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Feasibility study of effective usage of available Agricultural Information System for various Village Boundaries of India

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Abstract

Indian agriculture sector is poised to take big leap with the Digital India program. Mobile applications like KisanSuvidha, IFFCO Kissan Agriculture, RML Farmer-KrishiMitr, PusaKrishi, AgriApp, KrishiGyan, Crop Insurance, AgriMarket and WhatsApp have shown positive impact. Recently government of India has launched eNam (e-National Agriculture Market) Platform for transparent sale transaction and price delivery. This article provides a detailed review of the available Agriculture Information system and how these applications have transformed agriculture scenario in India. The topic includes potential of technologies in modernizing agriculture within the Indian village boundaries. This investigation further performs feasibility study of Agriculture Information System. The main focus is to identify gap and suggest design typology for future Agriculture Information System.

Keywords: ICT, Mobile application, Agriculture Information System.

Introduction

ICT has transformed the Indian agriculture sector in past two decade. Ample of Agriculture Information system has been deployed and used successfully by Indian farmers. These applications have shown imperative impact. The Indian government's Digital India program [1] envisaged a USD 20 billion investment covering mobile connectivity throughout the country, reengineering the government process via technology and enabling e-delivery of citizen services.

The National Optical Fiber Network (NOFN) [1] is being laid down in phases to connect all the 0.25 million gram panchyat in the country. Pradhan Mantri Sahaj Bijili Har Ghar Yojana-Saubhagya and Deendayal Upadhyaya Gram Jyoti Yojana [2] is to provide energy access to all by last mile connectivity and electricity connection to all remaining un-electrified in rural areas as well as urban areas to achieve universal household electrification in the country. Past ICT initiatives in agriculture has experienced poor connectivity in rural areas due to lack of telecom network, limited power supply, frequent power failures insufficient funds to equip the kiosks with latest infrastructure and difficulty to train people with the latest infrastructure and technology.

Indian farmers have taken advantage of rapid development of technologies resulting in significant increase in agriculture production and consequently increase in income. These developments indicates that time has come to transform Indian agriculture sector by overcoming bottlenecks of past ICT initiatives in India.

Objectives of Study

Present scenario of the typical Indian Village Boundaries require the following issues to be investigated and resolved to make an effective usage of available Agriculture Information System.

- The main objective of this paper is to define Indian Village Boundaries.
- To perform feasibility study of the Existing Agriculture Information System.

Transforming Agriculture through Agriculture Information System

Many farmers are availing services of existing Agriculture Information Systems but still subscription is limited. Various milestones have been achieved and efficient solutions to address various issues and challenges in agriculture to respond to the information needs of farmers [3]. Booming of wireless services, Internet and mobile communication industries have forced ICT to find a foothold in daily routine of farmers. Indian farmer needs strategic focus on promoting its penetration as an important source of growth which includes upgrading infrastructure, reducing cost of usage and other benefits of ICT. It helps in improving availability of information enhancing quality of decision-making. ICT's potential to contribute to agriculture and rural development of a nation has been well recognized. Effective harnessing of ICT can empower and increase socioeconomic livelihood of farmers. This requires implementation of complex set of policy, investment, innovation, capacity-building measures, etc., in consultation with beneficiaries and other partners, which will encourage the growth of locally appropriate, affordable and sustainable ICT infrastructure, tools, applications and services for rural economy[3]. Emerging field of E-Agriculture is focusing on improvement of agricultural and rural development through improved information and communication processes. Various initiatives include agriculture information system (AgIS) such as weather forecasting, irrigation monitoring, disease diagnosis, integrated pest management, etc. Figure 1 describes the flow of information in an AgIS and its database.

