



भारतीय प्रौद्योगिकी संस्थान दिल्ली  
Indian Institute of Technology Delhi

ELP305: Design and Systems Laboratory

Semester 2, 2021-22

## GRAMINDIA

Using affordable technology, proposing an integrated set of adequate technological solutions which would make living and working in rural India a better choice than in urban India.

Tribe F

March 30, 2022

## Abstract

In a typical Indian village, most villagers are primarily involved in agricultural activities. Animal husbandry, dairy products and cottage industries like pottery, art and craft, bidi making, etc are some other sources of income. A small portion of the people work as daily wage labourers in various factories including textile, farm products and other manufacturing industries. Due to the over-saturation in the agricultural sector, young skilled laborers are seeking employment in factories and construction, industries that offer considerably higher and more stable income than agriculture. There are also people involved in providing services to others, mainly in form of transport and storage.

In this project we are trying to identify problems faced by the rural population and propose solutions to mitigate them. We would like to impact the lives of as many people as possible and improve them as much as we can.

At first, we are looking at the various stakeholders in a village economy and their needs and aspirations in the course of their life.

Then, we analysed the problems they face and tried to come up with various technological solutions to help them.

## Motivation

The Motivation of this project is to analyse the working of a rural village and understand the life of various stakeholders in the village economy to finally be able to propose technological solutions to their problems and improve their standard of living.

We looked into the various stakeholders, both primary and secondary and analysed their problems. Hence, we brain stormed and landed on some ideas that will help the village grow and would make living and working in rural India a desirable choice.

# Mindmap

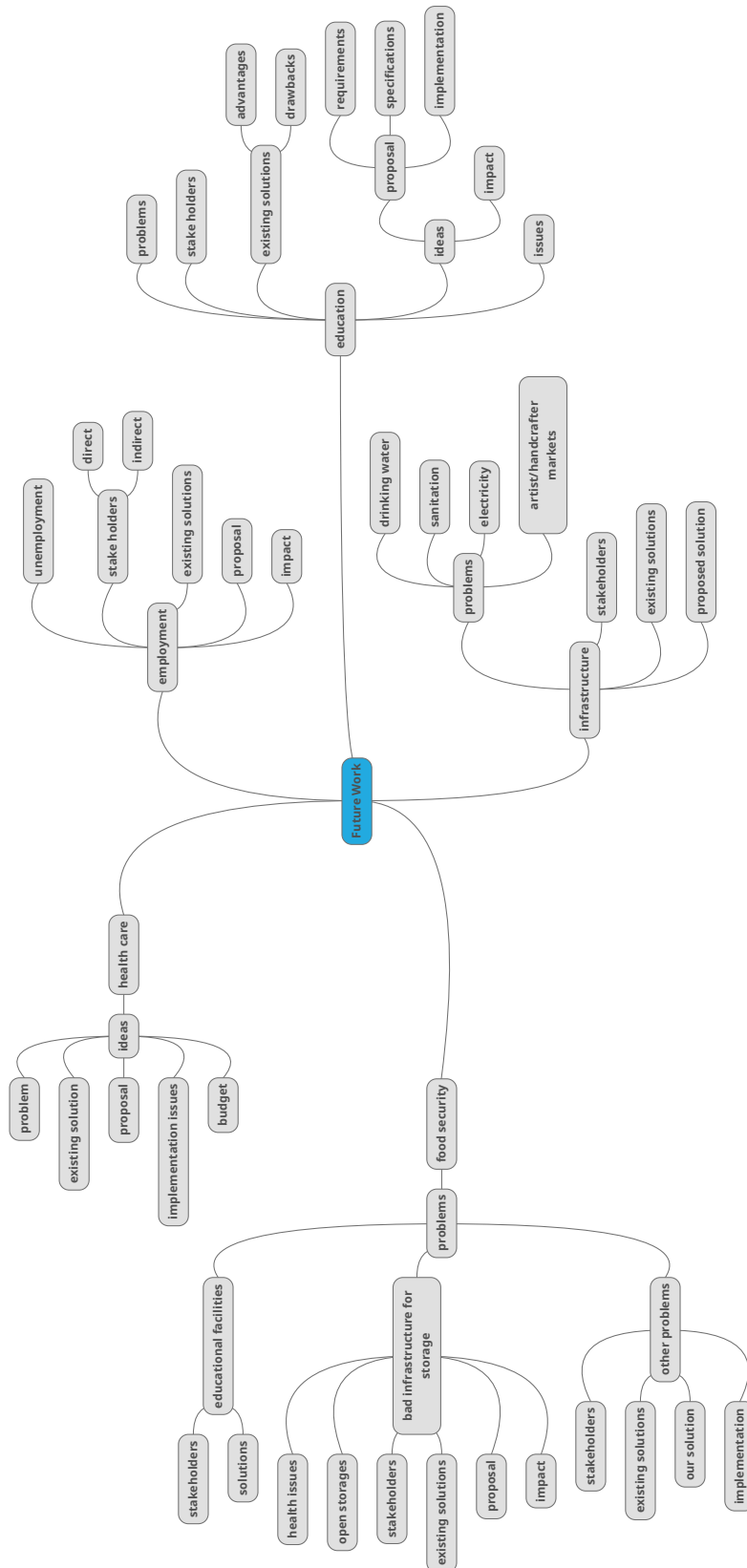


Figure 0.1: Mindmap

## List of Figures

0.1	Mindmap . . . . .	3
1.1	Gantt Chart . . . . .	8
1.2	Task Usage . . . . .	9
1.3	Work Breakdown Structure (WBS) . . . . .	10
1.4	Critical Path . . . . .	11
3.1	Flow Chart-Education . . . . .	25
3.2	Requirements for Healthcare . . . . .	29
3.3	Percentage share of different sectors in Storage of Food Grains . . . . .	37
3.4	Storage Structures . . . . .	38
3.5	Eco-friendly Two Pit, Pour-Flush Compost Toilet . . . . .	51

## List of Tables

1.1	Table of Authors and their Contribution . . . . .	7
1.1	<i>(Continued)</i> Table of Authors and their Contribution . . . . .	8
2.1	Documentation Team . . . . .	12
2.2	Documentation Statistics . . . . .	12
2.3	Document Readability Indices . . . . .	13

## List of Abbreviations

Abbreviation	Full Form
UNESCO	United Nations Educational, Scientific and Cultural Organisation
NFHS	National Family Health Survey
NGO	Non Governmental Organisation
ADHD	Attention Deficit Hyperactivity Disorder
EHR	Electronic Health Record
TEC	Technology Enabled Care
AI	Artificial Intelligence
LGB	infestation Large G Bugs
RO	Reverse Osmosis
Ed-Tech	Educational Technology

# Contents

<b>1</b>	<b>Authors</b>	<b>7</b>
1.1	ProjectLibre Gantt Chart . . . . .	8
1.2	ProjectLibre Task Usage . . . . .	9
1.3	ProjectLibre Work Breakdown Structure (WBS) . . . . .	10
1.4	ProjectLibre Critical Path . . . . .	11
<b>2</b>	<b>Documentation</b>	<b>12</b>
2.1	Documentation Statistics . . . . .	12
2.2	Document Readability Indices . . . . .	13
<b>3</b>	<b>Design and Future Work</b>	<b>14</b>
3.1	Employment . . . . .	14
3.1.1	Problems . . . . .	14
3.1.2	Direct Stake-holders . . . . .	15
3.1.3	Indirect Stake-holders . . . . .	15
3.1.4	Existing Solutions . . . . .	15
3.1.5	Our Solution . . . . .	16
3.1.6	Impact . . . . .	17
3.2	Education . . . . .	19
3.2.1	Idea 1 : Ed -Tech . . . . .	19
3.2.2	Idea 2: Extra Classes with Diverse Curriculum . . . . .	25
3.3	Healthcare . . . . .	28
3.3.1	Idea 1: Mobile Healthcare . . . . .	28
3.3.2	Idea 2: App for pregnant women and infants . . . . .	31
3.4	Food security . . . . .	34
3.4.1	Problem 1: Educational facilities . . . . .	34
3.4.2	Problem 2: Improving Infrastructure for Food Grain Storage Facilities . . . . .	36
3.4.3	Problem 3: Increasing Awareness in Farmers . . . . .	40
3.5	Infrastructure . . . . .	44
3.5.1	Improving the business/market for rural traditional handcrafters and artists . . . . .	44
3.5.2	Renewable Electricity Stations for Villages . . . . .	46
3.5.3	Drinking Water Supply and Sanitation . . . . .	49

