Case 7: App for connecting farmer and consumer

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Problem Identification and Formulation

Introduction
The project aims at reducing the financial burden subtended due to involvement of middlemen in the supply chain connecting agricultural producers and vendors. This leads to farmers getting only a marginal share in monetary amount of total supply chain. The project pursues the issue of low income to the agricultural producer Fig. 1 through process innovation in which the farmers would be connected to the consumers digitally through a multilingual-app based platform. A key factor for farmers being unable to get market prices is inefficient agriculture supply chain management. [1].

Problem definition
The problem can be stated as:
- Smaller profit share of the farm producers due to long and inefficient supply chain.
Overcrowding in mandis (COVID-19 scare).
Farmers are not able to cope with the economic pressure due to uncertainties in prices of the farm produce.

**Difficulties anticipated to be encountered in realizing the solution:**

- Selection of the method: -
  - Web APP or mobile cross platform application
- Selection of adequate tool
  - Python, PHP or another tool
- Survey in the targeted zone and creating database for: -
  - Seasonal Agricultural Produce (SAP)
  - Round the year Agricultural Produce (RAP)
  - Soil quality
  - Types of manures best suited.
  - List of local labors
  - Equipment resource base in targeted zones.
- Supply of agri produce from farmers to consumers
  - Packaging
  - Cost structure for delivery mechanism
  - Cost structure for sustaining the operations
  - Ensuring delivery at right time, right place to right person
  - Channel for collection of money from consumers

**Prior-Art Survey:**

An extensive review of existing e-platform for interlinking consumers and farmers have been performed (Annexure 1). Following major findings have been derived from the extensive APP review process.

**Findings of Extensive APP review**

- Many APPs considered a subset of features ‘Feature Set’ taken as the benchmark for comparison.
- Most APP targeted local regions and invested their platform in either empowering the farmers with better techniques, information, advice or agricultural raw materials but very few of them provided features of tracking the growth of farmers.
- The process innovation proposed in this project is unique and not been incorporated in any of the 72 APP reviewed till date.
- The process innovation proposed are given as under: -
  - Labor pooling
  - Consumer investment in agriculture
  - Resource pooling

Inference from the findings
An APP targeting farmer as prosumers (producers of agricultural products and consumers of farm equipment, accessories and other goods), and connecting them with end customers with optimizing supply chain mechanisms have potential to revolutionize the agricultural sector. To achieve the intended objectives, process innovation features along with the proposed APP feature-set could play a significant role.

**Proposed Solution**

During the analysis of the problem we have found that the majority of farmers are not getting an equitable price of their agricultural produce which leads to economic distress and the main reason behind their vulnerable situation in the supply chain. The conventional supply chain consists a diverse set of middlemen which takes a major share what is actually paid by the end consumers. In this regard, we have proposed an app-based transparent supply chain mechanism that connects farmers directly to end consumers. In the proposed case both the farmers as well as consumers will get benefitted. Additionally, the platform (खेतिहर एप) also connects farmers to farm equipment manufacturers, agricultural experts, and provides weather and price forecasts, credit system, labor pooling services.

**Fig. 3 Graphical illustration of proposed solution.**

**ARM: - Agricultural Raw Materials**

- These can be fertilizers, agricultural equipment’s (new and resource pooling)
- Labor
- Expert advice

**Novelty of the proposed solution**

In our research done so far, we investigated a number of different e-platform based solutions that have been functional as startup’s or as business enterprises. The major aspects that we observed are given hereunder: -

- Most of the applications are focusing on serving the consumers in metro-cities and hence do not give adequate benefit to agricultural producers rather they draw from the existing supply chain to meet the customers' needs.
Applications which focus on the agricultural sector are mainly investing their energy in well equipping the farmers with the agricultural know-how and equipment and do little with respect to the supply chain. The e-commerce platform proposed in this project would be focusing on:

- Shortening the supply chain by eliminating the middle-men and directly connecting the consumers to the producers.
- The target area would be rural areas.
- Involving the local transportation.

The novelty of the proposed platform lies in the concept that it would host three sets of market participants: producers, consumers, and transporters, where the producers would comprise of farmers and ARM suppliers and consumers would comprise of end users of farm products and farmers while the transporters would be the transport utilities linked for providing the home delivery service. The advanced methods of price forecasting, clustering, and aggregation of producers, customers, and transportation for minimizing the overall cost by optimal dispatch and pricing of the commodities would be done.

