



Knowledge of Farmers on Services Rendered by Rythu Bharosa Kendras (RBKs): Test Development and Assessment

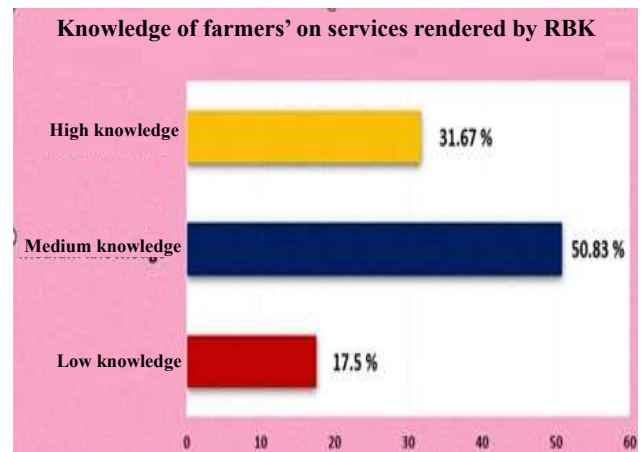
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HIGHLIGHTS

- The developed knowledge test has proven its utility in assessing farmers' knowledge on the services rendered by RBKs
- Farmers have medium to high knowledge of RBK services, but there are gaps in extension-related aspects of RBK services
- Tailored educational initiatives in local languages, visual aids, community engagement, and basic digital literacy programs at RBKs are recommended to enhance farmers' knowledge.

GRAPHICAL ABSTRACT



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ABSTRACT

Context: The Government of Andhra Pradesh prioritizes the welfare of farmers through hassle-free services at the village level, exemplified by Rythu Bharosa Kendras (RBKs). To optimize service utilization and improve information and education efforts, it is crucial to thoroughly understand farmers' knowledge of RBK services, ensuring that RBKs effectively enhance farmers' welfare.

Objective: To develop and standardize a knowledge test to assess the knowledge of farmers on services rendered by RBKs

Methods: The study employed an ex-post facto research design and gathered data from 120 farmers in the research area, specifically 12 randomly selected villages in East Godavari district, Andhra Pradesh. A knowledge test was developed using an analysis of three indices-Difficulty Index, Discrimination Index, and Point Biserial Correlation. This test was then used to evaluate the farmers' knowledge on services provided by RBKs.

Results & Discussion: Approximately half of the farmers had medium level of knowledge about RBK services. They showed greater knowledge on aspects such as e-crop booking and facility for procurement of farmers' produce at RBK. In contrast, their knowledge of extension-related services, particularly the RBK YouTube channel and the Rythu Bharosa magazine, was notably lower.

Significance: To enhance farmers' knowledge on RBK services, targeted educational initiatives in local languages, visual aids, and digital literacy programs should be implemented. Regular community engagement and collaborations with NGOs can further bridge knowledge gaps.

Agriculture remains pivotal to the Indian economy, sustaining a majority of the population through farming. With the increasing population in the country, demand for agricultural products has grown steadily. However, farmers encounter numerous challenges such as purchasing of quality inputs, marketing their products and navigating fluctuating market prices etc. The extension systems in India, both before and after the Green Revolution, significantly contributed to the dissemination of agricultural technologies. Today, due to severe shortage of extension workers, with an average ratio of 1:1162 (extension worker to farmer) (Anuhya *et al.*, 2022), it is impractical for each extension worker to personally assist every farmer. There is a dire need for an effective integrated platform that can deliver advisory services efficiently and cater to the diverse needs of farmers. In recent years, both state and central governments have implemented various initiatives to improve agricultural productivity and farmers' welfare. One notable initiative is the Rythu Bharosa Kendras (RBKs), launched by the Government of Andhra Pradesh during 2019-2020, aimed at providing comprehensive support to farmers at the village level (Reddy, 2020). A total of 10,778 RBKs has been established across the state in every village panchayat to serve as vital knowledge hubs for farming community. Each RBK is staffed with technically qualified personnel such as Village Agriculture Assistant (VAA)/Village Horticulture Assistant (VHA)/Village Sericulture Assistant/ Village Fisheries Assistant and Village Animal Husbandry Assistant. These technical staff are responsible for managing and maintaining the RBKs at village secretariats, ensuring they are equipped with up-to-date information and record (Babu *et al.*, 2021). RBKs offer a wide range of services including the supply of quality inputs, technical guidance, soil testing, training programs, crop insurance, health clinics, and expert interactions via audio and video conferences. Furthermore, they facilitate the procurement of farmers' produce (Saifuddin *et al.*, 2023). Despite the potential benefits offered by RBKs, assessing farmers' knowledge of these services is crucial. The effectiveness of this initiative heavily depends on how well farmers understand the services provided by RBKs (Saifuddin *et al.*, 2023). Knowledge plays a crucial role in enabling farmers to effectively utilize existing expertise and adapt to specific requirements and circumstances. It encompasses familiarity, awareness, or comprehension