# 1 Authors

*Table 1.1: Table of Authors and their Contribution*

Name	kerberos	E-mail	Role	PI
Nehal Baradia	ee3190584	<a href="mailto:ee3190584@ee.iitd.ac.in">ee3190584@ee.iitd.ac.in</a>	Tribe Coordinator	1
Payal Arora	ee1190503	<a href="mailto:ee1190503@ee.iitd.ac.in">ee1190503@ee.iitd.ac.in</a>	Documentation Team	1
Vineeth Ponugoti	ee1190545	<a href="mailto:ee1190545@ee.iitd.ac.in">ee1190545@ee.iitd.ac.in</a>	Documentation Team	1
Abhinav Reddy Oruganti	ee1190455	<a href="mailto:ee1190455@ee.iitd.ac.in">ee1190455@ee.iitd.ac.in</a>	Documentation Team	1
Aseem Gupta	ee1190163	<a href="mailto:ee1190163@ee.iitd.ac.in">ee1190163@ee.iitd.ac.in</a>	Group Member	1
Siva Tanuj Gunta	ee1190479	<a href="mailto:ee1190479@ee.iitd.ac.in">ee1190479@ee.iitd.ac.in</a>	Group Member	1
Peeyush Chourasiya	ee1190504	<a href="mailto:ee1190504@ee.iitd.ac.in">ee1190504@ee.iitd.ac.in</a>	Group Member	1
Rohan Sharma	ee3190121	<a href="mailto:ee3190121@ee.iitd.ac.in">ee3190121@ee.iitd.ac.in</a>	Group Member	1
Alok Singh	ee3190553	<a href="mailto:ee3190553@ee.iitd.ac.in">ee3190553@ee.iitd.ac.in</a>	Group Member	1
Parth Manchanda	ee3190587	<a href="mailto:ee3190587@ee.iitd.ac.in">ee3190587@ee.iitd.ac.in</a>	Group Member	1
Bhavuk Bhandula	mt1190683	<a href="mailto:mt1190683@maths.iitd.ac.in">mt1190683@maths.iitd.ac.in</a>	Group Member	1
Shravan Nawandar	mt1190764	<a href="mailto:mt1190764@maths.iitd.ac.in">mt1190764@maths.iitd.ac.in</a>	Group Member	1
Aarushi Gupta	mt6190738	<a href="mailto:mt6190738@maths.iitd.ac.in">mt6190738@maths.iitd.ac.in</a>	Group Member	1
Sanika Singh	mt6190837	<a href="mailto:mt6190837@maths.iitd.ac.in">mt6190837@maths.iitd.ac.in</a>	Group Member	1
Abhishek Agarwal	ee1180432	<a href="mailto:ee1180432@ee.iitd.ac.in">ee1180432@ee.iitd.ac.in</a>	Group Member	1
Kartikey Anand	ee1190257	<a href="mailto:ee1190257@ee.iitd.ac.in">ee1190257@ee.iitd.ac.in</a>	Group Member	1
Abhilasha Abhilasha	ee1190453	<a href="mailto:ee1190453@ee.iitd.ac.in">ee1190453@ee.iitd.ac.in</a>	Group Member	1
Aryan Gupta	ee1190466	<a href="mailto:ee1190466@ee.iitd.ac.in">ee1190466@ee.iitd.ac.in</a>	Group Member	1
Deepansh Jindal	ee1190474	<a href="mailto:ee1190474@ee.iitd.ac.in">ee1190474@ee.iitd.ac.in</a>	Group Member	1
Harshul Mewal	ee1190483	<a href="mailto:ee1190483@ee.iitd.ac.in">ee1190483@ee.iitd.ac.in</a>	Group Member	1
Kartik Parsoya	ee1190488	<a href="mailto:ee1190488@ee.iitd.ac.in">ee1190488@ee.iitd.ac.in</a>	Group Member	1
Rahul Meena	ee1190510	<a href="mailto:ee1190510@ee.iitd.ac.in">ee1190510@ee.iitd.ac.in</a>	Group Member	1
Sahil Bohra	ee1190516	<a href="mailto:ee1190516@ee.iitd.ac.in">ee1190516@ee.iitd.ac.in</a>	Group Member	1
Sarthak Gupta	ee1190520	<a href="mailto:ee1190520@ee.iitd.ac.in">ee1190520@ee.iitd.ac.in</a>	Group Member	1
Shreyansh Kashaudhan	ee1190528	<a href="mailto:ee1190528@ee.iitd.ac.in">ee1190528@ee.iitd.ac.in</a>	Group Member	1
Kshitij Alwadhi	ee1190577	<a href="mailto:ee1190577@ee.iitd.ac.in">ee1190577@ee.iitd.ac.in</a>	Group Member	1
Shambhav Tewari	ee1190657	<a href="mailto:ee1190657@ee.iitd.ac.in">ee1190657@ee.iitd.ac.in</a>	Group Member	1
Ashish Sharma	ee3180530	<a href="mailto:ee3180530@ee.iitd.ac.in">ee3180530@ee.iitd.ac.in</a>	Group Member	1
Aryan Salve	ee3190559	<a href="mailto:ee3190559@ee.iitd.ac.in">ee3190559@ee.iitd.ac.in</a>	Group Member	1

*Continued on next page*

Table 1.1: (Continued) Table of Authors and their Contribution

Name	kerberos	E-mail	Role	PI
Gautam Bamba	ee3190567	<a href="mailto:ee3190567@ee.iitd.ac.in">ee3190567@ee.iitd.ac.in</a>	Group Member	1
Naman Gupta	ee3190583	<a href="mailto:ee3190583@ee.iitd.ac.in">ee3190583@ee.iitd.ac.in</a>	Group Member	1
Nirjhar Das	ee3190585	<a href="mailto:ee3190585@ee.iitd.ac.in">ee3190585@ee.iitd.ac.in</a>	Group Member	1
Tamanna Tanwar	ee3190605	<a href="mailto:ee3190605@ee.iitd.ac.in">ee3190605@ee.iitd.ac.in</a>	Group Member	1
Chenika Garg	ee3190877	<a href="mailto:ee3190877@ee.iitd.ac.in">ee3190877@ee.iitd.ac.in</a>	Group Member	1
Rahul Singh	mt1190285	<a href="mailto:mt1190285@maths.iitd.ac.in">mt1190285@maths.iitd.ac.in</a>	Group Member	1
Shaurya Mohan	mt1190658	<a href="mailto:mt1190658@maths.iitd.ac.in">mt1190658@maths.iitd.ac.in</a>	Group Member	1
Anshuman Singh	mt1190676	<a href="mailto:mt1190676@maths.iitd.ac.in">mt1190676@maths.iitd.ac.in</a>	Group Member	1
Ayush Behera	mt1190679	<a href="mailto:mt1190679@maths.iitd.ac.in">mt1190679@maths.iitd.ac.in</a>	Group Member	1
Kaushal Verma	mt1190700	<a href="mailto:mt1190700@maths.iitd.ac.in">mt1190700@maths.iitd.ac.in</a>	Group Member	1
Pariket Bhagat	mt1190711	<a href="mailto:mt1190711@maths.iitd.ac.in">mt1190711@maths.iitd.ac.in</a>	Group Member	1
Shubh Jaju	mt1190727	<a href="mailto:mt1190727@maths.iitd.ac.in">mt1190727@maths.iitd.ac.in</a>	Group Member	1
Shubhan Srivastava	mt1190728	<a href="mailto:mt1190728@maths.iitd.ac.in">mt1190728@maths.iitd.ac.in</a>	Group Member	1
Vinay Kumar	mt1190734	<a href="mailto:mt1190734@maths.iitd.ac.in">mt1190734@maths.iitd.ac.in</a>	Group Member	1
Snigdha Garg	ee1190532	<a href="mailto:ee1190532@ee.iitd.ac.in">ee1190532@ee.iitd.ac.in</a>	Group Member	1
Deepak Suthar	mt1190686	<a href="mailto:mt1190686@maths.iitd.ac.in">mt1190686@maths.iitd.ac.in</a>	Group Member	1
Tedy Nithin Venkat	ee3190604	<a href="mailto:ee3190604@ee.iitd.ac.in">ee3190604@ee.iitd.ac.in</a>	Group Member	1

## 1.1 ProjectLibre Gantt Chart

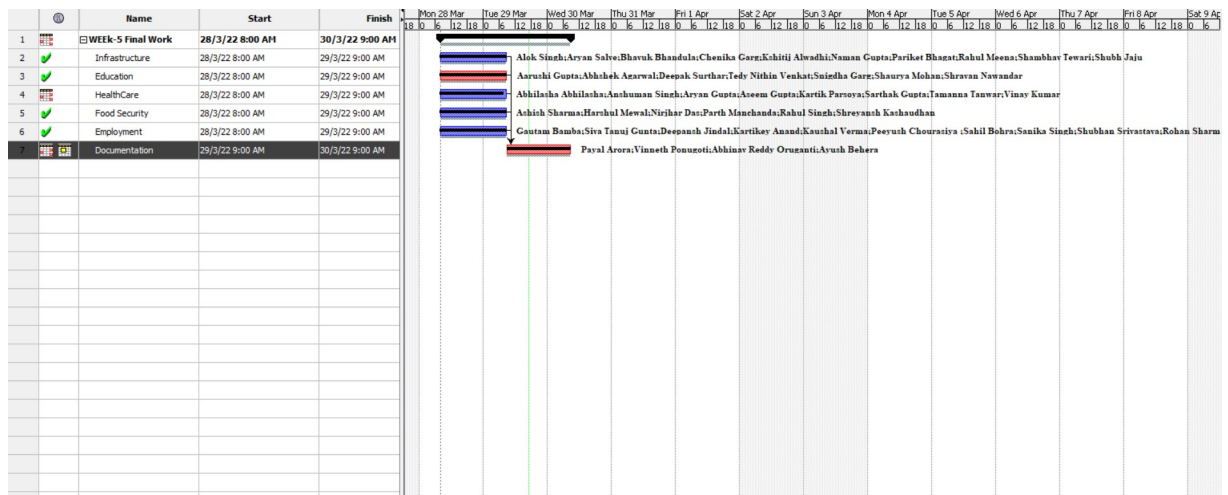


Figure 1.1: Gantt Chart



## 1.2 ProjectLibre Task Usage

	Name	Duration	Start	Finish
1	WEEK-5 Final Work	6.125 days?	28/3/22 8:00 AM	30/3/22 9:00 AM
2	Infrastructure	1.125 days?	28/3/22 8:00 AM	29/3/22 9:00 AM
	Chenika Garg	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Kshitij Alivadh	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Naman Gupta	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Shubh Jaju	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Bhavuk Bhandula	2 days	28/3/22 4:00 PM	29/3/22 8:00 AM
	Alok Singh	3.125 days	28/3/22 8:00 AM	29/3/22 9:00 AM
	Pariket Bhagat	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Aryan Salve	2 days	28/3/22 5:00 PM	29/3/22 9:00 AM
	Shambhav Tewari	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Rahul Meena	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
3	Education	1.125 days?	28/3/22 8:00 AM	29/3/22 9:00 AM
	Shaurya Mohan	2.765 days	28/3/22 10:52 AM	29/3/22 8:59 AM
	Snigdha Garg	2.765 days	28/3/22 10:52 AM	29/3/22 9:00 AM
	Aarushi Gupta	3.125 days	28/3/22 8:00 AM	29/3/22 9:00 AM
	Tedy Nithin Venkat	2.765 days	28/3/22 10:52 AM	29/3/22 9:00 AM
	Shravan Nawandar	2.765 days	28/3/22 10:52 AM	29/3/22 9:00 AM
	Abhshek Agarwal	2 days	28/3/22 5:00 PM	29/3/22 9:00 AM
	Deepak Surthar	2.765 days	28/3/22 10:52 AM	29/3/22 9:00 AM
4	HealthCare	3.125 days?	28/3/22 8:00 AM	29/3/22 9:00 AM
	Abhilasha Abhilasha	3.125 days	28/3/22 8:00 AM	29/3/22 9:00 AM
	Anshuman Singh	2 days	28/3/22 5:00 PM	29/3/22 9:00 AM
	Aryan Gupta	0 days	28/3/22 8:00 AM	28/3/22 8:00 AM
	Aseem Gupta	0.125 days	28/3/22 11:05 PM	29/3/22 12:05 AM
	Kartik Parsoya	0.125 days	28/3/22 8:57 PM	28/3/22 9:57 PM
	Sarthak Gupta	0 days	28/3/22 8:00 AM	28/3/22 8:00 AM
	Tamanna Tanwar	0 days	28/3/22 8:00 AM	28/3/22 8:00 AM
	Vinay Kumar	0 days	28/3/22 8:00 AM	28/3/22 8:00 AM
5	Food Security	1.125 days?	28/3/22 8:00 AM	29/3/22 9:00 AM
	Ashish Sharma	3.125 days	28/3/22 8:00 AM	29/3/22 9:00 AM
	Harshul Mewa	2 days	28/3/22 5:00 PM	29/3/22 9:00 AM
	Nirjhar Das	2 days	28/3/22 4:00 PM	29/3/22 8:00 AM
	Parth Manchanda	2 days	28/3/22 4:00 PM	29/3/22 8:00 AM
	Rahul Singh	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Shreyansh Kashaudhan	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
6	Employment	1.125 days?	28/3/22 8:00 AM	29/3/22 9:00 AM
	Gautam Bamba	3.125 days	28/3/22 8:00 AM	29/3/22 9:00 AM
	Siva Tanuj Gunta	2 days	28/3/22 5:00 PM	29/3/22 9:00 AM
	Deepansh Jindal	2 days	28/3/22 4:00 PM	29/3/22 8:00 AM
	Kartikey Anano	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Kaushal Verma	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Peeyush Chourasiya	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Sahil Bohra	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Sanika Singh	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Shubhan Srivastava	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
	Rohan Sharma	0 days	28/3/22 5:00 PM	28/3/22 5:00 PM
7	Documentation	3 days?	29/3/22 9:00 AM	30/3/22 9:00 AM
	Abhinav Reddy Oruganti	0 days	30/3/22 9:00 AM	30/3/22 9:00 AM
	Vinneth Ponugoti	0 days	30/3/22 9:00 AM	30/3/22 9:00 AM
	Payal Arora	3 days	29/3/22 9:00 AM	30/3/22 9:00 AM

