

Agro-based Mobile Apps—A Potential Aid to the Farmers on their Finger Tips

Manu Pattar^{1,*}, K.C. Prashanth²

Abstract

Agriculture is the backbone of our country, but the backbone needs more strength today to cater to the predicted increase in demand for food. Besides India being an agriculture based country, the majority of the farmers are facing many problems like lack of market price information, unnecessary expenditure on chemicals, unnecessary usage of chemicals which is a problem to the environment and the food quality too and many other such problems. Majority of the farmers still rely on information from the local middlemen and the local farming community which might leave them broken with misleading information. During the pandemic and other such critical situations mobility of the farmers will be paralyzed which multiplies the problems and challenge the farmers. Many of these problems arise because of lack of knowledge to access the scientific information. This paper focuses on one of the potential technological intervention that can aid the farmers in accessing the required information and avoid many of the problems stated above. In this paper, an extensive literary review is made to understand the benefits of agro-based mobile applications to the farmers and a few potential android mobile applications are selected from the android app store, and are extensively studied and categorized based on the benefits they provide to the farmers. Further researchers in this domain can also use this information in understanding the benefits that these agro-based mobile applications extend to the farming community which will result in strengthening the backbone of our country.

Keywords: Agro-based mobile applications, Information dissemination, Technology intervention

INTRODUCTION

Agriculture is the backbone of our country, but the backbone needs more strength today to cater to the predicted increase in demand for food. In this leading edge era of technology, agriculture is expected to flourish to an occasion where it is capable to cater to the food needs of global population. Reaching food security needs globally, persists as a challenge, with the increasing demand for food

*Author for Correspondence

Manu Pattar

E-mail: fovskuniversityballari@gmail.com

¹Research Scholar, Department of Management, Vijayanagara Sri Krishnadevaraya University, Ballari, Karnataka, India

²Associate Professor, Department of Management, Vijayanagara Sri Krishnadevaraya University, Ballari, Karnataka, India

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and protein overtaking the population growth rate (Calicioglu et al., 2019) [1]. Besides India being an agriculture based country, the majority of the farmers are facing many problems like High input cost, Lack of proper irrigation knowledge, lack of mechanization, Soil erosion and degradation, Improper marketing facilities, Lack of storage facilities, Inadequate capital, Unorganized setup, Lack of knowledge to access subsidies from the government, lack of market price information, climate change, unnecessary expenditure on chemicals, unnecessary usage of chemicals which is a problem to the environment and the food quality too (Kumar et al., 2020) [2] (Saroj, 2019) [3] (Thakur, 2018) [4] (By et al., 2021) [5].

Because of the COVID-19 pandemic, the governments are imposing lockdowns to stop the spread of the Corona virus pandemic. Amidst this lockdown, the government has provided exemption from lockdown rules to many agri-business operations from producing, harvesting, storing to the transportation of produce to the markets and mandis. Due to frightening rate of increase in positive cases in the country and due to a fact that the infection has entered the remote and rural parts of the country which has increased unrest among the rural population has resulted in paralyzing the their mobility which is disrupting many activities related to supply chain and agriculture. There are reports exhibiting that the migrant labour are not available which is heckling the agri-business and farming activities. The extension services are also immobilized. Disruptions have emerged in supply chains because of transportation problems and other restrictions very evidently. According to a few media reports, due to cessation of hotels and restaurants amidst the lockdown the sales of agricultural commodities are getting impacted. Due to decline or no income for the unorganized labourer and daily wagers, household consumption is also reduced. The actual situation of the farmers on various agricultural activities is daunting (Shirpi, 2020) [6]. As it is very much known that access to information and communication is very much crucial for the agricultural activities and agri businesses in today's world, the farmers and the other important stake holders of agri businesses need a reliable source of information to bridle the unforeseen situation like this. ICT has emerged as a potential solution to solve the problems faced by the farmers during as well as post pandemic situations. Among the ICT solutions, mobile phones play a very prominent role in information dissemination and connectivity. Hence, a survey of agro based mobile applications on android platform is done in this paper and the apps are categorized based on the aid they provide to the farmers in particular phases of his farming activities.

