Agrisociety network management system

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Abstract— **Algorithm of this project is based on "Larger a network, more the opportunities". In abstract this project will lead us to a platform that will provide more opportunities for agricultural growth by developing a proper business system and avoiding problems like price rise in a society. On our platform farmers or any professional related to agriculture business people will get good profit for their efforts. Hoarding will be less because of transparency provided by the platform. This platform will be "Price rise controller of basic needs" as sellers have to show their price details, and due to competition on platform they will not be able to afford consumer loss and so they will not do unnecessary price rise. This platform as a agribusiness network will connect around 53% to 60% population of agrarian country like India. The platform can be helpful to make organized, transparent and efficient agricultural cycle in India.**

Keywords—price rise controller, sensor based irrigation system, integrated system, connection maker, business strategy provider, hoarding protector

I. INTRODUCTION

Our project is to make an agricultural cycle in India more efficient and beneficial for small business holder in India. It will form a network of people having professions related to agriculture. In today's agriculture system, there are online platforms but they are only limited to specific business community but in this project, we are focused to provide a perfect platform usable for many business communities related to agriculture and it is embedded with many features those will be helpful for making agribusiness more easy and beneficial for all the people.

This platform is for farmers, fertilizer dealers, transportation provider and crop buyer. We are taking data input from them containing their business needs and showing them on platform. So, they can search the business opportunities considering factors like price and location. For an example, farmer want to sell crop then he/she will need transportation vehicle then there feature on our e-platform that farmer can easily find transportation vehicle nearby and payment can be done offline or online it will be recorded on our system. Farmers will be able to find best farming field analysis provider lab as all the soil analytical labs registered on platform will have to show services information and due to competition they will not loot farmers and will have to set prices affordable. Soil analytical lab will provide report to farmer containing what kind of fertilizers and crop can be beneficial for the field and element deficiency in farming field. There will be data available on platform that what kind of crop and its quantity are desired by crop buyer, so farmer can contact them if that much of quantity is available and prices are affordable for him. In our system we embedded sensor based irrigation system which will have sensors like temperature, humidity and methane and will help farmer to do smart farming. And thus, we are forming a network that can create more opportunities for agricultural people.

This project has one major intention and that is to make an effective agribusiness network. But e-platform we are making through this project can be owned or handled by government or a big private company in a single system else there would be complications if there are multiple platforms. This project is to bring whole agriculture community together.

Our Objectives to implement this project are listed below:

- To provide transparent, efficient and organized e-platform for agribusiness
- To prohibit acts like hoardings of product by product's transparent circulation
- To control price rises of food products
- To increase employment
- To create opportunities for small businessman related to agriculture
- To make people aware about affordable options for agribusiness
- To create a network for people involved in agriculture
- To make agribusiness world reachable and smaller by online platform.

Outcomes and potential impacts of this project are listed below:

- Due to such a platform, government will not need to make more efforts while making annual budget and such economical decision will be taken easily
- As there will be all the data about past and present of production of crop and products, government can take further decision about what to import and what to export for a country
- People involved in agriculture, will be well aware of market situation and government's new schemes
- Circulation of crop or agricultural products will be known to government and if in any circumstances government find lack of crop than according to circulation and production rate they can find if there is hoarding of things happening or not
- Agriculture business world will be reachable and narrow.
- Government and agribusiness holders will be able to interact with each other
- Price rises of basic needs will be controlled due to transparent platform
- There will be a transparent and efficient platform for agribusiness
- Due to gathering of many different professions on a single platform there will be more options for people to grow their business and to connect with people
- There will be less fraud problem because there will not be any unauthorized account and even if any fraud happen than due to deal record, cheater will be punished
- There will be an online platform after completion of this project that will suggest and offer solutions for almost all agricultural businesses.

II. LITERATURE SURVEY

Our project is AgriSociety Management System. We are developing a practical and feasible solution of various major barriers for agricultural society. The core function of our project will be to provide a robust networking based management system for stakeholders of agriculture.

The core unique features and functions of our project are: Integrated system (It connect users from various element of agriculture and makes a network), Information base (It provides a platform for accessing all the information about agricultural business.), Economic well-being (It gives a practical solution to improve economic status of agricultural society.), Smart irrigation based farming (It provides a precise sensor based irrigation for farming), Relevant connection maker (It provides a platform to people based on their needs and their business), Product flow controller (It collects and analyses the data of deal happened between two entities like price and time), Price rise controller (It extracts the data of business entities like ratings and product price so that user can choose the best option and seller maintains the quality of the business.).

