

## International Journal of Agriculture Extension and Social Development

Volume 7; Issue 7; July 2024; Page No. 155-164

Received: 01-04-2024  
Accepted: 06-05-2024

Indexed Journal  
Peer Reviewed Journal

### Performance evaluation of Rythu Bharosa Kendras (RBKs) in Andhra Pradesh

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DOI: <https://doi.org/10.33545/26180723.2024.v7.i7c.785>

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#### Abstract

The study evaluates the performance of Rythu Bharosa Kendras (RBKs) in Andhra Pradesh. Multi-stage random sampling was used to represent the whole study area. In total, 400 respondents were selected from 4 regions of the state for three consecutive years: 2020-21, 2021-22 and 2022-23. To construct performance indicators the Analytical Hierarchy Process (AHP) was used. The study revealed a predominantly young and male workforce with a strong educational background in agricultural sciences. RBKs cover various villages and manage diverse land areas, indicating their flexible operational scale. The research uses the AHP to assess RBKs' physical, digital, and knowledge infrastructure and service indicators. Significant improvements are noted in infrastructure development, particularly in digital technologies and agricultural testing equipment. Key services such as Rythu Bharosa, e-crop booking, and crop insurance maintain high availability, while marketing and registration services show steady enhancements. The overall performance index demonstrates a positive trajectory, reflecting comprehensive service delivery and infrastructure growth, thereby supporting sustainable agricultural practices and rural development. Policy recommendations emphasise continued investment in infrastructure, training, digital literacy, market support, and coordinated efforts to enhance RBKs' effectiveness in promoting agricultural development and improving farmers' livelihoods in Andhra Pradesh.

**Keywords:** Rythu Bharosa Kendras (RBKs), Analytical hierarchy process (AHP), performance evaluation, indicators

#### 1. Introduction

The public sector plays a major role in providing extension services. Still, its reach is limited, and it is burdened with non-extension responsibilities like distributing subsidies and inputs. This leaves little time for core extension activities. The observations made by Ravi and Nedumaran (2019) further emphasise the issue, noting that the ratio of extension workers to farmers is low at 1:1162 at the national level, which is higher than the recommended ratio of 1:750. This means that one agricultural officer is responsible for serving 1162 farmers, making it challenging for extension workers to address the diverse needs of each farmer personally. To control these problems, the government of Andhra Pradesh has initiated the "Rythu Bharosa Kendra (RBK)," a one-stop shop for all farmers' needs at every panchayat. RBK will address these challenges and enhance the agriculture extension system; there is a need to increase the number of extension professionals, provide adequate training, and streamline their focus on core extension activities. The RBK scheme started in May 2020; currently, 10,778 RBKs are established in 660 mandals in Andhra

Pradesh, and 14,347 personnel serve them. This includes 6,758 agricultural workers, 4,000 horticultural workers, 9,844 animal husbandry workers, 9,794 fisheries workers, and 400 silk workers. Local assistants from respective departments act as in-charges of the RBKs, and there are also 2,040 agriculture officers and 4,497 agriculture extension officers overseeing the operations. In total, 20,857 agriculture extension personnel work for 85,24,000 agricultural operational holdings, which, as per the agriculture census 2015-16, is 1.8 times higher than the nationally recommended level of one agricultural officer serving 408 farmers. In 2022-23, the state government spent 23464.32 Crores for the Rythu Bharosa scheme, benefiting over 51.12 lakh farmers; in 2021-22, for Crop Insurance and Procurement Scheme, govt spent 2977.82 and 13,542 Crores respectively. From the beginning, a govt share (i.e.50 %) of 81250 Crores was allocated for 6500 RBKs to implement custom hiring centres to boost the state's farm mechanisation. All the agriculture Schemes are implemented through RBK.

By doing so, extension workers can play a more effective role in assisting farmers with issues related to input procurement, product selling, market prices, and overall agricultural productivity, ultimately contributing to an improvement in farmers' income. These centres are staffed with trained professionals from various disciplines in the agriculture and allied sectors. Previously, farmers had to visit Mandal-level offices of agriculture, horticulture, veterinary, and fisheries for various tasks. However, with the introduction of RBKs at the panchayat level, delivering services such as agri-input shops, farmers' knowledge centres, custom hiring centres, e-crop booking, crop health monitoring, commodity market price and procurement, Farmer Field Schools, farm magazines, village agro advisory boards, RBK YouTube channel, method demonstrations, and quality inputs distribution are easily accessible to farmers and for delivering these service they are equipped with infrastructural facilities also. Hence, evaluating the performance of RBK will give the understanding of how well RBKs are functioning and how

efficient they are in delivering services to the farming community; identifying strengths and weaknesses in RBK operations and Regular evaluation promotes accountability and transparency in the implementation of agricultural support programs, ensuring they achieve their intended goals. This study forms the basis for policy improvements, enhances extension services, supports farmer empowerment, optimises resource allocation, and provides a model for replication and academic research

## 2. Materials and Methods

### 2.1. Sampling procedure

A multistage random sampling design was adopted to select the sample. The concept of RBK is present only in Andhra Pradesh. Hence, Andhra Pradesh was purposively selected for the present study. Then, to represent all the socio-economic conditions, agro-climatic conditions and cropping patterns, the state was divided into four regions: the North Coastal Region, Central Coastal Region, Southern Coastal Region and Rayalaseema Region.

