

Agriculture

The Problem

Agriculture plays an important role in the economy of Andhra Pradesh as 62 percent of the population is dependent on this sector for their livelihoods. This sector is growing at the rate of 5.9 percent and contributes around 27.8 percent to the Gross State Domestic Product (GSDP) (2014-15). Andhra Pradesh had a total cultivated area of 6.35 million ha in 2014-15, but it has low and stagnant productivity as compared to some other states in the country. On the other hand, the cost of production is increasing (GoAP, 2015) and overall farmer incomes are low

The 12th Five year plan aims to promote agriculture growth at the rate of 6% in (undivided) Andhra Pradesh, with an overall state growth targeted at 10%, for the period of 2012-17. The Government of Andhra Pradesh, GoAP (2015), has decided to design a strategy to transform the agricultural and allied sectors with specific emphasis on increasing the productivity of the crops, improving water conservation and micro-irrigation, reducing post-harvest losses and establishing processing, value addition capacity and supply chains of the identified crops. This is combined with a goal of doubling farmer incomes by 2022 as set out by the central government.

For the state of Andhra Pradesh the identified three interventions for analysis are: 1) Improving the availability of certified seeds; 2) Improving mechanization through custom hiring services, and; 3) Improving the extension services in the state through the use of modern ICT tools.

Solutions

Interventions	BCR	Total benefit (INR crore)	Total cost (INR crore)
Certified Seed Production & Promotion	15.4	6,176	401
Improving / Expanding extension services via ICT	6.2	6,250	1,003
Custom Hiring Centres	1.9	22,574	11,892

Total costs and benefits are discounted at 5%

The full paper by agricultural economist Dr **Surabhi Mittal**, Independent Consultant and Non-Resident Fellow, Tata-Cornell Institute for Agriculture & Nutrition (TCI), Technical Assistance and Research for India Nutrition & Agriculture (TARINA) is available on www.appriorities.com/agriculture-and-food-security.

Certified Seed Production

The Problem

Farmers mainly use farm saved seed (FSS) and unless they are replaced at regular intervals, the yield potential is not achieved. More than 70 percent seed usage, particularly for food crops, is through FSS resulting in low Seed Replacement Rates (SRRs). SRR has a strong positive correlation with the productivity and production of crops. The trend of using farm saved seed continues despite the introduction of a good variety of seeds in the country. It is important to ensure that the seed

technologies that are the outcomes of research are widely disseminated and adopted so that they can result in gains to the farmers.

The National Seed Policy 2002 also emphasises the need to enhance the seed replacement rates of various crops to achieve the food production targets. It also highlights that there are huge yield gaps and one of the reasons for this is the low seed replacement rate.

The Solution

As per the Government of Andhra Pradesh (GoAP 2015), the farmers of the state will be encouraged to produce their own seed through Seed Village

Programme (SVP) so that quality seed is available at the doorstep of the farmers, at affordable prices.

The aim of this intervention is to increase the availability of certified seeds for major crops in the state to improve the SRR, producing yield gains.

Costs

Costs include two components. First is the cost of production of the additional seed required for all the major crops in the state to achieve the higher SRR. It is assumed that higher SRR is achieved over a three-year period through this intervention, by making the extension, demonstration and field days more effective, so that larger numbers of farmers can adopt the modern seed varieties.

This forms the second cost component of this intervention that is the cost of promotion to increase the adoption of the improved seed. This cost is estimated at Rs 186 per hectare.

The total cost of this intervention comes to around Rs. 400 crores.

Benefits

The benefit is mainly increased yields because of the use of certified seed. The higher yields lead to increased production and thus higher incomes. The income gain to farmers is the total benefit. Yield gains of 10% are assumed in the study.

Total benefits due to this intervention are estimated at Rs. 6,176 crores.

Custom Hiring Centres

The Problem

Farm mechanization accelerates the pace of the growth in the agriculture sector but there are many small and fragmented land holdings that make the adoption of mechanization challenging.

Mechanisation is largely happening in the big land holdings and is still beyond the reach of over 80% of the small/marginal holdings, because of poor affordability.

The Solution

The focus of this intervention is on increasing agricultural productivity by mechanization. It also helps to solve the problem of the high cost of labor and the increasing unavailability of labor. The aim is

to increase the level of mechanization, even for small farms.

