

Development of Agri Infrastructure Model for Tadikonda Mandal, Guntur, District, Andhra Pradesh

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Abstract: In India approximately Rs.92,000 crores worth Agricultural produce is damaged. About 35% of perishable Agricultural products (fruits, vegetables, meat, milk) and non-perishable Agricultural products are damaged annually before reaching consumer due to lack of proper infrastructure facilities such as transportation, storage facility, processing, packing, etc. Hence, there is an immediate need to improve the Agricultural infrastructure to prevent loss, meeting food requirements of the country, improving the income of farmers. On an average about 12,000 farmers are committed suicide per annum since 2013 as the farming has become non- remunerative which has led to debit trap. This paper aims at understanding the infrastructure need for Agriculture and come up with an infrastructure model for Tadikonda Mandal of Guntur district, Andhra Pradesh which will help in meeting the ambitious objective of government of India in doubling the farmers income by 2022. Agricultural infrastructure involves water for irrigation, transport facility, post harvesting facilities, grading, processing, packing, marketing, etc. The existing infrastructure for Agricultural, Agricultural production in the study area is understood, questionnaire survey is carried out among the various concern stakeholders to understand their needs and expectations, identified the gap between the existing and expectations of the stakeholders. Also identified the infrastructure required for sustainable green revolution, collected the information regarding various schemes of central and state government that are suitable for the identified infrastructure and modes of finance for the identified infrastructure are evolved.

Index terms: Agricultural infrastructure, doubling farmers income, schemes, modes of finance

I. INTRODUCTION

More than 60% of population in India is depending on Agriculture and allied activities directly or indirectly. Agri infrastructure is the vital input for development of Agriculture in India. India's major Agriculture produce losses estimated at Rs. 92,651 crores per year according to data published by the Ministry of food processing industries. About 16% of fruits and vegetables valued at Rs. 40,811 are damaged every year, according to an analysis of production data between 2012 and 2014 at whole sale price by Central Institute of Postharvest Engineering and Technology, Ludhiana.

Be it out-break of pests at production, erratic rainfall, natural calamities, poor quality of seeds, indefinite power supply or losses in storage and transport or price uncertainty. While marketing, the risk is not distributed evenly among the other stakeholders like grain traders,

aggregators or processors. Being an agrarian country Indian farmer require long term strategic and sustainable solutions, minimizing risk instead of short-term rhetorical promises of the government such as loan waiver and subsidized inputs.

This process involves addressing challenges such as weak producer-consumer linkage, weak supplier power, technology starved, lack of adequate Agriculture infrastructure along value chain, customized approach to different crop groups, focus on Agricultural extension, availability of quality inputs in right time.

Every year throwing of tomato is common in Madanapalli of Chittoor district, Andhra Pradesh as and when prices clash. Prices fluctuates from Rs.1 to Rs.20 in whole sale market. Same is observed in the case of onion in Kurnool district of Andhra Pradesh and Nasik district of Maharashtra.

In India the capacity of storage godowns available for food storage is around 95 million metric tons and around 45 million MT capacity is estimated to be required for storing food products [1]. The increase in Agricultural productivity depends on well rural infrastructure, well domestic markets and approach to these technologies [2]. Rural roads are not only connecting the rural areas but also helps in changing the crop pattern due to easy access of Agricultural inputs and outputs from Agricultural fields to markets [3]. The nutrients and fertility of the soil are the keys to the yield of the Agriculture [4]. Farmers suicides as a percentage of total suicides are 23.5 % in Maharashtra [5]. Farmer S. Raju who lives in Ananthapur district has thrown away about 2 tonnes of tomato after realized that he won't get the transportation charges even if he sells it in the market [6].

In 2018 farmers burnt chilli without even plunk from the fields in Andhra Pradesh and Telangana states due to crash of prices of chilli [7]. It is reported that only 10-11% of fruits and vegetables cultivated in India use cold storage due to expenses involved and lack of suitable facilities [8]. Finance is another set-back. Due to lack of finance and liquidity, farmers are compelled to sell their produce immediately, within days of harvest, at any prevailing rate.