OBJECTIVES OF THE STUDY

- i. To explore the level of inclusion of Indian languages by the agro based mobile apps
- ii. To explore the level of inclusion of each feature in the agro based mobile apps
- iii. To match farmers' problems with the features of the apps that are potential solutions

FARMERS' PROBLEMS

The farmers face myriad of problems especially in a country like India because of many reasons like; uncertain monsoons and climatic conditions, illiteracy and semi literacy of farmers, exploitation of farmers by the middlemen, lack of proper infrastructure, and lack of knowledge with respect to scientific or precision farming, etc.

The review of literatures below, paves way to understand a few more problems faced by the farmers in detail and come a point where the problems can be categorized in a systematic way to conduct this research.

(Saroj, 2019) [3] in her research paper with the objectives of highlighting the problems faced by the farmers and suggesting ICT as a solution to handle the challenges faced by the farmers chose the literary review method to conduct the research using the sources like internet, thesis, research papers, newspapers, magazines, articles etc.

In her research, she has explored the following as the problems faced by farmers;

- a. **High Input Cost:** The farmers are finding that the prices of agri inputs (seeds, fertilizers, pesticides, fungicides, technological interventions) etc., are hitting the roof. The farmers are finding it difficult to afford the quality agri inputs.
- b. **Lack of Proper Irrigation:** Indian farmers majorly depend on monsoon for agriculture. In fact, in support of this, there is a famous saying that "Indian agriculture is a gamble with monsoon." This has led the farmers to incline towards digging their own tube wells which is impacting on the environment too by depleting the ground water.

- c. **Lack of Mechanization:** Many farmers are not able to afford and adopt the latest technological interventions for the agriculture. On one hand, a few do not know the availability of the technological interventions and they doubt the accessibility of the required technology, and on the other hand, a few opine that they are not affordable.
- d. **Soil Erosion and Degradation:** Due to excess use of harmful chemicals on the soil and due to unscientific cultivation practices, soil erosion and degradation is a problem to the farmers and the environment as well.
- e. **Improper marketing facilities:** this is one of sweeping problems faced by the farmers. the farmers are unaware of the reliable marketing solutions to sell their produce at the right prices and they end up in selling the produce to the middlemen who exploit the farmers and pay them a meager amount of money.
- f. **Lack of Storage Facilities:** As the farmers are unaware of easily available and accessible storage facilities and could even be exploited by the local storage facility providers, they find it difficult and unaffordable to store their produce and many times they fail to maintain the required conditions to store the produce where the harvested crop will be at stake.
- g. **Inadequate Capital:** the farmers do not know how to raise the required funds to run their agricultural activities. They are not aware of the different government schemes and subsidies. As a result they end up in borrowing loans from the local financers for higher interests, paying back which, is another crucial problem faced by the farmers.
- h. **Unorganized Set up:** Where the farmers are facing problems with respect to getting deceived from a few MSP outlets, middlemen, cold storage owners and even the inclination of a few insurance agencies towards the urban people rather than supporting the rural farmers.

The author has suggested that using ICT efficiently can help the farmers overcome each of these problems and perform their agricultural activities more effectively and efficiently.

(Kumar et al., 2020) in their research done in Uttar Pradesh, India, have focused on the challenges faced by farmers due to climate change. They conducted the study to find the knowledge and readiness to cope up with the climate change in the region under study. They found out that the climate change is one of the major problems faced by the farmers and the farmers in their responses stated that they are not having much information and knowledge about the abrupt changes in the climate and focus on keeping the farmers informed about the climate changes and their knowledge should be upgraded time to time to face the damage from climate changes [2].