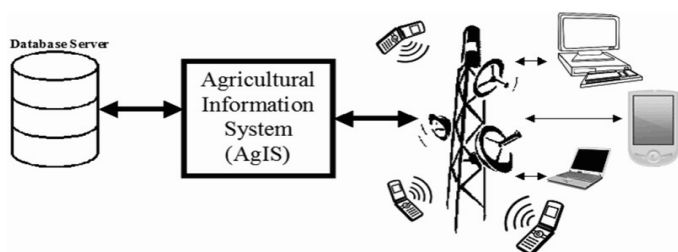


Figure 1: Basic Architecture of Flow of Agricultural Information From/To Agis

Agropedia(2012), resource of agricultural information, offers a crop-specific library, blog and chat. aAQUA is an Internet-based discussion portal which allows members to create, view and manage content in local languages. Many farmers have reported a positive change in income, quality of produce, crop diversification due to Agropedia and aAQUA[4]. Nokia life tools are an example of AgIS on mobiles. It is an SMS and subscription-based information service intended for emerging market covering health care, agriculture, education and entertainment. Tata Consultancy Services (TCS) mKrishi is a mobile application involved in disseminating agriculture-related information to farmers at a nominal cost. Integrated voice response technologies can transport voice messages between farmers and experts. SMS and voice message delivery (push and pull), like Indian Farmer Fertilizer Cooperative Ltd. Kissan Call Center, are the

other means of disseminating the information required by farmers.

Smart phone technology and Android software applications have created new opportunities for farm management applications in agriculture. Now Indian farmers can afford low cost smart phone and utilize the services of different Android applications. The use of the Android software application in a smart phone can overlap the high difficulties of Agriculture management requirements which were stand as obstacle for many years so far. Smart phones are equipped with various sensors which makes them a promising tool to assist diverse farming task.

The use of Information and Communication Technology (ICT) to support the transmission of localized information and services working towards making farming socially, economically and environmentally sustainable, while contributing to the delivery of nutritious and economical food for all – this comprises Digital Agriculture. This has also led to the rise and development of mobile apps which are helping existing government schemes, and other agriculture-based information to reach farmers in rural India. This digital change is acting as a game-changer for Indian agricultural conditions. Figure 2 represent m-app benefits in Indian supply chain.

Indian Village boundaries

Figure 3 depicts variables that define typical Indian village boundaries. Agriculture and other subsidiary profession are integral part of the Indian village economy. Indian agriculture productivity is very less as compared to the world standards due to use of absolute farming technology. Indian village boundaries comprises of fragmented land holding. Small land holding prevents farmers to implement modern agriculture techniques and boost productivity.

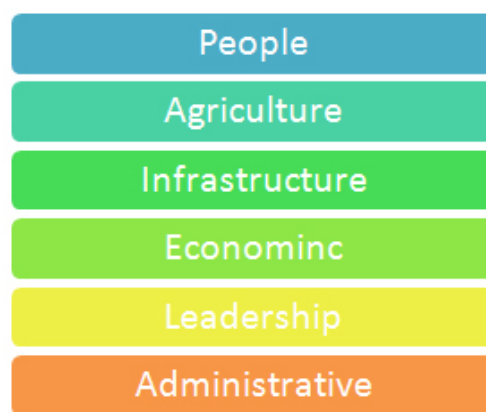


Figure 3: Variables that define typical Indian village boundaries

Agriculture is totally dependent on the Monsoon. There is shortage of irrigation water. Hence there is need of modern irrigation system. There is unavailability of storage facility. There is unavailability of inputs and shortage of skilled labour. Farming methodology varies from one geographical location to other due to change in soil and