According to report by the National crime records bureau [9] total farmers committed suicide are shown in table.1

Table.1 Statistics of farmers committed suicide

Year	Total farmer suicides in India
2005	17,131
2006	17,060
2007	16,632

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2008	16,796
2009	17,368
2010	15,964
2011	14,024
2012	13,754
2013	11,772
2014	12,360
2015	12,602

Tadikonda Mandal of Guntur district, Andhra Pradesh is taken as study area and it is having 12 villages with a population of 67,962 as per 2011 census with an area 194.23km². Area under commercial crops is highest in Tadikonda in Guntur district. The major crops cultivated in the Tadikonda Mandal are paddy, Chilli, cotton, black gram, chickpea, etc.

II. RESEARCH SIGNIFICANCE AND OBJECTIVES

Farmers are continuing the profession as they can't do any other job, have no alternatives in spite of getting debit trapped due the losses or migrating to urban areas in search of jobs. Quality of power supply is very poor and sometimes power is supplied to pumps during nights. Cost of storage of Agri produce in cold storage is very high and the crops are getting effected to attack of pests. There is no value chain, adequate market infrastructure, storage facility is inadequate. Producer and consumer linkage are very weak. In the view of the above there is a need to identify infrastructure needs of the selected area and develop a model for Agricultural infrastructure to address the issue. There is also a need to improve infrastructure in line with the ambitious objective of "doubling the farmers income in India by 2022" of government of India and converting 100% of the farmers in Andhra Pradesh to ZBNF to make Agricultural sustainable and prevent farmers suicides.

The main objective of this study is to identify the existing infrastructure in Tadikonda Mandal and to conduct a questionnaire survey to identify the infrastructure needs of the farmers and to come up with an Agri infrastructure model that is suitable to Tadikonda Mandal. The various schemes of state and central government that are best suited for funding the identified infrastructure are also presented. The approximate estimation of cost of the infrastructure is also prepared.

III. METHODOLOGY

The literature review is carried out, the existing Agricultural infrastructure, facilities and services are collected from various concerned offices. The various stakeholders involved in the study area are identified. A questionnaire survey is carried out among the identified stakeholders to collect the expectations and requirements. The gap between the existing and expectations of the stakeholders is identified. Various schemes offered by the Andhra Pradesh government and Central government for Agri infrastructure are identified and mapped with the identified infrastructure to be provided. The cost estimation is done for the infrastructure to be provided and suitable Agri infrastructure model is presented.

The detailed process of methodology is presented in the form of flow chart in Fig.1.