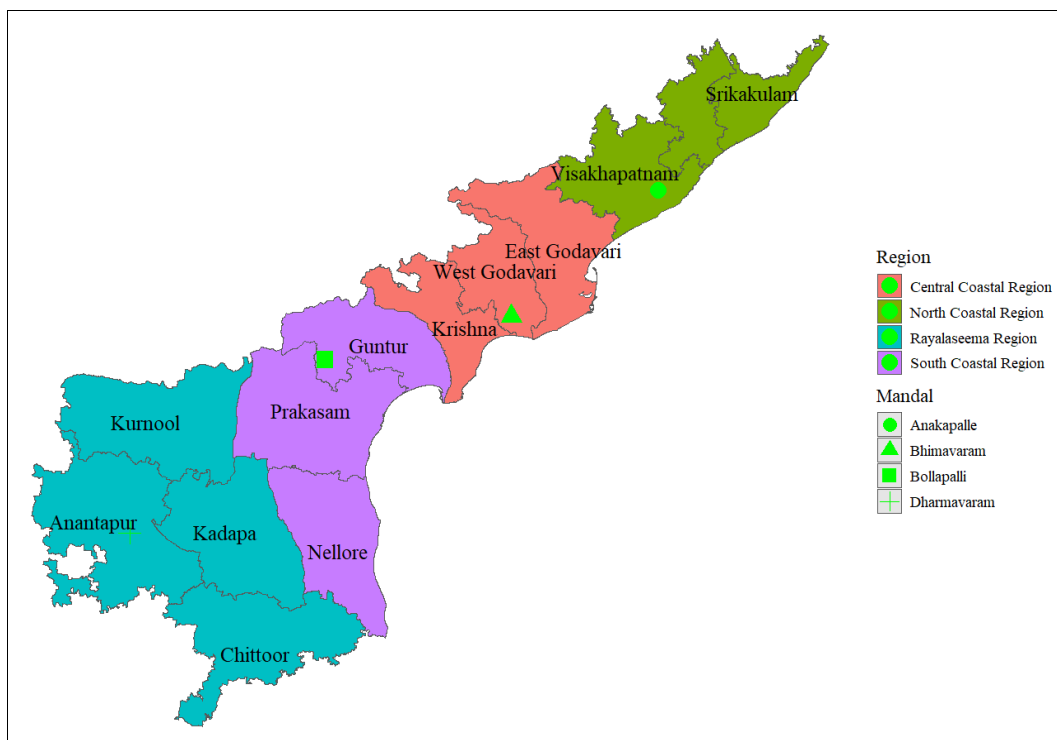


Fig 1: Map of Andhra Pradesh with selected districts and regions

**In each region, one district was selected randomly:** Visakhapatnam district is from the North Coastal region, West Godavari district is from the Central Coastal Region, Guntur district is from the South Coastal Region, and Anantapur is from the Rayalaseema region. In total, four districts were selected. One mandal was selected randomly from each district. Anakapalle mandal is from the Visakhapatnam district, Bhimavaram mandal district is from the West Godavari, Bollapalli mandal is from the Guntur district and Dharmavaram mandal is from the Anantapur district. Four mandals were selected. Ten RBKs from each Mandal were selected randomly. A total of forty RBKs were selected. All the staff working with RBK are the 40 respondents for the study.

### Tools of Analysis

#### Construction of Index for RBKs Performance Measurement

The analytic hierarchy process, introduced by Satty (1980), was known as a multi-criteria decision-analysis method and was employed here to construct a performance index. It is widely applied in outstanding works in various fields relating to best option selection, conflict solution, resource allocation, and optimisation of the decision-making process. In this study, the AHP is employed to establish the contribution of the components and sub-components in building RBKs' performance (Islam & Periaiah, 2023) <sup>[3]</sup> through the steps below.

**The basic procedure follows for the AHP**

1. Hierarchy construction
2. Developing a pairwise comparison matrix for each criterion
3. Normalizing the resulting matrix
4. Averaging the values in each row to get the corresponding rating
5. Calculation and checking the consistency ratio

**Hierarchy construction**

Hierarchy is established by breaking down the overall goal of RBK performance through basic elements. Reviewing literature and authors’ critical judgments has led to constructing the hierarchical model of different components. Making such a construction helps to identify the components with their exclusive domain. Moreover, it helps to control the duplication of subcomponents. The weights for major components and subcomponents were determined using the AHP method, with pairwise comparisons conducted by various stakeholders, including scientists, research scholars, agriculture officers, and progressive farmers (Abdulla & Haitham, 2021) [1]. These experts provided their insights, ensuring that the weights and actual contributions accurately reflect the priorities and practical considerations in the present research context. The experts were requested to give rank order based on the relative importance of the dimensions.