(Thakur, 2018) [4] in her research has taken an initiative in the economic analysis of plight of farmers suicide in India. In her study in the above said direction, the researcher has furnished terrifying statistics related to farmers suicide in India and has stated the reasons behind the suicide of the farmers where the following have emerged out as the major problems contributing to the death of the farmers; The increase in input costs, Cost of chemical fertilizers and seeds, Cost of Agricultural equipment, Labour costs, Distress due to loans, Lack of direct integration with the market, Lack of awareness, Water crisis and Climate change

(By et al., 2021) [5] conducted a study to find out the problems faced by marginal, small, medium and large scale farmers of Tamil Nadu. For their study, they conducted a survey on 150 farmers from one village of eight blocks each in Theni district. They considered the following as the factors (problems) for analysis; Problems related to agricultural inputs, Problems related to government subsidy, Problems related to finance, Problems related to agricultural technology, Problems related to price for agricultural produce. They finally have found out that small and marginal farmers face almost all the problems stated above compared to the other two types of farmers.

(Shirpi, 2020) [6] conducted a study in Salem district in India towards understanding the Operational, Logistics and Marketing Problems faced by the farmers due to COVID-19 crisis and

reviewing mobile applications as a potential solution to the problems. They found out the major problems that can be categorized as logistics problems, Operational problems and marketing problems faced by the farmers during COVID-19 pandemic.

They emerged out with the following as the problems faced by the farmers:

- a. **Operational Problems:** Shortage of labor for harvesting, Unavailability of machinery and equipment for farming, Inadequate supply of material inputs
- b. **Logistics Problems:** Inadequate storage facilities, Restriction of movement of people and goods
- c. **Marketing Problems:** Lack of appropriate market facilities, Lack of market information, reduced demand and consumption, Price fluctuations, Lack of support from government agencies.

Considering all the problems discussed in the literatures above, it is inferred that almost all of the problems occur because of lack of access to information and knowledge by the farmers. If the farmers are equipped with required knowledge and timely information, he can avoid many problems discussed above.

THE PROPOSED CATEGORIZATION OF FARMERS' PROBLEMS

In this paper, the researcher further categorizes the problems based on the phase of farming the farmer is in:

- i. **Problems related to pre sowing/plantation phase:**
 - Problems in selection of seed/sapling varieties
 - Problems due to lack of information about the demand for crops in the market
 - Problems in purchasing and usage of fertilizers for land/soil treatment and preparation
 - Problems from non-treatment of seeds before sowing them
 - Problems in procurement and usage of Technological interventions for sowing of seeds
- ii. **Problems related to sowing and growth phase:**
 - Problems due to unscientific sowing of seeds
 - Problems in purchasing and usage of fertilizers for plant care
 - Problems in purchasing and usage of Nutrition for plant care
 - Problems from mismanagement of water
 - Problems in purchasing and usage of Pesticides, fungicides, weedicides, etc., to treat the diseases and infections
 - Problems/hazards due to mismanagement of chemicals
- iii. **Problems related to harvesting and storage phase:**
 - Problems due to unscientific ways of harvesting
 - Problems due to mismanagement of soil after harvesting
 - Problems due to lack of information about the scientific ways to store the produce
 - Problems due to non-availability of proper storage facility for the produce
- iv. **Problems related to marketing and transportation phase:**
 - Problems due to lack of information about the market prices
 - Problems due to non-accessibility to different markets where the farmer can sell the produce
 - Problems due to non-availability of a reliable means of transportation of the produce
- v. **Problems related to all the phases:**
 - Problems due to bad weather
 - Problems due to lack of upgradation with the industry knowledge
 - Problems due to lack of access to the farming community
 - Problems due to unplanned and unnecessary expenses

ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) AND MOBILE PHONES

ICT has become a very reliable and strong source of information which is helping businesses to run in a trouble free way across many industries. ICT is capable to provide the crucial, timely and

required scientific information to the farmers in all the stages of farming, which helps them to avoid as many problems as possible. (Mahant et al., 2012) [7] in their study on the Uses of ICT (Information and Communication Technology) in agriculture have emphasized that ICT can play a very major role in aiding with timely information in every step of agriculture starting from crop cultivation to water management, fertilizer application, pest management, harvesting, post-harvest handling, Transportation of produce, packaging, safety, storage and marketing of the produce. According to them, lion's share of the problems are due to lack of access to timely information and ICT is the best solution to all the concerned problems.