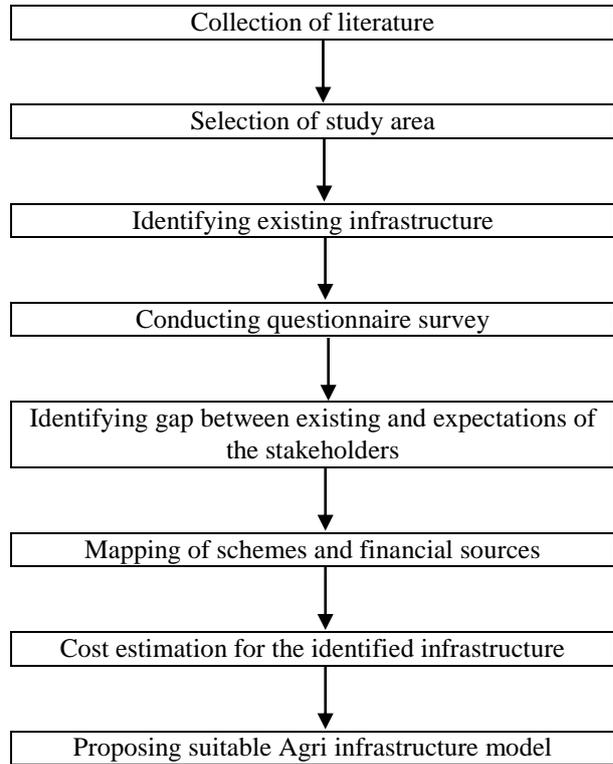


Fig.1- Flow chart of methodology

IV. RESULTS AND DISCUSSION

A. Existing Infrastructure

The existing infrastructure related to Agriculture is presented in table. 2

Table-2 Existing infrastructure related to Agriculture

Sector	Infrastructure
Water for irrigation	No canals, no bore wells for irrigation, few small tanks are catering to irrigation water for paddy
Value addition/ primary processing	Rice mills – 6no. cotton jinning units – 2no, markets – 20%.
Conventional storage facility	Bulk storage godowns -2 no. for individual storage, 80% of farmers are storing using tarpaulins in open place
Cold storage	Nil
Road connectivity for transportation of farm inputs and Agri produce	Kaccha cart tracks are available to 70% of the region but it is difficult to transport the fertilizers, other inputs and Agricultural outputs during rainy days
Consumer market for Agri produce	Markets – 20 stalls other than kerana shops, good access to markets
Agricultural extension officer	Agricultural university – 1no.



Testing laboratory	Seed testing labs – 1no. soil testing laboratory-1no. fertilizer testing laboratory-1no.
Agricultural marketing personal	Marketing personals 1no.
Demonstration plots	Demonstration plots – 4no. for selected crops
Veterinary hospitals	6 no.
Library for information related to Agriculture	Nil, but Acharya NG Ranga Agricultural university and lam research center is situated in this Mandal
Fuel filling stations	25 no.
Tractor repair centers	3 no.
Bullock cart repair and Agriculture implements manufacturing and selling units	2 no.
Chemical Fertilizer and pesticide shops	20 no. available in all villages
Organic pesticides	20 no. available in all villages
Organic / bio fertilizers	0 no.
Weighing bridges	2 no.
Manual and power sprayer repair centers	1no.

B. Questionnaire Survey

Various stakeholders related to present investigations are identified and they are farmers, consumers, Agricultural extension officers and Agricultural marketing personals, traders of fertilizer, pesticides, seeds, Agriculture implements manufacturers/ traders, Agriculture commodity commission agents and traders. Expectations and requirements of various stakeholders are compiled and presented in table 3

Table - 3 Expectations and requirements of various stakeholders

Sector	Infrastructure/ Service/ Facility
Farmer	Irrigation water supply, power supply or diesel engines, integrated market yard, individual storage facility, initiation of soil erosion preventing measures, bulk storage godowns,

	road network to farms, tractors, value addition to the Agri produce, forming farmers producing organizations (FPO), advice on crop selection and Agricultural produce that can be sold locally by adopting crop colony concept, exposure visit to model or progressive farmers and high tech farms, mixed live-stock based integrated farming, precision farming, poly house/ shade net, floriculture, ZBNF, training on reducing cost of farming, custom hiring machinery for all Agricultural activities, strengthening producer-consumer linkage and strengthening marketing facility, Water for irrigation water supply to meet irrigation demand
Agricultural extension officers	Support from government to take the farmers for site visits, training farmers on crop management, post harvesting technologies, establishment of quality control department, subsidy for machinery and power, more interaction with the farmers regarding selection of crop, sustainable farming methods, organic farming, storage, packing and transportation, awareness programs, integrated pest management, integrated nutrition management, good Agricultural practices
Agriculture marketing personal	To establish integrated E-marketing facility with transparent E- auction, appoint Agricultural marketing personal, price forecasting
Consumers	Market with all Agricultural products availability similar to rythu bazars, price display boards, digital accurate weighing scales, grading of produce, basic amenities at market, product wise stalls, accessibility for market, market days at all the villages with minimum facilities, establishment of cooperative stalls of farmers so that middle men are avoided in between the producer and consumer
Traders	Establishment of shops at strategic locations to have the better access to farmers, access to loan from public sector banks

C. Gap Between Existing and Expectations of Stakeholders

The gap between the existing infrastructure and expected infrastructure is identified and presented below in table 4.