**Developing a pairwise comparison matrix for each criterion**

To measure the contribution of one component over another, components have to be measured through a psychological scale (Whitaker, 1987) [8] that builds up through a psychological continuum by ordering the components through the psychophysical method. In this way, the weight score of pairwise comparison was assigned with a scale of 1-9, as depicted below.

Two items are equally important.				One item is extremely favoured over another.				
1	2	3	4	5	6	7	8	9

Here, the weightage scores assigned by the experts are pooled together, and the average pairwise score is worked out. The pairwise scores were depicted in the matrix format.

$$\text{Matrix of pairwise element} = \begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \\ C_{41} & C_{42} & C_{43} \\ C_{51} & C_{52} & C_{53} \\ C_{61} & C_{62} & C_{63} \end{bmatrix}$$

Sum the values in each column of the pairwise matrix =  $\sum_{i=1}^n C_{ij}$

**Normalizing the resulting matrix**

The average score of pairwise items in the normalised matrix was worked out to determine the overall importance

of one element over another. Each element was divided by its column total to generate a normalised pairwise matrix.

$$x_{ij} = \frac{C_{ij}}{\sum_{i=1}^n C_{ij}}$$

**Averaging the values in each row to get the corresponding rating**

The sum of the normalised column of the matrix was divided by the number of criteria used to generate the weighted matrix. Moreover, this average score gives the percentage contribution of a particular element towards the goal.

$$w_{ij} = \frac{\sum_{j=1}^n x_{ij}}{n} \quad \begin{bmatrix} W_{11} \\ W_{12} \\ W_{13} \end{bmatrix}$$

**Calculation and checking the consistency ratio**

Experts may need to consider the relative importance of each element to assign the pairwise matrix scale. If so, the score one got in the early steps may not reflect reality. A consistency check has to be carried out to determine the validity and reliability of the score. The consistency ratio was calculated to ensure the original preference ratings were consistent.

**There are three steps to arrive at the consistency ratio**

1. Calculation of consistency measure.
2. Calculation of consistency index (CI).
3. Calculation of consistency ratio (CR).

**Calculation of the consistency measure.**

The matrix multiplication function =MMULT() is used for actual rows with average columns to calculate the consistency measure.

i) Consistency measure is calculated by multiplying the pairwise matrix by the weights vector

$$\begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \\ C_{41} & C_{42} & C_{43} \\ C_{51} & C_{52} & C_{53} \\ C_{61} & C_{62} & C_{63} \end{bmatrix} * \begin{bmatrix} W_{11} \\ W_{21} \\ W_{31} \end{bmatrix} = \begin{bmatrix} C_{M11} \\ C_{M21} \\ C_{M31} \end{bmatrix}$$

ii) Consistency vector is calculated by dividing the consistency measure by the average criterion weight.

$$C_{v11} = \frac{1}{w_{11}} [C_{11}W_{11} + C_{12}W_{21} \quad C_{13}W_{31}]$$

$$C_{v21} = \frac{1}{w_{21}} [C_{21}W_{11} + C_{22}W_{21} \quad C_{23}W_{31}]$$

$$C_{v31} = \frac{1}{w_{31}} [C_{31}W_{11} + C_{32}W_{21} \quad C_{33}W_{31}]$$

iii)  $\lambda$  was calculated by averaging the value of the consistency vector

$$\lambda = \frac{\sum_{i=1}^n C_{vij}}{n}$$

**Calculation of the consistency index (CI).**

It was calculated (Nobanee & Ellili, 2018) using the formula below.

$$CI = \frac{\lambda_{Max} - N}{N - 1}$$

$\lambda_{axe}$  = averaging the value of the consistency vector, N = Number of criteria

**Calculate the consistency ratio (CI/RI where RI is a random index).**

It was done by following the formula.  $CR = \frac{CI}{RI}$

Were CI = Consistency index value and RI= Table value

**Random Index (RI)**

The RI was obtained from the random inconsistency indices given by Satty (1980) furnished below.

Matrix Size (n)	12	3	4	5	6	7	8	9	10
Random Index (RI)	0.0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

The scores derived through the analytical hierarchy process for major components, subcomponents and items are presented below in Table 1.