Among all the ICTs mobile phones stands as the premier ICT solution which has a major share of satisfied users which is growing exponentially. The current era of technology has touched almost all the lives and created a difference in their communication system. Mobile phones have become the most utilized technology for information dissemination and communication. (Radhakrishnan and Sriram, 2020) [8] in their research towards reviewing the role of mobile based advisory system for benefiting the farmers, made an extensive study on the literature globally and found that like other parts of the world, even in India, mobile phones have reached millions of people and have entered the rural India flawlessly. They have concluded that mobile platform is the only key to reach the last mile to connect with people and disseminate timely information. As a prop up to this, a study made by (Naqvi et al., 2020) [9] in Pakistan is directed towards finding the impact of usage of mobile phones by vegetable producers on the production of vegetables, found that the usage of mobile phones has largely helped farmers in production and other allied activities and has created a positive impact on the production of vegetables.

Such studies which have stressed on the importance and benefits of using mobile phones as a potential aid under ICT to the farmers are a few driving forces for this study to focus on agro-based mobile applications.

AGRO-BASED MOBILE APPLICATIONS

Not only basic mobile phones, the usage of smart phones operating with the help of Android, IOS, etc., have also grown in a remarkable way. It is very much evident that a few apps like WhatsApp, Facebook, YouTube, etc., have become an integral part of the society, and factuality is that, there are agro-based mobile applications which cater to both semi literates and literates and are claimed as a potential aid to the farmers and there are adequate researches that prove the benefits for the apps for the farmers. (Prasad et al., 2013) [10] have carried out a research towards solving one of the major problems faced by the farmers i.e., pests and diseases management. According to them this is a kind of problem which can be solved by providing the right information and support in diagnosing and treating the disease or infection. Besides a fact that farmers tend to spend more on chemicals, they even use the chemicals unnecessarily wherever not required and not only lose money, but also dampen the fertility of the soil. In order to tackle this problem in an effective way, they have worked in image sensing technology where they have created a mobile application named Agro mobile, where the farmer can take a photograph of the infected plant and the application will diagnose the infection and prescribe the required treatment to cure the plants from infections using image sensing technology.

(Anand et al., 2015) [11] In an international conference on "Agriculture in an urbanizing society" focused on bridging the information gap using ICT and mobile phone technology by building crop specific information dissemination application. In which they have emphasized on the problems due to non-adoption of package of practices in agriculture. As a result of this non-adoption, the farmers end up in spending more money on the chemicals, fertilizers, and other agricultural inputs which increases their expenses, increases the harm to the environment and deteriorate the food quality. Hence, to address this problem, they came up with a mobile application which needs no internet connection and can solve the problems arising from non-adoption of package of practices and help farmers tackle problems.

(Arrova and Author, 2020) [12] in their study have done an extensive literature review from the following sources; sources from Directory of Open Database Journal (DODJ), records from Ebscohost, Records from Google scholar, and records from other popular articles. They have proclaimed that mobile apps are the potential solutions to the problems faced by the farmers both before and during COVID-19 pandemic. They have even categorized the mobile based applications based on the available literatures and have ranked them based on their usage. The categories that they had considered in their study were; business and financial data, agricultural technology, farm management, animal production, agricultural news, training, agricultural machinery, spraying activities, pests and diseases, weather forecast.

