Original Research Article

Mobile Technology for Farmers: An Overview of Agricultural Apps

Abstract

A growing trend in agriculture is the use of mobile applications or apps on smartphones. Through the apps, farmers may obtain all information and answers with a single tap. Information about pests and diseases, scheme-related facts and the specifics of the package of practices are all kept in mobile devices for convenient access. Small-scale farmers make up the bulk of Indian farmers. They frequently lack access to the technological and informational resources that could help them raise the productivity of their crops and products and obtain higher prices. The ubiquitous mobile phone network provided a solution to this issue. The majority of apps are only useful for a certain amount of information, while some have multiple uses. This study examines the mobile applications for agriculture that are accessible in India and are intended for farmers. It is more likely that mobile apps in the agricultural and related industries will become more integrated and dependent. In the present study the Plantix application more effective as it is informative, simple and easy to use app.

Key Words: Agriculture, Information, Farmers, Technology

Introduction

It is evident that various factors impact the progress of agriculture; still, the primary obstacles are the absence of immediate knowledge and the labour-intensive nature of farming methods. For agricultural production to be effective, access to relevant information and knowledge is crucial. For the purpose of applying agricultural inputs like insecticides and fertilizers, which can be impacted by unanticipated weather disasters, farmers need to be aware of the weather prediction. A sustained rise in agricultural productivity and incomes to satisfy present and future demands is the goal of discussions on climate-smart agriculture. Based on their source and usage, a variety of mobile applications related to agriculture can be utilized in farming and related activities. For Indian farmers, growers and agriculturists to benefit from quick growth and convenient access, it must be used. The farmer can profitably harvest crops by having knowledge of policies, best agricultural methods, commodity market pricing, current demand and numerous beneficial agriculture schemes. Therefore, it is imperative that farmers have access to all of this information. Easy information availability on a farmer's mobile device

is one of the primary benefits of mobile applications for farmers. Information such as the specifics of the package of practices, information about pests and diseases, and scheme-related information are all kept in the mobile device for convenient access. For mobile apps to retrieve data from back-end server databases, internet access is necessary, regardless of the dynamic nature of the information - for instance, weather information, market prices or advisory services.

Source of Information

Agriculture information and technology transfers during the past few decades have mostly been carried out by village-level employees, extension agents, scientists, KVK subject matter experts, universities and other organizations. After the introduction of the internet, web-based methods (also known as e-based services) were used to try and obtain the majority of the information. Nonetheless, the installation expenses of computer devices, such as e-choupal kiosks, have restricted its usage base. ICTs are shifting to mobile apps since while voice and SMS message delivery methods are simple, they require specific options or formats to be supplied to the system in order to obtain accurate information.

Importance of Mobile Applications in Agriculture

Although all of the information is in the public domain, farmers may find it challenging to obtain. Applications for smartphones or mobile devices are known as apps and they may access all of this data with varying weather conditions and seasons. With just one touch, farmers may obtain all information and answers. Based on statistical data, there were two billion smartphone users worldwide in 2016. Small-scale farmers make up the bulk of Indian farmers. In order to address this issue, the widely used mobile phone network proved to be useful. Some applications are multi-informant; however, most are only useful for certain information. A few are solely mathematical in nature and intended for scholarly use. For this reason, India's growing mobile network penetration offers a chance to increase the accessibility of important information.

For the benefit of farmers, the Ministry of Agriculture and Farmers Welfare, Govt. of India has launched a number of mobile phone initiatives. Developing nations are better positioned to benefit from ICT applications thanks to the development of new wireless and satellite-based solutions. Numerous applications are used for various functions related to farming activities, such as information about cropping, insecticides, fertilizer, seed, selling of crops, irrigation, crop production estimation, weather, and information about new technologies,

dealers, and market prices. The confined nature of the information makes it more comfortable and precise to use.

Methodology

In the present article, we examined many applications related to agriculture and farming practices that can facilitate faster and easier agricultural development. One of the most important ways to measure the efficacy, user satisfaction, and popularity of agricultural mobile apps is to look at ratings and downloads on the Google Play Store. Positive user experiences are often reflected in high ratings, which show that the app effectively satisfies the demands of its target market, whether it be by offering pest control guidance, market prices, crop management tools, or weather information. Another important measure that demonstrates the app's popularity and user base is downloads. Millions of downloads indicate that farmers, agronomists, and other agricultural stakeholders find these apps widely useful and acceptable.

