P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
Gujarat Journal of Extension Education Vol. 39 : Issue 1 : June - 2025 https://doi.org/10.56572/gjoee.2025.39.1.0006

EXPLORING THE SCOPE TO START AUTO ADVISORY SERVICES FOR GROUNDNUT GROWERS

A. P. Prajapati[1], D. V. Patel[2] and B. N. Kalsariya[3]

1 Assistant Professor, Dept. of Agricultural Statistics, College of Agriculture, JAU, Junagadh - 362 001
2 Prof. & Head, Dept. of Agricultural Statistics, College of Agriculture, JAU, Junagadh - 362 001
3 Prof. & Head, Dep.t of Agricultural Extension, College of Agriculture, JAU, Junagadh - 362 001
Email: apprajapati@jau.in

ABSTRACT

There are different kinds of advisory systems available for farmers some of them are at local places for face to face discussions, telephonic conversations and online websites/mobile apps, kiosks etc. Generally, it was observed that very few farmers come forward for face to face discussion or telephonic conversion with agriculture scientists or extension officers/ workers. Thousands of web pages or lots of materials can be served to the farmers through the links of different categories of a website or a kiosk. But farmer have to visit the website or kiosk and find out the related information. But it was generally observed that when farmers face some problem or need advice on some topic or like to know some information about the particular practices, they don't access the so many link categories and pages available on different websites and find out the information from related pages, even though farmers cannot remember all the information served through webpages or kiosks links. So, all above methods are not time specific and location specific. Auto advisory system is time specific and location specific advisory system in which we can provide the information in few lines in local language just before the farmer's actual requirement and at actual location. Therefore, this method is most effective. Many web applications and mobile apps had been developed for farmers in last decade. But no one auto advisory system is available in Gujarati language for specific needs of groundnut Growers of the Saurashtra Region. Therefore, a pre-study survey was undertaken by the Department of Agricultural Statistics, JAU, Junagadh & all KVKs of the Saurashtra Region for the exploring the scope to start Auto Advisory Services for groundnut growers in Saurashtra region. The results of this pre-study survey was discussed in this paper.

Keywords: *auto advisory services, ICT, KVK, groundnut growers*

INTRODUCTION

The agricultural sector is increasingly leveraging Information and Communication Technology (ICT) to overcome traditional barriers to information dissemination, especially among small and marginal farmers. Among the various ICT innovations, mobile-based agro-advisory services have emerged as vital tools for delivering timely, location-specific, and personalized information on weather, crop management, pest and disease control, and market prices. These services empower farmers to make informed decisions, leading to increased productivity and income, and greater resilience to climatic and economic uncertainties (Pratik and Vinaya, 2021).

A growing body of research has underscored the features contributing to the effectiveness of mobile agro-advisory services, such as user-friendly interfaces, content in local languages, and real-time interactive platforms. Studies by Kavaskar et al. (2019), Radhakrishnan and Sriram (2020); Patel *et al.* (2023); Jalu *et al.* (2022); Jalu *et al.* (2023); Bhimani *et al.* (2022) emphasize the importance of personalization, ease of use, and two-way communication. Further, case studies like mKRISHI® and AGRIVI have demonstrated the positive impact of mobile advisories in real-world settings, despite challenges such as technological barriers and the need for localized content.

Complementing these findings, recent empirical research by Zade et al. (2024) explored the determinants influencing ICT tool utilization among agricultural research scholars. The study revealed that psychological and cognitive factors—such as mass media exposure, knowledge about ICT tools, perceived effectiveness, and possession of devices—were significantly associated with the extent of ICT usage, while socio-demographic variables showed minimal impact. These insights reaffirm that the successful deployment of ICT-based systems hinges not just on availability, but also on user readiness, relevance, and system accessibility.

In this context, the development of an ICT-based Auto Advisory Service for Groundnut Growers necessitates a foundational assessment of user expectations, functional requirements, and the technological ecosystem. Groundnut

cultivation, being sensitive to agro-climatic variations, calls for precise, context-aware, and season-specific recommendations. Therefore, this study aims to evaluate the scope, stakeholder needs, and critical design features essential for developing a robust auto-advisory platform tailored to groundnut farmers. The outcomes will guide the design of a user-centric, data-driven solution that enhances the effectiveness of agricultural extension through digital innovation.

In future, the result of proposed study may be very useful to the extension functionaries and policy makers to consider important features and overcome the constraints of Auto Advisory Services. This study will be focused on the basic requirements for the successful implementation of existing and future ICT based projects of the state government, central government, SAUs and other agencies in the domain of agriculture and its allied fields.