Andhra Pradesh government plans to increase the focus on making available the best machinery for farming operations, including land preparation, sowing, inter cultivation, harvesting and post harvesting. Establishing Custom Hiring Centers (CHC) facilitates the availability of high cost machinery to small and marginal farmers on a hire basis.

To achieve the benefits of CHC's, the machinery needs to be used properly. Thus, the technical experts and extension agents also have a key role in ensuring that the CHCs are working efficiently

Costs

The costs include the capital cost for establishing the CHCs, operational costs every year for a period of 5 years, the cost of promotion, and the administrative costs of setting up the CHCs. The unit capital cost for setting up the CHC is worked out as Rs. 15.50 lakh, which includes cost of construction of a workshed of 500 sq. ft (NABARD n.d).

The operational and maintenance cost of each CHC comes to around Rs. 4.5 lakh in the first year assuming 75% of the total capacity utilized and around Rs. 6 lakh per year for the subsequent years. The final component of the cost side is the expenditure on promotion which has been kept as 5 percent of the total annual cost of the CHC. The annual promotion cost is Rs. 288 crore for the first year and Rs. 87 crores for the subsequent years.

It is assumed that each well stocked CHC can serve approximately 500 acres of land every year and thus in Andhra Pradesh 28,679 CHCs will be required. The cost calculations are based on establishing and operating this number of CHCs over a period of 5 years.

Total cost of the intervention is estimated at Rs. 11,892 crores.

Benefits

The major benefit of CHCs is easy access to machinery, especially to small and marginal farmers. The increased farm mechanisation reduces the cost of production due to reduction in the cost human labor, animal labor and also better utilization of

other inputs like seed, fertilizer and manure. This intervention results in the reduction in costs of: seed and fertilizer by 15%; animal labor by 60%; and human labor by 20%.

Another important benefit is income gain due to yield enhancement which is because of the efficient utilization of inputs from mechanization. It is assumed that there will be 2% yield gains per year over a period of 5 years. The total annual benefit due to yield gain is Rs. 1570 crores.

The third and final benefit, which accrues at the end of the fifth year, is the residual value of the machinery at the CHC after five years of operation. The same is estimated to be 10% of the capital cost at the end of the fifth year. This gives a benefit of Rs. 1.6 lakh at the end of the fifth year of the intervention.

The total benefit for this intervention is estimated at Rs. 22,574 crores.

Improving / Expanding extension services via ICT

The Problem

The extension services in India has primarily been the responsibility of the public sector. Public sector extension services in India are usually criticized for their ineffective targeting, poor reach and the huge administrative cost of delivering information (Mittal, 2012).

It is important to strengthen the agricultural extension system for increasing productivity, profitability, sustainability and incomes for the farmers.

The Solution

This intervention focuses on relying on ICT enabled extension service. Extension services play a crucial role in supporting overall agricultural activities by taking the research, the technology and the know-how to the farmers to improve adoption.

During the past few years, with the increase in mobile penetration even in rural areas, there has been an evolution of ICT-based extension services models to disseminate agriculture related information. The overall goal of using the mobile phone-enabled information delivery mechanism is to

have inclusive growth by reducing the knowledge gap between large and small farmers and by creating awareness.

Costs

The cost for this intervention is a sum of 3 components. First, cost of delivering agricultural advisories through SMS. Second, cost of IVRS (Integrated Voice Recording Service) Third, other cost of operations. Since agriculture is an activity throughout the year, the assumption of 200 SMS per year at the rate of Rs. 1 per SMS is added as a cost.

The operational cost is taken as \$0.83 per household per month. The intervention is built up over the 5 year period with users as 20 percent in year 1, 40 percent in year 2 and going up to 60 percent by year 5.

Total cost of this intervention is estimated at Rs. 1,003 crores.

Benefits

The main benefit of improved extension services is in form of increased farmer incomes due to efficiency in production.

For this calculation 16% profit figures on the base profit income of the households is used. The average of small and marginal farmers is taken as the base income figure to remove the bias because of large farming households, Rs. 37,370 per household per year.

Total benefits of this intervention is estimated at Rs. 6,250 crores.

Pay-back on agricultural interventions