of facts, information, descriptions, or abilities acquired through experience or education (Barman and Pradhan, 2024). Without adequate knowledge, farmers may not fully benefit from the resources and support systems put in place, thus undermining the objectives of these centres. Therefore, a knowledge test was constructed to measure farmers' knowledge of services provided by RBKs. This assessment is crucial for ensuring the effectiveness of RBKs in achieving their intended outcomes by optimizing the use of available services and identifying areas where information dissemination and educational efforts need enhancement. This approach can lead to more targeted and effective extension programs, thereby enhancing the overall impact of RBKs.

METHODOLOGY

Knowledge is defined as the ability to remember and recognize ideas, information, or phenomena, often assessed through specific behaviors and test situations (Bloom *et al.*, 1956). The knowledge was operationalized as degree of information possessed by the farmer regarding the services rendered by RBKs. The development of a specialized knowledge test to assess the farmers' knowledge on the services offered by RBKs followed a systematic procedure as outlined below. The procedure was guided by the methodologies used in the studies of Mukherjee *et al.*, (2019), Srinivas *et al.*, (2014), Avhad *et al.*, (2023), Bharati and Sagar (2022), Moyal *et al.*, (2022) and Manichandana *et al.*, (2022).

Item collection and expert review: Items on RBK services were gathered from literature, personal experience, expert consultations, and a pilot study. Thirty-six items were compiled and refined by experts, resulting in the final selection of 28 items categorized into General, Input-related, Extension-related, and Marketing-related aspects of RBK services.

Pre-testing and item analysis: The 28 items were pre-tested with 60 farmers in non-sample area using fill-in-the-blanks, multiple-choice, and yes/no questions. Responses were scored (1 for correct, 0 for incorrect) and analyzed using item difficulty, discrimination indices, and point biserial correlation

The scores from the 60 respondents were sorted in descending order and divided into six groups of 10 respondents each, labelled as G1, G2, G3, G4, G5, and G6. To conduct item analysis, the middle two groups (G3 and G4) were excluded, keeping four extreme groups with the highest and lowest scores.

Item difficulty index (P): : The item difficulty index reflects the percentage of respondents answering an item correctly, indicating how challenging it is relative to their knowledge of RBK services.

$$(P) = \frac{\text{No. of answered correctly}}{\text{Total no. of respondents}} \times 100$$

P=Item difficulty index

In this study, items with 'p' values ranging from 30 to 70 were selected for inclusion in the final version of the knowledge test.

Item discrimination index (E1/3): The discrimination index (E1/3) measures how well an item differentiates between knowledgeable and less knowledgeable respondents.

$$E1/3 = \frac{(S1 + S2) - (S5 + S6)}{N/3}$$

Where,

S1, S2, S5, and S6 represent the frequencies of correct answers in the groups G1, G2, G5, and G6, respectively

N = Total number of respondents

In this study, items with discrimination indices between 0.30 and 0.80 were chosen for inclusion in the final test.

Point biserial correlation: The Point biserial correlation assessed internal consistency of the items by analyzing the relationship between total scores and binary responses, using the formula proposed by Guilford and Fruchter (1978).

$$r_{pbi} = 1 + \frac{\bar{p} - \bar{X}_q}{S_t} \times \sqrt{Pq}$$

Where,

r_{pbi} = Point-biserial correlation coefficient

\bar{X}_p = Mean score on continuous variable of successful group on dichotomous variable

\bar{X}_q = Mean score on continuous variable of unsuccessful group on dichotomous variable

S_t = Standard deviation on continuous variable for total groups

p = Proportion of respondents who answered correctly on dichotomous variable

q = Proportion of respondents who answered wrong on dichotomous variable

Items with a point biserial correlation (rpbi) of 0.268 or above were selected for the final version of the knowledge test. Ultimately, 23 items across four categories met these criteria.

Representative of the test: After a final review by experts to confirm the inclusion of all essential aspects, 23 items were selected for the final knowledge test according to the established criteria.