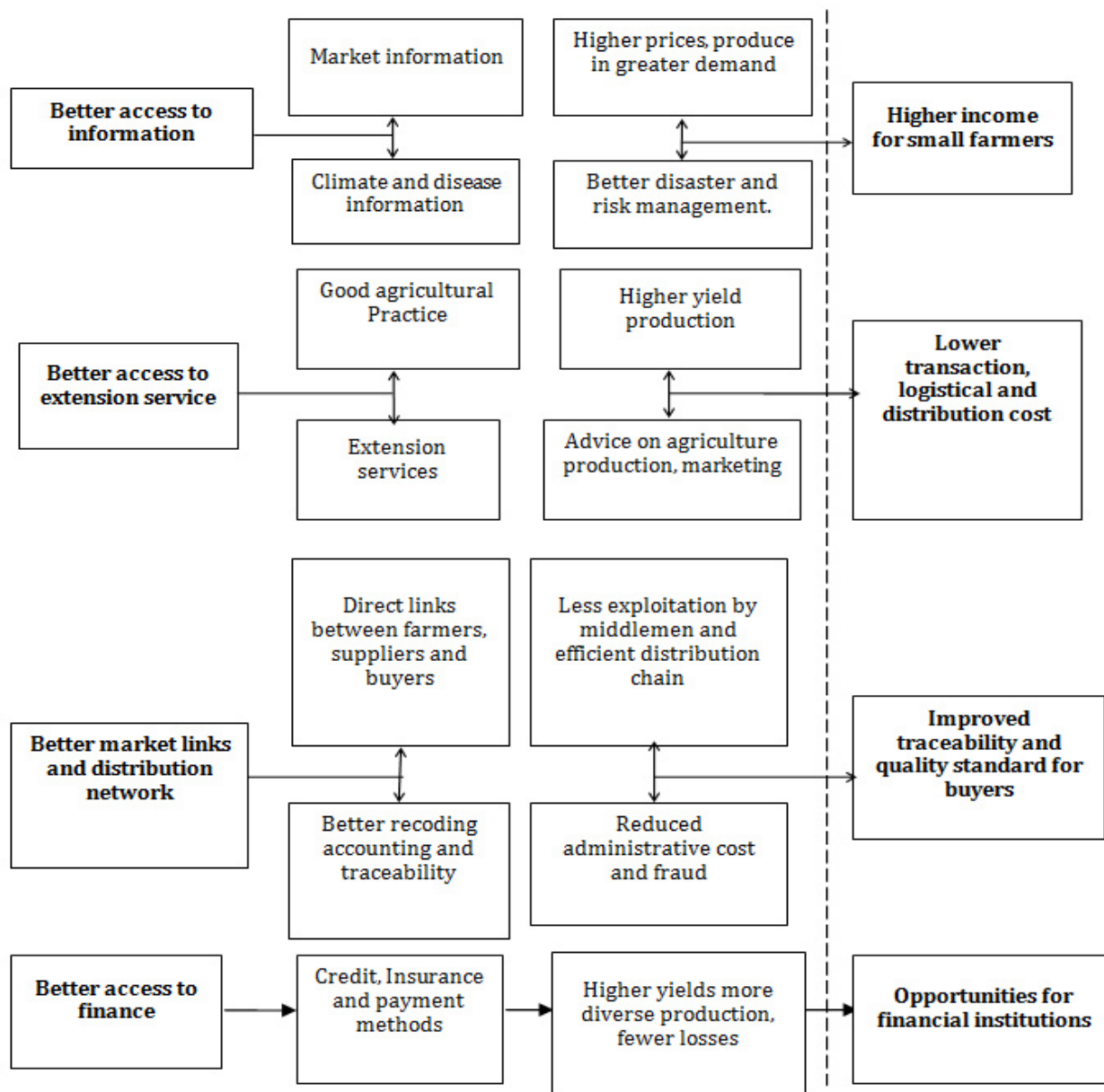


Figure 2: m-app benefits in Indian supply chain

climate. Village People have low level of education to understand development efforts of new technology. There is poor awareness about the current trends. Indian village have poor infrastructure. Village leadership is likely to be in the hands of inactive, incompetent and self-money making people [5]. Village administration faces political interference, lack of motivation, unwillingness to work in village. There is no proper mechanism to monitor implementation of government program which results in improper utilization of funds.

An overview of the Mobile based Agriculture Information System in India

Mobile based agriculture applications have been designed and developed for sharing, scheduling, controlling and monitoring of agricultural information. Mobile based Agriculture Information System is helping farming community. Many mobile apps have been surfaced to support agriculture with the introduction Digital India

Program by the government of India [6]. This program has helped ITC to reach rural India by promoting digital literacy and creation of digital infrastructure. Indian farmers are adopting these innovative services and applications within the agricultural value chain. These applications mostly facilitate services for producers and traders like market information, weather information, peer to peer learning, financial services (payments, loans and insurance) and agriculture related news [7]. These Agriculture Mobile Applications can be categorized based on the usability of information. For instance an application which provides information related to farm management is kept under farm management category. Further the classification of the agriculture mobile application is performed based on the availability, criticality, applicability and usability. These agriculture apps can be further classified as shown in the Table 1.