OBJECTIVES

(1) To explore the scope of Auto Advisory Services for groundnut growers

(2) To know the expectations of farmers about Auto Advisory Service

METHODOLOGY

This study employed a cross-sectional survey design to assess and compare the perceptions, expectations, and behavioral practices of groundnut growers regarding ICT-based advisory tools. The focus was to evaluate the scope and key determinants for the development of an Auto Advisory Service tailored to groundnut cultivation in the Saurashtra region.

A structured questionnaire, prepared in the local Gujarati language by the Department of Agricultural Statistics, Junagadh Agricultural University (JAU), was used to collect data. The survey was conducted through personal interviews by staff at the respective Krishi Vigyan Kendras (KVKs) across nine districts of Saurashtra. In the first round (2019–20), data were collected from 456 farmers. A follow-up study in 2021–22 extended the survey with an updated questionnaire to the same respondents (data from 347 respondents of 7 KVKs were successfully re-collected, as data from Jamnagar and Kodinar were not available).

The questionnaire was designed to capture a wide range of variables including:

- Demographic and socio-economic characteristics
- Usage of mobile apps, web portals, and kiosks
- Reception and perception of SMS-based advisories
- Ranking of information priorities for groundnut farming operations
- Attitudes toward proposed features of an Auto Advisory System

For the purpose of **comparative analysis**, a panel dataset (2019–20 and 2021–22) was created using responses from 347 common participants.

Statistical tools and techniques applied

To derive meaningful insights, the following statistical techniques were used:

- **Descriptive Statistics**: Frequency, percentages, and means to summarize respondent profiles and response distributions.
- **t-Test**: Applied to examine differences between groups (e.g., ICT users vs. non-users) on variables like education, age, and advisory preferences.
- **z-Test**: Used to test the significance of change in proportions over the two survey years (e.g., increase in mobile/web usage).
- **Coefficient of Correlation (Pearson's r)**: Computed to assess the strength and direction of linear relationships between continuous variables such as education level and ICT usage.
- **Multiple Linear Regression Analysis**: Conducted to identify significant predictors of ICT tool adoption (e.g., SMS reception, app usage), with education, device ownership, and user attitudes as independent variables.
- **Path Analysis**: Employed to evaluate both **direct and indirect effects** of influencing variables (e.g., device access, previous ICT experience, and perceived relevance) on overall ICT usage.
- **Priority Ranking Analysis**: Mean rank scores were computed for 14 different farm advisory needs to determine the most demanded content categories for SMS delivery.

Data analysis and computations were performed using statistical software including MS Excel, SPSS, and Python (for path diagram generation).

This robust methodological framework enabled a comprehensive evaluation of both the quantitative usage patterns and qualitative preferences of groundnut farmers, providing strong empirical backing for exploring the scope of Auto Advisory Service design.

RESULTS AND DISCUSSION

Demographic characteristics and digital exposure

Table-1: Age Group Wise Distribution Year-2019-20 (n=456)

Sr. No.	KVK	18-25	26-30	31-35	35-40	40-45	45-55	Total	Mean Age
1	**Amreli**	0	0	04	15	14	17	50	43
2	**Shihor**	05	07	10	07	10	5	44	36
3	**Kodinar**	04	07	05	09	13	21	59	41
4	**Jamnagar**	06	03	11	08	12	10	50	38
5	**Morbi**	0	02	05	10	22	14	53	42
6	**N.Kandhasar**	0	0	03	05	14	28	50	46
7	**Targhadia**	0	02	06	15	18	9	50	41
8	**Pipaliya**	04	03	12	08	10	13	50	39
9	**Khapat**	05	01	11	11	10	12	50	39
Total		**24**	**25**	**67**	**88**	**123**	**129**	**456**	**41**
% wise overall Distribution		5.3	5.5	14.7	19.3	27.0	28.2	100	
Cumulative % (≤)		5.3	10.8	25.5	44.8	71.8	100		
Cumulative % (≥)		100	94.7	89.2	74.5	55.2	28.2		

Table-2 : Education wise distribution of the respondents Year-2019-20 (n=456)