Figure 1.2: Task Usage

1.3 ProjectLibre Work Breakdown Structure (WBS)

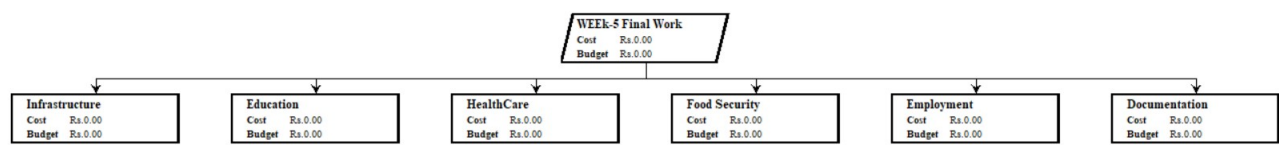


Figure 1.3: Work Breakdown Structure (WBS)

1.4 ProjectLibre Critical Path

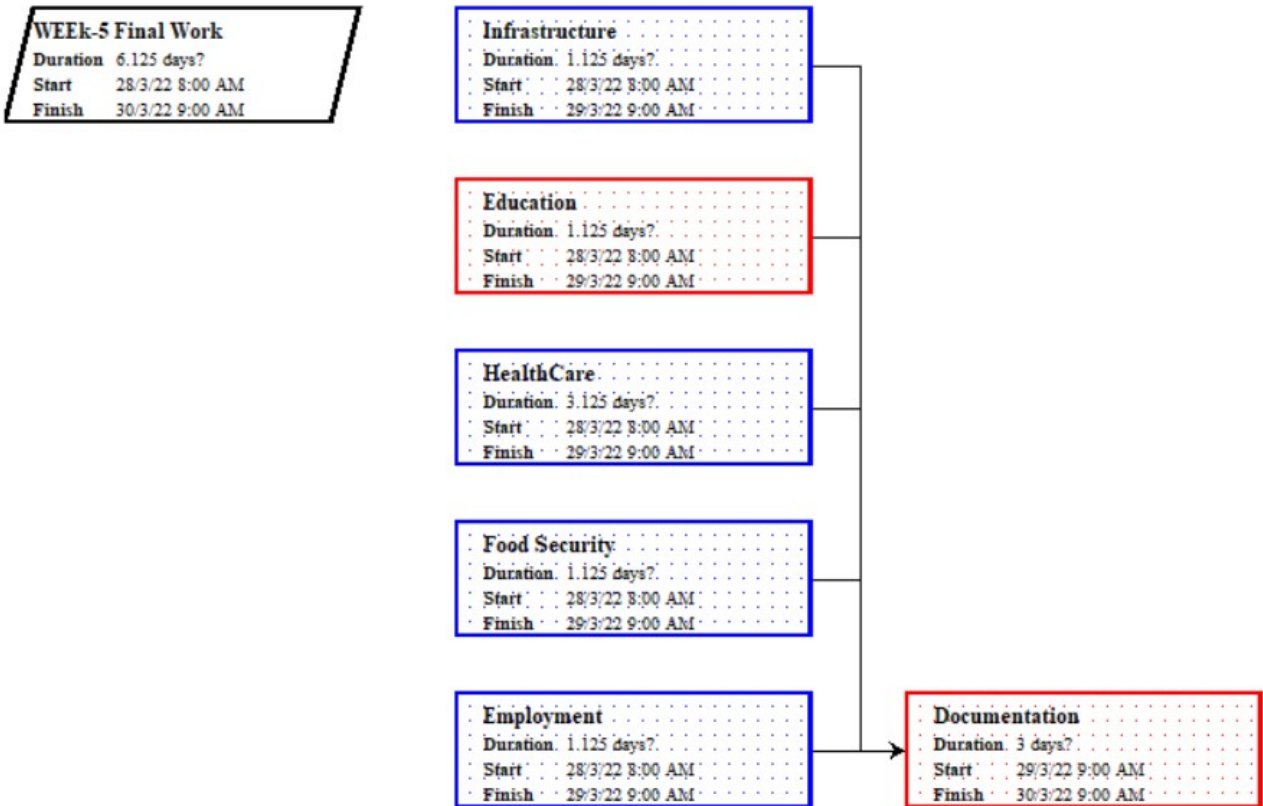


Figure 1.4: Critical Path

## 2 Documentation

<b>Documentation ID</b>	<b>v2.005</b>
Tribe Name	Tribe F
Approved for submission	Payal Arora Vineeth Kumar Ponugoti Abhinav Reddy Oruganti
Contact for Correction/Clarification	Payal Arora (+91 99117 57803, <a href="mailto:ee1190503@ee.iitd.ac.in">ee1190503@ee.iitd.ac.in</a> )
Submitted to	Prof. Subrat Kar Instructor, ELP305 Design and Systems Laboratory
Submitted on	March 30, 2022 , 02:00 IST

*Table 2.1: Documentation Team*

### 2.1 Documentation Statistics

Characteristic	Quantity
Word Count	13052
Number of characters	86562
Average number of words per sentence	15.5
Total number of sentences	872
Average number of syllables per word	1.84

*Table 2.2: Documentation Statistics*

## 2.2 Document Readability Indices

Index	Value	Range	Ideal Value
Gunning Fog	10	0-20	7-8
Flesch Reading Ease	54.88	0-100	60-70
Flesch-Kincaid Grade level	9.75	0-18	8-10
The Coleman-Liau Index	11.8	0-17+	8-10
The SMOG Index	12.4	5-18+	10-15
Automated Readability Index	11.8	1-14	8-12

*Table 2.3: Document Readability Indices*

## 3 Design and Future Work

While researching thoroughly about the various stakeholders in a village and its economy and what can be done to improve the standard of living in a village, various things were discovered which were not known before. Classifying all the problems into various sub categories, a lot of solutions were discussed throughout the course of the project and at the end decision was made to choose a few of them to be implemented first which can be seen through this proposal.

### 3.1 Employment

#### 3.1.1 Problems

1. **Seasonal Unemployment:** Agriculture in the Indian context is a seasonal occupation and there is always a heavy demand for labour at the time of sowing and harvesting, whereas in the slack season, demand for labour falls considerably. The period of seasonal unemployment in India varies from state to state, depending upon the methods of farming, the nature of the soil and the possibility of multiple cropping. In rained agriculture, farmers remain unemployed for four or six months of the year. Because of illiteracy, poverty, and poor health, they are unable to avail themselves of some alternative employment opportunities during this period.[1]
2. **Concealed Unemployment:** In this case, a person is employed but is adding nothing significant to the production. This type of unemployment is very common in the agriculture sector. Overcrowding and consequent pressure of population on land lead to subdivision and fragmentation of land and a decline in the area of land per capita, resulting in an increase in concealed unemployment in agriculture. As agriculture is usually a family business, the entire family tends to work on small family inherited or owned land, which otherwise needs less labor.
3. **Educated Unemployment:** A large number of young educated people are unable to find work, or if they do, they are working in jobs that require fewer qualifications. People accept work that does not give them the income that people with similar qualifications get elsewhere. There is a mismatch between the skills learned by people and those required by industries. Aside from agriculture, other sources of employment included

village or cottage industries. But with rapid industrialization, these industries are losing relevance, leading to large-scale unemployment among the youth.

### 3.1.2 Direct Stake-holders

1. **Farmers:** Farmers make up a sizeable proportion of the rural population. Since they'll be involved directly with the operations of agro-tourism, they are a major stakeholder for us.
2. **State/Local Government:** The local government will also be involved in the project. This is because we would need permission to set up such a reasonably large project where non-village people might come as visitors. The frequency of travel, etc., will be discussed with them.
3. **Unemployed Rural Population:** Other than farmers, other people will be needed for day-to-day coordination of activities. This includes people for tour guides etc.

### 3.1.3 Indirect Stake-holders

1. **Shopkeepers:** Travellers will probably buy from local shops, which means shopkeepers are indirect stakeholders.

### 3.1.4 Existing Solutions

Rural India makes up more than half of India's population and workforce. Hence, it is vital that measures be taken to make sure such a large chunk of our population receives suitable training so that they can be contributing and useful members of society. The government has launched several schemes and initiatives to assist and help them. Some of them are:

1. **Deen Dayal Upadhyaya Grameen Kaushalya Yojana:** Deen Dayal Upadhyaya Grameen Kaushalya Yojana, a part of the National Livelihood Mission, has the objectives of catering to the career aspirations of the rural youth and adding diversity to the income of rural families. The yojana is present in 21 states and the Union Territories across 568 districts and 6215 blocks, changing the lives of youth. Around 690 projects are being implemented by 300 partners. As per government reports, over 2.7 lakh

candidates have been trained till now, and nearly 1.34 lakh candidates have been placed in jobs.

