Model Village

APPROACH AND CASE STUDY

BY TEAM TECHGSR, IIT BOMBAY
Why not promote migration from village to city?

- In search of development
  - Gaining Education and settling
  - Overpopulation
  - Jobs
    - poverty index
city going to low
Why not just urbanize?

- So then why not just urbanize?
  - Village has the **true culture** of a country which only they can sustain
  - **Agriculture** is available only in the village areas
  - **Natural resources** will be destroyed and pollution promoted due to automobiles
  - Village has a **community** or a society behavior culture
It clearly indicates that villages are lagging behind “somewhere” and require advancement to “eradicate economic, technical, social barriers for their upliftment.”
What comprises in a model village?

**Support**
- Basic needs
  - Food, water, energy and health & hygiene
  - Agriculture
  - Infrastructural facilities
  - Education
- Needs for luxury

**Equality**
- Social equality
- Political equality
- Economic Equality
How to make a model village?

- **Analysing problems**
  - **Interact** with the Stakeholders
  - **Analyse** the village requirements
  - Get the **exact problem statement**

- **Finding solutions**
  - Make sure the solution is **sustainable**
  - Make sure the solution is **replicable** for more villages
  - Make sure the solution is **feasible** and **affordable** by all
  - Make sure the solution is **acceptable**
Our Approach

- What are engineering students enriched in:
  - Technical Skills
  - Organizational Skills

- First and foremost to work for people—

“Make a diverse team from technology, Designing, management, and field research experience”

“Become Responsible!”

“Innovate”

Understand the how!
https://www.youtube.com/watch?v=dg6MZON9CgM
Model Approach

Nearby institutes – Interdisciplinary Social Responsibility Group
- Design
- Engineering
- Humanities
- Management

Villages

Anganwadi

- Credit Based project / courses NSS
- Institute help
- Set up new department
- Certification like toastmasters
- Already existing departments
- NGO/social enterprise help
- Competition based
How - Open innovation platform
(Human Centered Design)

Stage 1
The big question
• Every challenge starts with a big question posed by the team.

Stage 2
Research
• Challenge is posted with existing case studies, stories and examples to serve as inspiration to the students.

Stage 3
Ideas
• Together everyone posts the solutions to spark creative efforts.
• Applause: Ideas are applauded and comments to get shortlisted.

Stage 4
Evaluation
• The teams refine the concepts formed taking advice from experts.

Stage 5
Impact
• Winning ideas are implemented and showcased. These initiatives can be led by sponsors CSRs or Govt. schemes.
The HOW!

Identifying Location

Interact with the people already working for the villages – NGOs, CSRs
Locate the places in need of support from the basic daily requirements
Chose a smaller village for larger impact, but accommodating diversity
Interact with the people and Gain their confidence

Hirewadi – A tribal hamlet of 40 houses with problems from water distribution to social equality among the communities!

Smart bucket Challenge
https://www.youtube.com/watch?v=Wkxp-xhz0Ag
Location
Finalizing problem statements

- Rate the problems with a weightage on the basis of criteria

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>Total (22)</th>
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</thead>
<tbody>
<tr>
<td>PS</td>
<td>Need (1)</td>
<td>Scope of Innovation (5)</td>
<td>Reapplicability (3)</td>
<td>Impact (5)</td>
<td>Sustainability (2)</td>
<td>Total (22)</td>
<td></td>
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<tr>
<td>Efficient lightning</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Chahal Smokeless</td>
<td>4</td>
<td>3.6</td>
<td>2.4</td>
<td>4</td>
<td>1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Water purification of well</td>
<td>6.15</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>1.65</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>Vehicle mobility - healthcare</td>
<td>6.5</td>
<td>3.6</td>
<td>1</td>
<td>4.5</td>
<td>1</td>
<td>16.6</td>
<td></td>
</tr>
<tr>
<td>Drip irrigation</td>
<td>5</td>
<td>3.25</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>16.25</td>
<td></td>
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<tr>
<td>Maule preparation device</td>
<td>3</td>
<td>3.35</td>
<td>1</td>
<td>2.125</td>
<td>1</td>
<td>10.475</td>
<td></td>
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<tr>
<td>Housing</td>
<td>4.5</td>
<td>2.5</td>
<td>1</td>
<td>2</td>
<td>1.5</td>
<td>11.5</td>
<td></td>
</tr>
</tbody>
</table>
## The solutions – our USP

