

AgriAI: Smart Precision Farming App

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Abstract - In our big world with over 8 billion people, we all share one thing in common – the need to eat. Sadly, we often hear about the tough times farmers in India face, despite being more than half of the working population. Every day, 28 farmers, dependent on agriculture, feel so burdened that they resort to suicide. While many of us express frustration and sympathy, we often don't truly understand the problems these farmers face on the ground. To help them out, we've come up with a Precision Farming App, a tool that we hope will bring a positive change to farming. This app is like a bundle of helpful features for modern farming. For instance, it can track how your crops are growing in real-time, like a virtual map for your plants. It also acts like a health check for your crops, spotting diseases early and suggesting solutions. The app even recommends what crops are best for your farm based on where you are, the type of soil you have, and the local weather conditions. But it's not just about your crops; the app also connects farmers with each other, creating a community where they can share experiences and learn from one another. And when it's time to sell crops, the app makes it easier by connecting farmers directly to buyers. Looking at how farming in India has changed over time – from old ways to the Green Revolution and now, technology playing a big role – our app fits right into this journey. It addresses the challenges farmers deal with, from unpredictable weather to soil problems, by providing them with smart tools for better and more sustainable farming. In a nutshell, this app is like a ray of hope for Indian farmers, bringing together technology and traditional farming practices. It wants to create a future where farming is not just smart and sustainable but also brings success and prosperity to every farmer. So, as we embark on this exciting farming journey, the goal is clear: to make farming smart, sustainable, and successful for years to come.

Key Words: Precision Farming, Advance Farming, Future of Farming, Machine Learning, Data science, Artificial Intelligence.

1.INTRODUCTION

The world's population has crossed 8 billion and in these 8 billion people there is only one thing that is common that no one can do photosynthesis. Everyone has to eat. Every now and then we keep hearing about the pathetic state of farmers in our country. And in spite of employing more than 50% of the workforce, the condition of the Indian agricultural sector has been so bad that every day, 28 people dependent on agriculture come at suicide. And every time we hear this news, 99% of us curse the government, we feel sorry for the farmers

and we just move on until another news comes in. And in this process of shallow activism, we never ever try to understand what exactly is the problem of the farmers at the ground. to solve this problem, We Create a new application that helps farmers to increase crop production and their yield.

Welcome to the future of farming with our Precision Farming App! In an era where technology is transforming agriculture, we've developed a tool that puts the power of innovation directly in your hands. This app is your all-in-one solution for modern farming, from tending to your crops to fostering connections within the farming community. With our Crop Tracking feature, you can follow your crops' journey from planting to harvest, gaining insights into their growth through cutting-edge technology. Think of it as a real-time visual guide for every step of your crops' development. Concerned about your crops' health? Our app acts like a personal health check for your plants. It detects potential diseases early on and provides actionable solutions to ensure your crops remain healthy and thriving throughout their growth. Say goodbye to the headache of expensive fertilizers! Our app steps in with affordable and personalized fertilizer recommendations, ensuring your crops get the nutrients they need without straining your budget. Choosing the right crops has never been easier. Our app takes into account your location, soil type, and local weather conditions to provide tailored crop recommendations, guiding you towards a successful and informed harvest. But it's not just about your crops; it's about connecting with fellow farmers too. Our Farmer-to-Farmer Interaction feature creates a friendly community where you can share experiences, ask questions, and learn from each other. It's like having a supportive group of friends who understand the ins and outs of farming. And when it comes to selling your crops, our Farmer to Buyer feature simplifies the process. List your crops, explore companies' requirements, and apply with ease. Our app ensures a smooth transaction from your field to the market. Get ready to embrace a new era of farming with our Precision Farming App — your go-to tool for sustainable, easy, and technologically-driven farming. Let's cultivate a future where innovation and farming go hand in hand, bringing prosperity to every farmer. Join us on this exciting farming adventure!

1.1 How Indian farming was in the past and how it is now

Over time, farming in India has gone through big changes. In the past, farmers mostly used traditional ways, like manual labor and relying on the monsoon for water. Then, in the 1960s, the Green Revolution brought new high-yield crops, better irrigation, and fertilizers. This made a huge difference in how much food India could produce, especially in places like Punjab and Haryana. Moving into the late 1990s, technology like tractors started replacing old ways, making farming more efficient. But these changes didn't happen the same way everywhere, and some areas still faced challenges like not having enough resources or access to new farming methods. In recent times, there's a focus on making farming more sustainable and precise. Farmers now use technology for things like testing soil, predicting the weather, and keeping an eye on their crops. Government programs, such as the Pradhan Mantri Krishi Sinchayee Yojana and the Soil Health Card scheme, aim to help farmers and promote sustainable farming. Even though challenges like not having enough land, water issues, and difficulties in selling crops still exist, Indian farming today is a mix of old wisdom and new ideas. Farmers are adapting to changes, trying to feed a growing population, deal with climate changes, and make sure farming is sustainable. As India looks ahead, the journey of transforming farming continues, shaped by tradition, technology, and the goal of having enough food for everyone.