**Desirability of the solution**

- To minimize public contact by shortening the supply chain and digitization through the proposed platform.
- Low cost solution to maximize farmers income through sale of agri-produce through a dedicated channel
- A transparent medium to connect sellers to buyers
- Consumers will get fresh farm produce within a reasonable price range
- Based on quality farmers could sell the agri-produce on premium prices to optimize profits.
- Farmers committing suicide:

  Between 2012 and 2015 over 10,000 farmers committed suicides in India.

  Lacks of investment in rural infrastructures such as road connectivity (linking village markets to nearby wholesale market) and lack of cold storage facilities as factors prohibiting price discovery for agricultural produce.

  Farmers' indebtedness resulting from crop failures and inability to sell, as reasons for suicides

  The reasons for inefficient supply chain management include lack of reforms in the Agricultural Produce Market Committee (APMC) Act, low bargaining power due to small farm size, and lack of warehousing facilities. Crop failures happen because of poor irrigation facilities.
Important characteristics of the proposed solution

Functionality and Features

- Directly connecting farm producers (farmers) of rural areas to consumers of local cities through existing/new transport mechanisms with an aim to minimize overall cost and maximize social welfare.
- Providing predictive information of price forecast and anticipated demand to the farmers and consumers respectively.
- Providing farmers expert advice.
- Providing labour through the available database to the farmers.
- Clustering farmers to create an online FPO with their consent.
- Easily accessible platform for farmers
- Reduction in leakages or wastage of agri-produce
- Door-step delivery of fresh farm produce to city consumers
- Farmers could be rated based on the quality of their agri-produce

Feasibility of the solution

- Easily accessible platform to sellers and buyers
- Provide end to end connectivity with minimizing leakages
- Provides assistance to farmers in selling their produce to prospective buyers
- Enhance employment opportunities in rural areas by rolling in transport and packaging services
- A digitalized solution to bridge the inequality in pricing of agri-produce

*Fig. 4 Schematic illustration of Problem identification and solution proposed through MIND MAP*
Fig. 5 Schematic illustration of Problem identification and solution proposed through Tree Diagram

Task Segregation and Time Layout

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Task Description</th>
<th>Priority/ID</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Market Survey</td>
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<td>Devesh, Ashutosh</td>
</tr>
<tr>
<td>2</td>
<td>Agricultural Survey</td>
<td>2</td>
<td>Devesh, Ashutosh</td>
</tr>
<tr>
<td>3</td>
<td>UI design</td>
<td>3</td>
<td>Akash, Ashish</td>
</tr>
<tr>
<td>3(a)</td>
<td>Login Page, Account Crating Page</td>
<td>4</td>
<td>Akash, Ashish</td>
</tr>
<tr>
<td>3(b)</td>
<td>First Page, Mock UP design</td>
<td>5</td>
<td>Akash, Ashish</td>
</tr>
<tr>
<td>4</td>
<td>Producer Feature</td>
<td>6</td>
<td>Devesh, Ashutosh</td>
</tr>
<tr>
<td>5</td>
<td>Consumer Feature</td>
<td>7</td>
<td>Devesh, Ashutosh</td>
</tr>
<tr>
<td>6</td>
<td>Techno-Economic</td>
<td>8</td>
<td>Devesh, Ashutosh</td>
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Work-Time Layout

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<tr>
<th>Task ID</th>
<th>Day 9</th>
<th>Day 10</th>
<th>Day 11</th>
<th>Day 12</th>
</tr>
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</table>
Market Research

Introduction
In the proposed solution to minimize farmers distress over getting equitable prices for the sale of agricultural produce an app based platform is envisioned. Though there are variety of tools are available but the efficacy of a particular tool/mechanism depends on numerous factors. To assess the potential of the proposed solution, a consumer preference survey (Annexure II) has been conducted to understand consumers inclination towards purchase of agricultural produce directly from farmers and related services. The survey results are mentioned below:

Consumer preference survey: -
The survey received response from a blend of people ranging from different regions background and age. The diversity of the survey is illustrated by the plots shown in Fig. 6. While the composition of different genders is inked in Fig. 7

Fig. 6 Survey Composition
Following major questions were raised in survey the response to these questions have been sequentially delineated hereunder: -

1. **Do you think farmers get an equitable price for the sale of their agri-produce?**

The response has been shown using the pi-chart in the Fig. 8. The major portion of survey participants has an opinion that farmers do not get an equitable price of their agricultural produce. The price variation of agricultural produce from farmers to end consumers could be 2 to 3 times or higher. This can be reasoned due to large margin taken by the middlemen in the conventional supply chain system.
Fig. 8 Does farmers get equitable share of their produce?

