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**Rushabhkumar Patel**  
MBA Student,  
Navsari Agriculture University,  
Navsari, Gujarat, India

**Dr. Mehul G Thakkar**  
Associate Professor in HRM and  
University Placement &  
Counselling Head, Navsari  
Agriculture University, Navsari,  
Gujarat, India

## Awareness, expectations and usage of agricultural apps by farmers in Banaskantha district of Gujarat

**Rushabhkumar Patel and Dr. Mehul G Thakkar**

### Abstract

In an agrarian economy like India wherein majority of Indian population depend on agriculture and allied occupation; there is an urgent need to give a facelift to our agriculture from a tradition-bound subsistence oriented farming system to commercial market driven techno savvy production with emphasis on value addition, quality, efficiency and export orientation. Use of ICT tools, techniques and applications can have galvanizing effect on Indian agriculture and it can positively affect farmers' productivity and income. Ironically, use of Agricultural Apps is still at a nascent stage in India as compared to other countries. The challenges of irrelevant data, lack of knowledge of technology, training for usage seem to be stumbling blocks to wide spread awareness and usage. In this regard, the present Empirical Research Paper, utilizing the published theoretical literature and Communication Approach of the Descriptive Cross-sectional research design, assesses the awareness, expectations and usage of agricultural apps by farmers in Banaskantha district of Gujarat. Based on a survey of 200 farmers selected through multi-stage sampling method, this study found that there is a big gap between farmers' awareness and usage of agricultural apps. The findings suggest that majority (94%) farmers are aware about Agri Apps, but only 52.13% of them are users of it. Further, farmers use Agri. Apps mostly for weather forecasting data, crop insurance, market price, crop advisory and input purchase. The top three most expected features in Agricultural Apps are found to be weather forecasting, pest & disease management and nutrient management. The outcome of this hitherto research study will help the Agritech companies in developing Agricultural Apps by incorporating expected features and it will also be useful for the extension functionaries to develop strategies to popularize the usage of Agricultural Apps among the farmers; ultimately contributing to the missionary goal of doubling farmers' income.

**Keywords:** Agrarian economy, agricultural apps, awareness, expectations, nutrient management, pest & disease management, weather forecasting

### 1. Introduction

India is an agrarian economy and agriculture sector in India is a primary source of livelihood for a majority of the population. Serving as the ideal building block of our economy since times immemorial, with the passage of time, from the infancy stage of merely subsistence farming; the agriculture sector has matured in the form of business venture. Today, agriculture and allied sectors employ more than 60 percent of Indians directly or indirectly, generating 18 percent of the country's GDP. India is one of the world's largest producers of most agriculture crops. Despite high level of production, agriculture yield in India is lower than other large producing countries. Hence, to remain remunerative, vibrant and sustainable in the post-liberalized global market driven economy, there is an urgent need to give a facelift to our agriculture from a tradition-bound subsistence oriented farming system to commercial market driven techno savvy production with emphasis on value addition, quality, efficiency and export orientation. In agriculture, access to relevant and timely information is of paramount importance for the farmers. Related to this, the challenging task for farmers is information management mainly in terms of the amount of data and the complexity of processes in precision farming. To meet this pressing challenge in this digital era, technology driven smart mobile apps cater to the needs of the farmers. Use of ICT tools, techniques and applications can have galvanizing effect on Indian agriculture and it can positively affect farmers' productivity and income. Mobile application has emerged as one of such technologies that can be used directly in agricultural growth. Ironically, use of Agricultural Apps is still at a nascent stage in India as compared to other countries. Considering the importance of mobile based applications in agriculture, the present study was carried out to know the awareness, expectations and usage of agricultural apps by farmers of Banaskantha district of the vibrant state of Gujarat.

**Corresponding Author:**  
**Rushabhkumar Patel**  
MBA Student,  
Navsari Agriculture University,  
Navsari, Gujarat, India

## 2. Materials and Methods

The study was carried out with the following Research Objectives:

- To study the socio-economic profile of farmers.
- To study the awareness level of farmers regarding agricultural Apps.
- To study usage of various Agricultural Apps by farmers.
- To find out the expectations of farmers regarding agricultural Apps.
- To suggest action steps for increasing usage of Agricultural Apps by farmers.

Descriptive cross-sectional research design has been used for the study. Primary data have been collected through a structured interview schedule. Secondary data were collected from prior research studies, electronic databases and websites. Multistage sampling method was used to select 200 farmers as respondents.