Reliability: Reliability was assessed using Kuder-Richardson Formula 20 (Guilford and Fruchter, 1978), resulting in a statistically significant coefficient of 0.654.

$$r_{tt} = \left(\frac{n}{n-1} \right) \left(\frac{S_t^2 - \sum pq}{s_t^2} \right)$$

Where,

r_{tt} = reliability coefficient of the test

n = number of items in the test

p = proportion of respondents who answered a test item correctly

q = 1-p

S_t^2 = variance of the test

Based on the reliability coefficients determined through various methods, it suggests that this knowledge test is highly reliable.

Validity: Biserial correlation (rbis) confirmed the test items' construct validity. Therefore, the knowledge test effectively assesses farmers' knowledge of RBK services, demonstrating high reliability and validity.

Scoring pattern and test administration: The final knowledge test, consisting of 23 equally weighted items on RBK services, awarded '1' for correct answers and '0' for incorrect answers. Each respondent's total score, ranging from 0 to 23, was calculated by summing correct answers, and statistical methods were employed to analyze the responses (Table 1).

The developed test was used to evaluate farmers' knowledge on services provided by RBKs. The study was carried out in the East Godavari district of Andhra Pradesh as shown in figure 1, by adopting an *ex-post facto* research design. A multi-stage sampling approach, combining purposive and random sampling, was employed to select 120 farmers. East Godavari district and four mandals within the district with the highest number of RBKs were purposively chosen. Within each selected mandal, three villages were randomly selected. From each village, ten beneficiary farmers were chosen at random. Primary data was collected from these respondents using a structured interview schedule in 2022. The collected data were analyzed with statistical methods such as mean, standard deviation, frequency, and percentage. This analysis allowed for the classification of respondents into three distinct groups, as detailed below.

Category	Score Range
Low knowledge level	< Mean – S.D.
Medium knowledge level	Mean ± S.D.
High knowledge level	> Mean + S.D.

**Table 1. Difficulty index, discrimination index and point-biserial correlation coefficient
[of knowledge items related to services rendered by RBKs (N =60)]**

Item	A	B	C
General aspects of RBK services			
Do you know the location of RBK available in your village? (Yes/No)	100.00	0	a
RBKs are working from Monday to Sunday (Yes/No)	61.66	0.3	0.717
RBK centres in your village are operated by a) VAA &VAH b) VHA&VAH c) VSA&VAH d) VFA&VAH	48.33	0.5	0.686
RBKs working as one stop shop for supply of a) Inputs b) Advisory services c) Testing of soil d) Procurement, e) All of the above	43.33	0.6	0.412
e-Crop booking is done by a) VAA b) AO c) ADA d) JDA	100.00	0	a
e-Crop booking along with the crop insurance registration is done by technical staff of RBK at free of cost (Yes/ No)	70.00	0.3	0.490
Input related aspects of RBK services			
Are you aware that green manure seeds are distributed to farmers at no cost before the sowing period at RBKs? (Yes/No)	41.66	0.4	0.687
Testing of soil is available at village level from the establishment of RBKs. (Yes/No)	48.33	0.5	0.578
Which types of quality-tested inputs with a government seal are provided at RBKs?-a) Seeds, b) Fertilizers c) Pesticide, d) Animal feed , e) All the above	41.66	0.8	0.694
Multi- brand quality agricultural inputs are available at RBKs (Yes/No)	38.33	0.2	0.018
Digital kiosk is available at RBK for ordering of inputs from the farmers (Yes/No)	55.00	0.6	0.694
What are the details of farmer required for ordering inputs from RBKs? a) Aadhar number b) mobile number , c) Both a & b	56.66	0.8	0.703
The time taken for delivery of inputs to the farmers after placing an order is _____	68.33	0.6	0.509
Provision of IPM kits to the interested farmers at nominal cost through RBKs (Yes/No)	26.66	0.9	0.051
Farm implements are available to farmers at RBK custom hiring centres (Yes/No)	40.00	0.6	0.412
Provision of free vaccination to animals through RBKs (Yes/No)	50.00	0.7	0.690
Extension related aspects of RBK services			
Technical staff of RBKs organizing training and capacity-building programs on the latest technologies for farmers at the village level? (Yes/No)	38.33	0.6	0.365
Polambadi/Thotabadi program is conducted for farmers by RBK staff on which day _____? _____?	35.00	0.4	0.291
Smart tv maintained at RBK is used for interacting with scientists/experts via audio and video conference (Yes/No)	36.66	0.6	0.018
Name the magazine available at RBK _____	46.66	0.5	0.051
Interval of publication of “Rythu bharsa” magazine by RBKs a) Weekly b) Monthly, c) Quarterly d) Yearly	31.66	0.7	0.578
Toll free number of RBK Integrated call centre for advisories on welfare schemes and technical queries is _____	33.33	0.3	0.291
Name the YouTube channel launched by RBK for disseminating innovative practices adopted by progressive farmers _____	30.00	0.5	0.520
Weather alerts to farmers through technical staff of RBKs (Yes/No)	31.66	0.6	0.509
Marketing related aspects of RBK services			
RBKs are taking care of procurement of farmers’ produce at village level (Yes/No)	68.33	0.4	0.537
e- crop booking of farmers’ field is an essential criterion for procurement of farmers’ produce at RBKs (Yes/No)	56.66	0.3	0.402
What are the parameters of farmers' produce that have to be maintained for procurement at RBK? _____	36.66	0.7	0.445
What is the maximum amount/limit of farmers' produce that can be procured at RBK per farmer? _____	40.00	0.5	0.268