A Survey of Agro-Based Mobile Applications on App Store and Play Store to Understand them in Detail

(Patel and Patel, 2016) in their survey of the agro-based mobile apps have categorized the apps as follows [13]:

- Business apps
- Conference apps
- Diseases and pests apps
- Farm management apps
- Learning and reference apps
- Location-based apps
- Market data apps
- Weather apps

They made a survey of a few select apps and made an effort to categorize these apps in the above made categories and found out how many apps are catering the which category. The apps that they considered were, Farm manager, Agro mobile, Krishi ville, Agriculture supply chain management, Scheduling controlling and monitoring of agricultural devices, E-agree, Agriculture decision support system, Solution for farmer consumer interaction, Maha farm, Farmer helping services, Irrigation control system, Kharif and rabi crop disease information.

(Costopoulou et al., 2016) [14] made a study on agro-based mobile apps by surveying android and IOS platforms and gave a bird view of the agro-based mobile apps globally and made a case study in Greece. They made a detailed survey of the Andriod's play store and Apple's app store and categorized the apps into the following categories; Business and financial data, Animal production, Farm management-Crops, Pests and diseases, Agricultural technology and innovation, Agricultural machinery, Spraying related activities, Weather forecast, Training and Agricultural news. These fall in line with the above discussed paper by (Arrova and Author, 2020) [12]. They conducted a survey on Android and IOS considering the following characteristics; Category of the app, Language, Country of origin, Geographical coverage, Target group, Date, Cost, Size, Downloads and Rating.

METHODOLOGY USED TO CATEGORIZE MOBILE APPS

In the current study, the android apps platform (Play store) was surveyed for Indian agro-based mobile applications using the search key word; Agriculture apps India. In the same lines as in the above literature, the information including name of the application, size of the application, number of downloads, rating given to the app, number of ratings given to the app, number of Indian languages that the app supports and the benefits/features that the app has in it for the farmers were used to perform the survey.

All the apps with many number of downloads, high rating from many users, date of release and date of latest update were selected for the study as those are the apps that are generally in use and are continuously getting updated by the developer. The benefits that those applications extend to the farmers were listed and further categorized in line with the above proposed categorized problems.

RESULTS AND DISCUSSION

As a result of the survey 252 apps were unveiled among which 168 apps were not selected for the study as they were falling under at least any one of the following categories; below 10k downloads, less than 3.0 rating, less than 100 reviewers or no latest reviews or no updates from the developer after 2019. These signs are considered as the application is either not performing well or is not taken care by the developer. A few apps which come among the above said categories were considered for the study as these apps showed exceptional response in the other categories. After all the eliminations, 84 apps were chosen to analyze their features and benefits and find which is the most included feature among the surveyed apps followed by their order and finally categorize the features based on the problems that the farmers face in different phases of farming.

13 Indian languages were selected for the study and the availability of the apps in these languages were recorded and analyzed. Table 1 shows the percentage of availability of apps to access in these languages and the languages are ranked based on the percentages of apps embracing them.

Most of the apps support English language (77.38%) followed by Hindi (60.71%) and Telugu (26.19%). Very less apps are available to access in Assami language (4.76%) followed by next least apps available in Urdu (8.33%), Odia (9.52%) and Bangla (10.71%). As English is the universal language, there is no wonder in English showing the highest percentage of apps followed by Hindi being the most used language in India.

The features of the agro-based mobile apps extracted from the surveyed, selected and analyzed apps and the percentage of the apps with the features included in them are listed in Table 2 which helps us to understand the level of inclusion of each feature among the surveyed apps.

Majority of the apps have included E-Commerce feature (44.04%) followed by Weather forecast (42.85%), POP (34.52%), Expert advice access and Market values indicator (33.33%) and a very few apps have included Transportation aid as a feature (1.19%) followed by next least included feature Hiring aid and Uploading documents (2.38%), Crop advisory and document access (4.76%), etc. The analysis infers that among the surveyed apps, a few features like E-Commerce, Weather forecast, POP (Package of Practices), Expert advice access, Market value indicator, News and Updates, Disease and Pest management and Farmers' Community are embraced more by the applications. It can be further inferred that the applications are encompassing the above said features highly because the farmers in India would be using the apps majorly for benefiting from these features.