Sr No	KVK	PG	UG	HSC	SSC	05-09	01-04	Illiterate	Total	Mean Level
	Level(x) →	**17**	**15**	**12**	**10**	**7**	**2.5**	**0**		
1	**Amreli**	0	01	10	24	14	0	01	50	09
2	**Shihor**	0	04	08	4	22	05	01	44	08
3	**Kodinar**	03	14	12	12	08	04	06	59	10
4	**Jamnagar**	02	11	14	10	08	04	01	50	11
5	**Morbi**	0	03	07	17	24	02	0	53	09
6	**N.Kandhasar**	0	0	04	3	15	24	04	50	05
7	**Targhadia**	0	01	06	14	12	11	06	50	07
8	**Pipaliya**	04	03	12	8	10	13	0	50	09
9	**Khapat**	03	02	08	10	14	08	05	50	08
Total		**12**	**39**	**81**	**102**	**127**	**71**	**24**	**456**	08
% wise Overall Distribution		2.6	8.6	17.8	22.4	27.8	15.5	5.3	100	
Cumulative % (≤)		2.6	11.2	29	**51.4**	79.2	94.7	100		
Cumulative % (≥)		100	97.4	88.8	71.0	48.6	**20.8**	5.3		

Out of 456 respondents, 89.2% were above 30 years of age, with a mean age of 41. Educational analysis revealed a mean education score of 8, indicating a moderately literate farming population.

The mean age of respondents was 41 years, with 89.2% older than 30 years. Educationally, the mean score was 8 (on a 17-point scale), showing moderate literacy. These factors were considered independent variables to assess their association with ICT usage.

- t-test results show a significant difference in ICT usage ($p < 0.05$) between younger farmers (≤35 years) and older farmers, suggesting that younger farmers were more likely to experiment with mobile-based solutions, in agreement with **Malik et al. (2021)**.
- A t-test comparing mean education levels between kiosk users (mean = 9.6) and non-users (mean = 7.8) showed

a statistically significant difference ($t = 2.87$, $p < 0.01$), suggesting that higher education levels facilitate greater ICT adoption. This aligns with Zade et al. (2024), who concluded that education level strongly influences ICT utilization among agricultural stakeholders.

- z-test comparing education levels revealed a statistically significant difference ($z = 2.84$, $p < 0.01$) in adoption of ICT tools between farmers with education above SSC and those below.

Mobile/Web App usage and constraints

Table 3 : KVK wise response of groundnut growers of Saurashtra region about the use of any website or mobile app to get the information about groundnut cultivation (n=347)

Sr No	KVK	No. of respondents	No. of internet Users who use Mobile App/web sites for getting information about groundnut cultivation				
			2019-20	2021-22	Total	Average	Per cent (%) increase
1	**Amreli**	50	8	11	19	9.50	6.00
2	**Shihor**	44	6	8	14	11.00	4.55
3	**Morbi**	53	3	7	10	5.00	7.55
4	**N.Kandhasar**	50	5	8	13	6.50	6.00
5	**Targhadia**	50	6	10	16	8.00	8.00
6	**Pipaliya**	50	5	9	14	7.00	8.00
7	**Khapat**	50	1	6	7	3.50	10.00
Total		**347**	**34**	**59**	**93**	**66.50**	**7.20**

App usage rose from 9.8% in 2019–20 to 17% in 2021–22, a z-test confirmed that this increase is statistically significant ($z = 2.41$, $p < 0.05$). Despite this progress, only 26.8% of respondents had ever used any ICT-based advisory app.

Among the app users, correlation analysis revealed

Variable	Correlation with App Usage (r)	Significance
Education level	+0.43	$p < 0.01$
Age	–0.36	$p < 0.05$
Internet Access & Device Ownership	+0.57	$p < 0.01$
Attitude Toward Timely SMS Delivery	+0.48	$p < 0.01$

These results corroborate Samagra Governance (2025) and AGRIVI (2024) findings, which show that localized, timely digital services attract more user engagement, especially among younger or more educated farmers.

Kiosk usage and associated barriers

Table4 : KVK wise response of groundnut growers of Saurashtra region about the use of kiosk (n=347)

Sr. No.	KVK	No. of respondents	No. of respondents who use the kiosk for getting information about groundnut cultivation				
			2019-20	2021-22	Total	Average	Per cent increase
1	**Amreli**	50	07	09	16	08.00	04.00
2	**Shihor**	44	07	08	15	07.50	02.27
3	**Morbi**	53	03	05	08	04.00	03.77
4	**N.Kandhasar**	50	04	07	11	06.50	06.00
5	**Targhadia**	50	04	09	13	06.50	10.00
6	**Pipaliya**	50	15	17	32	16.00	04.00
7	**Khapat**	50	02	05	07	03.50	06.00
Total		**347**	**42**	**60**	**102**	**51.0**	**5.19**

Kiosk usage increased by 5.2% over two years, with only 29.4% of respondents (102/347) ever using kiosks. Users cited major issues including:

- Bulk of content (64.7%)
- Overcrowding (70.4%)
- Inability to store or print advice (72.5%)

A t-test comparison of kiosk users' satisfaction between 2019–20 and 2021–22 yielded no significant change ($t = 1.12$, $p = 0.13$), implying that despite slightly increased usage, the perceived effectiveness remained low.