2. **Swarnjayanti Gram Swarozgar Yojana (SGSY)/National Rural Livelihood Mission:** Swarnjayanti Gram Swarozgar Yojana, which has been redesigned as the National Rural Livelihood Mission, was launched in 2011. Also known as Aajeevika, this scheme aims at empowering women through self-help models across the country. Under this scheme, the government provides a loan of 3 lakh rupees at an interest rate of 7%, which can be reduced to 4% at the time of repayment.
3. As per the **National Rural Employment Guarantee Act (NREGA)** of 2005, 100 days of employment are guaranteed to any rural household adult who is willing to do unskilled manual work in a financial year. If a person does not get a job within 15 days, they are eligible to get an unemployment allowance.

The main problems with the existing solutions are:

1. Implementation is usually very inefficient.
2. Corruption is inherent in the system, which makes the effect of these schemes very diluted.

### 3.1.5 Our Solution

The coronavirus pandemic has severely affected the tourism sector. Agritourism contributes significantly to the rural economy in states like Maharashtra. It has recently launched an agritourism policy that aims to diversify the income of farmers and provide employment opportunities for women and youth. The response by the farmers has been highly encouraging and it is hoped that by next year, the income of a farmer will have doubled.

We will focus on skilling in the sector along with a set of backward and forward linkages with self-help groups, farmers' markets, rural artisans, home chefs, etc. We are hoping to create an accessible market for farm goods at these centers. An ideal agro-tourism centre will be set up in every district to learn farming. Sustainable practises in this sector are being focused upon.

Furthermore, we are looking at organising a virtual B2B conference and travel marts. The Department of Tourism will provide the booking engines for tourists to reserve accommodation



in agro-tourism units. We are planning to organise agro-tourism-based tourism festivals, for example, the Mango Festival (Ratnagiri), Orange Festival (Nagpur), Grape Festival (Nashik), and the Chickoo Festival (Dahanu). This will brand the destination as well as encourage the agro-tourism centers. We plan to further develop and promote the agri-tourism sector across the state.

It will showcase the vital role played by rural women as enablers of sustainable and socially responsible tourism.

### **3.1.6 Impact**

#### **Agro-tourism**

Agri-tourism includes a variety of activities and services such as farm accommodation, local food and beverage, festivals, nature observation, you-pick (harvest) activities, educational and leisure visits, hunting, fishing, and the sale of gifts. It was thought of as a low-risk, low-investment strategy in many places because farms mostly used what they already had.

New employment is created in the maintenance of tourism and other logistics.

From the entry of tourists into the villages, their accommodation and guidance throughout will be carried out by local volunteers. Tourism opens up lots of opportunities for opening shops selling locally made products ranging from agriculture to handicrafts.

This employment will also be stable because once a village becomes well-known as a tourist destination, there will be a constant or growing number of tourists visiting there, generating more revenue and income.[\[2\]](#)

#### **Income increase**

The income levels of most of the categories of people, including local guides and businesses, will see a substantial rise because of tourism. This will soon become a staple income and will encourage more young people to settle down in their own villages rather than migrate to cities in search of a living.[\[3\]](#)

#### **Infrastructure improvement**

Tourists generally require good accommodation, which is generally provided. This will bring

more facilities into the villages, like good drinking water, proper roads, a community hall and sanitation. These facilities will also slowly become affordable to the locals as their income levels rise.

It affects social behaviour and the rural lifestyle.

With generating a great source of employment, it will increase the income of all levels of social classes. So all classes will have access to good educational and cultural freedom.

Improvements in infrastructure improve the lives of villagers by providing easy access to daily necessities, and it also fosters a sense of entrepreneurship among farmers and villagers. Accommodation of tourists can create some havoc in local structures.

### **Health and environmental pollution**

Eco-friendly agriculture will be helpful in reducing the carbon footprint by a significant amount. Due to extreme environmental pollution in urban areas, one can find villages more suitable for their health.[4]

## 3.2 Education

### 3.2.1 Idea 1 : Ed -Tech

#### Problems :

- 1. Poor education quality in rural India:** This issue has been reported in many news articles, and many experts have also pointed this out. According to some reports, the quality of education provided to children in rural areas is deteriorating even further.
- 2. High dropout rates from schools and colleges in rural India:** Although the dropout rates have steadily decreased over time, as of September 2011, the dropout rate was 17.7% in secondary and 1.8% in primary. And according to UNESCO, approximately 0.32 billion students in India have been affected by school closures due to the COVID-19 pandemic (UNESCO 2020). Of these, almost 84% reside in rural areas, while 70% attend government schools. This shows that there is still a lot of scope for improvement.[5]
- 3. Diversification of topics covered in schools:** The current education policy in place only ensures basic language knowledge (writing, reading, and speaking) and basic arithmetic. This is not only a pretty low standard, but also a very narrow spectrum that is being covered. One can say that it is minimal or even less.

#### Direct Stake-holders

- 1. Children in villages:** Clearly, children in rural regions are the first ones affected by any change in the policy.
- 2. Parents in villages:** Parents play a pivotal role in ensuring their children get an education. As a result, they are direct participants in any solution.
- 3. State Government** Our solution will involve the state government's approval and help.
- 4. Local Government** Our solution will involve the state government's approval and help.
- 5. Big EdTech companies (For this idea)** Our idea is based on tie-up with these big ed-tech companies for a uniform, interactive and immersive quality digital courses.

## Indirect stake-holders

- 1. Many of the industries** Industries will benefit from better educated employees from rural regions.
- 2. Local governments** Local governments will have improved quality with more educated representatives.
- 3. Rural population** With more aware rural residents, they will be more aware of their rights and duties and will try to improve their village's standard of living.

## Existing Solutions

### A. The State Government's Basic Education Policy

#### The Solution

In India, the state government is in-charge of education and related sectors. According to the Right to Education Act introduced in 2009, the appropriate government is to provide "free and compulsory education to children aged 6–14." The financial burden of this act is borne by both the state and the central government. However, it is generally implemented by the state government through local authorities and governments. So the government is legally obligated to give free education to every child and also ensure attendance and completion of elementary education. Along with this, there is also the mid-day meal scheme that has to be implemented by the state government (according to the Supreme Court on November 28th, 2001). This has also played a pivotal role in increasing the attendance in these rural schools and even urban ones, since this relieves a lot of parents (generally mothers) from feeding their children and pausing work.<sup>[6]</sup>

#### Advantages

The above acts and the constant work on infrastructure have increased enrollments, decreased dropout percentages, and also increased attendance.

**Drawbacks**

1. Due to corruption, a lot of the money that has been allocated for these schools in rural areas doesn't even reach the schools.
2. The mid-day meals have been reported to be of poor quality a lot of the time, with reports of lizards and mice in the food being found, making the parents apprehensive about the scheme.
3. The teachers appointed to these rural schools might not be qualified, or if qualified, many times don't come to classes as there is no supervision. This causes a degradation in quality in education.

**B. Various NGOs aiding in primary education**

**The Solution:** The solution implemented by NGOs is not uniform but generally involves working with a village or a cluster of villages and trying to improve the quality of education and diversification of topics that children learn, both in academic and recreational space. We have read of some 10 NGOs involved in education, and almost all of them were region-specific and generally based near a big city.

**Advantages**

1. Children are exposed to high-quality education and experience overall growth in academics, personality, and recreational activities.
2. The volunteers get good experience and generally build a helpful attitude towards education, possibly giving rise to more NGOs working in education or other areas.

**Drawbacks**

1. The impact is local and not uniform across the country.
2. They usually do not have enough funding to expand their techniques to a scale such that the impact is state-wide or country-wide.

## Our Solution

Partnership with Tech-Education giants like Byju's and other such companies. Here, the government will set up 3-4 smart classrooms in each of the villages and employ a technician for each village (preferably someone from the village itself). Then the government can subsidise the courses that they take for each village, thereby providing a very interactive learning environment.

This actually solves a very big problem, because in the last report it was shown that many villagers believe that their children will get a better education outside the village. Providing such high-quality courses created by these EdTech giants will give a boost to not only the quality of education imparted to these children, but also their parents, who will also have increased confidence in the education their children are receiving. This confidence is a really important factor because many parents are sceptical about rural primary education and usually end up removing their children so that they can help at work.

## Requirements

The requirements for this idea are:

1. Collaboration between the state government and village administrative bodies with Tech-Ed behemoths such as Byjus
2. Establishment of 3–4 smart classes in each village Each of these smart classes would involve proper visual and audio facilities for effective use of lectures by Byjus. This includes good quality projectors, screens and speakers.
3. The presence of one or more technicians throughout the lecture period to assist with technical issues with any of the smart class devices.
4. The presence of properly trained professors who can use the application correctly and answer any questions the students have during the lecture.
5. Administrative heads to ensure the proper usage of all the above-mentioned facilities.

## Specifications

1. A contract between the state government and one or more of these EdTech companies. This agreement should be such that these EdTech companies are to provide heavy discounts for their courses for bulk purchase and also, since it's on humanitarian grounds,
2. Smart class infrastructure should be set up so that we can have at least 3–4 smart classes in each village. The teacher in that village should be given the task of using and running this.
3. There should be a technician to tend to this infrastructure in case of malfunction. The technician should preferably be from the village itself and be trained by the government to handle the smart class technology.
4. A monthly check on this system should be performed by a government-assigned team to ensure that each village is properly utilising the resource, and this team also serves as a proxy supervisor to the government.

## Implementation

1. Byjus' annual subscription costs around Rs. 25000. This price needs to be reduced considerably, and we expect this to happen first on humanitarian grounds. Moreover, bulk discounts should play a very important role. We also plan to introduce government subsidies.
2. Taking into account these 3 factors, we expect that Byjus would agree to arrange lectures for multiple students, although their policy is to maintain one-on-one teaching. This would bring the number of subscriptions down to 3–4 per village. Given the large number of villages and hence the bulk subscription of their products, we expect additional discounts from Byjus' end and, adding government subsidies to it, the total cost per village should go down to around Rs. 30000 (considering Rs.5000 discount and Rs.10000 subsidy per subscription).
3. In addition to this, the cost of projector+screen+speakers should be around Rs. 3000 + Rs. 3000 as subsidy per smart class, making a total cost of Rs. 9000 per village.

4. Therefore, we have a one-time cost of Rs. 9000 per village and a yearly cost of Rs. 30000 for the subscription.

## **Impact**

Impact on direct stake-holders:

1. Students will get better opportunities in the future.
2. Better education can help with better jobs and hence help parents financially.
3. Local and state governments will benefit from having better candidates for government jobs. Moreover, this would increase the literacy rate in the state.