Table 4 Gap Between Existing and Expectations of Stakeholders

Type of infrastructure	Existing infrastructure	Expectations of the stakeholders	Gap between the existing and expectations of the stakeholders
Integrated market yard	None	To come up with an integrated market yard with conventional storage, cold storage, value addition for paddy, cotton, chilli, green gram, weighing platform, sales outlets for Agri commodities, fruits and vegetables, seeds, fertilizers, pesticides of chemical and organic, home foods, gunny bags, bullock cart and Agriculture implements, custom hiring machinery, tractors repair, market forecast information centre, other basic amenities	To come up with an integrated market yard with conventional storage, cold storage, value addition for paddy, cotton, chilli, green gram, weighing platform, sales outlets for Agri commodities, fruits and vegetables, seeds, fertilizers, pesticides of chemical and organic, home foods, gunny bags, bullock cart and Agriculture implements, custom hiring machinery, tractors repair, market forecast information centre, other basic amenities



Individual storage facility	80% of farmers are storing using tarpaulins in open place	Permanent godowns to be constructed for all the needy farmers as per their requirement capacity	Permanent godowns to be constructed for all the needy farmers as per their requirement capacity
Bulk storage godowns	500MT	2500MT	2000MT
Tractors	100	150	50
Road network to farms	Kaccha cart tracks are available to 70% of the region but it is difficult to transport the fertilizers and other inputs during rainy days	80 km length of cart track to be converted into pakka dumber roads	100 km length of cart track to be converted into pakka dumber roads
Power supply for bore wells and drip irrigation	Nil	Power supply for all needy farmers	Power supply for all needy farmers
Water grid for irrigation water supply to meet irrigation demand	Nil	To provide water for every acre in Tadikonda Mandal using water grid as there is limited surface water source and limited ground water	To provide water for every acre in Tadikonda Mandal using water grid as there is limited surface water source and limited ground water
Drip irrigation for all the farms	Nil	100% of the Agricultural land to be provided as it is not possible to meet irrigation demand using conventional methods	100% of the Agricultural land to be provided as it is not possible to meet irrigation demand using conventional methods

D. Mapping of schemes and cost estimation for the identified infrastructure identified infrastructure are identified and cost estimation is prepared and presented in table 5

The various schemes that are best suitable for the

Table 5 Cost estimation for identified infrastructure and suitable schemes

Type of infrastructure	Capacity required	Total cost	Schemes available for funds	Funds to be generated
Integrated market yard	Details are presented in Fig.3	Total cost = 70 crores	Godown And Warehouse Creation Rural Godown Scheme Centrally Sponsored Scheme for Setting Up of Rural Godowns And Storage Infrastructure Agricultural and marketing infrastructure, grading and standardization Integrated scheme for Agricultural marketing Bharat Nirman Integrated cold chain scheme of Ministry of Food Processing Industries (MOFPI)	On an average 25% of the cost is expected in the form of subsidy from various schemes. Balance cost is rupees 52.5 crores state government to establish the market yard
Power supply for fields	Power supply lines	Estimation is not carried as it is funded by government	No related schemes	100% cost to be bear by APTRANSCO
Individual storage facility	Minimum 5 MT	Cost per MT (land cost is excluded)	Rural Godown Scheme Gramin Bhandaran Yojana	75% of capital investment



Bulk storage godown	2500MT	2500 Cost per MT (land cost is excluded)	Rural Godown Scheme Gramin Bhandaran Yojana	75% will be funded by government. To identify potential entrepreneurs and encourage to establish by briefing the benefits
Road network to farms	100km	50lakhs per km	Bharat nirman Pradhan Mantri Gram Sadak Yojana	Completely funded by government
Tractors	50 no. of 10HP capacity	2lakhs	Schemes of Agricultural department	Identify the needy farmers explain the benefits offered to the extent of 50% remaining cost is bear by individual farmers
Water grid for irrigation water supply to meet micro irrigation demand	Grid covering 90km ² acres	Water grid =0.95lakhs per acre	No related schemes	Government to bare the total cost
Drip irrigation for all the farms	90km ² acres	Drips = 0.95lakhs per acre	Micro irrigation schemes of state Agricultural department	50% subsidy by Agricultural department, farmers bear the remaining cost

E. Justification for facilities and services

The justification for the identified facilities and services is presented in table 6.