It's important to remember that while large download counts and reviews are encouraging signs, they do not always imply that the program will work well in all situations. An app's success is also largely dependent on its user interface design, customer service, and information relevancy and accuracy.

The study was carried out in February- 2022. A list of agricultural apps on google play store was prepared and the downloads and ratings of the apps were analysed and top ten (10) applications were briefly discussed. Different score was assigned for ratings and downloads and the final ranking was given based on the combined score of these two factors i.e., ratings and downloads. Five score for each point rating and 10 score for every 10, 000 downloads. The list of top ten (10) highest rated and downloaded applications along with their combined scores were listed in Table 1. In order to know the constraints faced by the farmers while using the agriculture mobile applications and suggestions to overcome these were recorded. A total of 30 farmers were randomly selected based on the data obtained from these applications and the results were expressed in frequency and percentage.

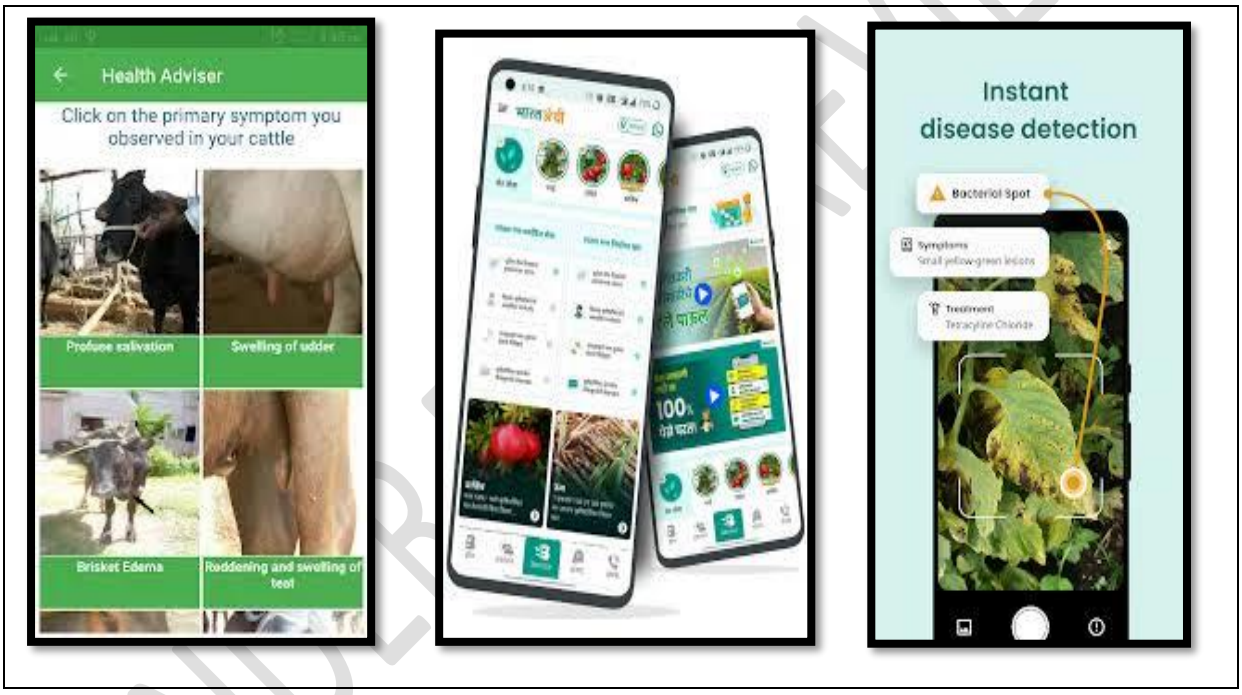

Fig 1. Glimpse of Agriculture Apps on Google Play store

Results and Discussion

Table 1. List of Top Ten Agricultural Mobile Applications

App. Name	Ratings on Google Play store	Downloads on Google Play store	Combined Score	Rank
Plantix	4.3	1,00,00,000	100021.5	1
BharatAgri	4.1	10,00,000	1020.5	2