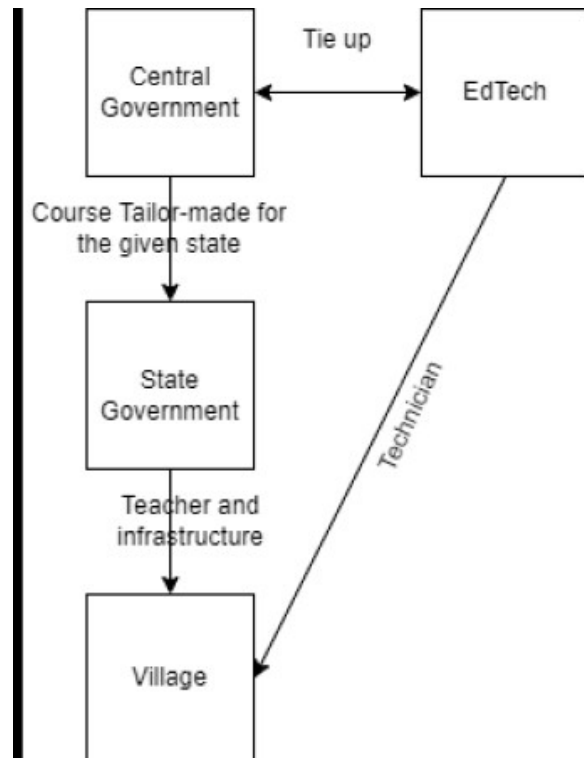
Impact on indirect stake-holders:

1. Local industries will be benefitted by an increased number of skilled labourers and hence higher profit rates.
2. The general rural population would become more educated, which would result in a reduced number of crimes and social evils.

Implementation Issues:

1. The annual subscription rate of Byjus is still very high, and alternatives to reducing this can be thought of.
2. Given the regular use of projectors and speakers, high maintenance costs might become an issue.
3. Technical issues might delay the process of teaching on given days.
4. Daily usage of these electrical devices might end up increasing the expenditure on electricity.





*Figure 3.1: Flow Chart-Education*

### 3.2.2 Idea 2: Extra Classes with Diverse Curriculum

We are trying to help rural kids get involved in extracurricular activities, give additional inputs to the students with respect to academics and make learning more practical and enjoyable for them, during their summer vacations.

#### Direct Stakeholders

School children, college students

#### Indirect Stakeholders

Teachers, parents, school administration

## Existing solution

1. During the summer vacation, hold extra classes for students.

Issue: This will just be a continuation of regular school for them, which can cause boredom and not give them enough time to rejuvenate.

2. Assign students holiday homework.

Issue: since adequate guidance is not available to them and parents are generally not literate, there is doubt that they will be able to complete the homework. Also, it is possible that parents might involve them in household chores or farming, thus not giving them enough time to complete their homework.

## Our solution

We plan to involve local college-going students to volunteer during their summer semester break to teach rural children with a focus on holistic development. The activities to be conducted can be enlisted and described by either the state boards or district-level officers of competent authority, with input from teachers and principals of rural schools.

The activities to be conducted include :

- team-building games to develop team spirit and leadership qualities
- sight-seeing activities to help children appreciate nature and the services it provides to us
- Extra tuition to students who are weak in certain subjects like mathematics, with a focus on utilising methods beyond the chalk-blackboard
- Conducting workshops on art and craft like origami, paper mache, etc.
- Providing vocational training to students
- Conducting workshops on health issues like tuberculosis, heart disease, ill effects of tobacco, menstrual hygiene, adverse impacts of open-defecation, malnutrition, anaemia etc. and giving them sex education
- Conducting workshops on social issues like patriarchy, gender discrimination, dowry, child labour, etc

- Conducting workshops for teachers to sensitise them towards the issues faced by children like bullying, discrimination, ADHD, etc. The college students shall be provided a certificate for their volunteering with or without a stipend, as decided by the concerned authority

## **Impact**

We expect this exercise to positively impact the overall development of children with the inculcation of values, team spirit, sensitivity towards the environment and awareness regarding social issues. Since this exercise will be conducted by college students, the high school students can be more open to them regarding their problems. With this, the college students will also get a chance to learn about the issues faced by our rural masses and make them more empathetic towards them. Lastly, the high school students should see the college students as role models and be motivated to pursue higher education.

## **Implementation issues**

- Drafting of the schedule of the activities to be conducted by the authorities will take time
- The college students can be preoccupied with their college work
- The parents might not be willing to send their children for the activities during summer vacation and expect them to contribute to household chores

Time frame- It shall be a two month exercise.

Budget- 0 or equal to the stipend being provided to the volunteers.

## **Concluding Note**

This appears to be a very promising idea, with very little investment required compared to the benefits it might generate in the long run. It is a win-win situation for all the stakeholders and should certainly be given a try, at least at a pilot level.

## 3.3 Healthcare

### 3.3.1 Idea 1: Mobile Healthcare

#### Problem

Due to limited infrastructure and the retention of quality healthcare professionals in rural communities, residents often have to spend time and money travelling long distances to receive specialised treatment in the cities.

#### Existing Solution

A lot of villages in rural India are devoid of basic medical and healthcare facilities since many villagers are ignorant of several serious illnesses as well as due to a lack of money. Setting up a hospital for every village is not a feasible solution as it would be extremely costly. The best way to deal with this problem and make people aware of basic sanitation and health habits is to use mobile vans that have all the basic tools and equipment for health care. These vans can visit a few parts of a village at a time to make it easier for people to get regular health checks.

#### Our Solution

An electronic health record (EHR) can be maintained for people in rural areas for health management, as it enables healthcare professionals to view a patient's medical history no matter where they are located. Sharing information electronically means patients can receive more timely and accurate care without having to travel for miles to get it. Clinicians are able to view and evaluate previous visits, tests, diagnoses and correspondence between other specialists, allowing for more accurate and personalised care. Where specialist support is required, telehealth systems can make remote consultations and diagnosis easier and more convenient for both patients and clinicians. A fully comprehensive EHR would be extremely useful for rural patients as it could, in the near future, include digital device data that displays information on a patient's health issues and can include information about their lifestyle and habits.

Genomic data can also be added to an EHR to provide a more holistic view of the patient, including certain medications that either agree or disagree with a patient's genome. Genomic data could help a clinician know whether a specific type of medicine would work for a patient

without having to trial several different treatments. This could save both the clinician's and patient's time by removing the need for as many follow-up appointments, would reduce the cost of treatment as less medication would be required, and could potentially reduce the risk of allergies and side effects. It could also help to pivot healthcare from being reactive to proactive, giving clinicians the ability to address potential problems long before they become a risk.

The global movement towards technology-enabled care (TEC) has influenced the growth of digital devices that monitor and record personal health data. These include fitness bands, blood pressure monitors, and digestible pills that monitor medication reaction and adherence. Most of these devices transmit data from a patch or sensor to an app on a smartphone. TEC offers benefits to rural communities where healthcare infrastructure is limited but smartphone ownership is high. Rural people must be educated about these technologies, and trust in these technologies must be built.



*Figure 3.2: Requirements for Healthcare*

## Implementation Issues

**a. Security** Patient information is a vital part of the process. However, over 50% of all healthcare institutions fall prey to at least one cyber-attack, and one-third of such attacks are successful.

**b. Complexity in Implementation and Integration:** It is a fact that a large part of the population owns smartphones. However, mobile healthcare applications that are difficult to integrate and implement with the existing systems and complicated to use defeat the purpose of efficiency due to a lack of simplicity in deployment and ease of use.

**c. Health awareness and literacy** A big challenge for healthcare providers is to think from the perspective of the users. While the medical fraternity is health literate, the patients may or may not come with a reasonable medical understanding.

**d. Patient Engagement** Transparency in the interaction between healthcare providers/doctors and patients is the pulse of mobile healthcare services. If the app fails to enhance the medical experience of individuals through vital information and data, it fails the purpose.

**e. Electronic Health Records** One approach to buying electronic health records is to deploy them on-premise, meaning that you'll host the EHR solution on your own servers. This requires the purchase of a perpetual licence, which usually comes with a large upfront fee. Hidden EHR costs also make up a big part of the total cost of getting the system up and running.

## Budget/Cost Analysis

We provide an account of EHR costs to highlight the cost issues for mobile healthcare: A Health Affairs study estimates that the typical multi-physician practise will spend roughly \$162,000 to implement an EHR, with approximately \$85,000 going toward first-year maintenance costs. Practices that implement an EHR solution can expect to cover the cost of their EHR in about two and a half years and then receive an average of roughly \$23,000 in net benefits per year for each full-time employee.

### 3.3.2 Idea 2: App for pregnant women and infants

#### Problem

Generally, in rural areas, people are not aware of proper medications and health care tips that need to be followed, and this increases the risk of diseases in both mother and child. They get to talk to the doctor once, and they forget or misplace the prescription, leading to missing some of the medications, especially for pregnant women and infants who need regular medications and care.

#### Our Solution

To avoid missing, repeated, or incorrect vaccinations and also to keep track of mother and child's health information we propose an application that collates all relevant information at one place to cater the patients.

1. Mother's profile, login (Aadhar Card), and prescribed doctor  
Creating a profile for the users that will ask for their Aadhar number on signing in. For a mother, a single profile, where more than one child can be tracked simultaneously, For example, Varun is 3 years old while Arun is a newborn baby.
2. Prescriptions are collected by doctors. For every checkup, the prescription and details of the visit can be tracked in a single portal. This way, any new doctor can easily continue to take care of the mother-child pair seamlessly. Keeping the rural setting in mind, each entry would be done by the doctors, hence giving the mother trustworthy information in her palm.
3. Tracking mother and child health percentages, mother and child self-survey, where a simple AI can attempt to predict health hazards.
4. Articles, tips, and guidance from doctors should be followed before and after the pregnancy period. so that mothers can easily follow those tips and take care of their health properly.
5. Tracking of the baby's and mother's health should be started by the end of 5 months and continue till the baby is 5 years old, i.e., when all the required vaccinations are completed.
6. Pre-registrations (preference-based): Availability of vaccines can be shown in the app at various hospitals along with pre-booking of their time slots to avoid long queues.

7. Notifications: Moms can be told about upcoming vaccine shots, their regular medications, and other health-related things.

## Impact

- Reducing manual labour for women to pay for regular hospital visits, making it easier for doctors to take care of each patient and their medications.
- Keeping track of mother and baby's medical history, which can be further used in the future
- There are a lot of women who are single parents and are taking care of their babies on their own. So it'll be easy for single women to take care of their babies and themselves by managing things accordingly.
- Women's networking, nearest hospital contact, emergency labour options, medication delivery options
- Make contact with an emergency doctor via video call.