### Need based model
- Transport (impact)
- Water (Process)
- Housing (Research)

### Solution based model
- Livelihood solutions (Gvika) – Business Planning
- Interaction with People (Smart bucket, Cleanliness drives)
- Awareness (Weekly interactive)
- Miscellaneous – Agriculture
Livelihood
The solutions
Economic Equality - GVika

1. Call/Sms on a code by the customer
2. Verification system
3. There will be a research team for data collection
   - explore potential businesses
   - Give existing opportunities
4. Approach donations or connect to the existing opportunity
5. Investing in the businesses
6. Returns in the form of shares and for some duration
GVika

BMC for the SMS system

- **Value opportunities**
  - Help for rural India

- **Customer segments**
  - Rural working jobless section

- **Customer relationships**
  - Personal assistance

- **Channels**
  - Mobiles/SMS/calls
  - Flyers/ Digital Media
  - TV/radio/communication
  - Websites and online

- **Key activities**
  - Advertisements (Self and associates)
  - Team (Data collection & Data analysis)
  - Investing in new business
  - Approach for donation

- **Key partners**
  - Government (funding)
  - Advertising firms
  - NGO and rural institutes (data collection)
  - Venture Capitalists
  - Unskilled job providing firms like construction firms
Gvika – Revenue & cost of the system

- Cost
  - Data collection
  - Communication charges
  - Verification charges
  - Office charges
  - Salaries

- Revenue
  - Donation from government
  - Emerging Enterprises
  - Advertisements
GVika—
The team skills

- Data collection & analysis (Opportunity search)
- Verification
- Connecting to the existing opportunities
- Design, Analysis and implementation of the proposal

- The team can be a company
- The team can be an incorporated part under TechGSR teams (volunteer)
Small Scale Industry Business Plan (Papad)

**Selling point**
- Near by Eateries
- Mess
- Hotels
- Shops
- Online (at later stage)
- Predicted selling price 90 Rs / Kg

**Raw material**
- Flour : 3 kg (3*20=60 Rs)
- Common salt : 250 gm (5 Rs)
- Baking powder: 50 gm (10 Rs)
- Green chillies: as per taste. (5 Rs)
- Cost of making = 80 Rs / 3 Kg

**Revenue**
- 190 Rs/ 3 kg
- Approx. 15 families/women will work for 20 days
- Overall increase in villages income = Rs 57,000
Transport

IMPACT
Prioritizing the problem as magnitude

<table>
<thead>
<tr>
<th>Problem</th>
<th>Need (out of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Emergency</td>
<td>9</td>
</tr>
<tr>
<td>Low and unreliable frequency for public transport</td>
<td>6</td>
</tr>
<tr>
<td>Lack of initiatives by government</td>
<td>4</td>
</tr>
<tr>
<td>Low incentives for public autos</td>
<td>5</td>
</tr>
<tr>
<td>Lack of vehicles as per the income of families</td>
<td>6</td>
</tr>
<tr>
<td>Vehicles are not sharing with other families</td>
<td>5</td>
</tr>
<tr>
<td>No source of fuel or No maintenance</td>
<td>4</td>
</tr>
<tr>
<td>Remote location and lack of good infrastructure</td>
<td>7</td>
</tr>
<tr>
<td>Lack of expert drivers</td>
<td>6</td>
</tr>
</tbody>
</table>
Affordable, Medically and mechanically equipped vehicle with a sustainable system for drivers and involved stakeholders
Analysis of requirement for the process

Communication: To communicate the need of an emergency

Vehicle: Well equipped as per the bad road – Mechanically strong

Drivers: Local resident

Road: Proper road preferable

Destination: Closest preferable hospital

Emergency Vehicle:
- Well equipped medically
- Easy maintenance
- Affordable travel

Drivers:
- Low incentives
- Available all time
- Responsible

Road:
- Proper road preferable

Destination:
- Closest preferable hospital
Final solution - Convertible auto-ambulance for degree 1 medical emergencies

**VEHICLE PARAMETERS**
- DISTANCE TO TRAVEL – 20 KM
- CAPACITY – PATIENT, COMPANION AND DRIVER
- FACILITIES – FIRST AID KIT

**AVAILABILITY FOR THE VEHICLE**
- PRIVATE - 15 BIKES, 1 WAGONER, TEMPO CYCLES
- PUBLIC - BUSES, BLACK YELLOW AUTO
TADA AH!
convertible automotive solution to medical emergencies

Around 60% of the women could not use the facility for delivery as reported by hospital. We took up the challenge to reduce the delay in seeking medical facility.