These findings are aligned with Radhakrishnan & Sriram (2020), who reported that without real-time or personalized interaction, static tools like kiosks often fail to meet the dynamic needs of farmers.

SMS Advisory services – Reach and effectiveness

Table-5: KVK wise response of groundnut growers of Saurashtra region about the SMS received from any agency for advisory of groundnut cultivation (n=347)

Sr. No.	KVK	No. of respondents	No. of Respondents who get the SMS from any agency for advisory of groundnut cultivation				
			2019-20	2021-22	Total	Average	Per cent (%) increase/ Decrease
1	**Amreli**	50	24	22	46	23.00	-4.00
2	**Shihor**	44	06	5	11	5.50	-2.27
3	**Morbi**	53	05	0	5	2.50	-9.43
4	**N.Kandhasar**	50	46	46	92	46.00	0.00
5	**Targhadia**	50	27	30	57	28.50	6.00
6	**Pipaliya**	50	03	12	15	7.50	18.00
7	**Khapat**	50	26	25	51	25.50	-2.00
Total		**347**	**137**	**140**	**277**	**164.00**	**0.86**

SMS remains the most used method of digital advisory, with 47.3% of respondents receiving messages. However, regional variation was stark: Nana Kandhasar KVK had a 92% SMS reach, while Morbi had only 4.7%.

A regression analysis was applied to predict SMS adoption using independent variables: education level, device possession, and perception of message relevance.

Regression summary

- $R^2 = 0.59$ (model explains 59% of variation in SMS usage)
- **Significant predictors**
  - Education ($\beta = 0.31$, $p < 0.01$)
  - Device Access ($\beta = 0.39$, $p < 0.01$)
  - Timeliness of Advisory ($\beta = 0.33$, $p < 0.01$)

This supports Vincent and Saravanan (2020), who emphasized integrating extension systems with SMS alerts to bridge the last-mile information gap.

Path analysis of factors influencing ICT adoption

To assess direct and indirect effects of various variables on ICT usage (apps/kiosks/SMS), a path analysis was performed.

Variable	Direct effect	Indirect effect	Total effect
Device Accessibility	0.41	0.18	0.59
Education	0.32	0.11	0.43
Favorable Attitude	0.38	0.14	0.52
Age	–0.28	–0.08	–0.36

Interpretation : Attitude toward receiving SMS just before action time had the strongest total effect, reinforcing the conceptual value of the Auto Advisory System. These results align with Zade et al. (2024), who concluded that cognitive and psychological factors—not socio-economic variables—best explain ICT tool adoption.

Ranking of farm operations for SMS priority

A total of 303 respondents ranked 14 farm operations for receiving SMS advisories. The analysis used mean ranking scores, with lower scores indicating higher priority.

Table-6 : Priority base ranking score (01-14) for the requirement of information and suggestions about different farm works and its rank (n=347)

Sr. No.	Farm work	Total ranking score (s)	Mean ranking score (s/n)	Rank
	No. of respondents (n)→	303		
1	Seed Selection and Seed Treatment	701	2.31	1
2	Disease & Pest Control	1068	3.52	2
3	Fertilizer Application	1288	4.25	3
4	Sowing time & Method	1456	4.81	4
5	Irrigation requirement & Method	1615	5.33	5
6	Weeding & Inter Cultivation	1834	6.05	6
7	Climate & Land Preparation	1935	6.39	7
8	Market intelligent	2678	8.84	8
9	Harvesting Time & Method	2836	9.36	9
10	Storage & Post Harvest Technology	3103	10.24	10
11	Information about farm machinery	3143	10.37	11
12	Value Addition	3331	10.99	12
13	Information about crop insurance	3351	11.06	13
14	Information about input Dealer	3476	11.47	14
	Total	**31815**	-	-

The priority given to technical farm tasks (Seeding, Disease & Pest Control, Fertilization) over institutional or commercial content (insurance, dealers) is in line with findings from AGRIVI (2024) and mKRISHI® case studies, which revealed that real-time agronomic support is most valued by farmers.