Moreover, extending it to a single father (so he will be able to take care of the baby) is a good idea.

## Implementation Issues

1. Major implementational issues would be to encourage doctors to start this practise of maintaining the portal and writing all the reports online and also educate them on the proper use of the portal so that they will willingly adopt it.
2. This is also preconditioned on the fact that most of the villagers have phones, or at least one family member in a household possesses a smart phone, which needs to be verified while implementing it for a specific village.
3. This portal is very complex as it has a video call feature, medication and prescription history with an AI based health hazard prediction model, pre-registration for vaccinations and its availability feature, which not only makes the creation of such a portal tough due to the feature set but also makes it simple enough for people to use and adopt without external help or compulsion. The user experience of the portal should be very good, which would be tough to achieve while implementing this idea.



4. In the initial phase, the adoption of this portal could be tough and cumbersome for the general population as well, and for this we could set up a few offline meetings with the villagers to educate them on the use of the portal. We could also place posters and demonstrations on the steps to make this portal easily usable in every hospital.

### **Budget/time-frame**

1. Maintaining such a cumbersome app will require at least 4-5 professionals, so there is some recurring cost to maintaining such an app.
2. Also, to build the app, it will require intensive research and testing. Hence, there will be some initial cost.
3. We can charge the mothers a small monthly fee, say 10 rupees, for using this app.as a result of which people feel ownership and responsibility for using the app.anything that comes free of cost, it isoften taken for granted.
4. Since we are trying to solve an issue of national importance, the government can fund the initial costs and bear the remaining recurring costs.
5. Also, we can have a special login for the Asha workers so that they can track the health of all the pregnant women and children in their locality, even if the mothers don't have smartphones.

## 3.4 Food security

### 3.4.1 Problem 1: Educational facilities

Agricultural education is very important for our country. Agriculture not only provides food and raw materials but also offers employment opportunities to a considerable proportion of the population. As a result, an agricultural education system that incorporates the most recent technological advances and management strategies is critical. Education is important to the improvement of agricultural productivity in that formal education opens the mind of the farmer to knowledge, non-formal education gives the farmer hands-on training and better methods of farming, and informal education keeps the farmer abreast with changes. For these ideas to be implemented, there have to be certain institutes or facilities that need to be established where people can learn about agriculture and become aware of usage of the internet, apps like weather forecasting, effective utilisation of land and various government schemes.

#### Direct Stakeholders

1. Farmers: Almost all the farmers in our country are uneducated, and for this very reason, many of them don't utilise the resources provided to them by the government or private companies. Therefore, certain facilities need to be established where farmers can be made aware of the various facilities available to them for their own benefit.
2. App owners: In this growing world of technology and start-ups, many young individuals are providing suitable and efficient solutions to many diverse problems. In this, both the creator and the customer will benefit from it.

#### Indirect stakeholders

1. Government: The farmers will now be aware of the welfare schemes introduced by the government for the farmers, and they will now reach and benefit the maximum number of farmers. This is the role of the government .

## Problems with Existing solutions

Droughts(dryness) due to low rainfall, flood-prone areas are mainly affected.

## Solutions

Small weather forecasting centres can be opened for groups of villages well equipped with advanced technology, which will be able to monitor the upcoming weather changes with the help of satellites, and the same information will be communicated with the nearby villagers in advance so that farmers can plan their agricultural activities. This will save farmers from the uncertainties of the monsoon and other atmospheric effects.

Less crop yield per unit area of land: A large fraction of the area cultivated with wheat and rice in UP has less yield than the national average, although UP's being the producer of 1/3rd of total wheat production in the country speaks about how much yield potential is being lost due to ineffective techniques.

Factors leading to low yield -

1. This can also be due to low-quality seeds.
2. It can also be due to unreliable water supply despite developed irrigation techniques.
3. Low water utilisation efficiency due to seepage, uneven water distribution, etc. is also an important factor.

Smart apps for smart agriculture like IFFCO KISAN and AgriApp can be introduced in villages to provide timely updates regarding the availability and cost of seeds, fertilizers, pesticides and other agricultural commodities. Present stock and shortages of seeds, fertilizers, and pesticides can be communicated with farmers in advance by using these apps.

### 3.4.2 Problem 2: Improving Infrastructure for Food Grain Storage Facilities

#### Problem

1. The warehouses or godowns lack the necessary conditions like proper temperature and moisture.
2. The storage facilities are poor, often leading to damage by pests and insects. The storage facilities are also not suitable for long-term storage of grains.
3. This seriously harms the quality of grains, leading to damage and wastage of the stocks.
4. The grains are infested with mould and insects because of the lack of safe storage facilities.

#### Storage in open space:

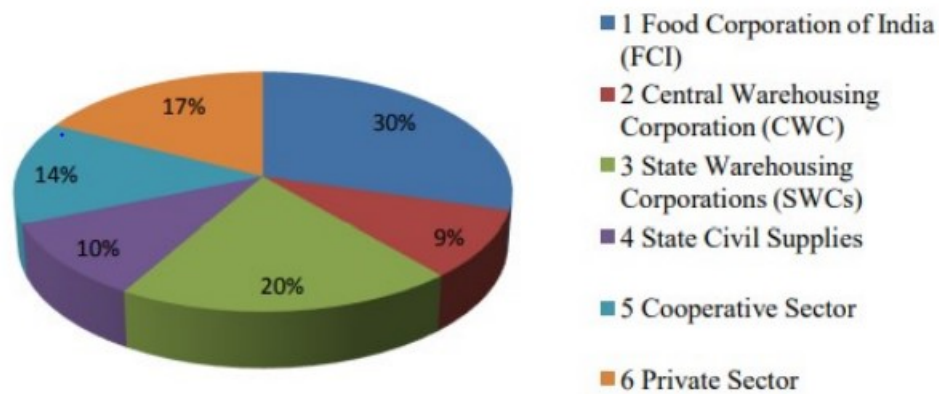
1. The absence of proper cover and plinth storage facilities during the procurement seasons led to stocks being simply deposited into the open spaces without any sort of precautionary measures to preserve these excessive grains.
2. This results in damage to stocks due to the seepage of water from the ground due to the lack of a proper plinth or height of ground or due to floods and rain.

#### Health issues:

- According to a paper released by the World Health Organisation, mycotoxins are found in mouldy grains. These are very common in the godowns.
- Mycotoxins are natural toxins made by certain moulds (fungi) that can be found in food. They can cause sickness.
- These have a wide range of health effects and can be dangerous to both humans and livestock, from short-term poisoning to long-term effects like immune deficiency and cancer. They can also be dangerous to the environment.

**Direct Stakeholders:**

1. Farmers
2. Food Industry Sector
3. Food Regulatory and Enforcement Agencies



*Figure 3.3: Percentage share of different sectors in Storage of Food Grains*

**Indirect Stakeholders:**

1. Consumers
2. Retailers
3. Transport facility provider
4. Chemical Industry
5. Equipment provider and manufacturer for Storage.

## Existing Solutions

1. Bulk (Open Storage) Farm products are sometimes stored in surface structures in a loose form. Large quantities of food grain can be stored.
2. Covered storage This is the most popular storage method used by FCI, CWC, and SWCs. It is a method wherein a jute bag is used to store the grains. Grains packed in jute bags are piled inside warehouses or godowns.
3. Silos These are tall, tower-like structures used to store grains. Silos require 30% less land when compared to conventional warehouses and can run round the clock, making them more efficient.<sup>[7]</sup>

**CONVENTIONAL STORAGE STRUCTURES**

Sl. No.	Structures	Make	Commodity stored	Capacity	Remarks
1.	<b>Bamboo Structures</b>	Split bamboo woven in the form of a cylinder with wide base and narrow mouth	Paddy, wheat and sorghum	5 quintals	Life 4-5 years. Weight loss due to insect attack is 5 % in paddy and 15 % in sorghum.
2.	<b>Mud and earthen structures</b>	Clay, straw and cow dung- 3:3:1. earthen structures are made, sun dried and then burnt in fire	Paddy, wheat, sorghum, oil seeds and pulses	5 - 10 quintals	Life 8- 10 years. During rainy season develop cracks and moisture absorption followed by insect and mould infestation.
3.	<b>Wooden structures</b>	Local wood is painted black. At the top, 30cm x 20 cm inlet and at the bottom 30 cm x15cm outlet is provided	Paddy	10 quintals	15- 20 years. Neither airtight nor moisture proof.
4.	<b>Brick structures</b>	Rectangular, structures built as part of the house, with brick in cement or lime mortar having a wall thickness of 40 – 50 cm. At the top 50x 50 cm inlet and at bottom 15 x15 cm outlet is provided.	Paddy, sorghum and wheat	25- 30 quintals	25- 30 years. High initial cost, not insect and moisture proof.

*Figure 3.4: Storage Structures*

## Our Solution

**a. Hermetic storage:** These are sealed, airtight storage units that can hold large quantities of food grains while also avoiding the use of any chemicals, artificial or natural, to keep the grains from deteriorating. These are very effective in the long-distance movement of grains. The method creates an automatic modified atmosphere of high carbon dioxide concentration using sealed waterproof bags or structures. As the structures are airtight, the biotic portion of the grains (insects and aerobic microorganisms) creates a self-inhibitory atmosphere over time by increasing carbon dioxide concentration (oxygen decreases) due to its respiration metabolism.[8][9]

**b. Temperature and Humidity:** Inspect the storage for water leakage and temperature optimality by recording the highest temperatures and lowest humidity levels reached in the storage area and constructing a damp-proof and rigid floor free of cracks and crevices.

**c. Insects and rodents:** Insects and rodents are major pests of food grains. This problem can be tackled with the use of chemical fumigants, insecticides, and pesticides. Once the grains are sufficiently dry, they can be sprayed with phostoxin to keep away the LGB infestation. Shelling the grains and storing them in polypropylene bags after proper application of Actellic Super can effectively avoid pest infestation for a few months of storage. Among natural insecticides, the leaves and oil extract from the leaves of *Chenopodium ambrosioides* Linn. (Chenopodiaceae) have been found to be very effective in controlling the damage of cereal grains by insects during storage.