Cattle Expert System	4.6	10,000	33	8
A Fisher Friend Mobile Application	4.4	10,000	32	9
Kisan Suvidha	3.9	10,000	29.5	10
Pashu Poshan	3.6	50,000	68	7
e-NAM Mobile App	3.6	1,00,000	118	5
Meghdoot	3.5	1,00,000	117.5	6
Crop Insurance	3.4	5,00,000	517	3
IFFCO Kisan	3.3	5,00,000	516.5	4

1. Plantix

With more than one crore downloads and a 4.3 rating, the app was created by PEAT, GmbH, a Berlin-based AI start up in Germany. With cutting-edge technology, the Plantix app is an effective diagnostic tool for plant diseases, pests, and nutritional deficits, making it a valuable resource for farmers. Plantix, which was created with an emphasis on agricultural productivity and sustainability, uses machine learning and artificial intelligence (AI) to give farmers precise and timely answers to crop-related issues.

2. BharatAgri

For farmers, it's an agriculture and smart farming app. enables farmers to increase their total revenue by providing information on cutting-edge satellite mapping, weather forecasting, soil testing, and water testing. It has been downloaded over ten lakh times and has a rating of 4.1. It is a smartphone app that offers tailored, data-driven farming advice in an effort to empower farmers. Utilizing technology, the app provides farmers with customized farming solutions that boost output, maximize resource utilization, and enhance crop yields.

3. Crop Insurance

The Indian Government’s Ministry of Agriculture and Farmers Welfare created this app. It has 5L downloads and 3.4 ratings. In the event that the loanee farmer is using it, it can be utilized to determine the Insurance Premium for notified crops based on region, coverage amount, and loan amount. With crop insurance applications, farmers now have simple access

to services and information that shield their livelihoods from the unpredictable nature of farming. These apps have grown to be invaluable tools for farmers. These applications are made to assist farmers in controlling crop production hazards, like severe weather, pest outbreaks, and changes in the market.

4. IFFCO Kisan

The App was developed by Indian Farmers Fertilizer Cooperative Ltd. It has 3.3 ratings and 5L downloads. It helps access various modules, including agricultural advisory in text, images, audio, and videos in the selected language. It also connects with Kisan Call Centre Services. It is a productive tool that gives farmers access to essential agricultural services and information, empowering them in the process. This smartphone application, created by the Indian Farmers Fertiliser Cooperative (IFFCO), provides a range of features that are specifically designed to meet the demands of the agricultural community with the goal of improving farming operations' productivity, profitability, and sustainability.

5. e-NAM Mobile App

The Ministry of Agriculture & Farmers Welfare, Govt. of India developed this App. It has one lakh downloads and a 3.6 rating. It will enable dealers to bid remotely and give farmers and other stakeholders smartphone access to arrivals and price-related information. It intended to improve farmers' access to market information and simplify agricultural marketing. This software, which was released as a component of the government's e-NAM project, links farmers to a nationwide network of more than 1,000 agricultural marketplaces, or mandis, by allowing them to engage in a single online trading platform.

6. Meghdoot

With more than a million downloads and a 3.5 rating. It will offer weather forecasts that include temperature, precipitation, humidity, wind direction, and speed- all of which are crucial for agricultural operations - as well as advice to farmers on how to best care for their livestock and crops. is a useful tool made to help Indian farmers make agricultural decisions by giving them access to localized, timely meteorological information. Meghdoot, which was developed by the Indian government in partnership with the Indian Institute of Tropical Meteorology (IITM) and the Indian Meteorological Department (IMD), is especially designed to meet the needs of farmers and provides vital information that can have an immediate influence on crop management and production.

7. Pashu Poshan

This app was created by the National Dairy Development Board (NDDB), and it has received over 50,000 downloads and a 3.6 rating. By taking into account the animal's profile-cattle or buffalo, for example - age, milk production, milk fat content, and feeding schedule, a ratio may be created with the aid of this balanced app while optimizing costs. It is a useful tool made to help farmers, especially those in rural and agricultural areas, manage the health and nutrition of their livestock.

