

# **An Advisory model for organic farming of vegetables using Big Data Analytics**

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**Abstract-** Agriculture plays an important role in Indian economy. For safety and security of the agricultural products, people are moving to the Organic farming. To produce good agricultural product, farmers need advice on various parameters. These parameters are soil health, weather forecasting, and proper use of fertilizers and diseases prevention techniques. This paper suggests an advisory model for an organic farming of vegetables using big data analytics. The big data analytics play a vital role in the advisory model as it can store the data which has big volume, velocity and different variety of data. The system is based on the push and pull model which is multi-platform based and overcome the language barriers.

## **1. INTRODUCTION**

An organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection". Organic farming endorses the concept that the soil, plant, animals and human beings are linked. In philosophical terms organic farming means "farming in sprits of organic relationship". In this system everything is connected with everything else [1]. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals, and people." [2] (NOSB, 2003).The motivations for organic production include concerns about the economy, the environment, and food safety.

Since organic farming means placing farming on integral relationship, we should be well aware about the relationship [3]

- between the soil, water and plants,
- between soil-soil microbes and waste products,
- between the vegetable kingdom and the animal kingdom of which the apex animal is the human being,
- between agriculture and forestry,
- between soil, water and atmosphere etc.

It is the totality of these relationships that is the bedrock of organic farming.

**Key Characteristics of Organic Farming**

Protecting the long-term fertility of soil by maintaining soil organic matter levels, fostering soil and biological activity and careful mechanical inversion, Plant nutrients supply through relatively insoluble nutrient sources (organic sources) made

available by the action of soil microbes, Meeting crop need of nitrogen through nitrogen fixation by leguminous crops in the cropping systems and recycling of farm organic materials including crop residues and livestock wastes, Importance of crop rotation, natural predators, resistance varieties and other agronomic manipulations of plant protection including weed management, and Biodiversity management, soil and environmental health. [4]

The paper is divided into the following sections such as Literature Survey, An Advisory Model, Architecture, Outcomes and Applications of the proposed system, Conclusion and Future enhancement.

## **2. LITERATURE SURVEY**

The growth of organic agriculture in India has three dimensions and is being adopted by farmers for different reasons. First category of organic farmers are those which are situated in no-input or low-input use zones, for them organic is a way of life and they are doing it as a tradition (may be under compulsion in the absence of resources needed for conventional high input intensive agriculture) [5]. Second category of farmers are those which have recently adopted the organic in the wake of ill effects of conventional agriculture, may be in the form of reduced soil fertility, food toxicity or increasing cost and diminishing returns. The third category comprised of farmers and enterprises which have systematically adopted the commercial organic agriculture to capture emerging market opportunities and premium prices [6]. The entire data available on organic agriculture today, relates to these commercial organic farmers. There were many advisory systems which provides various kinds of advices based on the parameters such as only based on soil health, only based on weather

forecasting, only based on use of fertilizer etc [7] [10] . There are also some advisory systems which are mobile based, web based, call centers etc. But these systems have some limitations such as language barrier, limited storage capacity, no direct contact with experts, very limited follow up services etc [8] [9] . So to avoid these limitations, in these paper we are suggesting a big data based advisory model of organic farming of vegetables [11].

### 3. AN ADVISORY MODEL

An advisory model for organic vegetable farming will consider some important parameters or real time data for prediction and analysis of patterns which is going to help farmers to take necessary actions and decisions like soil management, diseases management, market analysis and new trends, availability and management of natural resources, crop cycles, and crop patterns. It aims to improve and strengthen existing organic farming by integrating information technology approach. The entire advisory model operates at different blocks such as at Village level, Block level and state level. The model will use following parameters to analyze the patterns and predictions:

- Weather
- Soil
- Water
- Market analysis
- New trends
- Availability of natural resources
- Machineries requirements and labor requirements

Information requirement for input provider

- Forecast demand correctly, to forecast crop yielding, to determine land area and usage
- Real time online input for problems and difficulty
- Sharing of mechanised appliances
- Farmers can plan, run and analyse their entire farming operation through the entire farming cycle as efficiently as possible
- Input providers can devise adaptive strategy for profitability and marketing
- Responsible & Clean technology

### 4. ARCHITECTURE OF AN ADVISORY MODEL

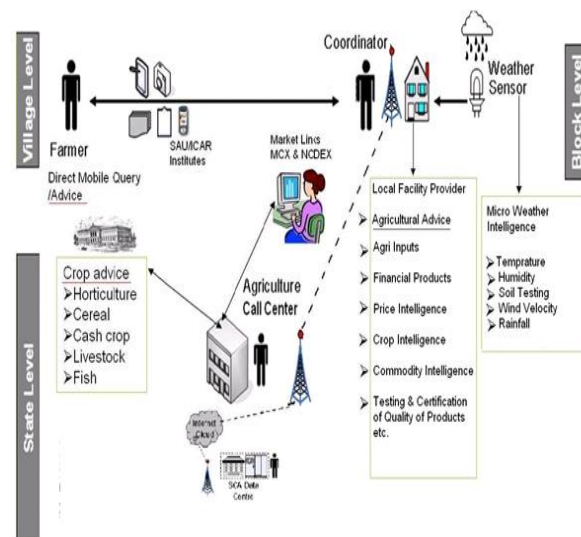


Fig 1: Architecture of an advisory Model

At the village level farmers will be using the mobile based technology to send query and to receive the advice. These information will then passed to the coordinator who will use the different technologies to gather the data such as weather sensor to sense the temperature, humidity, rainfall, wind velocity etc. Also it will analyze the data of soil health, different diseases that may occur based on the weather conditions, the quantity of fertilizers etc. Also the information about the market condition gather for the prediction of the crop market rates. All these information is stored into a centralized database system which is based on the Big Data technology. All the gathered information will be passed to the central call center where the advice will be prepared based the query given by the farmers and all the gathered data. Then this advice will be given back to the farmer via local coordinator. The entire model is push and pull based where data can be transmitted through text, voice, images and videos from both end like farmers to expert and back. It is the multi-platform based which is mobile based, web based and uses Big Data analytics for analysis and prediction. It also provides the advice based on the multiple languages to overcome the language barrier.

### 5. OUTCOMES AND APPLICATIONS OF PROPOSED ADVISORY Model

The following are the possible outcome of the proposed Advisory Model

- A proper cropping patterns can be infer from this model.
- Crop residue management
- Model will give patterns for effective crop rotation
- Finding out dieses patterns and suggesting organic control mechanism
- Based on the weather conditions, soil heath and market analysis suggesting how much land should be used for crops and which crops to plant.
- Maintenance of natural cycles and life forms
- Increasing Yield
- Weed control techniques
- Cultivation techniques
- Various pests and crop protection techniques

Applications of the proposed Advisory Model:

- increasing yields in low-input areas
- conserving bio-diversity and nature resources on the farm and in the surrounding area
- increasing income and/or reducing costs
- producing safe and varied food
- being sustainable in the long term.

Beneficiaries of this model:

- Farmers
- Agricultural Experts
- Department of Agriculture (Maharashtra)

## 6. CONCLUSION AND FUTURE ENHANCEMENT

The proposed system will help the farmers to get the personalized advice based the query they send to the local coordinator. Also the advice will be provided into vernacular language to overcome the language barrier. The system uses Big Data technology to store the data and for prediction and data analytics. The system can be enhanced as an intelligent advisory system using the machine learning techniques.

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