanathapuram district. *International Journal of Current Research* **5**(05): 1029–33.

Pal S, Marwaha S, Arora A, Choubey A K, Singh A K, Poswal R S, Adhiguru P, Islam S N, Kumar H, Gupta C and Kumar S. 2019. KVK Mobile App: An ICT tool to empower farmers. *Indian Journal of Agricultural Sciences* **89**(8): 1362–65.

Pal S, Arora A, Marwaha S, Rai A, Gupta C, Verma N and Pandey P S. 2020. Web based Direct Benefit Transfer Management Information System (MIS) at DARE-ICAR. *Journal of the Indian Society of Agricultural Statistics* **74**(2): 165–73.

Rao N S, Kumar M, Choubey A K and Jha S K. 2016. Design and development of web based information system for results framework document in ICAR. *Journal of the Indian Society of Agricultural Statistics* **70**(2): 173–77.