### 2.1 Sampling Plan

**Stage 1:** Out of 14 talukas of Banaskantha District, 8 talukas were selected randomly through lottery method.

**Stage 2:** Out of 8 talukas, 5 villages from each taluka were selected randomly through lottery method.

**Stage 3:** From each village, 5 farmers were selected purposively.

## 3. Review of Literature

Mittal and Mehar (2015) <sup>[11]</sup> discovered that some socioeconomic variables of farmers, such as age, level of education, income, and farm size, were strongly associated to farmers' use of various agricultural information sources. These insights can be used to develop programs that are personalized to the requirements of individual farmers. Simply said, using these insights, data providers may be able to better forecast which types of farmers will use their data. These findings highlight the importance of complementarity when using several sources of information, as well as the importance of education in linking farmers to new sources of information.

According to Costopoulou *et al.* (2016) <sup>[5]</sup>, mobile apps are seeing exponential growth in a variety of commercial areas, including entertainment, information, education, banking, tourism, and health. In the mobile agricultural app market, the number of shown apps is around 1300, which is a very tiny amount in comparison to the importance of agriculture in the global economy. It was discovered that mobile agricultural apps are not growing at the same rate as the supply side. According to the survey, mobile agricultural applications have a low rating in the stores' associated tag, indicating that they do not suit the needs of agricultural stakeholders. The majority of these apps cater to the needs of farmers, and more than one-third of them are free to download. iOS is the most popular platform among publishers for mobile agriculture apps (581 apps), followed by Android (551 apps). Other platforms are losing popularity. The majority of the apps are published in the United States, and the primary language is English. In addition, they offer restricted geographic coverage for other countries.

Rashid and Islam (2016) <sup>[17]</sup> reported that the main issue affecting farmers in the research area was a lack of understanding about e-agriculture. Furthermore, the study discovered that characteristics such as farmer education, involvement in training, e-Agriculture usage, attitude toward

e-agriculture, and e-agriculture availability were responsible for 65.8 percent of the concerns farmers had with e-agriculture. Furthermore, the researchers suggest that non-governmental organizations (NGOs) and local government entities promote farmer knowledge of the availability and utility of e-Agriculture services through local seminars and training programs.

According to Shaikh (2017) <sup>[19]</sup>, out of 95 farmers, 79 do not utilize any agriculture-related mobile applications, and only a few use agricultural apps for their agricultural tasks. It is interesting to learn that farmers were not using agricultural-related software despite their availability, which was generally free. They do use smartphones to some extent, but the applications they use are the standard ones that everyone uses.

According to Barh and Balakrishnan (2018) <sup>[3]</sup>, smartphones are one of the effective technologies that have benefitted a big number of individuals in the developing countries. Mobile applications are revolutionizing agriculture in India. To make agribusiness more productive, seamless, and respectable, it must be linked to cutting-edge technologies. These technologies must become smarter, faster, and less expensive to employ. One of these technologies that can be used directly in agricultural expansion is mobile applications. The solutions for expanding application-based information necessitate the removal of impediments such as better modest handsets, compatible smart phones, a multilingual platform, subsidized internet packs, regular trainings, and farmer awareness. Smartphones are an example of overcoming adversity by bridging the rural digital divide, delivering financial benefits, and acting as a catalyst for social mobilization through enhanced communication.

Naredla *et al.* (2018) <sup>[12]</sup> found that weather information, soil information, pesticide information, fertilizer information, and other issues were the most pressing concerns in use of agricultural applications.

Janarthanan *et al.* (2019) <sup>[9]</sup> found that in agriculture, farmers were largely unaware of the Android mobile application. Farmers were extremely pleased with the performance of the TNAU android expert system application in sugarcane. To popularize this application among sugarcane growers, adequate extension efforts and appropriate result oriented interventions are required.

Mandi and Patnaik (2019) <sup>[10]</sup> reported mobile technology is revolutionizing access to information among agrarian populations. Farmers may now access new apps thanks to the digital revolution and increased internet availability in rural areas. Several new apps are being developed in response to new requirements and challenges in agriculture and related industries. It was suggested that mobile apps should aim for holistic rural development through gender-sensitive technology, farmer training and capacity building using technology-driven platforms for income production activities.