Table 1. Showing the percentage of apps existing in different languages in India in descending order.

S.N.	Languages	Percentage of existing apps
1	English	77.38%
2	Hindi	60.71%
3	Telugu	26.19%
4	Gujrati	21.42%
5	Kannada	20.23%
6	Marathi	19.04%
7	Tamil	17.85%
8	Malayalam	15.47%
9	Punjabi	14.28%
10	Bangla	10.71%
11	Odia	9.52%
12	Urdu	8.33%
13	Assami	4.76%

Table 2. Showing the percentage of apps including the following features in India in descending order.

Features	Percentage of apps
E-Commerce	44.04%
Weather forecast	42.85%
POP (Package of Practices)	34.52%
Expert advice access	33.33%
Market value indicator	33.33%
News and Updates	32.14%
Disease and Pest management	29.76%
Farmers' Community	27.38%
Govt. schemes subsidies and insurances	15.47%
Crop Calendar	10.71%
Calculators	10.71%
Technology intervention Information	10.71%
Record keeping	9.52%
Soil testing information	7.14%
Live-stock management	7.14%
Documents access	4.76%
Crop advisory	4.76%
Upload documents	2.38%
Hiring aid	2.38%
Transportation aid	1.19%

Categorization of Agro-based Mobile Apps

Information from the apps' description gives the features present in the app. A few apps include many features which are used in many different phases of agriculture. But the apps with many features regard some as major and some as supporting features. Hence, in this study, every feature is considered as an exclusive app and the categorization of apps is made based on features in lieu of using the app's names and categorizing them. When compared with the above proposed categorization of farmers' problems, the apps can be classified in line with the phases of the agriculture in which the farmer utilizes the features. The apps are categorized as follows (Table 3–7).

Table 3. Apps for pre sowing and plantation phase

Farmers' Problems	Apps with the features that have potential to solve the proposed problems
Problems in selection of seed/sapling varieties	POP (Package of Practices)
Problems due to lack of information about the demand for crops in the market	Market value indicator
Problems in purchasing and usage of fertilizers for land/soil treatment and preparation	POP, E-Commerce, Crop calendar and Crop care, Fertilizer Calculators, Soil testing information and Expert advice access
Problems from non-treatment of seeds before sowing them	POP and Expert advice access
Problems in procurement and usage of Technological interventions for sowing of seeds	E-Commerce, Technology intervention information

Table 4. Apps for sowing and growth phase

Farmers' Problems	Apps with the features that have potential to solve the proposed problems
Problems due to unscientific sowing of seeds	POP (Package of Practices)
Problems in purchasing and usage of fertilizers for plant care	POP, E-Commerce, Crop calendar and Crop care, Fertilizer Calculators and Expert advice access
Problems in purchasing and usage of Nutrition for plant care	POP, E-Commerce, Crop calendar and Crop care and Expert advice access
Problems from mismanagement of water	POP, Crop calendar and Crop care and Expert advice access
Problems in purchasing and usage of Pesticides, fungicides, weedicides, etc., to treat the diseases and infections	E-Commerce, POP, Disease and Pest management, Crop calendar and Crop care and Expert advice access
Problems/hazards due to mismanagement of chemicals	POP and Expert advice access

Table 5. Apps for harvesting and storage phase

Farmers' Problems	Apps with the features that have potential to solve the proposed problems
Problems due to unscientific ways of harvesting	POP, Crop calendar and Crop care and Expert advice access
Problems due to mismanagement of soil after harvesting	POP, Crop calendar and Crop care and Expert advice access
Problems due to lack of information about the scientific ways to store the produce	POP
Problems due to non-availability of proper storage facility for the produce	Hiring aid, Transportation aid and Govt. schemes subsidies and insurances