To understand the objective of our project, first we have to go through various studies based on current agricultural management models. They will provide a basic understanding of the agricultural sector. These studies will shed a light on the role of information technology for advanced agriculture in future.

Many recent research studies has theory of developing a management system for agricultural production. Research from Liopa et al. (2010) shows that "Integrated management system (IMS)" can be applied to modernize the production management of crop. This application can be implemented with mobile technologies (smartphones, tablets etc). IMS theoretically supports "Precision Agriculture (PA)". PA is an approach of farm management linked with information technology (IT). We have implemented an irrigation system based on IOT sensors (soil moisture, temperature, humidity, methane). This irrigation system will be fully optimizable according to specific crop needs.

Liopa et al. (2010) suggest that all the possible agricultural tasks which are executed in the farm field should be reviewed and analyzed. Progress of cultivation and production should be documented by using electronic means by farmer. Each product will be documented safely and stored in an information database for future traceability. So that these documentation will be available from start (farmer) to end user (consumer) and the end user will have every necessary production information. In our project, we are storing information about production of each and every farm by retrieving crop ID, sowing time and harvesting time, expected production and price, delivery time in our database. Data of price and retail will play major role in stopping the price rise issue in the agricultural business. This data will be stored and the documentation of this data will be reviewed and analyzed. Future traceability is also a key feature

of the database. So, each and every information can be retrieved as per need in the future.

Research from Sharma and Mehta (2012) shows that data mining of agricultural data can be helpful in knowledge management of sustainable agriculture. Agricultural data has high diversity in terms of nature and interdependencies. These data resources need to be evaluated, monitored and analyzed so that it can help in making business strategies, decision making and policy implication. In current state of agriculture, knowledge management containing extraction, storage, retrieval and modification of data is under development. Mostly, data mining is used in business and corporate sectors. If it would be used in agriculture for characterization, discrimination, prediction and decision making purposes, business side of agriculture can be uplifted. An example of that can be soil characteristic evaluation can be helpful to decide which crop will be best fit for the field and how much irrigation need will be required. So, by knowing all this in prior stages it can be very helpful near perfect crop cultivation. Therefore it will increase quality and integrity of business economy of whole agricultural business cycle. Xu and Zhang (2004) suggested a Knowledge Management System in which data and rules enters into the system as input, knowledge is extracted from the data based on input rules, this knowledge is managed in the system and it is provided to the stakeholders. Study is based on extracting data of various resources used for farming, contradicting to that, in our project, we are proposing a system which extracts the economic data of farmer and other entities and also data of crop and farm fields. In addition to that, we are focusing on making a relational database system available to all business stakeholders of agriculture like farmer, crop buyer, fertilizer dealer etc. For analysis, we will extract data like farmer's yearly income, loan, residency to understand the economic condition, data like sowing time and harvesting time, expected production and price, delivery time of crop of current season and previous season, data like use and price of fertilizer and data of soil analysis test. In addition to this, transactional data will also be taken from the stakeholders. Payment details will be helpful in understanding the market situation of agricultural business and issue regarding price hoarding can be solved efficiently. We are proposing to create a relational database containing all the entities of agriculture so that this data will be helpful through-out the business cycle. In future, decision making, predictions, strategy suggestions will take a major role in uplifting the activities of agriculture. And all this will be possible by extracting and utilizing the data of the system.

Research from Yan-e (2011) proposes a similar system but with the link of IOT to the agriculture. Agricultural information technology (AIT) is a new concept that has been applied to every aspect of agriculture and is useful for enhancing agricultural productivity and for making use of full agricultural resources. This study introduces the concept of Agriculture Management Information System (AMIS). It is required to unite all the parts of Digital Agriculture and manages various data formats. Recently, AMIS has included new technologies with internet connectivity and application of Internet of Things (IOT). The dynamics of this system contains data of crop production. The crop typically undergoes various crop handling stages. At start, in the farm characteristics like water and nutrient supply affects the crop then soil characteristics affects the diseases and pests in the crop. So, in-time acquisition of data is vital for improving the accuracy of agricultural production.
In addition to this, study also suggests that data collection should also be present in the further stages of agricultural production such as crop growth, crop storage and sell. In crop growth stage, study suggest the use of IOT. In our project, we have experimented and implemented an iot based irrigation system. This system will analyze the data provided by sensors like temperature, humidity, soil moisture, methane sensor and it will optimize and work according to the data. We have also proposed a soil analysis lab which will provide a soil test based on the provided soil sample, this will improve the quality of crop growth factor. In the crop storage and sell stage, ability to track crop status can be implemented. The study suggests that radio frequency identification (RFID) can be used to tag the crop and then it will start linking up the supply chain from farm to food providers. But for more affordable and generalized way we have used a crop ID generalization by giving each crop a specific computer generated ID. But, track the crop in the supply chain we have added the deal specifications. So, whenever the crop is supplied from one entity to the other the deal records and entity records will be stored in the database. Using this framework, we can implement production tracking easily and affordably.