1.2 Why Farmers need Precision farming technology

Farmers in India face many challenges, from unpredictable weather to soil problems, and the need

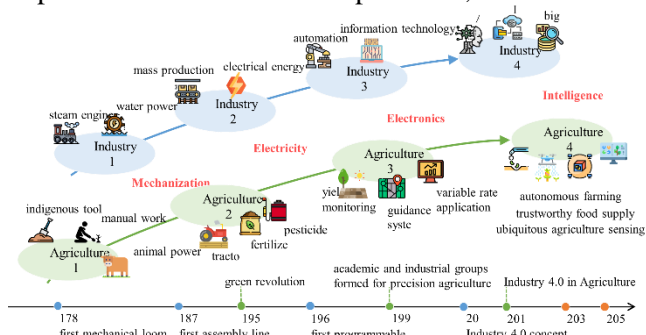


Fig 1: The development roadmap of Agricultural revolutions

to produce more food for a growing population. Precision farming technology can be a big help for Indian farmers. This kind of technology gives farmers advanced tools to make their farming more efficient and sustainable. Firstly, India has different types of climates

in different areas. Precision farming allows farmers to adjust their methods to fit the local conditions. For example, they can use GPS-guided tractors and sensors to manage things like water and fertilizers more precisely, avoiding waste and making the most of resources. Secondly, precision farming helps deal with the problem of unpredictable weather. With real-time data on weather and crop health, farmers can make smart decisions to reduce risks related to climate changes. In terms of money, precision farming can save farmers a lot. Technologies like crop monitoring systems and automated machinery can lower costs and increase how much farmers can produce. The technology also gives accurate advice on things like fertilizers, helping farmers avoid spending money on things they don't need and making their farms more profitable. Not only that, precision farming is good for the environment. By using resources efficiently, it helps with problems like soil damage and lack of water. This is important for India's goal of having sustainable agriculture that can last for a long time. In simple terms, precision farming is not just a fancy idea but something farmers in India really need. It's like giving them smarter tools and data to make their farming better and deal with the challenges they face. As India works towards making sure there is enough food and that farming is sustainable, precision farming is a key part of making that happen.

1.3 How Crop Selling Works

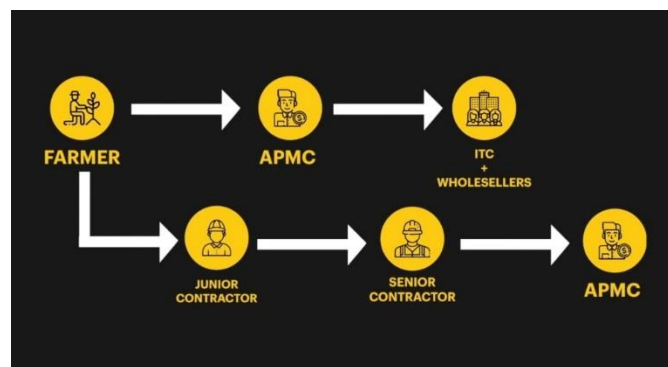


Fig 2: Current Supply Chain Working

Well, as it turns out, it was because of a major inefficiency in the supply chain of crops. And this is how it worked out. On paper, there were three elements in the supply chain. The farmers, the APMC or the Agricultural Produce Market Committee and then we had export companies like ITC and the wholesalers. So ideally, the farmers were supposed to produce their crops and they were supposed to take it to the APMC. APMC was nothing but a body of licensed traders set up by the government to ensure that farmers are not exploited by open trade. It's also called as the Mundi. So, at the Mundi, only government licensed traders

could buy the produce from the farmers and no other trader was allowed. So theoretically, these traders were supposed to auction for the crops and the highest bidder procured the crops from the farmers. This way, the farmers were supposed to get the best prices and they were supposed to be rich. But in reality, this was far, far away from the truth for three major reasons. Firstly, the Mandis were about 30 to 50 kilometres far away from the farmers and more than 80% of the farmers in our country are still small farmers. So, most of them neither had storage facilities nor could they afford transportation facilities. Therefore, they either had to rent a truck or they had to sell it to a junior contractor who then sold it to the senior contractor who then took it to the Mundi. So, to put that straight, they either had to bear the cost of transportation or they had to sell their produce to the middlemen at an extremely low cost. Secondly, the farmers had no way to find out what exactly was the price being offered at a particular Mundi on a particular day. As a result, they only had to rely on word of mouth and take the risk of traveling 50 kilometres with the hope that the word of mouth was true. And lastly, since no other trader was allowed to procure crops from the Mandi, the licensed traders formed a cartel. And instead of auctioning for the highest price, they all quoted the same price which was way below the standard price of the produce. For example, if one quintal of soya bean was supposed to be sold at a base price of 8,000 rupees per quintal, what the traders would do is all of them would quote a price of 6,000 rupees only. Why? Because 1700 farmers have already travelled 50 kilometres and they cannot go back and they couldn't sell their produce anywhere else, so the farmer had no other option but to sell his crops at a bare minimum profit of 500 rupees to the licensed traders. And worst case, if the farmer sold it to the junior contractor, then the profits would go down further from 500 rupees to less than 100 rupees to sometimes even at a loss.