Barbosa *et al.* (2020) <sup>[2]</sup> discovered that agricultural apps have a diverse set of features. Although the majority of apps were related to periodicals and market information, apps on farm management, pests and diseases, precision farming, and technical support were prevalent. The countries with the most apps were the United States, Brazil, and India, which accounted for 64% of all apps discovered. However, the diversity and availability of paid apps were larger in the United States and Brazil than in India. Between 2015 and 2018, there was a significant growth in the number of agricultural applications and nations that generated them,

demonstrating a growing interest in this technology. In the study by Bolfe *et al.* (2020)<sup>[4]</sup>, 84 percent of Brazilian farmers employ at least one digital technology, and this ratio falls as the technological sophistication of the application grows. Connectivity, mobile apps, digital platforms, software, global satellite positioning systems, remote sensing, and field sensors were the primary technologies used in the study. The main benefits claimed by Brazilian farmers include increased productivity, higher product selling potential, better planning, and control of production systems.

Agriculture mobile applications, according to Ganeshan and Vethirajan (2021)<sup>[6]</sup>, connect agricultural producers and give them with shared knowledge on how to maximize the productivity of their properties. Cloud computing, integrated IT systems, and online education via mobile phones make it easier to provide agricultural information to farmers in the poorest communities. Better connectivity and information flow can assist farmers in making more informed land management decisions.

In their pioneering study in Pakistan, Riaz *et al.* (2022)<sup>[18]</sup> reported that age group and education level played a key impact in shaping farmers' perceptions of the aspects that were accounted for in the use of smartphone technology. However, neither education nor age played an impact in farmers' perceptions that smartphone apps aid in enhancing agricultural production. According to the study, farmers' proper use of smartphone technology can be extremely beneficial for increasing agricultural production in Pakistan. They also proposed that farmers be educated on how to make the maximum use of smartphone technology for agricultural growth.

Patel and Thakkar (2023)<sup>[14]</sup> reported that Indian farmers have started using smart phones and internet services but they are

not yet aware about the strength of this technology and how they can use such technologies for their agricultural purpose. Progressive farmers are always an exception to this general rule. But they are still in minority in terms of numbers. People of new generation are very techno friendly and when they will do farming, they will prefer smart-work rather than hard-work. They will use such digital technologies and digital services very effectively for farming purpose.

#### 4. Results and Discussion

##### 4.1 Socio-economic characteristics of respondent farmers

Table 1 shows the socio-economic characteristics of respondent farmers. Out of 200 respondents in Banaskantha district, 39 percent of respondents were under the age group of 31 to 40 years and 33 percent of respondents were under the age group of 41 to 50 years followed by age group above 50 years (17%) and 20 to 30 years (11%). Mostly (44%) farmers were under the SSC group followed by below SSC (32%), HSC (16%), and graduate (8%) in education. mostly (56%) respondents were under 3 to 5 members household followed by above 5 members household (28.5%) and below 3 members household (15.5%). mostly (43.50%) respondents were doing Farming + Livestock followed by Farming + Business (19.5%), Farming + Livestock + Business (18%), Farming + Livestock + Service (9%), Farming + Service (5.5%) and Farming Only (4.5%). Only 4.5 percent respondents were depended on farming only. Majority of respondents were connected with other occupation with farming. Majority of respondents were connected with other occupation with farming. This shows progressive nature and outlook of farmers. mostly (54.5%) respondents belongs to the group of semi-medium followed by medium (18.5%), Marginal (13%), Small (8.5%), and large group (5.5%) for farm landholding.

**Table 1:** Socio-economic Profile of Respondent Farmers

Particular	Parameter	No.	Percentage (%)
Age	20 to 30 Years	22	11
	31 to 40 Years	78	39
	41 to 50 Years	66	33
	Above 50 Years	34	17
Education	Below SSC	64	32
	SSC	88	44
	HSC	32	16
	Graduate	16	8
Household	Below 3 members	31	15.5
	3-5 members	112	56
	Above 5 members	57	28.5
Occupation	Farming Only	9	4.5
	Farming + Livestock	87	43.5
	Farming + Service	11	5.5
	Farming + Business	39	19.5
	Farming + Livestock + Service	18	9
	Farming + Livestock + Business	36	18
Farm Landholding	Marginal (up to 1 Ha)	26	13
	Small (1-2 Ha)	17	8.5
	Semi Medium (>2-4 Ha)	109	54.5
	Medium (>4-10 Ha)	37	18.5
	Large (more than 10 Ha)	11	5.5

##### 4.2 Awareness and Usage of Agricultural Apps by Respondent Farmers

Out of 200 respondents in Banaskantha district, all (100%) respondents own Smartphone. In the era of digitalization, farmers are also taking benefits of technologies. Mostly (45.50%) respondents use their phone occasionally for

Agriculture information followed by many times (24.50%), Always (18.50%), Rarely (9.50%) and never (2%).