## Impact

Hermetic bags experienced moisture migration, as attested by 2-3 percentage points of moisture variation in wheat samples. Milling yields, ascertained after removing insect-damaged kernels, were lower for gunny bags compared to two other treatments. Hermetic bags maintained stored grain quality and protected wheat from insect infestation more than conventional structures. Hermetic bags can be an effective solution for reducing storage losses of wheat in India. The major disadvantage of the existing storage method is that the structure is not airtight, moisture, or rodent proof. Damage often results from rodent pest or insect infestations, structural failure, and termite infestation. On the other hand, hermetic storage also prevents the reabsorption of moisture from the atmosphere. Re-absorption of moisture can deteriorate stored grains as it encourages mould growth, which can lead to aflatoxin contamination. Hermetic storage is also floodproof.

## Implementation Issues

The most critical problems associated with flexible hermetic storage structures, such as rodent attack, human pilferage, and deliberate piercing of holes by enemies or domestic animals, are practically nonexistent with rigid hermetic storage structures. However, major issues associated with rigid hermetic storage structures include improper sealing of the edges, loading and unloading points. Various rigid hermetic structures have other problems, ranging from moisture condensation to the high cost of hermetic storage structures. Individual materials used for the construction of hermetic storage structures differ in their reactions to external climatic conditions. Rigid hermetic storage structures made of metallic materials are bound to have condensation problems, which are also expected in plastic but not in glass containers, but glass and plastic containers are relatively expensive, especially in high volumes, and as such, many peasant farmers are not able to afford them. Even so, research says that when structures are kept in the shade or under a roof while they are being stored, better results will be achieved.

### 3.4.3 Problem 3: Increasing Awareness in Farmers

The Indian agriculture industry is extremely mismanaged. The middlemen gobble up the majority of the profits, either due to monopoly in the market or due to some debts of the farmers. Also, small-scale farmers have such low profits that they aren't able to afford any new machinery, good quality seeds, or anything else that would help them increase their crop yield due to these middlemen eating up the majority of that small profit.

The farmers also don't have enough knowledge about the quality of products they are purchasing, like the quality of seeds and fertilisers, which directly affects the crop yield.

This is majorly due to the unawareness of the farmers about government policies and different technologies, so this is a major problem which needs to be solved as soon as possible, which would lead to the betterment of the quality and standard of life of the farmers.

### Direct Stakeholders

1. Farmers: Many farmers in India are not financially able to purchase big machines like harvesters, tractor implements (rotavator, cultivator, sprayer), good quality seeds, etc. Therefore, they are direct stakeholders when they are able to remove the middlemen and use their profits for their own betterment.



2. Middlemen: Cutting them off from the middle of the farmer-to-consumer chain would have a significant impact on them, so this must be handled carefully as they wouldn't want them to lose profits by gobbling them up from small farmers by exploiting them.

### **Indirect Stakeholders**

1. Consumers: No middlemen implies increased profits for farmers, and the farmers can also decrease the selling price a little bit, which can be beneficial for consumers due to less cost.
2. App owners: The apps are used by farmers to sell their produce, which would thus increase the revenues of the app owners.
3. Machine Manufacturers: With increasing profits, the farmers would now be able to buy these machines from machine manufacturers, which would in turn increase their supply and their revenue stream.
4. Government: The reduction of middlemen would thus strengthen the economy of the nation, as agriculture forms the major backbone of the country's economy.

### **Existing solutions and the problems with them**

Apps like SmartCrop, Mandi Trades, and Kisan Market serve as an online marketplace, providing space for farmers to sell their produce after collecting information regarding market prices and for customers to compare and buy produce. State-specific apps narrow down the user base and help provide information regarding a specific area. Farm-o-pedia for Gujarat, AgriSmart for Punjab, and Krishi Suchak for Karnataka are a few examples of such apps. All these mobile apps are helping reduce transportation, corruption, and transactional waste in agriculture and also offer a gateway for resource sharing for farmers. Thus, the apps are helping boost overall business performance and reduce the negative environmental impacts of farming. These advancements will definitely help bring significant change in the lives of farmers and the field of agriculture.

However, there are few platforms for farmers to purchase high-quality seeds and low-cost machinery, preventing them from increasing their yield; as a result, they frequently end up in debt and are exploited by the retailers/middlemen from whom they borrowed the money, losing a large portion of their profits.

Moreover, the apps are government-owned and not well managed. This leads to less penetration in the market overall. Most farmers end up buying requirements like pesticides from local sources, which has led to a lot of deaths due to pesticide poisoning. This is because local pesticides are often adulterated and farmers do not have the required knowledge of how to use them.

## **Solution**

An all in-one market place to buy products and sell their produce.

Requirements: A farmer can get whatever requirements he has (like seeds or pesticides) from reliable sources. We could have a label for trusted products or vendors, which would improve yield. This application would also be open to consumers to directly buy from farmers at lower costs.

As a result, this application would be a platform type in which consumers, farmers, and shopkeepers collaborate closely for mutual benefit.

1. Information: We could also provide information to the farmers about how to use a product and when to plant or not plant the crop they have bought. In general, providing information in the local language (in this case, Hindi) will greatly increase the penetration and prevent accidents while increasing overall farmer productivity.
2. Produce: Farmers (or the village) could sell their produce online directly to customers. This would prevent the exorbitant logistic prices as customers could buy locally, including organic produce. This would also increase farmers' income.
3. Sharing System: A big problem in Indian agriculture is the existence of small farms. Since the farms are so small, renting machinery is difficult. We could solve this problem by having village rental programmes where the entire village could rent a machine for a while at subsidised prices.

## **Implementation**

It is not fair to assume every farmer will have an internet connection or will be able to use a mobile app on their own.

Providing a phone to everyone and teaching them how to use the internet and these apps would be very time-consuming.

The solution to this would be to negotiate with the government to provide one phone per village, which would be held by village-level volunteers.

### **Work of volunteers**

The volunteers are the backbone of the success of this solution. These volunteers act as the driving force to make our solution penetrate the hearts of both farmers and buyers. These volunteers have a daily visit to each farm to ask for the requirements and make the purchases they like to make, or we can set up a small hut or shack in which the farmers can visit the volunteers for a fixed period of time from morning to evening to place their orders or share their concerns. Volunteers collect the information from farmers and place the order or place the produce into the system. The work of the volunteers is not only limited to getting orders from farmers or helping them sell their produce, but also includes informing the farmers when the prices of goods or equipment have gone down so that they can buy them at a much lower price or which crop demand is higher so that the farmers can grow that and increase their profits. Thus, volunteers should be working for the upliftment of farmers and farmers only without any of their own corruption and should be strict officials appointed by the government who have a lot of experience in the field of agriculture. This model is similar to that followed by Jio Mart currently to involve more and more shopkeepers in engaging and making wholesale purchases through their app. The volunteers, after a fixed period of 2-3 days, would post a collective order for all the needs on the app, and the local sellers/vendors registered on the application can quote their best selling price, and the best price can be selected by the volunteer, thus reducing the need for the middlemen (distributor/retailer), in this case, who sells through shops. Latest Minimum Support Prices will be available on the system for all types of products, and every transaction being made will be cross-checked with MSP to avoid any sort of mistake happening in selling farmer's produce.

## **3.5 Infrastructure**

### **3.5.1 Improving the business/market for rural traditional handcrafters and artists**

#### **Current problems**

1. The living conditions and income of several of the rural artists who are skilled in several of the traditional art and craft techniques and traditional dress making is not good.
2. Despite being skilled, these artisans usually find it hard to sell their products and find customers.
3. They either operate small shops in rural areas or sell their products directly to middlemen at low costs.

#### **Direct Stakeholders**

1. The rural artisans who make products such as wooden or earthen decorative items, colour paintings of various traditional styles, and several other decorative textile items.
2. The middleman involved is who buys the products from artisans and sells them to urban markets.
3. The customers, who can be either from rural or urban areas, buy these products.

#### **Indirect Stakeholders**

Not any.

#### **Existing Solutions**

1. Most rural artists try to sell their products in places where there is a good daily consumer flow, but this is not an easy task for them due to a lack of proper marketing skills. Many of them sell their products to middlemen at very low profit rates.

2. A few of the rural artists are knowledgeable enough to sell their products through online platforms such as e-commerce websites.

It is clear that the current condition is nowhere near good for these skilled artists. Most of them only sell their products at very low costs, which allows them to get a meagre income. The involvement of middlemen is also seriously affecting the earnings of these artists. There is a need for a better solution that can work for the welfare of these rural artists and can improve their income and living conditions. The new solution must also eliminate the involvement of middlemen.

### **New Solution**

The problem can be solved by directly connecting the artisans to a large number of potential buyers. In many of the metropolitan cities, there is an increasing demand for high-quality traditional handicrafts, wooden items, pottery items, paintings in traditional styles, and traditional clothing items. The following points are proposed-

1. The solution involves the creation of an online platform where all these products made by artisans can be listed with appropriate pricing.
2. This platform can be first implemented for all the villages of a particular region, which is famous for some of its traditional art styles, and then it can incorporate villages from an entire state.
3. One of the main problems is connecting every artisan with this platform. It can be done with the help of rural welfare organisations whose members can go to each artisan in a particular village or of several villages in a region to facilitate the exact process of connecting the artisan to the platform by listing his/her products on the website. Although, connecting the artisans of India will probably take a lot of time and will also involve a good amount of funding, government funding can easily facilitate the entire process. Besides, a fixed amount of a minimal fee can be asked from an artisan who wishes his/her item to be listed on the website.
4. The website must be properly organised so that a customer can easily search for products in a particular category and sort them as per his/her preference for products listed in the closest possible region. Once a customer makes a purchase through the online platform, the selected product can be procured from the particular artist and the entire process can be handled by a delivery partner.

5. The working of the website will also involve significant funding as there will be lakhs of products listed in several different categories. Besides, several servers will be needed to ensure the proper functioning of the website throughout India. This problem can be easily solved by deducting a small percentage of the profit made from the sale of an item by an artisan.

Apparently, this solution does not have any significant issues, although the proper planning and execution is a big task. As already mentioned, the main problem is connecting thousands of skilled artisans to this online platform. Although this is just an initial issue, there are no significant hurdles in maintaining the website once all the artisans are connected to it, as the funding for continuous management of the website will be deducted as a small percentage of their profits.

This solution will solve the problem by increasing the earnings of skilled artisans by giving them a much more fair share of the money for the products they sell. This solution will also eliminate the involvement of a middleman.

Note: There are already a few NGOs and small websites that are using the same idea, but they are actually operating on a very small scale. Of the few online websites available, most of them work with a very limited number of artisans to make some specific products, and in some cases, there is also the involvement of a middleman.