- Are you interested to purchase agri-produce directly from farmers? / क्या आप किसान से उनका उत्पाद सीधे खरीदना पसंद करेंगे?

A major portion of survey participants have shown interest in direct purchase of agricultural products (vegetables, grains, and milk products etc.) from farmers. Purchasing agricultural produce directly from farmers have several benefits for both farmers as well as city consumers viz. farmers can get appropriate price for their produce, end consumer can get fresh agri-produce at reasonable prices, consumer can track the source of purchase without any hurdle. The response from the participants has been shown in Fig. 9.

Fig. 9 Interested in purchasing agricultural produce directly from farmers

- What products are you willing directly from the farmers? / आप किसानों से किन - किन वस्तुओं को खरीदने में रुचि रखते हैं?

Among vegetables, grains, dairy products and spices, the survey participants have given most preference to direct purchase of vegetables from farmers. The direct purchase platform has potential to enable numerous positive externalities to both farmers and consumers. The result has been shown in Fig. 10.

Fig. 10 Which items would you like to purchase from farmers.
Availability of edible items during COVID 19 in your locality / खाने-पीने के सामग्रियों की कोविड-19 के दौरान आपके इलाके में क्या स्थिति है?

Most of the survey participants have responded that, during the COVID-19 lockdown period they have got good access to edible items in their locality. However, a significant share of participants informed to get edibles at higher prices during the same time. This could indicate to have a transparent system so that prices could be monitored. The responses are graphically shown in Fig. 11.

![ACESS OF EDIBLES DURING COVID19](image)

*Fig. 11 Availability of edible items in the locality during Covid -19 lockdown*

Would you like to return the packaging basket to delivery personnel or interested in pay for the package? / क्या आप झोला बोडो या पाके ट जो डिलीवरी करते समय आते है उनको वापस करना या उनका मूल्य देना पसंद करेंगे?

Packing plays an important role to ensure quality of agricultural produce in a supply chain system. A biodegradable packaging viz. bamboo basket is proposed in this solution, majority of survey participants have responded to return the basket after the doorstep delivery of agricultural produce. This shows a good indication towards maintaining the supply chain in environment friendly manner. The response has been shown in Fig. 12.
Fig. 12 Return the packaging basket to delivery personnel or interested in pay for the package

Fig. 13 Preferences for online shopping

Summary of market survey

The market survey carried out in this project brought out few major aspects. These aspects can be summarized as:

- Most consumers are willing to buy directly from the farmers.
Most consumers are of the view that farmers don’t get proper monetary share of their produce.

Most consumer specially youth prefers online purchasing.

If provided opportunity the consumers would return the package/basket in which the product is being delivered to them.

**Agricultural Research**

Agricultural research is an attempt to understand current practices followed by farmers in the cultivation and sale of agricultural produce. Preliminary baseline data of pilot villages planned to be collected through telephonic conversations and google forms. The collected data used to identify the anomalies existed in the current cost structure and issues faced by farmers. Further, this survey will be the basis of selection of a village for pilot project demonstration.

The proposed solution attempts to resolve all the existing issues faced by farmers due to unavailability of transparent channels for sale of agricultural produce with ultimately improving financial gain to farmers by reducing the middlemen’s in the entire pre-existing conventional supply chain. To ensure the success of the solution, stakeholder analysis with influence-importance matrix evaluated to identify and validate future course of action.

**Techno Economic Research**

The purpose of the proposed techno-economic modelling is to assess the feasibility and monetary break-even point of the proposed solution.

**It is to be mentioned that the model has been created but the critical evaluation of the proposed solution using the techno-economic model was not done. The reason for not completing the techno-economic survey being the difficulty in visiting the villages nearby and consulting the local farmers due to COVID-19 pandemic. Although the analysis has not been done, the stochastic model developed for the purpose has been explained hereunder.**

Let us consider the market scenario:

<table>
<thead>
<tr>
<th>S No</th>
<th>Consumer Centre</th>
<th>Distance</th>
<th>Production Centre/Agency</th>
<th>Trans. Cost/Quintal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>City/Town A</td>
<td></td>
<td>Village A (Name)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>City/Town B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village B</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>City/Town C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Village C</td>
<td></td>
</tr>
</tbody>
</table>

**Produce Scenario:**

<table>
<thead>
<tr>
<th>S No</th>
<th>Producer</th>
<th>Product Name</th>
<th>MSP</th>
<th>AP</th>
</tr>
</thead>
</table>

| a    |
1 Village A b c d a
2 Village B b c d a
3 Village C b c d l
4 City A F G I
5 City B F G I