**Table 1:** RBK Performance Index for Infrastructure and Service

Primary Component	Major Components	Weightage	Subcomponents	Actual Contribution
Infrastructure	1. Physical Infrastructure	46.34	1.1. New RBK Building	6.42
			1.2. Storage Godown for Inputs	6.24
			1.3. Yard for Procurement	2.64
			1.4. Rest Rooms	5.97
			1.5. Tables and Chair	5.93
			1.6. Racks	4.28
			1.7. Notice Board	5.23
			1.8. Milk Procurement Centre	5.09
			1.9. UPS Backup Facility	4.56
	2. Digital Infrastructure	29.6	2.1. Digital Kiosk Machine	5.55
			2.2. Tab	5.95
			2.3. Computer	6.31
			2.4. Printer	5.52
			2.5. Internet	6.27
	3. Knowledge Infrastructure	13.44	3.1. Smart TV	5.28
			3.2. Digital Library	3.79
3.3. Farmers Library			4.37	
4. Testing Equipment	10.62	4.1. Soil Testing Kit	2.96	
		4.2. Moisture Testing Kit	4.78	
		4.3. Seed Testing Kit	2.88	
		4.4. Other Testing	0.00	
Service	1. Extension Services	17.68	1.1. Agri Extension Services	7.67
			1.2. Village Advisory Board	1.88
			1.3. Farmers Field School	3.6
			1.4. Veterinary Service	4.53
	2. Marketing Services	30.6	2.1. Input supply	7.96
			2.2. Interest Subsidy	7.46
			2.3. Agri Output Procurement	8.22
			2.4. Milk Collection Center	6.96
	3. Knowledge Services	9.41	3.1. Digital Library	1.84
			3.2. Farm Magazines	1.19
			3.3. WhatsApp advisory	3
			3.4. Price & weather forecast	3.38
	4. Registration Service	29.65	4.1. Rythu Bharosa Scheme	8.17
			4.2. Crop insurance	7.63
			4.3. E-Crop Booking	7.84
			4.4. Custom Hiring Centers	2.93
			4.5. CCRC (Tenant Farmers)	3.07
	5. Other Service	12.65	5.1. Soil Testing	5.62
			5.3. Seed Testing	1.81
			5.2. Moisture testing	5.22

Source: Author Calculations

First, the weightage of each major component is calculated using pairwise comparisons and normalised matrices in the AHP method to calculate the contribution of each major component and its subcomponents. Then, each subcomponent's relative weight was multiplied by the major component's weightage to determine its contribution. The availability of listed infrastructure and services, particularly RBK, takes value 1, multiplied by their actual contribution, and is summed up to arrive at individual RBK Performance Scores (Yaghoobi & Haddadi, 2016; Bentes *et al.*, 2012) <sup>17, 21</sup>. For region-wise comparison, the Performance score of each zone was added.

$$\text{Infrastructure Performance} = \left( \begin{matrix} \text{Availability of listed} \\ \text{infrastructure} \\ \text{(If Yes=1, 0:Otherwisw)} \end{matrix} \right) * \left( \begin{matrix} \text{Sub Components} \\ \text{Actual Contribution} \end{matrix} \right)$$

$$\text{Services Performance} = \left( \begin{matrix} \text{Availability of listed} \\ \text{Services} \\ \text{(If Yes=1, 0:Otherwisw)} \end{matrix} \right) * \left( \begin{matrix} \text{Sub Components} \\ \text{Actual Contribution} \end{matrix} \right)$$

$$\text{Overall Performance} = \sum_1^n \left( \begin{matrix} \text{Infrastructure Performance} \\ + \\ \text{Service Performance} \end{matrix} \right) / 2$$

**Results and Discussion**

**Table 2:** Basic Profile of Sampled Rythu Bharosa Kendras (n=40)

Group	Category	Variable	Frequency	Percentage
Staff Profile	Gender of Staff	Female	12	30
		Male	28	70
	Age Group (in years)	Less than 25 years	24	60
		25 to 30 years	12	30
		More than 30 years	4	10
	Educational Qualification	Diploma	15	37.5
		Undergraduate	20	50
		Post Graduate	5	12.5
	Educational Background	Agriculture	29	72.5
		Horticulture	4	10
Sericulture		1	2.5	
Agri Eng.		1	2.5	
Science and Other		5	12.5	
Operational Parameters	Number of Villages Covered by RBK	Up to 2	26	65
		2 to 4	8	20
		Five or more	6	15
	Number of Staff in RBK	One	26	65
		Two	11	27
		Three	3	7.5
	Number of Farmers Under RBK	Up to 500	21	52.5
		501 to 1000	12	30
		1001 to 1500	3	7.5
		1501 to 2000	2	5
		2500 to 3000	2	5
	Areas Under RBK (In acres)	Up to 500	6	15
		501 to 1000	11	27.5
		1001 to 1500	8	20
		1501 to 2000	4	10
2001 to 2500		2	5	
More than 2500		9	22.5	