### **3.5.2 Renewable Electricity Stations for Villages**

#### **Problem to be solved**

Many villages face a big issue with inconsistent power supply. Even though the electrification rate in Uttar Pradesh has grown by leaps and bounds, there is a lack of uninterrupted supply. It is a problem of great importance to all villagers, as well as the services linked to it. Erratic electrical supply always causes problems and can impede machine operations as well as people's comfort. The lack of electricity sometimes also makes mobile networks erratic, which is severely detrimental to the quality of life of the villagers.

#### **Existing Solutions**

Currently, the Uttar Pradesh government is actively working on improving the electrification of the villages by launching schemes and improving the electrical infrastructure of the state.

It has been consistently working on expanding the state power grid to even the most remote regions and has also been trying to improve the robustness of the power grids by increasing the number of rural feeders.

Unfortunately, while these efforts are very admirable, there is still a long way to go before a consistent electricity supply can be achieved. Furthermore, there are villages in remote regions that will not be able to connect to the state power grid in the near future. Villages such as this would need other solutions for power generation.

## **Our Solution**

The basic idea that we propose is to set up energy stations for a village or group of villages (depending on location and proximity). These energy stations will primarily collect renewable energy. The primary function of these energy stations will be to patch the gaps in the state energy supply, though depending on the village requirements, it may be possible to set up a station capable of providing electricity for most of the day (for usage by remote villages which cannot be electrified through the state grid).

These energy stations will primarily convert and store solar energy, as it is the most convenient form of renewable energy. Wind energy requires a lot of space because of the spacing needed between individual turbines, and on top of that, it has location issues because of the noise produced by the wind panels. Other possible energy sources like biofuel require expensive storage, have slightly poor efficiency, and also have other problems in setting up the plant, like the problem of odour in the case of biofuel (these issues have been explored in more detail in previous reports).

The energy stations will store the converted solar energy throughout the day, which can then be supplied as and when required by the subscribed villages. Since our aim is to place such electricity stations in close proximity to the subscribed villages, ideally there will not be very significant transmission losses.

For storage, a battery storage system will be employed. The battery system can easily provide electricity for a few hours and can very quickly transition from a standby to an active phase. These are also relatively small and do not require a significantly expensive cooling system or specific geographic features like a pumped storage hydroelectric system. This makes it ideal for our use case.

The exact size specifications of the plant will be based on the average amount of power required by the village and the amount of interruption faced in the state supply. These two quantities vary massively amongst different villages.

We also hope to install powered mobile towers and repeater stations to improve mobile network connectivity in villages.

### **Implementation Problems**

The biggest challenges to the implementation of such an idea are the issues of pricing and maintenance.

Local solar energy solutions cannot compete with the economies of scale and subsidies provided by state power. It will, on average, be pricier than the state grid per unit of energy, which can be hard for the villagers to bear. Especially on top of the state supply. Making it affordable will be a major challenge. This can be solved using a state-level subsidy from the government.

Secondly, there will be the problem of maintenance. The solar panels will mostly require regular cleaning and debris removal. These will not require replacement for a decade or two. The batteries will require replacement every few years, otherwise there will be major losses in efficiency. These will need to be kept in mind to keep the station operational for longer. We would need to set up a robust checkup and maintenance pipeline to keep track of the enormous quantities of the villages.

### **Impact of the Solution**

We believe that this solution will significantly help in making the village power supply more consistent and last for a long time. The solution is specifically designed to tend to the problems with the existing supply.

This being said, it does not fully solve all the problems with the current supply. Remote villages will need supplies for basically the entire day, which will require larger stations. Since they will be used more often than the other stations, they will require more checkups and maintenance.



### 3.5.3 Drinking Water Supply and Sanitation

#### Problem

In India, less than half of the population has access to safe drinking water. Chemical contamination of water, mainly through fluoride and arsenic, is present in 1.96 million dwellings. Two-thirds of India's 718 districts are affected by extreme water depletion, and the current lack of planning for water safety and security is a major concern. One of the challenges is the fast rate of groundwater depletion in India, which is known as the world's highest user of this source due to the proliferation of drilling over the past few decades. In 2015, India achieved 93 per cent coverage of access to improved water supply in rural areas. However, a new baseline estimates that less than 49 per cent of the rural population is using safely managed drinking water.

There are studies and field reports that have analysed the Swachh Bharat Mission (SBM) in terms of coverage and use of toilets in rural India. The official government survey, the National Annual Rural Sanitation Survey (NARSS) 2018-19, shows that 93% of rural households have access to a toilet, and 96% of those having a toilet use it. Around 13% of households in a village in UP have access to a tap water supply in their homes, while the rest have no such facility. Hence, forcing most households to depend on handpumps, etc. for water supply.[10]

#### Direct Stakeholders

As the majority of the villagers in UP are dependent on farming for their livelihood, the farmers in the state will need constant water supply for irrigation. Hence, they are one of the biggest stakeholders when it comes to water supply. Apart from that, every household would also require a constant supply of water for their daily chores.

1. Households/Farmers: They are at the receiver's end of the water supply chain and, hence, trivially, are stakeholders in the same.
2. Plumber-Installing water pumps and finding solutions to any problems causing trouble in the smooth functioning of supplying water. Hence, they constitute a major stakeholder in the process.

## Indirect Stakeholders

1. Government: Provision of water supply falls under the jurisdiction of the state government in Uttar Pradesh, making them a highly influential stakeholder in the process. They must function efficiently in order to provide good quality water in different villages in UP.
2. Gram Panchayat Representatives: Gram Panchayat representatives as well as officials, as they will have to shoulder responsibility for the construction of civil works and subsequently undertake the O & M.
3. Self-Help Groups: Responsible for the supply of good quality water in sufficient quantity for the villages.

## Existing Solutions

In most cases, where water is not available nearby, the load on women to carry water has increased. A pour-flush latrine, the type most preferred, requires at least 12 litres of water per use. With four to five members in the household, the minimum daily requirement becomes about 60 liters, forcing women to collect at least three times the amount of water they would otherwise collect. We have observed that without water in the household premises, a woman's water carrying load increases to more than twice the pre-latrine time. With the current solution, it requires a large amount of water to be used in each flush. And this water has to be brought by the family members from the wells in villages, causing a lot of trouble. To resolve this issue, we need to find an alternate solution. Most of the village members don't have access to clean drinking water, but some of them use traditional techniques like boiling water for drinking. The problem with this is that it is not a very efficient solution and requires a lot of energy and time to make water fit to drink by boiling.

## Our Solution

### Solution Description

1. Chlorination: Chlorine is a powerful chemical that has been in use for many years to treat water for home consumption. Chlorine is an effective water purification method that kills germs, parasites, and other disease-causing organisms found in ground or tap water. Water can be purified using chlorine tablets or liquid chlorine. As an off-the-shelf

- water purification product, chlorine is cheap and effective. However, you should be careful when you use chlorine liquid or tablets to make drinking water cleaner.
2. Reverse Osmosis : is a pressure-driven membrane process used for purification of water. In all pressure-driven membrane processes, water passes through the membranes more easily than the contaminants that are being removed. However, not all of the water supplied to an RO membrane passes through the membrane. The two water streams of differing water quality are produced in the RO process: Stream 1: The water stream that passes through the membrane is purified and is referred to as "permeate". Stream 2: As the feed water stream passes along the membrane and loses water to the permeate stream, the concentration of contaminants on the feed water side increases. For this reason, the feed stream quality declines along the membrane and is often referred to as "concentrate" when it exits the membranes.[11]
  3. Eco-friendly Two Pit, Pour-Flush Compost Toilet: The working model of this toilet is very simple. Two pit holes are created around the toilet, one of which is functional while the other is kept closed until the opened pit is fully filled with human waste. The filled pit is then closed for composting, and the waste collected in that pit is converted to bio fertilizers. What's great is that the fertilizers made this way are high in nitrogen and phosphorous, two chemicals that help with better irrigation.[12]



*Figure 3.5: Eco-friendly Two Pit, Pour-Flush Compost Toilet*

**Budget**

1. Chlorine Tablets: For 1000L of drinking water, we would require Rs.150 worth
2. RO filter: One RO filter costs Rs.10000 and can be used by the entire family.
3. Eco friendly pits: These practically cost nothing and is just a clever and effective way to improve the sanitation conditions.[13]

**Impact**

The proposed solutions for drinking water supply would improve the quality of drinking water that the people in villages drink. Moreover, the proposed solution for sanitation would reduce water wastage and also improve the present situation of sanitation in villages, leading to better living conditions.

**Implementation Issues**

1. RO filters might require a hefty initial investment, plus there's this additional problem of teaching the operation of RO filters to the villagers.
2. Community acceptance of eco-friendly pits might be an issue in some villages.

## References

- [1] *Rural Unemployment in India (2921 Words)*, 2013.
- [2] *Agri-tourism has positively impacted farmers' lives, socially & economically: Valsa Nair, Maharashtra Tourism.*
- [3] *To enhance income of farmers, consider Agri-tourism*, <https://www.newindianexpress.com/opinions/2020/09/22/enhance-income-of-farmers-consider-agri-tourism-2226815.html>.
- [4] Krishna D K , N V Kumbhare , J P Sharma , D U M Rao and Arpan Bhowmik, *Challenges and Strategies for Promotion of Agritourism: A Multi-dimensional Study.*
- [5] A. N. Bureau, '*Dropout Rate At Secondary School Level In India Is More Than 17%*', *Claims Study*, <https://news.abplive.com/education/dropout-rate-at-secondary-school-level-in-india-is-more-than-17-claims-study-1466998>, 2021.
- [6] *26 NGOs Enabling Indian Education*, <https://www.educationworld.in/26-ngos-enabling-indian-education/>, 2016.
- [7] *Food Grain Storage & Management in India — UPSC*, 2020.
- [8] O. C. A, Chukwu, O, A. B. A, Haruna, and S. A, "Hermetic Storage Technology: The Way forward in Solving Numerous Cereal Grains Storage Challenges in Developing Countries", *International Journal of Engineering Research & Technology*, vol. 6, no. 7, 2017.
- [9] L. Concepcion, *All You Need To Know About Hermetic Storage*, <https://news.grainpro.com/all-you-need-to-know-about-hermetic-storage>.
- [10] *Rural Health Care: Towards a Healthy Rural India – gramvaani.org.*
- [11] *What is Reverse Osmosis? Explained & Simplified*, <https://optipurewater.com/news/reverse-osmosis-explained-simplified/>, 2018.
- [12] *4 Methods to Purify Your Water — Sauk Rapids, MN*, <https://www.schultzsoftwater.com/blog/4-methods-to-purify-your-water>, 2014.
- [13] *Clean drinking water*, <https://www.unicef.org/india/what-we-do/clean-drinking-water>.