Table 1: Agriculture Mobile Application Classification

Mobile Application Categorization	Usability	Examples
Crop Specific Mobile Application	This category of mobile application has been developed for specific crop management.	CICR Cotton App, Groundnut-IPM, Groundnut-IFC, Fodder Kannada, ICAR IISR Black pepper, Seed Spices Info, MalwaFasal, VNMKV, Soybean Gyan, Rice-IFC, RKMP Rice Vocs, Rice Expert, ICAR – MUSHROOM.
Resource Management	The purpose of such type of mobile application is to assist stakeholder to manage farm resource.	Saur Shakti ICAR, Fertilizer Calculator – Goa, PIS, GypCal-Sodic Soil Reclamation, Havaamaana- Krishi.
Agriculture Engineering	This category of mobile application gives complete details about farming and its technologies.	Food Safety, AgroTech VNMKV.
Horticulture Science	These categories of mobile application are dedicated to horticulture.	ArkaBagwani, Fruit crops, ICAR DMAPR, SolapurAnar, ICAR IIOR Sunflower, ICAR-NRC L, GrapesDSS, Orchids Farming
Animal Science	This category of mobile application has been designed for animal husbandry management.	Buffalo Reproduction,Dairy Kannada, Indigenous Dairy Products, Feed Calculator, VetMicro, Hoof Care, IVRI - Artificial Insemination App.
Fisheries Science	This category of mobile application has been designed for fish farming.	CIFFISHPRO,mKRISHI® Fisheries, VanamiShrimpapp
Agriculture Education	Agriculture Education mobile application is repository of agriculture related news and knowledge database.	ICAR-CRIJAF.
Agriculture Extension	Agriculture Extension mobile application provides information related to extension services.	KrishiGyan, KisanMitra, DeHaat, Genebank app.
Disease, Pest and Weeds Management	This category of mobile application is dedicated to crop disease, pest and weed management.	Weed Manager, Plantix, Crop Insurance

Figure 4 to 10 shows the distribution of different category of Mobile Application with respect to the number of installs. The number of install of these Agriculture Mobile Applications can be obtained from Google Play Store. The number of install shows the popularity and usability of these applications among the Indian Farmers.

Figure 11 shows the distribution of popular Agriculture Mobile Application with reference to the number of installs from Google Play Store. The above data is collected from the Google Play Store. Table 2 describes the popular mobile based Agricultural Information System used in India.

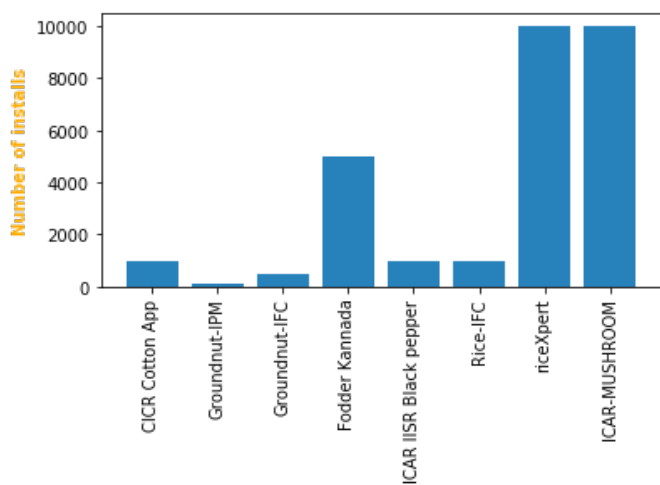


Figure 4: Distribution of Crop Specific Agriculture Mobile Application with respect to the number of install

Feasibility Study of Existing Agriculture Information System

This feasibility study has been performed by considering the following parameters.

Initiatives by Public, Private, Co-operative and others:

There are several Agriculture University and Research organization are providing services by collaborating with Information Technology and software solution providers. These public and private initiatives have also been supported by co-operative, self-help group and other business firms.