Table 6. Apps for marketing and transportation phase

Farmers' Problems	Apps with the features that have potential to solve the proposed problems
Problems due to lack of information about the market prices	Market value indicator
Problems due to non-accessibility to different markets where the farmer can sell the produce	Market value indicator, E-Commerce
Problems due to non-availability of a reliable means of transportation of the produce	Transportation aid, E-Commerce

Table 7. Apps for all the phases

Farmers' Problems	Apps with the features that have potential to solve the proposed problems
Problems due to bad weather	Weather Forecast
Problems due to lack of upgradation with the industry knowledge	News and Updates
Problems due to lack of access to the farming community	Farmers' community
Problems due to unplanned and unnecessary expenses	POP, E-Commerce, Crop calendar and Crop care, Fertilizer and other calculators, disease and pest management and Record keeping

CONCLUSION

In accordance with the objectives of the study, the researcher found that agro-based mobile apps are available in many Indian languages which is a major aid for the semi-literate and literate farming community and a few languages should be concentrated more by many potential apps which do not support those languages. And when the features were analyzed the researcher found that the application provide a plethora of features which provide diverse aids to the farmers and extend a commendable effort in solving many problems of the farmers. The majority of the problems that arise because of lack of scientific, reliable and timely information. These agro based mobile applications with such variety of features has complete potential to solve the problems faced by the farmers during and even after the COVID-19 pandemic.

Teaching Notes

Target Group

Undergraduates and postgraduates (Specifically MBA, MCA, BCA, BBA, B.Sc. Agri or M.Sc. Agri, etc.), Research scholars (domains like; Mobile phone apps technology, ICT, Agriculture, Agri business sustainability, Business decision making, Information technology in agri business, etc.), Executives (mobile app developers, agri businessmen, farmers, agri input dealers, etc.)

Learning Objectives

To Understand the Operational Problems Faced by Farmers in India

This paper gives an insight on the operational problems faced by the farmers on the field in India and has found that majority of the operational problems arise because of lack of information or misleading information which makes them to take wrong decisions and face losses. The chapter 3 and 3.1 gives in depth explanation of the problems faced by the farmers on the field in India.

To Understand the Level of Penetration of ICT and Mobile Phones in Agriculture

This paper helps to understand the level of penetration of ICT and mobile phones in the area of agriculture and the potential of a mobile phone to act as a medium to deliver crucial information for agri business in India. The chapter 4 has a brief on the usage of mobile phones for ICT services in agri business.

To Understand Agro based Mobile Apps

This paper helps the reader to understand the nature of agro based mobile apps, their status in India, the path way of this technology and the level to which the technology is upgraded in India agricultural scenario. The chapters 5, 5.1 and 7 will let you understand the agro based mobile apps, the benefits that they promise to give and the problems that they are able to solve in detail.

To Ignite Thought Process and Research in Conceiving New Product Ideas

Keeping the updates provided in this paper regarding the mobile apps in agricultural industry into consideration, the brainstorming of new ideas to develop new products and designs in this domain is another learning objective that this paper caters to. The entire paper gives foundational information to know the field of mobile phone applications in agricultural industry and helps the students, scholars and other executives in the context to further add to the knowledge in providing much stronger ICT to the farmers and strengthen agri businesses.

To Understand the Importance of having a Strong MIS (Management Information System) in Agribusinesses

This paper paves way for the students and researchers in this domain to understand the importance of having a strong Management Information System for the farmers who are actually managing their agri businesses. Their operational performance becomes more productive with the help of ICT and a proper MIS in the business. And the agro based mobile apps acts as a provider of a strong MIS to the farmers.

Questions for Discussion

1. Research and brainstorm to come up with new product ideas that you can conceive in the domain of ICT/mobile apps to solve the problems of the farmers
2. Discuss the key factors that motivate the users (farmers) to adopt to the new technology in the field of ICT.
3. Explain the importance of having a strong MIS in agri business using this case-let as an example.

Relevant Theories for Discussion MIS–

Management Information System,
TAM–Technology Acceptance Model,
IST–Information Systems Theory

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