Perceived benefits of Auto Advisory System

Table-7: suggestions, beliefs or opinions of the respondents for the development of Auto Advisory Services (n=347)

Sr. No.	Suggestions, beliefs or opinions	No. of respondents agreed	
		Total	%
1	If the information or guideline is received at the doorstep or location of actual requirement through SMS, then it is more useful.	451	98.9
2	If information or guideline about the particular farm work is sent through SMS just before the time of work, then its implementation is increased.	454	99.6
3	If the information or guidelines sent through the SMS is precise, short and easily understandable in Gujarati language, then its implementation is increased.	446	97.8

From 456 respondents:

- 99.6% agreed SMS sent just before farm operations would increase adoption.
- 98.9% preferred advisory delivered at their doorstep.
- 97.8% favored short, simple, Gujarati-language messages.

This overwhelming support validates the Auto Advisory System's core design and reinforces previous claims made by Kavaskar et al. (2019) and Namita Singh et al. (2024) regarding the significance of local language, timeliness, and personalization in agricultural digital advisory systems.

Statistical highlights

- z-test confirms significant rise in mobile app usage ($p < 0.05$)
- t-test shows educated farmers adopt ICT tools more effectively ($p < 0.01$)
- Regression explains 59% of SMS usage variation; education and access are key
- Path analysis reveals that attitude and access exert the strongest influence on ICT adoption
- Correlation coefficients show strong positive relationships between ICT usage and device ownership ($r = 0.57$), education ($r = 0.43$)

CONCLUSION

Most of the groundnut growers of Saurashtra region (73.2 % respondents) never use any website and mobile app for

getting required information about the groundnut cultivation. Very few young farmers (26.8 % respondents) can use the such type of ICT tools and only 15.3 % became success to search required information about the groundnut cultivation. Among the users of web application/mobile app, 64.5 per cent users faced the problems of less internet speed and 49.5 per cent users faced the problem of internet connectivity in rural area, 54.8 per cent users faced the problem for searching information.

Very few groundnut growers (29.4 per cent respondents) of Saurashtra region use kiosk facility during their visit of agriculture exhibition/museum for getting the information about the groundnut cultivation. Among them many of the users (64.7 per cent) found the problem for searching information form bulk of information stored in the kiosk, most of the users (70.4 per cent) faced the problem to study the information due to huge mass of farmers at a time.

This study clearly shows that while mobile apps, websites, and kiosks are available for agricultural advisory, most groundnut farmers in the Saurashtra region are not actively using them. Limited internet access, digital literacy barriers, and difficulties in navigating complex platforms reduce their effectiveness. Only a small portion of farmers could successfully retrieve useful information, and many faced issues such as poor connectivity, overcrowding at kiosks, or inability to store and recall digital content.

However, the study also reveals a strong demand for timely, localized, and easy-to-understand advisory services. Farmers overwhelmingly prefer receiving short and relevant messages in Gujarati, delivered just before the actual farming activity—directly at their location. Among all topics, seed selection, pest control, and fertilizer application emerged as the most critical areas where farmers want SMS-based guidance.

Statistical analysis confirmed that education, mobile access, and attitude toward timely advisories significantly influence ICT tool adoption. These insights strongly support the development of a farmer-centric Auto Advisory System that is proactive, personalized, and delivered in local language via SMS.

POLICY IMPLICATIONS

(a) Localized, SMS-based auto advisory should be institutionalized for major crops

Given that 99% of farmers prefer receiving short, timely, and Gujarati-language advisories via SMS just before specific farming operations, agricultural departments and extension agencies should adopt and scale a state-supported Auto Advisory System. This system should deliver crop-specific, time-sensitive, and location-aware guidance directly to farmers' mobile phones. Implementation can begin with groundnut and expand to other regionally important crops.

(b) ICT projects must shift focus from apps and kiosks to accessible, push-based models

As most farmers do not actively use mobile apps or kiosks due to literacy, connectivity, and usability challenges, future ICT policies should prioritize push-based information delivery over pull-based platforms. Government and institutional ICT investments should support low-bandwidth, user-friendly technologies like SMS or voice alerts, rather than focusing solely on web portals or mobile apps.

CONFLICT OF INTEREST

All the authors hereby declare that they have no conflict of interest.

ACKNOWLEDGEMENT

Authors are grateful to the Junagadh Agricultural University, Junagadh and all KVKs of Saurashtra Region for providing research facilities required to carry out this work.

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Received : April 2025 : Accepted : June 2025