Transportation and Logistics
Sl No Transportation Mode Minimum Path Maximum Path Packaging Cost

Anticipated Initial Investment
Sl No Asset Cost/Year
1 App Maintenance and cloud
2 Transportation

In the following subsection the variables notations used for the techno economic analysis are defined hereunder:

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Notation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>$d^i_j$</td>
<td>Distance between city $i$ and village $j$</td>
</tr>
<tr>
<td>2</td>
<td>$T^i_j$</td>
<td>Transportation cost of product from $i$ to $j$</td>
</tr>
<tr>
<td>3</td>
<td>$C^k_i$</td>
<td>Cost of produce or ARM $k$ when purchased from location $i$</td>
</tr>
</tbody>
</table>
Problem Formulation
The problem which we are tackling deals with determining the break-even point for business model sustainability.

Objective Function:
Assessment of minimum operational and sustainable cost under most adverse conditions could be formulated as a stochastic optimization problem.

\[
f(x) = \min \left( \sum_{s=1}^{n} p_s \left( \sum_{v=1}^{n} \left( \sum_{j=1}^{n} d_j^i T_j^i + \sum_{v,k,l} c^k \xi^k + \sum_{v,k} l^k + OMC \right) \right) \right)
\]

Constraints
\[
\sum_{v \in [1,n]} p^s = 1
\]
\[
c^{k,MP} \leq c^k \leq c^{k,MRP}
\]
\[
d_j^i \leq d_j^i \leq d_j^{i,\text{max}}
\]
\[
T_j^i \geq 0
\]
\[
l^k \geq 0
\]

Tools: Any linear programming tool can be used to solve the above problem

Stakeholder analysis:
Any person/entity which have direct or indirect influence on the project outcomes termed as stakeholders. Understanding stakeholder’s role could provide useful insights for identifying most influential and most important stakeholders for the success of any project. In this project, for creating an app based supply chain mechanism to connect farmers to consumers in a transparent manner, following stakeholders were identified with their role mentioned in Table 1. The data have been generated from the response of various professionals to whom questions raised in Annexure III were asked.

\[
\begin{array}{|c|c|c|c|}
\hline
\text{S. No.} & \text{Stakeholder} & \text{Role} & \text{Influence} & \text{Importance} \\
\hline
\end{array}
\]
<table>
<thead>
<tr>
<th></th>
<th>Role</th>
<th>Description</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Farmer</td>
<td>Producer of agricultural products, and consumer to farm equipment and other</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agri-related goods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Farmer Producer Organization (FPO)</td>
<td>Legal entity and point of contact to farmers</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Transporters</td>
<td>Transport of farm produce from farmers to end consumers (doorstep delivery)</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>City residents</td>
<td>Consumers of agri-produce</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Monopolistic agri-produce suppliers</td>
<td>Supply agri-produce to wholesalers/ retailers</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Farm product manufacturer</td>
<td>Production/supply of farm equipment/accessories and other products (seeds, fertilizers, pesticides, etc)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Internet service provider</td>
<td>Ensure internet connectivity whenever, wherever needed</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------</td>
<td>-----------------------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8</td>
<td>App developer</td>
<td>Platform provider</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Small scale food processing units</td>
<td>Bulk consumers of agri produce</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Financial institutions</td>
<td>Provide monetary support to farmers while purchasing farm equipment’s and other products</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Village sarpanch-</td>
<td>Support in executing the operations</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Biodegradable packaging manufacture/supplier</td>
<td>Producer/supplier of packaging sheets</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>Agricultural Scientist</td>
<td>Disseminate information about best agricultural practices</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>Retailers</td>
<td>Sell the agricultural produce to end consumers at retail prices</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Role</td>
<td>Description</td>
<td>Influence</td>
<td>Importance</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>15</td>
<td>Wholesaler</td>
<td>Purchase in bulk quantities and supply to retailers</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>Industrial Units-</td>
<td>Bulk consumer of agri-produce</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>17</td>
<td>Supply Chain/Market Research Experts</td>
<td>Provide assistance in effectively maintaining supply chain</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

![Influence Importance matrix illustration](image)