8. Cattle Expert System

To help farmers manage their cattle more successfully and efficiently, the Cattle Expert System app is a useful resource. As a digital advisor, this smartphone app gives farmers quick access to tools and professional information on a range of cattle management topics. With a 4.6 rating and over 10,000 downloads, this app was created by TNAU in Coimbatore and C-DAC in Hyderabad. This app includes general care for cattle and buffalo as well as feeding and breeding management, illness management and control, production technologies, and calf management.

9. A Fisher Friend Mobile Application

This app was created by the M. S. Swaminathan Research Foundation in collaboration with Qualcomm as part of their wireless outreach initiative. It has been downloaded over 10,000 times and has a rating of 4.4. It is a one-window solution that makes all pertinent fishing information easily accessible. It is a cutting-edge technology that delivers vital, up-to-date information straight to mobile devices of fishermen and coastal communities, supporting their livelihoods. This program, which was created with fishermen's requirements in mind, has a number of features that improve decision-making, productivity, and safety for people who operate at sea.

10. Kisan Suvidha

The app was created by the Ministry of Agriculture and Farmers Welfare, Govt. of India and it has received over 10,000 downloads and a 3.9 rating. It supports farmers by giving them pertinent data on godowns, cold storage, plant protection, market prices, dealers, seeds, and expert advice. It is an essential tool that is intended to empower Indian farmers by giving them access to timely and pertinent information that would improve agricultural output and decision-making. The app, which was created by the Ministry of Agriculture and Farmers Welfare, is a complete resource for farmers that offers a variety of functions that are suited to their need.

Table 2. Constraints faced by the farmers while using agricultural mobile applications

SI. NO	Constraints	Frequency	Percentage
1	Limited Internet Connectivity	24	80.00
2	Lack of Technical Knowledge	21	70.00
3	Language Barriers	15	50.00
4	Inadequate Localized Content	12	40.00
5	High Data Costs	09	30.00

It was evident from the table. 2 that, majority (80%) of the farmers stated that one of the biggest obstacles to efficiently use these apps was having sporadic or inadequate internet access, especially in rural locations. This restricts their access to current information and changes followed by 70 per cent of farmers reported that their lack of technical expertise made it difficult for them to navigate and use the apps. Many farmers, particularly the elderly, found the user interfaces difficult to navigate and difficult to grasp. Since many apps are only available in English or other non-native languages, half (50%) of farmers reported concern about language hurdles as a hindrance to using the app efficiently. According to 40 per cent of farmers, the applications' usefulness was diminished because the information they offered was not always pertinent to their unique local circumstances, such as the type of soil or climate. 30 per cent of farmers cited high mobile data costs as a barrier, making frequent access to and usage of these apps costly.

Table 3. Suggestions Given by Farmers for Improving Agriculture Mobile Applications

SI. NO	Suggestions	Frequency	Percentage
1	Improve Connectivity	22	75.00
2	Simplified User Interface	20	65.00
3	Language Barriers	18	60.00
4	Inadequate Localized Content	15	50.00
5	Affordable Data Plans or App Sponsorship	09	30.00

It was observed from the table 3. that, three-fourth (75 %) of the farmers reported that, apps should be made to function well even in places with poor internet connectivity, perhaps by using optimized data usage or offline functions. According to 65% of farmers, the apps should have easier-to-use interfaces that need little technical expertise so that people with

different levels of digital literacy may utilize them. In order to improve comprehension and usage, three- fifth (60%) of farmers argued that the apps should support more regional languages. This would allow farmers to access information in their own language. Fifty percent of farmers recommended that the applications offer additional regionally specific information, such as crop advice, localized market prices, and weather forecasts. 30 per cent of the farmers proposed that, either the apps should be optimized for lower data consumption or partnerships should be established with telecom providers to offer subsidized data plans for farmers using these agricultural apps.

Conclusion

The use of mobile applications in agriculture is becoming so commonplace that it is completely changing how farmers manage their markets, resources, and crops. Farmers are able to make well-informed decisions that increase production and profitability by using these apps, which offer real-time information on weather, pest control, crop management, and market prices. It is more likely that mobile apps in the agricultural and related industries will become more integrated and dependent. The production-consumption interface has changed significantly as a result of the employment of information technology tools in agriculture that are widely available, affordable, and friendly to farmers. These apps allow farmers to make well-informed decisions ahead of time, increasing productivity and reducing risk in agriculture to a greater degree.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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