**Existing solutions**
The vehicle will not be in regular use as medical emergencies do not arise every day and so we cannot guarantee whether it is in working condition when needed.

**Route Statistics**
- Change in altitude: 70.5 m
- Distance: 26 km
- Maximum speed: 42 kmph

Hospital is in Kashele only. There are around 20 villages who visit this hospital for any medical emergency.

**User study**
Contextual interviews with rickshaw drivers led to understanding of operation of the auto stand and their operations. All the autos get permit from the government which are transferable. Some drivers also reported taking some medical emergencies while operating the auto and were positive when we proposed the conversion option.

**Stretcher**
The stretcher is made using the cushion base and a foldable stretcher shown in the image. Two step folding activity enables the user to convert the seat into a bed with reclining headrest. Then the roll up stretcher is deployed with straps to arrest the patient in static position protecting from any random jerks.

**Foldable front seat**
The seat is made of hard cushion base with a soft cushion on top. The conversion is estimated to take approximately 2 minutes.

**Implementation**

**Additional seat**
Final detailed solutions

- Patient will give 800 INR
- Driver gets more than what he gets in general on the same route
- Union gets money as it is bringing in the changes in the vehicles (autos)
- Associate/facilitator has –
  - Receive call from patient twice (before receiving and after the delivery of service)
  - Assign driver – record on slip – give a slip to driver
  - Give a call to union leader to ensure payment will be received
  - Maintain the register

Union 150 INR  Facilitator 50 INR  Driver 600 INR
Water

(PROCESS)
## Parameters

<table>
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<tr>
<th>A</th>
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<th>D</th>
<th>E</th>
<th>F</th>
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<tbody>
<tr>
<td><strong>water purity</strong></td>
<td><strong>Stream water</strong></td>
<td><strong>River well</strong></td>
<td><strong>River water</strong></td>
<td><strong>Well cleaning/ restructuring</strong></td>
<td><strong>Bore river / stream</strong></td>
</tr>
<tr>
<td><strong>monthly availability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>harnessing feasibility</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>storing feasibility</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>stakeholders involved</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>time for formalities</strong></td>
<td></td>
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<tr>
<td><strong>Budget</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Options available for water sources:
- *Stream water*
- *River well*
- *River water*

Options available for feasibility:
- *Well cleaning/ restructuring*
- *Bore river / stream*

- *water purity*
- *monthly availability*
- *harnessing feasibility*
- *storing feasibility*
- *stakeholders involved*
- *time for formalities*
- *Budget*
Steps finalized

1. Map the village and understand the options available
2. Compare the options as per basic parameters
3. Work over the finalized option for supply
4. Work over purification options accordingly
5. Work over groundwater recharge – check dams
6. Work over rainwater harvesting
Supply design for overhead tank and wells

- **Green line:** Water supply line from elevated storage reservoir(esr)
- **White line:** Line from well 1 to esr
- **Red line:** Line from well 2 to esr
## Cost analysis for wells

### Rough Costing Estimate (Rs)

<table>
<thead>
<tr>
<th></th>
<th>Well near river</th>
<th>Well near stream</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline</strong></td>
<td>195600</td>
<td>45,600</td>
<td>Calculated at a rate of Rs 400/m for GI pipelines</td>
</tr>
<tr>
<td><strong>Pump</strong></td>
<td>13,000</td>
<td>13,000</td>
<td>Approx cost for 2 hp pump</td>
</tr>
<tr>
<td><strong>Well</strong></td>
<td>500000</td>
<td>250000</td>
<td>For well near stream, approx cost for lining, digging, and check dam</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>80000</td>
<td>80000</td>
<td>Rs 4/lt for 20,000 ltr syntex tank</td>
</tr>
<tr>
<td><strong>Supply line</strong></td>
<td>120000</td>
<td>120000</td>
<td>Two 150m pipelines as shown in map</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td>90860</td>
<td>50860</td>
<td>10% of above charges, includes labour, valves extra charges</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>999460</strong></td>
<td><strong>559460</strong></td>
<td>Doesn’t include gabion consuction, washing zone, rain water harvesting techniques etc</td>
</tr>
</tbody>
</table>