To summarize our review, many researches and studies suggests a sustainable architecture for agriculture management system. Researches showing frameworks of agricultural database to store data for knowledge that can be helpful in the future, Studies suggesting a link between agriculture and internet of things, Proposed integrated management system for efficient utilization of farming by just using a portable mobile technology, Making a system which can collect and analyze the crop cultivation data and providing it from the farmers to the consumers, Extracting economic and retail data from the agricultural business stakeholders and utilizing it to provide a decision making application and providing a solution the price rise problem of the market, Collecting the crop production data to track the crop in the whole supply chain from farm gate to the restaurant plate. Our project aims to provide a unity of all of these functionalities for betterment of the agriculture. We have implemented and analyzed the practical features like making a link between farmer and crop buyer, farmer and fertilizer dealer. For the core entity (Farmer), we have functionalities like crop cultivation data, production data, economic data, IOT features like soil analysis, smart irrigation system, increasing job opportunities by providing handling of the transportation business to vehicle business owners.
In conclusion, our Agrisociety management system is integrated, easily accessible, fully optimizable, adaptable and robust.

III. PROPOSED WORK

Our work provides online platform monitoring agricultural product flow in the market and suggesting business deals as per their need. There are some constituents provided to customer as a part of facilities, according to their needed/desired demands.

- Product flow controller *constituent*
  On this platform, Details like crop produced from farmer to crop/agricultural byproducts sold to the crop buyers are recorded. so any type of hoardings can be detected and further actions can be taken.
- *Decision helper constituent*
  Our platform is for agricultural society, and regular and accurate agricultural products' production detail are key to the success of agribusiness. Our database will be able to deliver the accurate data to the customers. So, considering demand and price of products in the market, users can take accurate decision for their business growth.

- *Online money transaction and billing constituent*
  With the use of this constituent, users will be able to transact money and will get receipt of it. This constituent will reduce the tension of offline money transaction and will help to avoid any kind of cheating as receipt is given.

- *Connection maker constituent*
  Data taken from users are in a way that their current needs and location can be traced and using such information users can be notified or suggested to make connection with people who can buy or sell them products according to their needs and at their desired price. Such connection provides ease to do business for users.

Uniqueness

- Integrated system – Users on platform are from various element of agricultural business, and our system integrates them on a single platform and creates a link between them as per data of their business needs taken from them. And such integrated system helps to form a healthy agribusiness cycle.

- Business strategy provider- Database will keep the record of every year's production, demand and sell cycle. And using data analysis of past recorded data and considering current weather conditions, platform holders can provide very helpful information related to agribusiness to their users, so that users can decide further strategy for their business.

- Hoarding protector- Due to product flow controller constituent of the system, system will always eye on production of products and flow quantity of the products in market. And due to that monitoring when hoarding occurs, it can be detected and cheaters of the system can be caught.

- Price rise controller- As to do deals, some data like seller's ratings and price at which user is selling products is needed, so such data is taken from users and this data will be shown on platform. So due to that user will be able to choose the best options. And sellers will have to maintain the price and quality of products to be on platform, and this thing prohibits the price rises.

- Combination of smart business and smart farming for farmer – In our system specially for farmer we embedded the sensor based irrigation system, so user of farmer category will have to buy one sensor based system that can help them to do farming using automated irrigation system.

IV. EXPERIMENTAL SETUP/ANALYSIS

Our project is based on providing the integrated and efficient system to agricultural society. To deliver the system with the very least possible errors, we have done some experiment and analysis. We tested our system by creating some user account and found some problems that users can face and tried to solve the problems or tried to reduce the user's discomfort to use the system. Here some of problems and solutions found for them are listed.

The database of this system is made in a way that, the main enemy of poor farmer, 'Hoarding' can be protected. And the people who does hoarding can be prohibited but if any merchant wants to do hoarding by showing fake sale of his/her items by creating fake IDs as consumer and showing deals with them that it will be detected by system. If IDs are making very less deals than usual consumer and with the same sellers than those IDs will be under inspection and there background information will be checked by system and if any suspicious thing got found like farmer ID is registered but that ID doesn't has any farm than they will be notified to give the explanation. And if they found guilty, they will be suspended from the platform.