Table 2 presents the basic profile of Rythu Bharosa Kendras (RBK) staff, including variables such as age group, gender, educational qualification, and educational background; the profile of RBK's sampled staff provides insights into the demographic and educational composition of their workforce, reflecting broader trends and implications within the organisation and operational parameters across several key categories. The predominance of males (70%) and a significant concentration of staff under 25 years (60%) suggest potential implications for workforce dynamics, including possible generational perspectives and leadership development needs. Educationally, the majority holding undergraduate degrees (50%) alongside significant numbers with diplomas (37.5%) and postgraduate qualifications (12.5%) highlights a diverse educational background conducive to varied skill sets and career trajectories within RBK. Moreover, the heavy emphasis on agricultural

education (72.5%) underscores RBK's specialised focus and expertise in agricultural sciences, possibly influencing innovation and research directions within the organisation. RBK's operational parameters: Firstly, it outlines the distribution of villages covered, showing that a significant portion (65%) of RBK's activities is concentrated in up to 2 villages, with smaller but notable involvement in 2 to 4 villages (20%) and more extensive coverage in five or more villages (15%). This suggests a varying scale of geographic outreach. Secondly, it details the staffing structure, revealing that the majority of RBK units are managed by one staff member (65%), with smaller percentages managed by two (27%) or three (7.5%) staff members, indicating a likely decentralised operational model. Thirdly, it highlights RBK's engagement with farmers, focusing on smaller groups, particularly those with up to 500 farmers (52.5%), demonstrating targeted agricultural support efforts. Finally,



the table indicates the distribution of land areas managed by RBK, showing varied acreage sizes, with a notable concentration in the 501 to 1000-acre range (27.5%), reflecting diverse agricultural landscapes under their management.

**Performance of RBK in Andhra Pradesh**

Considering the presence and quality of infrastructure and services along with AHP-derived weights, an index was calculated to gauge the overall performance of RBKs in delivering services and maintaining infrastructure in Andhra Pradesh. This approach allowed for a comprehensive evaluation that factored in the importance of various elements within RBKs, providing valuable insights into their overall effectiveness and areas for potential improvement.

In infrastructure indicators, The Physical Infrastructure component evaluates the development and maintenance of physical facilities such as buildings, storage facilities, procurement yards, restrooms, and equipment like tables, chairs, racks, and notice boards within RBKs. The Digital Infrastructure component reflects adopting and utilising digital technologies like kiosks, tablets, smartphones, computers, printers, and internet connectivity to enhance RBKs' operational efficiency and service delivery. The knowledge Infrastructure component focuses on the availability and dissemination of knowledge-related

resources such as smart TVs, recorded videos, farmer libraries, and digital platforms for information sharing and educational purposes. The testing equipment component assesses the presence and functionality of essential testing kits for soil, moisture, and seed testing, which is crucial for providing accurate agricultural advice and support to farmers.

In Service Indicators, The Extension services component measures the effectiveness and outreach of agricultural extension services, including advisory boards, field schools, veterinary services, and other initiatives to educate and assist farmers. The marketing services component evaluates RBKs' role in providing marketing support to farmers, including input supply, zero-interest crop loans, procurement of agricultural outputs (grains and milk), and operating milk collection centres. The knowledge services component focuses on additional knowledge-based services such as digital libraries, farm magazines, WhatsApp advisories, and access to price and weather forecasts for informed decision-making. The registration service component assesses the facilitation of registration services related to agricultural schemes, insurance, crop booking, custom hiring centres, and support for tenant farmers (CCRC). The other services component encompasses a range of supplementary services like soil and seed testing, moisture testing, and other specialised services catering to farmers' diverse needs.

**Table 3:** Percent Availability of Infrastructure in Sampled RBK Over the Years (in %)

Infrastructure Category	Particulars	Year		
		2020-21	2021-22	2022-23
Physical Infrastructure	New RBK Building	2.5	12.5	32.5
	Godown for Inputs	42.5	65	80
	Procurement Yard	5	5	5
	Restrooms	12.5	27.5	60
	Table and chair	100	100	100
	Racks	92.5	97.5	97.5
	Notice Board	97.5	100	100
	Milk Procurement Centre	2.5	20	22.5
Digital Infrastructure	UPS backup facility	70	85	87.5
	Digital Kiosk machine	100	100	100
	Tab	100	100	100
	Computer	15	27.5	72.5
	Printer	15	27.5	82.5
Knowledge Infrastructure	Internet Facility	35	55	90
	Smart TV	100	100	100
	Digital Library	100	100	100
Testing Equipment	Farmers Library	100	100	100
	Soil Testing Kit	15	27.5	42.5
	Moisture Testing Kit	27.5	55	57.5
	Seed Germination Testing Kit	5	25	60

Table 3 provides a comprehensive overview of the percentage of infrastructure availability at RBK across three successive years (2020-21, 2021-22, and 2022-23), offering insights into the organisation's strategic investments and operational enhancements. Firstly, significant increases are observed in the availability of key physical infrastructure.