Note: *Indicates the items chosen for inclusion in the final knowledge test

A=Item Difficulty index; B=Item Discrimination index; C=Point biserial correlation coefficient

Table 2. Knowledge score of farmers on different aspects of services rendered by RBK (N=120)

Knowledge Items	No. (%)
General aspects of RBK services	
RBKs are working from Monday to Sunday (Yes/No)	102 (85.00%)
RBK centres in your village are operated by-	98 (81.66%)
a) VAA &VAH b) VHA&VAH c) VSA&VAH d) VFA&VAH	
RBKs working as one stop shop for supply of	82 (68.33%)
a) Inputs, b) Advisory services , c) Testing of soil d) Procurement , e) All of the above	
e crop booking along with the crop insurance registration is done by technical staff of RBK at free of cost (Yes/ No)	115 (95.83%)
Input-related aspects of RBK services	
Are you aware that green manure seeds are distributed to farmers at no cost before the sowing period at RBKs? (Yes/No)	76 (63.33%)
Testing of soil is available at village level from the establishment of RBKs. (Yes/No)	62 (51.66%)
Which types of quality-tested inputs with a government seal are provided at RBKs?	87 (72.50%)
a) Seeds, b) Fertilizers , c) Pesticides, d) Animal feed , e) All the above	
Digital kiosk is available at RBK for ordering of inputs from the farmers (Yes/No)	93 (77.50%)
What are the details of farmer required for ordering inputs from RBKs?	90 (75.00%)
a) Aadhar number b) mobile number, c) Both a & b	
The time taken for delivery of inputs to the farmers after placing an order is _____	84 (70.00%)
Farm implements are available to farmers at RBK custom hiring centres (Yes/No)	60 (50.00%)
Provision of free vaccination to animals through RBKs-(Yes/No)	92 (76.66%)
Extension related aspects of RBK services	
Technical staff of RBKs organizing training and capacity-building programs on the latest technologies for farmers at the village level (Yes/No)	86 (71.66%)
Polambadi/Thotabadi program is conducted for farmers by RBK staff on which day _____?	57 (47.50%)
Name the magazine available at RBK _____	58 (48.33%)
Interval of publication of “Rythu bharsa” magazine by RBKs	55 (45.83%)
a) Weekly b) Monthly	
c) Quarterly d) Yearly	
Toll free number of RBK Integrated call centre for advisories on welfare schemes and technical queries is _____	59 (49.16%)
Name the YouTube channel launched by RBK for disseminating innovative practices adopted by progressive farmers _____	46 (38.33%)
Weather alerts to farmers through technical staff of RBKs (Yes/No)	72 (60.00%)
Marketing related aspects of RBK services	
RBKs are taking care of procurement of farmers’ produce at village level (Yes/No)	113 (94.16%)
e- crop booking of farmers’ field is an essential criterion for procurement of farmers’ produce at RBKs (Yes/No)	105 (87.50%)
What are the parameters of farmers' produce that have to be maintained for procurement at RBK? _____	101 (84.16%)
What is the maximum amount/limit of farmers' produce that can be procured at RBK per farmer? _____	65 (54.16%)

Table 3. Categorization of farmers based on their knowledge on services rendered by RBKs (N = 120)

Category	No.	%
Low knowledge (< 15.43)	21	17.50
Medium knowledge (15.43 – 18.73)	61	50.83
High knowledge (> 18.73)	38	31.67
Mean		17.08
S.D		1.65