While experimenting, we observed one problem that, in our sensor based irrigation feature, we can't just take reading at certain time then start watering crop and set the duration because in that process, if we set duration of watering to 1 hour and suppose in that specific duration weather changes occurred and moisture level went up than at that time crop will be watered more than required and it may affect crop in negative way. So, as a solution, instead taking 'watering crop time' input from user, we will set the crop type and moisture level required for that specific crop, so once moisture level goes down, irrigation system will react and it will run until moisture level reaches to satisfactory level for crop. And due to this solution crop will not get affected negatively by required watering and water will be used only when it is needed.

After making irrigation system responsive on continuous readings of sensor instead fixed duration of watering duration, we found that, there might be possibility that farmer may not have water tank having sufficient water to water the crop at the same time when irrigation system demands water, so in such case, farmer will have to disable the feature until the water tank has sufficient water. There might be another solution for this that, we measure the level of water tank, send the reading to irrigation system, compare the available water volume to the required volume and if available volume is less than required than irrigation system will not call/response and will go in sleep mode. But every farmer have to maintain such sensors and if due to some reasons those sensor doesn't get accurate reading then system can get affected and so as of now we didn't add water tank's level measurer to the system and followed the solution in the form of 'disabling the irrigation system', in this feature, farmer will be allowed to disable the irrigation system when he realize that water tank/water resource doesn't have sufficient water.

On the platform, we asks fertilizer dealers and crop buyers about the stock available of items they are selling, but as they are sellers and they will sell items daily and multiple times a day, so it might be headache for them to update data after every sell, and at the same time update in data is needed else there might be data inconsistency. So, we decided that for the ease of buyer and seller data consistency will be maintained on the condition that when fertilizer dealer sell fertilizer to registered farmer or crop buyer buy from registered farmer, they don't have to add data, while they will go through the billing process, system itself will make change to the available stock and sometimes user may ask that they need flexibility to deal with unregistered users but in such case they will have to make change in such available stock data. So, we solved the problem here and maintained the flexibility of users as well.

Feature Name	Explanation
Provides integrated system	System will be for various types of users/organizations like farmers, crop buyers, soil analysis test labs, transformation provider etc. So system integrates all the scattered part of agribusiness.
Relevant Connection maker	System will take needed data from users and will use it to form an efficient network in a way that user will be able to contact other users with whom he/she can do desired deals.
Strategy provider	Considering Past recorded production, price, and current season's weather condition, users make their strategy or system itself can suggest them some useful decision.
Product flow monitoring	Quantity of Produced crops and quantity of channelized crop will be recorded and can be monitored by administrator.
Price controller	All the sellers on platform will have to show their business deal ratings and price of the products, so due to such data displayed on platform, seller will not be able to do unnecessary price rises.
Smart irrigation system for farmers	By taking readings from sensors like temperature and humidity, system can form smart irrigation system.

Reference No.	Relevant Connection maker	Product flow monitoring	Strategy provider	Price controller	Provides integrated system	Smart irrigation system for farmers
[1]	No	No	Yes	No	Yes	No
[2]	No	No	Yes	No	Yes	No
[3]	No	Yes	Yes	No	Yes	Yes
[4]	No	No	Yes	No	No	No
[5]	No	No	Yes	No	No	Yes
[6]	No	No	Yes	No	Yes	No
[7]	Yes	Yes	No	Yes	Yes	No
[8]	No	No	Yes	No	No	No
[9]	No	No	Yes	No	Yes	Yes
[10]	No	No	Yes	No	Yes	Yes
Our approach	Yes	Yes	Yes	Yes	Yes	Yes

- *SQL Query Analysis*

Here we are listing some of SQL queries as examples which might be used either by user or by administrator to get some of specific outputs as per their needs.