The New RBK building, for instance, saw a notable rise from 2.5 per cent in 2020-21 to 12.5 per cent in 2021-22 and a substantial leap to 32.5 in 2022-23. This trend suggests ongoing construction projects to expand operational capacities and improve workspace environments. Similarly,

the availability of godown for inputs rose consistently from 42.5 per cent in 2020-21 to 65 per cent in 2021-22 and further to 80 per cent in 2022-23, indicating enhanced storage capabilities to manage agricultural inputs effectively. Secondly, digital infrastructure has seen significant improvements, reflecting RBK's commitment to leveraging technology for operational efficiency. The availability of internet facilities increased steadily from 35 per cent in 2020-21 to 55 per cent in 2021-22 and then jumped to 90 per cent in 2022-23, highlighting efforts to strengthen connectivity and digital communication

channels. Similarly, facilities like Digital Kiosk Machines, Tabs, Tables and Chairs, Smart TVs, and Digital Libraries maintained consistent availability at 100 per cent across all three years, underscoring RBK's emphasis on integrating digital tools to enhance information dissemination, education, and stakeholder engagement. Additionally, the table illustrates the progressive adoption of technological tools and agricultural support equipment. For instance, while facilities like UPS backup facilities and printers showed steady growth (15 % to 82.5 %) in availability, tools such as soil testing kits, moisture testing, and seed

germination kits also saw incremental increases, indicating ongoing investments in agricultural research, quality control, and productivity enhancement. Overall, the data points highlight RBK's holistic approach to infrastructure development, balancing physical expansion with digital integration to support sustainable agricultural practices and improve service delivery to farmers. These efforts enhance operational efficiencies within RBK and contribute to broader agricultural development goals, fostering innovation and resilience in rural communities served by the organisation.

**Table 4:** Percent Availability of Services in Sampled RBK Over the Years (in %)

Services Category	Particulars	Year		
		2020-21	2021-22	2022-23
Extension Services	Agriculture Extension Services	100	100	100
	Village Agro Advisory Board	75	97.5	97.5
	Farmers Field School	97.5	100	2.5
	Veterinary Service	77.5	67.5	70
Marketing Services	Input Supply	97.5	100	100
	Interest Subsidy	65	82.5	100
	Procurement	27.5	65	50
	Milk Collection	5	15	15
Knowledge Services	Digital Library	100	100	100
	Farm Magazines	97.5	100	100
	WhatsApp Advisory	100	100	100
	Price and Weather Forecast	100	97.5	100
Registration Service	Rythu Bharosa	100	100	100
	Crop Insurance	100	100	100
	E-Crop Booking	100	100	100
	Custom Hiring Cent	42.5	75	82.5
	Crop Cultivator Rights Cards	75	80	97.5
Other Service	Soil Testing	10	15	97.5
	Moisture Testing	37.5	57.5	57.5
	Seed Germination Testing	5	17.5	80

Table 4 offers a detailed look into the breadth and percentage availability of services provided by RBK over three consecutive years, reflecting the organisation's efforts to support agricultural communities comprehensively. Key services such as Rythu Bharosa, e-crop booking, crop insurance, and agriculture extension services exhibit steadfast full availability (100%), indicating their foundational role in RBK's service portfolio. Rythu Bharosa likely encompasses financial assistance programs crucial for farmers' livelihoods, while e-crop booking facilitates streamlined access to agricultural services through digital platforms. Crop insurance mitigates risks associated with crop losses, providing farmers with financial security, and agriculture extension services ensure continuous education and knowledge dissemination on modern farming techniques. Procurement services showed varying availability, starting at 27.5 per cent in 2020-21, peaking at 65 per cent in 2021-22, and decreasing to 50 per cent in 2022-23. This trend suggests fluctuations in RBK's purchasing activities, possibly influenced by market dynamics and organisational strategies to optimise resource allocation.

Conversely, the input supply and custom hiring centre maintained high availability (97.5% to 100%) throughout the years, underscoring RBK's commitment to providing

farmers with essential agricultural inputs and rental services for farm machinery. These services enhance productivity and operational efficiency in rural agricultural settings. Additionally, advisory and educational initiatives like the village agro advisory board, Farmers Field School (FFS), and crop cultivator rights cards (CCRC) demonstrated robust availability, supporting farmer empowerment and rights documentation. The availability of veterinary services fluctuated slightly between 67.5 per cent and 77.5 per cent due to limited personnel available at the village level, indicating ongoing efforts to provide consistent healthcare support to livestock owners. Digital resources such as the digital library, farm magazines, and WhatsApp advisory maintained full availability (100%), highlighting RBK's technology integration to disseminate information and facilitate communication with stakeholders effectively. Furthermore, agricultural testing services like soil testing, moisture testing, and seed germination testing showed varied availability trends, reflecting RBK's evolving focus on enhancing crop quality and sustainability through scientific methods. Forecast information (Price and weather) and interest subsidy consistently provided critical decision-making support with high availability (97.5% to 100%), aiding farmers in planning based on market trends and accessing financial incentives.