Majority (94%) respondents were aware about Agri. Apps while only 6 percent of respondents were not aware about Agri apps. Out of 188 respondents, who were aware about Agri. Apps., 39 and 33 percent of respondents got to know

about Agri. Apps from Progressive farmers and social media respectively. Some (17.50%) respondents got to know about Agri. Apps from friends, while about 10.5 percent respondents got to know about Agri. Apps from Agro centre, Consultant, KVK and Government Institute.

Out of 188 respondents, who were aware about Agri. Apps., mostly (52.13%) respondents were using it, while 47.87 percent of respondents were not using it. Out of 98 respondents, who were using Agri. Apps., 47.96 percent of respondents were using Agri. Apps from less than 1 year while 35.71 of respondents were using it from 1 to 3 years. Remaining 16.33 of percent respondents were using it from more than 3 years. Out of 98 respondents, who were using Agri. Apps., 33.67 and 24.49 percent of respondents were using Agri. Apps for Weather forecasting and market price. While 15.31, 12.25 and 8.16 percent of respondents were using it for, purchase input, crop advisory and insurance purpose respectively. Some (6.12%) respondents were using it for other information. Out of 98 respondents, who were using Agri. Apps., only 36.72 respondents said that apps provide customer services to them while 63.27 percent of respondents said that no customer services were provided to them.

#### 4.3 Expectations of respondent farmers regarding Agricultural Apps

**Table 2:** Expected Features in Agri. Apps

Features	Mean Score	Rank
Weather Forecasting	4.50	1
Pest & Disease Management	4.44	2
Nutrient Management	4.37	3
Crop Information	4.02	4
Water Management	3.76	5
Soil Information	3.06	6
Harvesting Management	3.01	7
Government Scheme	2.60	8
Price of Commodities	2.47	9
Input Service	2.32	10

As per the data reported in Table 2, the top three most expected features in Agricultural Apps are found to be weather forecasting ranked first, pest & disease management ranked second and nutrient management ranked third. The least expected features out of total ten features identified on the basis of secondary data, are information regarding Government Scheme, Price of Commodities and Input Services. This partly explains the farmers' mentality and the underlying reasons of low propagation of agricultural apps among the farmers.

**Table 3:** Suggestions of Farmers

Suggestions	Frequency	Percentage (%)
Arrange Training Programmes	18	9
Give Relevant Information	7	3.5
Provide Customer service	6	3
Local Language	12	6
User-friendly interface	5	2.5

An attempt was made to have suggestions from the respondent farmers for popularizing the use of Agricultural Apps. Table 3 shows the suggestions given by these farmers. Out of 200 respondents, only 48 respondent farmers were progressive in terms of opening up and giving fruitful suggestions for increasing usage of Agricultural Apps. 9

percent farmers suggested arranging regular training programmes for spreading awareness and guiding farmers for handling such apps. Other useful suggestions given by farmers were related to making user-friendly interface, giving only relevant information, providing customer service support and providing information in local language.

#### 5. Conclusion

Agriculture plays a major role in Indian economy. Accurate information regarding farming can help farmers to increase their productivity and income. In the era of digitalization, Indian farmers have also started to harness the power of ICT tools. Agricultural Apps are helping farmers by giving them accurate information about farm activities. This study was undertaken to understand the Awareness, Expectations and Usage of Agricultural Apps by farmers in Banaskantha district. Analysis of this survey shows that farmers are aware about Agricultural Apps but all of them are not using it in daily activities. According to the analysis, all respondents own Smartphone. From them, most (45.50%) respondents use their phone occasionally for Agriculture information. Majority (94%) respondents were aware about Agri Apps, but only 52.13 percent of respondents were using it. Furthermore, to increase usage of Agri. Apps, company can plan to go for campaigning, farmer meeting, field visit, digital marketing, etc. The developers should also focus on user-friendly interface and giving only relevant information. Providing customer service support and information in local language can also prove beneficial in attracting more and more farmers for using these apps. The extension functionaries should organize training programmes at regular intervals for spreading awareness and guiding farmers for handling such apps. The outcomes of the study will surely help in understanding farmers' expectations and pave the way for developing the Apps which may be best fit for Indian farmers.

#### 6. Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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