Table 6 Justification for facilities and services

Sector	Facilities and services	Justification
Agricultural extension officer	Support from government to take farmers to site visits	To give exposure to farmers to innovative, sustainable, precision farming, ZBNF, poly house, good Agriculture practices, integrated mixed farming, organic farming,
	Programs on crop management, selection of crop, sustainable farming methods, organic farming, storage, packing and transportation	To train the farmers on crop management and advise on crop selection to go for right crops and other motivate them to go for sustainable farming methods
	Post-harvest technologies	To train the farmers on better post-harvest management to prevent losses and come up with better quality
	Establishment of quality control department	For providing better testing service for seeds, fertilizers, pesticides, crop quality, soil health
	Awareness programmes on integrated pest management, integrated nutrition management, good Agricultural practices	To create awareness among the farmers
	Subsidy for machinery and power	To bring awareness on selection of right machinery and various schemes available for subsidy and finance
Farmers	Initiation of soil erosion preventive measures	To guide the farmers in initiating measures to prevent soil erosion in the areas prone to soil erosion
	Value addition	Facilitate to establish FPO's for the value addition, sourcing of inputs, exchange of knowledge, establishment of custom hiring centre
	Forming farmers producing organizations (FPO)	Facilitate to identify the interest farmers, form a group and train them on running FPO, brief the avail benefits from NABARD
	Advice on crop selection and Agricultural produce that can be sold locally	Prepare a crop colony model and advice on selection of right crop
	Exposure visit to model or progressing farmers farm, high-tech farms	Facilitate to get exposure high-tech, innovative forming and successful farm models

	Mixed live-stock based integrated farming	To provide exposure visit to successful farms to get convinced and guide them on establishment with continuous support
	Training on reducing farmer expenditure	To explore the farmers to reduce the cost of the cultivation
	Custom hiring machinery for all Agricultural activities	To make all the machinery required for Agriculture available and accessible at affordable cost
Agricultural marketing personal	To establish integrated E-marketing facility with E-auction facility	For transparent auction access to traders all across the country and world for better price to the farmers
	Appoint Agricultural marketing personal	For price forecast and advise on selling the produce
Consumer	Market with all products availability similar to rythu bazar	To make all quality Agri produce available at affordable price
	Basic amenities at market	To attract more consumers and convenient shopping
	Product wise stalls	To attract more consumers and convenient shopping
	Accessibility for market	To attract more consumers and convenient shopping
Traders	Establishment of shops at strategic locations to have the better access to farmers	To attract more consumers and convenient shopping
	Access to loan from public sector banks	To facilitate for better access to banks to get loans

E. Proposed Agricultural infrastructure model:

Proposed strategic location and layout of integrated market yard comprising of all associated infrastructure and

amenities is presented in fig. 2 and fig.3 respectively. Proposed infrastructure model for Tadikonda Mandal is presented in table.7.

Table.7 Proposed infrastructure model for Tadikonda Mandal

Sector	Infrastructure	Facility/service
Agriculture	Integrated market yard with conventional storage, cold storage, value addition for paddy, cotton, chilli, green gram, weighing platform, sales outlets for Agri commodities, fruits and vegetables, seeds, fertilizers, pesticides of chemical and organic, home foods, gunny bags, bullock cart and Agriculture implements, custom hiring machinery, tractors repair, market forecast information centre, other basic amenities water grid covering the entire Agricultural land with drip irrigation facility power supply to all farms individual storage facilities bulk storage facility road network to farms quality control laboratory tractors	Initiation of soil erosion preventing measures, value addition to the Agri produce, forming farmers producing organizations (FPO), advice on crop selection and Agricultural produce that can be sold locally by adopting crop colony concept, exposure visit to model or progressive farmers and high tech farms, mixed live-stock based integrated farming, precision farming, poly house/ shade net, floriculture, Zero Budget Natural Farming (ZBNF), training on reducing cost of farming, custom hiring, machinery for all Agricultural activities, strengthening producer-consumer linkage and strengthening marketing facility
Consumer	Nil	Market with all Agricultural products availability similar to Rythu bazars, price display boards, digital accurate weighing scales, grading of produce, basic amenities at market, product wise stalls, accessibility for market, market days at all the villages with minimum facilities, establishment of cooperative stalls of farmers so that middle men are avoided in between the producer and consumer
Traders	Nil	Access to loan from public sector banks
Marketing	Nil	To establish integrated E-marketing facility with transparent E- auction, appoint Agricultural marketing personal, price forecasting