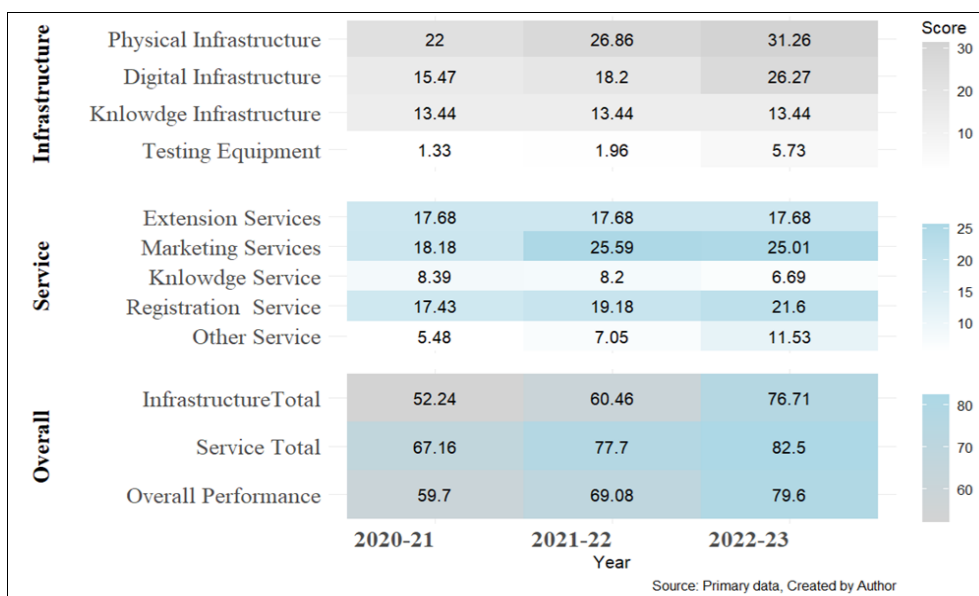
**Table 5:** Performance of Rythu Bharosa Kendra

S. No.	Component	Year		
		2020-21	2021-22	2022-23
1	Physical Infrastructure	22.00	26.86	31.26
2	Digital Infrastructure	15.47	18.20	26.27
3	Knowledge Infrastructure	13.44	13.44	13.44
4	Testing Equipment	1.33	1.96	5.73
5	Infrastructure Total (A)	52.24	60.46	76.71
6	Extension Services	17.68	17.68	17.68
7	Marketing Services	18.18	25.59	25.01
8	Knowledge Service	8.39	8.20	6.69
9	Registration Service	17.43	19.18	21.60
10	Other Service (testing)	5.48	7.05	11.53
11	Service Total (B)	67.16	77.70	82.50
12	Overall Performance (C=(A+B)/2)	59.70	69.08	79.60

Table 5 presents a detailed analysis of the performance of Rythu Bharosa Kendras (RBKs) in Andhra Pradesh across three consecutive years (2020-21, 2021-22, and 2022-23), utilising an Analytical Hierarchy Process (AHP) methodology to assess both infrastructure and service indicators. The components include infrastructure indicators like physical infrastructure, digital infrastructure, knowledge infrastructure, testing equipment, and service indicators, including extension, marketing, knowledge, registration, and other services. This structured approach allows for a comprehensive evaluation of RBKs' effectiveness in delivering agricultural services and maintaining essential infrastructure across different regions of Andhra Pradesh.

Infrastructure Indicators First, the scores for physical infrastructure, which encompass buildings, storage facilities, procurement yards, restrooms, and essential equipment like tables, chairs, racks, and notice boards, exhibited steady growth over the three years. Starting at 22.00 in 2020-21, the score increased to 26.86 in 2021-22 and 31.26 in 2022-23. This upward trend reflects ongoing investments and improvements in infrastructure development within RBKs to enhance operational capabilities and provide conducive environments for agricultural activities. Second, the digital infrastructure component evaluates adopting and utilising digital technologies such as kiosks, tablets, computers,

printers, and internet connectivity within RBKs. Scores for digital infrastructure showed consistent improvement, rising from 15.47 in 2020-21 to 18.20 in 2021-22 and significantly to 26.27 in 2022-23. This indicates RBKs' increasing reliance on digital platforms to streamline administrative processes, improve service delivery efficiency, and enhance farmer engagement through access to digital resources and information. Then, the knowledge infrastructure focuses on the availability and dissemination of knowledge-related resources such as smart TVs, recorded videos, farmer libraries, and digital platforms for information sharing; the knowledge infrastructure component maintained a stable score of 13.44 across all three years. This suggests consistent efforts in providing educational resources and promoting agricultural knowledge among farmers and RBK staff, which is crucial for informed decision-making and skill development. Finally, the scores for testing kits essential for soil, moisture, and seed testing increased notably from 1.33 in 2020-21 to 1.96 in 2021-22 and further to 5.73 in 2022-23. This significant improvement underscores RBKs' efforts to enhance agricultural advisory services by ensuring the availability of accurate testing capabilities, thereby supporting farmers with scientific data and recommendations for improved crop management practices.