**Total**: 999460

**Total**: 559460
Bore recharge system

- There is an existing bore in the village – which has frequent and less amount of water
Low cost methods
Rainwater recharge
Check dams

**Reused plastic barrel method**

**Tires/plastic bags**
Water Purification
Quality chemical tests

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Observed Values</th>
<th>Prescribed by BIS 10500</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7</td>
<td>6.5 to 8.5</td>
</tr>
<tr>
<td>Turbidity</td>
<td>0 to 5 NTU</td>
<td>&lt;5 NTU</td>
</tr>
<tr>
<td>Hardness</td>
<td>135 mg/L</td>
<td>&lt;300 mg/L</td>
</tr>
<tr>
<td>Chlorides</td>
<td>160 mg/L</td>
<td>&lt;250 mg/L</td>
</tr>
<tr>
<td>Free Chlorine</td>
<td>0 mg/L</td>
<td>&lt;0.2 mg/L</td>
</tr>
<tr>
<td>Iron</td>
<td>0 mg/L</td>
<td>&lt;0.3 mg/L</td>
</tr>
<tr>
<td>Nitrates</td>
<td>0 mg/L</td>
<td>&lt;45 mg/L</td>
</tr>
<tr>
<td>Fluoride</td>
<td>0 mg/L</td>
<td>&lt;1 mg/L</td>
</tr>
</tbody>
</table>

Quality pathogen tests

Observed a slight black tinge in the solution - traces of **fecal coliform**
Chlorine dispenser – requirements

For well, if we use this dispenser -
1. We need circulation system
2. At least 6 monthly storage of tablets and then let the water dispense slowly

- Make a separate circulation system using air flow – use the impact force to push air inside and create bubbling with a valve system to circulate the water
- Use a binder solvent base chlorine for continuous supply of chlorine (6 months supply based)
- It will not have just one point of supply but rather various points all over the circumference
Washing zone Characteristics

- Bigger and wider Slab area
- Flow of water should be higher
- Rocks flooring (brick bat coba)
- Tank for treatment of greywater
- Sloping slab (towards tank)

Mulch works as purifier for the grey water (mulch – small wood pieces/wood chips)
Housing
(RESEARCH)
Ventilation - All climate variations

Greenhouse effect utilized in winters by closing shades at the top

Kept open in the summer to allow cross ventilation and settle the cold air

Open low windows where breezes enter and high windows where they leave. If you have a fan, place it at one of the high vents or windows to speed the escape of hot air.
Low cost solutions - Trombe wall

Summers – open upper roof day and night

Low cost trombe wall solutions

Winters
Designing houses - Affordable ideas
Interaction - Equitable distribution of resources – Policies Drives

- Swatch Bharat Abhiyan
  Involve villagers to clean the village
  Promote Hygiene
  Promote aesthetics
  Develop tourism

- PM’s prakash path yojana
  Improve access to lights and energy
  Raise hope for the villagers about governments assistance
Weekly interactive ideas - Awareness

- Awareness
  - Health
    - Medical services
    - Hygiene
  - Education
    - Primary & Higher education
    - Infrastructural/ engineering
    - Superstitious nature
    - Importance of Hard work
    - Society development
    - Self help groups
  - Leisure
    - Games / sports
    - Entertainment (TV)
    - Storytelling, movies
  - Diet
  - Diseases
  - Connectivity with outside world
  - Agriculture & Cattle Breeding
  - Environment
    - Sustainable living
  - Sanitation
  - Pollution
  - News
  - Trading
  - Internet
  - Knowledge & practices
  - Market rates
  - Communication skills
  - Livelihood based
Weekly interactive ideas

**Awareness**
- Videos/Documentaries
- Street shows
- Trainings
  - Health & Hygiene
  - Internet
- Street Plays
- Posters
- Storytelling
  - Personal experience
  - Personalities
  - Opportunities
  - Demonstrations Product

**Community involvement**
- Team building games
- Group rural activities
  - Environment
  - Training
  - Dream camps
- Competitions
- Festival Celebrations
- Games
Miscellaneous - Agriculture

**Machines Deficiency**

- Awareness
  - Agricultural Practices
  - Pesticides, Insecticides
  - Government schemes
  - Market rates

**Water**

- Rain water harvesting
- Water management (irrigation)

**Cattle breeding**

- Maintenance
- Veterinary (health)