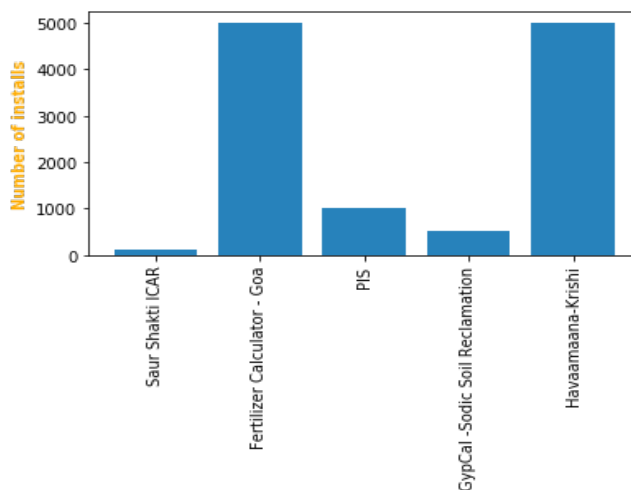


Figure 5: Distribution of Resource Management Agriculture Mobile Application with respect to the number of install

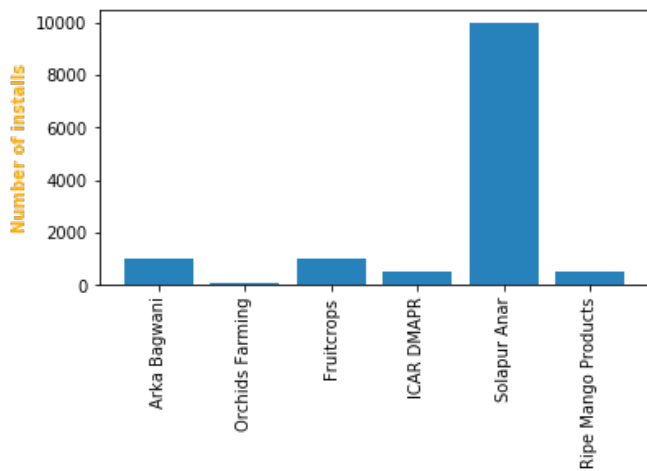


Figure 6: Distribution of Horticulture Science Agriculture Mobile Application with respect to the number of install

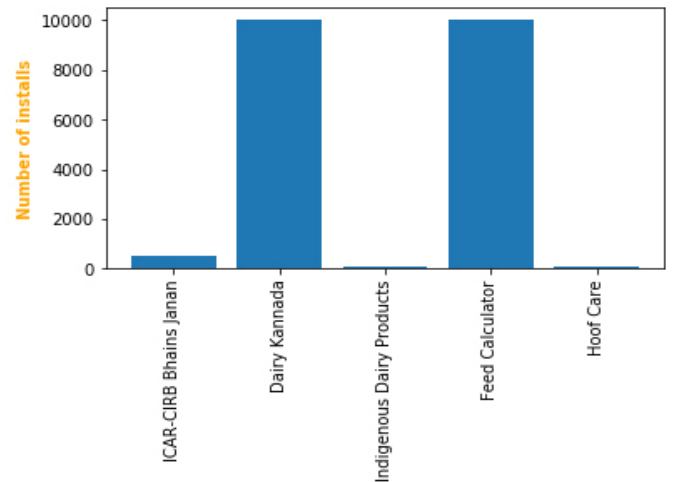


Figure 7: Distribution of Agriculture Engineering Mobile Application with respect to the number of install

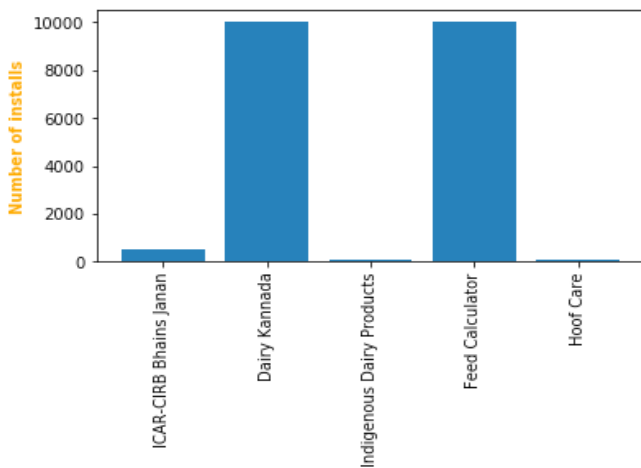


Figure 8: Distribution of Animal Science Mobile Application with respect to the number of install