**Fig 2:** Performance of Rythu Bharosa Kendras in Andhra Pradesh



Regarding Service Indicators, first evaluating the effectiveness and outreach of agricultural extension services provided by RBKs, this component maintained consistent scores of 17.68 across all three years. This indicates stable performance in farmer education, advisory services, and agricultural training initiatives to enhance productivity and sustainable farming practices among rural communities. Next, scores for marketing services, which include input supply, interest subsidy crop loans, procurement of agricultural outputs, and operation of milk collection centres, showed steady improvement from 18.18 in 2020-21 to 25.01 in 2022-23. This reflects RBKs' enhanced support in marketing agricultural produce, providing financial assistance, and facilitating market access for farmers, thereby contributing to improved income generation and economic stability in rural areas. Then, focused on additional knowledge-based services such as digital libraries, farm magazines, WhatsApp advisories, and access to price and weather forecasts, scores for knowledge services slightly declined from 8.39 in 2020-21 to 6.69 in 2022-23. This trend indicates potential areas for improvement in leveraging digital platforms and information dissemination strategies to enhance farmer access to timely and relevant agricultural information.

Scores for registration services related to agricultural schemes, insurance, crop booking, custom hiring centres, and support for tenant farmers (CCRC) increased steadily from 17.43 in 2020-21 to 21.60 in 2022-23. This improvement reflects RBKs' efforts to facilitate easier access to government schemes and services, thereby reducing bureaucratic hurdles and enhancing farmer participation in agricultural development programs. Other services include supplementary services such as soil and seed testing, moisture testing, and other specialised services catering to diverse farmer needs. Scores for other services increased significantly from 5.48 in 2020-21 to 11.53 in 2022-23. This indicates expanded service offerings and enhanced support mechanisms implemented by RBKs to address specific agricultural challenges and improve overall service delivery effectiveness.

The overall performance index, which combines infrastructure and service indicators scores, showed steady improvement over the years. Starting at 59.70 in 2020-21, the index increased to 69.08 in 2021-22 and 79.60 in 2022-23. This upward trajectory underscores the comprehensive growth and effectiveness of RBKs in delivering agricultural services, maintaining infrastructure, and fostering rural development across Andhra Pradesh. The improvements reflect RBKs' strategic initiatives in infrastructure development, digital integration, knowledge dissemination, and service expansion, aimed at enhancing farmer livelihoods, promoting sustainable agriculture, and fostering economic growth in rural communities.

### Conclusion

The performance evaluation of Rythu Bharosa Kendras (RBKs) in Andhra Pradesh indicated significant strides in enhancing agricultural extension services and infrastructure. RBKs have substantially improved their physical and digital infrastructure, supported by consistent investments in buildings, storage facilities, and digital tools. The availability of essential agricultural testing equipment has

also seen notable growth, enabling better advisory services for farmers.

On the service front, RBKs have maintained high levels of accessibility for key services such as Rythu Bharosa, e-crop booking, and crop insurance, ensuring robust support for farmers' financial and operational needs. Marketing and registration services have shown steady improvements, reflecting RBKs' enhanced role in facilitating market access and government schemes. While knowledge services exhibited a slight decline, the overall service delivery remains strong, with notable gains in specialised services like soil and seed testing.

The overall performance index demonstrates a positive trajectory, underscoring the comprehensive growth of RBKs in delivering agricultural services, maintaining infrastructure, and fostering rural development. These improvements highlight RBKs' critical role in supporting farmer livelihoods, promoting sustainable agriculture, and contributing to the economic growth of rural communities in Andhra Pradesh.

### Policy Implications

- **Enhanced Funding and Resources:** Continued physical and digital infrastructure investments are essential. Allocating more funds to build new RBK facilities and upgrade existing ones will improve service delivery.
- **Training and Capacity Building:** Focused training programs for RBK staff, particularly in digital literacy and testing equipment, will enhance the quality of services provided to farmers.
- **Strengthening Knowledge Services:** Addressing the decline in knowledge services by integrating more comprehensive digital platforms, expanding the range of educational resources, and improving dissemination strategies can ensure that farmers receive timely and relevant information.
- **Expanding Market Support Services:** Strengthening the marketing services component by enhancing procurement mechanisms and establishing more milk collection centres will provide farmers with better market access and income opportunities.
- **Policy Integration and Coordination:** Ensuring better coordination between various governmental departments and RBKs will streamline the implementation of agricultural schemes and reduce bureaucratic hurdles for farmers.
- **Monitoring and Evaluation:** Implementing a robust monitoring and evaluation framework to assess the performance of RBKs regularly will help identify areas for improvement and ensure that the services provided are meeting farmers' needs effectively.
- **Promotion of Youth Involvement:** Given the significant concentration of younger staff, policies that promote leadership development and career progression within RBKs will harness the potential of the younger workforce for innovative and sustainable agricultural practices.

By addressing these policy implications, the Government of Andhra Pradesh can further enhance the effectiveness of RBKs, ensuring sustainable agricultural development and improved livelihoods for farmers across the state.

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