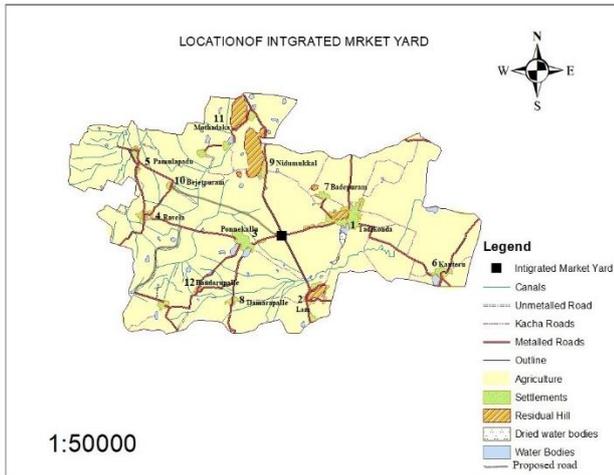


Fig. 2 – showing location of the integrated market yard

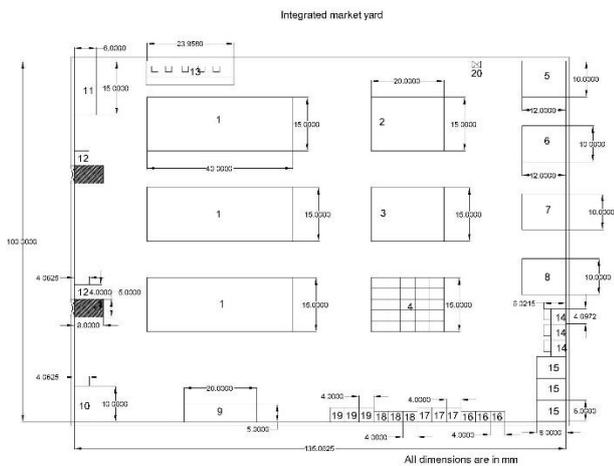


Fig. 3 – layout of proposed integrated market

- 1 – yard
- 2 & 3 – conventional storage
- 4 – cold storage
- 5 to 8 – value addition
- 9 – canteen
- 10 – washrooms
- 11 – cattle shed
- 12 – security room
- 13 – departmental office
- 14 to 19 – shops for custom hiring centre, fruits and vegetables, tractor repair, seeds and pesticides, etc

V. CONCLUSION

The area under study is having very poor Agricultural infrastructure, irrigation facility is very limited, no market yard, no sufficient storage. Farmers are mainly depending on commercial crops such as chilli and cotton. There is no linkage between producer and consumer and value addition to the Agricultural produce. The farmers are still following conventional farming methods. In line with the ambitious objective of “doubling the income of farmers by 2022 and stopping the farmers suicides, it requires transformation and strategic plans, strengthening Agricultural infrastructure, establishing integrated market yard comprising of value addition, storage facility, sales outlets, etc, exposure visits and awareness on innovative, improved and sustainable farming methods such as precision farming, ZBNF, organic

farming, integrated mixed farming, horticulture and floriculture under controlled atmosphere, minimizing post harvesting losses, access to provide for all Agricultural related machinery and improvement through establishment of custom hiring centers at affordable price to reduce the input cost. A suitable Agri infrastructure model is proposed for Tadikonda Mandal (table 7).

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