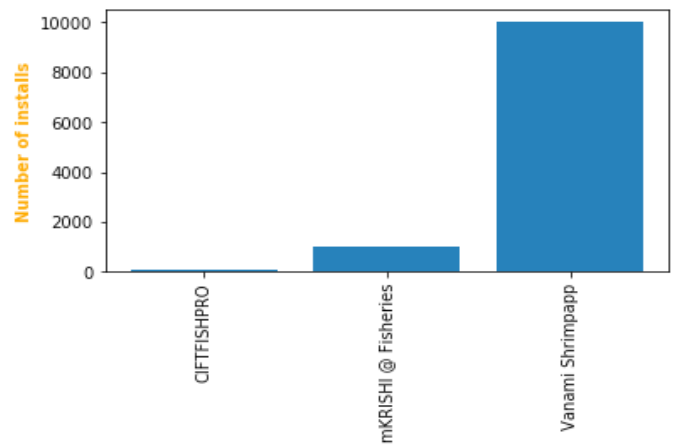


Figure 9: Distribution of Fisheries Science Mobile Application with respect to the number of install

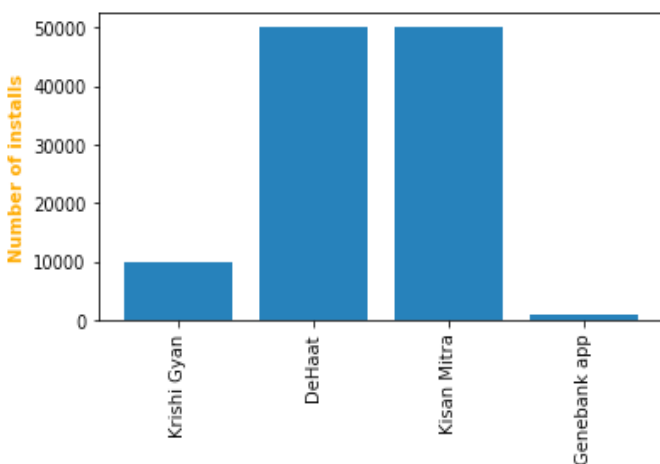


Figure 10: Distribution of Agriculture Extension Service Mobile Application with respect to the number of install

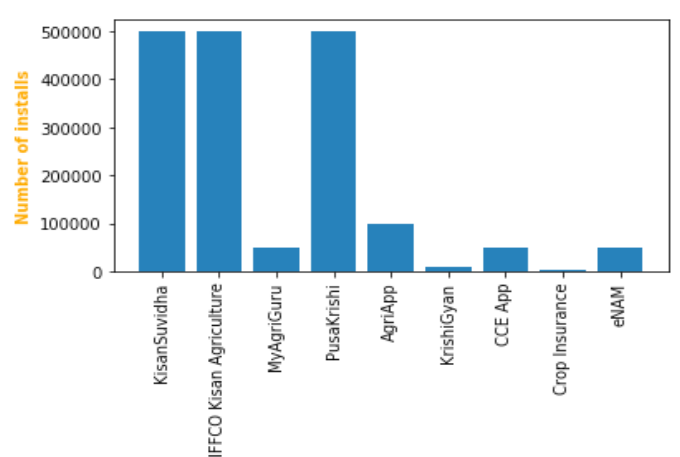


Figure 11: Distribution of popular Agriculture Mobile Application with reference to the number of install.