RESULTS

The developed knowledge test was administered to 120 farmers of East Godavari district, and findings are outlined in Table 2. The analysis indicated that nearly all (95.83%) of the respondents correctly answered the question on the cost of e-crop booking and crop insurance, because it is a mandatory process overseen by RBK technical staff who visit farmers' fields to facilitate it. Therefore, farmers' knowledge in this regard is well-established owing to the direct involvement and support offered by RBK staff during the e-crop booking process. Additionally, a significant majority (85.00%) accurately knew the working days of RBKs. The knowledge on this aspect is attributed to the placement of RBK at village level, which enhances accessibility for farmers to visit these centres and utilize the services they offer. When it came to input related services, nearly three-fourth (77.50%) of the farmers were knowledgeable about the availability of digital kiosk within RBK for ordering inputs. This knowledge is due to agricultural inputs being provided at RBK at reasonable (subsidized) prices with pre-tested and certified quality compared to local input dealers, which has led to more farmers visiting RBKs to order agricultural inputs such as seeds and fertilizers. Regarding extension services, a notable percentage (71.00%) of farmers were aware of the training programs offered at RBKs, possibly because these trainings are conducted at the RBK itself (village level). This setup makes it convenient for farmers to receive information through WhatsApp groups managed by RBK technical staff and from fellow farmers in the same village. Finally, in terms of marketing-related services, a vast majority (94.16%) of respondents showed awareness of the procurement opportunities available for farmers' produce through RBKs. This can be attributed to effective dissemination of information by RBK technical staff through various channels such as public announcements, local media and community networks. Additionally, Government of Andhra Pradesh assures remunerative prices for farmers produce procured through RBK.

The farmers' overall knowledge of RBK services was assessed and categorized into three categories: low knowledge, medium knowledge, and high knowledge, according to mean and standard deviation scores detailed in Table 3. The data shows that half (50.83%) of the farmers possessed medium level of knowledge, followed by 31.67 per cent exhibited high level of

knowledge and 17.50 per cent of the farmers were found with low level of knowledge. These findings align with previous studies conducted by Alawa (2014), Archana (2016), Meena (2016) and Harisha (2021); Reddy *et al.*, (2022) and Reddy *et al.*, (2023).

DISCUSSION

Based on the findings of the knowledge assessment among farmers regarding Rythu Bharosa Kendras (RBKs) services in East Godavari district, it is evident that the respondents demonstrate a medium to high level of knowledge. The fact that RBKs were situated at village level and put farmers in constant contact with the technical staff (Saifuddin *et al.*, 2024) may be the likely cause of the aforementioned trend. The Government of Andhra Pradesh has effectively utilized publicity campaigns to educate farmers about RBK services. Additionally, farmers in the study area have shown that medium utilization of mass media channels such as television, mobile phones, and newspapers (Saifuddin *et al.*, 2022) to enhance their knowledge about RBK services. These factors appear to be key contributors to the observed levels of knowledge among farmers in the region.

However, it is clear that over fifty percent of the farmers in the study area had limited knowledge about certain services provided by RBKs. These services include polambadi program, magazines available at RBKs, toll-free number of the RBK integrated call centre, and YouTube channel of RBK. All these services pertain to the extension-related aspects of RBK, which necessitate farmers to have a relatively high level of literacy to understand. It is noteworthy that over half of the farmers in the study area had education backgrounds ranging from illiterate to middle school (Saifuddin *et al.*, 2022). This disparity in education levels likely contributes to the low knowledge of the aforementioned services.

To enhance the knowledge of farmers on these aspects, technical staff of RBK should implement tailored educational initiatives in local languages and visual aids at centres. Moreover, promoting community engagement through regular meetings and collaborations with local NGOs and educational institutions could foster better understanding and utilization of these services. Lastly, integrating basic digital literacy programs at RBKs would empower farmers to access online resources like the YouTube channel and Call Centre effectively. Such efforts would

bridge the educational gap and empower farmers to maximize the benefits of RBK services for improved agricultural practices and outcomes.

CONCLUSION

The developed knowledge test, which proved its utility in assessing farmers' knowledge on services rendered by RBKs, revealing that most of the respondent farmers had medium level of knowledge in this regard. The study identified specific areas where farmers exhibited both high and low knowledge aspects of RBK services, providing actionable insights for policymakers to optimize RBK services and improve their impact on rural communities. It is recommended that future studies utilize this developed knowledge test to gain deeper insights into regional disparities in knowledge and utilization of RBK services across all regions of Andhra Pradesh. Continued efforts to disseminate information about RBK services are crucial for sustaining agricultural growth and improving farmers' livelihoods in Andhra Pradesh. Future research could focus on longitudinal assessments to track changes in farmers' knowledge levels over time and evaluate the long-term impact of RBKs on agricultural productivity and welfare.

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Authors' contribution: The first author gathered and analyzed the data, the second author developed the study concept and directed the research, while the remaining authors played a crucial role in the analysis and offered critical insights for the study.

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