1) Query 1:

This query is for finding work status of lab on the basis of time taken to complete soil analytical test and price taken by lab. This query can be used to check labs are doing their work properly or not.

```
SELECT
provides_soil_analysis.Lab_ID, Lab_Name, Contact_No,
Area_Name,provides_soil_analysis.Test_ID,
amount_paid,F_ID,
DATEDIFF(Report_recieved_date,sample_given_date) as
days_for_test,
CASE WHEN
DATEDIFF(Report_recieved_date,sample_given_date)>14
AND amount_paid>1800 AND
provides_soil_analysis.Test_ID='T30789' THEN 'Expensive
and late'
WHEN
DATEDIFF(Report_recieved_date,sample_given_date)>14
AND amount_paid<=1800 AND
provides_soil_analysis.Test_ID='T30789' THEN 'late with
ok price'
WHEN
DATEDIFF(Report_recieved_date,sample_given_date)<14
AND amount_paid>1800 AND
provides_soil_analysis.Test_ID='T30789' THEN 'On time
and expensive'
ELSE 'On time with ok price'
END as deal_status
FROM soil_analytical_lab,provides_soil_analysis
WHERE soil_analytical_lab.Lab_ID=provides_soil_analysis.
Lab_ID;
```

2) Query 2:

This query gives farmer's current season's wheat production details, price status and give the output in the ascending order of expected price. This query will be used by crop buyer.

```
SELECT
current_season_crop.F_ID,First_name,
Contact_No, Expected_production, Expected_price,
CASE WHEN Expected_price>220 THEN 'expensive'
WHEN Expected_price<=220 THEN 'affordable'
END AS price_status
FROM farmer, current_season_crop
WHERE state='Gujarat' AND Expected_production>200
AND
crop_ID='WH123' AND crop_delivery_month='July' AND
crop_delievery_year='2000' AND
current_season_crop.F_ID=farmer.F_ID
ORDER BY(Expected_price) ASC
```

3) Query 3:

This query gives farmer's list fulfilling some conditions about their last season crop details. This query can be used for analysis purpose.

```
SELECT
farmer.F_ID,First_name, Contact_No,Address,
previous_season_crop.production,state,district
FROM farmer,previous_season_crop
WHERE sowing_month='January' AND
harvest_month='May' AND sowing_year=2000
AND harvest_year=2000 AND
previous_season_crop.crop_ID='WH123' AND
previous_season_crop.F_ID=farmer.F_ID AND
production= ANY
(SELECT production FROM previous_season_crop WHERE
production BETWEEN 200.0 AND 500.0)
ORDER BY(production) ASC;
```

4) Query 4

This query gives detail about those fertilizer dealer selling fertilizer than normal price and having stalk more than normal.

```
SELECT
fertilizer_dealer.Fd_ID, Contact_No, First_name,
fertilizer_availability.Price,Available_stock,
District,Area_Name
FROM
fertilizer_dealer, fertilizer_availability
WHERE
fertilizer_availability.Fertilizer_ID='FE1232'
AND EXISTS (SELECT
price FROM fertilizer_availability UNION
SELECT
Available_stock FROM fertilizer_availability
```

```
WHERE
price>500 AND Available_stock>=20)
AND fertilizer_availability.Fd_ID= fertilizer_dealer.Fd_ID
AND state='gujarat'
ORDER BY (fertilizer_availability.Price) ASC;
```

V. CONCLUSION AND FUTURE WORK

As of now, our system covers the only chore parts of agribusiness, and it doesn't cover whole cycle of agricultural business, by that we mean that our system deals with farmer, crop buyer, fertilizer dealers etc. But we haven't extended our platform to that part of agribusiness which is indirectly related to agriculture and deals with the final form of any type of chore agricultural products, the part of agribusiness that is formed by small vendors selling agricultural by products to the big companies making agricultural by products. So in future, we will try to link them with our platform and forming the complete agricultural cycle on platform. And by linking, such more departments with the platform, we think, we can more opportunities to the small business holders and can provide more jobs to the people in the future.

Our e-business platform is made to make agribusiness cycle more efficient. We tried to understand the loop holes or difficulties affecting small business holder in agriculture and tried to solve them by our platform. Our whole project followed the algorithm of "Larger a network, greater amount of opportunities".

WE TRIED TO COLLECT THE DATA WHICH CONTAINS THE BUSINESS REQUIREMENT OF USERS AND SHOWED THEM ON THE PLATFORM. SO WE PROVIDED FACILITY TO USERS THAT BY SEARCHING BUSINESS OPTIONS BY LOCATION WISE, QUANTITY WISE AND PRICE WISE THEY CAN CONNECT WITH OTHER USERS, SO WE CAN SAY THAT USING BUSINESS NEEDS OF USERS, WE TRIED TO CONNECT THEM IN MORE EFFICIENT AND BENEFICIAL WAY FOR THEM.

ACKNOWLEDGMENT *(Heading 5)*

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression "one of us (R. B. G.) thanks ...". Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

The template will number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2].

Refer simply to the reference number, as in [3]—do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first ..."

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