*Fig. 14 Influence Importance matrix illustration*

**Stock holders Name Wise who have been contacted**
- Vikash Singh 5 yrs. experience Reliance Industries, Packaging and Supply chain
- Abhishek Kalla Prof. Agriculture
- Prince Singh Retailer
- Prasoon Purwar MBA, Market Research and supply chain
- Ankur Entrepreneur
- Pradeep Pandey 16 years work experience in software design based in Netherland
- Shailesh Tripathi Entrepreneur
- Pankaj Dubey Legal Expert
- Prof. Rakesh Singh Dept. Agriculture Sciences BHU Varanasi.
- Sanjay Talvia Grass-root innovator
- Prakash Raghuvansi Grass-root innovator
Application development “खेतिहर APP”

Tools Used
The tools used in APP development has been delineated hereunder:

- **Flutter**: Flutter has been used in this “खेतिहर एप” APP. It is a framework of dart language developed by google. Flutter has several advantages few them have been mentioned below:
  - **Same UI and business logic in all platforms (Cross platform support)**: UI patterns extracted out to reusable widgets. It eliminates the need to individually set UI properties such as colors, styling, etc. We can adjust UI and business logic globally through editing the code for both IOS and Android Flutter apps.
  - **Time Effective**: Owing to Flutter’s hot reload feature, there is no need to spend time on deployment like in regular programming. You can apply all the changes instantly without losing the current application state. Fixing bugs, building UI, adding new features with no need to compromise on speed and development which to a big amount reduces the Quality Assessment efforts is one more reason why to choose Flutter.
  - **Complex and custom UI support**: Combining various widgets, you can create a complex UI that looks the same on different versions of operating systems. With a large library of handy animations that can be easily implemented with Flutter’s animation support, your application will look polished and smooth. And everything you can see on the screen can be customized!
  - **Best for Minimal Viable Product**: A Minimal Viable Product is one of the most efficient approaches to validate a business idea. It gives you a hand in preventing business failures, as you can easily get feedback and the needs of your customers. As to its high speed, ease of integration and flexible UI, Flutter has become a perfect choice to create a mobile MVP.
  - **Responsiveness of Application**: Flutter apps can be run on any present platform functioning properly with no changes to Dart code and preservation of outstanding design on the platforms. Flutter app development has already moved forward from mobile and opened new opportunities for web and desktop that are in active use today.

Flutter is Google’s UI toolkit for building beautiful, natively compiled applications for mobile web and from a single codebase. The demand of flutter has been increasing continuously, statistic of how flutter has grown monthly has been shown in Fig. 15.
Adobe-XD
Adobe Experience Design is a prototyping application. XD combines lightweight layout and drawing tools with simple button linking to different artboards to simulate navigating through an app or site. The results can be published online directly from the application as an interactive presentation, making it quick to share with project partners.

Flow Diagram
The flow diagram has been shown through the presentation handouts given hereunder:
Out 2: s

1. Add Item
2. Track Sold Item
3. Generate e-Invoice
4. Label item - Out of stock

Out of stock?

Out 3: others

1. Forecast
2. Weather
3. Price
4. Expert Advice
5. Consumer Investment
6. Labor Pooling
7. Resource Pooling
8. Farm Management
9. Gov Schemes
10. Credit System
11. Order Tracking
Mock Up
Conclusion

The proposed KHETIHAR APP provides a one stop solution to farmers for availing range of services viz. sale of agri-produce directly to end consumers, purchase of farm equipment/goods, weather/price forecasts, credit system, and labor pooling. The surveys (consumer preference, stakeholder survey) performed to assess pre-feasibility assessment have indicated inclination of farmers and consumers for using KHETIHAR APP (खेतिहर ऐप). Further, telephonic interviews of stakeholders conducted to understand the issues in the existing supply chain and resolve them through the APP. Availability of the APP in multi-lingual
mode will certainly connect a large set of farmers with this platform and assist them to use the services in the simplest manner. Support of a floating voice button will help in keyboard free searching with less hassle and ease.

The way forward

➢ Selection of rural areas for pilot project demonstration.
   o Four different states namely UP, Bihar, Odisha, and Uttarakhand would be targeted and few locations of each state would be identified.
➢ Intensive field survey for creating
   o labor pool data base
   o local resource polling database
   o linking with local FPO’s
   o linking local gram panchayats
➢ Identifying spatially distributed consumer-farmer taste and needs through: -
   o In-depth survey of local farm produce and socio-economic situation mapping.
➢ Gathering the database of grass-root innovators and providing them an platform for marketing and selling their product through the developed e-platform.

Reference:

[1] Nilanjan Banik, Farmer Suicides in India and the Weather God,
Procedia Computer Science, Volume 122, 2017, Pages 10-16,