Table 2: The popular mobile based Agricultural Information System used in India

Mobile Application	Service provider	Feature and Service offered	Installs
KisanSuvidha	Mobile Seva (C-DAC)	Information on weather of current day, next 5 days and alerts, Market Price, agro advisories, plant protection, IPM practice.	500,000+
IFFCO Kisan Agriculture	IFFCO Kisan	Accessing customized agricultural information, mandi prices, weather forecast, agricultural advisory, best practices tips related to agriculture, Animal Husbandry, horticulture; a buyer and seller platform, and all agriculture related news and govt. schemes.	500,000+
MyAgriGuru	MyAgriGuru	Crop Information, AgriBuzz, Market Price, Weather, Tip of the day, other information like government schemes etc.	50,000+
PusaKrishi	CDAC-Mumbai	Crops and information , agriculture advisory	500,000+
AgriApp	Agriapp	Package of Practices, Chat, Videos of best practices, News, Quick Search, Buy and sell, secure payment	100,000+
KrishiGyan	ISAP India	Disseminate agricultural information to rural, farming audiences, ask query, agriculture chatbot	10,000+
CCE App	Ministry of Agriculture, PMFBY	Crop Insurance services	50,000+
Crop Insurance	Ministry of Agriculture, PMFBY	Crop Insurance services, View your policy details, Download PDF of own policies, Insurance Premium Calculator to calculate premium before applying, Check application status on every step, Help Desk to submit issues, FAQs.	1,000+
eNAM	Small Farmers' Agri-Business Consortium	Unified national market for agriculture commodities, remote bidding for traders and access to arrivals, price related information to farmers from the list of eNAM mandis and other stakeholders.	50,000+

Content Generation: The core task for any Information system is to generate content. The content is generated by research resource like university and ICAR institutes for the public sector initiative. Private company usually appoints dedicated research team to generate location specific information or hire third party who is expert in the field.

Partnership: Data suggest that such projects have partnership with Information Technology solution providers and agriculture technology experts. This model ensures that they work together to cater actual needs of the farmers.

Information Coverage: India is land of diversity where agriculture methodology varies from one geographical location to other. Agriculture information classified as in figure 4 needs to be covered.

Sustainability & Scaling-up: Agriculture Information System has to provide services to the farmer over the longer duration and it should be scalable with the time.

Cost Effectiveness: Most of these applications are free. To sustain these services should generate revenue. Some of these applications are aAqua, IKSL, Nokia Life Tools, RML etc.

Voice, Text and Video: For usability of Agriculture Information system by the people with Indian village boundaries it should support voice, text and video. IVRS has been integrated with mobile based agriculture advisory system.

Add-on rather than Replacement of old system: Recent trend has suggested that every new mobile application is add-on of the existing agriculture information system.

Minimal investigation of the existing and feedback collection: Socio-economic condition leads to limited subscription of the users. After a certain period of time people stop to collect feedback from the users which also make system obsolete.

Key factors affecting the success of agriculture information system

The following factors are affecting the success of agriculture information system.

Collaboration: For any project to be successful right people has to collaborate to achieve common goal.

Can be customized with location: Agriculture Information system can be customized as per location to make it more usable. Agriculture Information needs to be localized and personalized with respect to user.

Media Mix: Content should be mix of text, voice, audio and video to make system more interactive and usable.

Innovation: Innovation and appropriate mobile application development is necessary to ensure the sustainability of the services.

Timeliness: Information should be disseminated in real time so that farmer can respond timely.

Quality and Credibility: The quality and credibility of the information disseminated determines the success of the service provided. Real time information related to weather, market price, price forecast, pest attack forecast etc are more desired than prevention.

Conclusion

This investigation shows that existing information provides routine information with limited revision and validation. Future generation Agriculture Information system will use capability of AI and IOT to enhance usability. For sustainability of Agriculture Information System should be designed in such way that it should generate revenue. Recent trends in ICT has suggested that Indian farmers are now inclined to use Agriculture Information System and this has helped in reducing transportation cost, minimal transaction, disease and pest tracking. User base of Agriculture Information System will increase in coming days because of the government initiatives like National Optical Fiber Network (NOFN), Pradhan Mantri Sahaj Bijili Har Ghar Yojana-Saubhagya, Deendayal Upadhyaya Gram Jyoti Yojana and Digital India program.

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