Fig 3: Farmers Profit And Losses

And to make matters worse, even after dragging the price down to a mere 500 rupees, the Mundi traders did not pay the farmers right away and they took the hard-earned produce at an unofficial credit and paid the farmers only when they made a profit. And this time of

credit would range between one week to even one month. And this pathetic system put the farmers in a very dangerous vicious cycle. Since the farmers did not have enough cash flow, it led to a loss of 100 rupees. to low investment into farming equipment and other essential inputs like pesticides and fertilizers. This led to low production leading to low margins, which again led to a cash crunch. In fact, even today, this is the state of most of the farmers in our country. And at the end of the day, in 1999, the farmers were losing 60 -70% of the potential value of their crop, with the agricultural yields of only 25 -30% of the global standards.

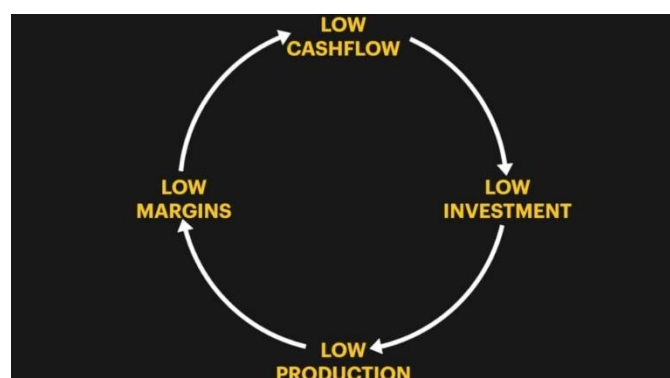


Fig 4: Farmers Cash Flow on Crops

2. How Our Solution Helps

2.1 Crop Tracking –

The crop tracking feature is like a helpful friend for farmers, keeping a close watch on how their crops grow from the start to when they're ready to be harvested. It works by using smart technologies like sensors and GPS. Imagine it as a virtual map that shows every step of your crop's growth in real-time. This helps farmers know things like if the soil is right or if the plants are healthy. With this information, farmers can decide when to water, add fertilizer, or use pesticides, making sure their crops get exactly what they need at each stage. In simple terms, the crop tracking feature is a handy tool that gives farmers a clear picture of how their crops are doing, helping them take good care of their plants and get the best harvest possible.

2.2 Crop Diseases Detection and Provide Solution –

Detecting and solving crop diseases using machine learning is like having a smart helper for farmers. This technology looks at pictures of crops, the weather, and past disease patterns to figure out if there might be a problem with the plants. When it spots a potential disease, the machine learning system quickly suggests solutions. It does this by using a big database of information about different diseases and what works best to treat them. This helps farmers take action right away to protect their crops and stop diseases from spreading. The great thing about using machine learning is that it gets better at its job over time. As it sees more

examples, it becomes really good at spotting and figuring out diseases accurately. This means farmers can trust the information it gives them. So, using machine learning to detect and solve crop diseases is a big help for farmers. It lets them quickly deal with problems, so their crops stay healthy, and they get a good harvest. It's like having a smart friend in the field, making farming more efficient and sustainable.

2.3 Crop Recommendation –

Crop recommendation with the help of machine learning is like having a smart advisor for farmers. This technology looks at a bunch of information like where the farm is, what kind of soil it has, and what the weather is like. Then, using this data, it suggests the best crops for that specific farm. The cool thing about this technology is that it keeps learning and getting better. As it sees more information over time, it becomes really good at giving farmers personalized recommendations. So, when farmers follow these suggestions, they can pick the crops that are just right for their farm. Why does this matter? Well, it helps farmers make smarter choices about what to plant, which means they can grow more crops and use their resources better. This is not just good for the farmers, it's also good for the environment because it promotes sustainable farming practices. In simple terms, machine learning-based crop recommendations are like a helpful friend for farmers, guiding them to make the best decisions for a successful and efficient harvest.

2.4 Farmer-to-Farmer Connection –

Farmers connecting with other farmers is like creating a big group of friends who help each other out in farming. This connection happens when farmers share their experiences, tips, and solutions with each other. By talking about what works and what doesn't, farmers can learn better ways to grow crops and overcome challenges like bad weather or pests.

This farmer-to-farmer connection is super useful because it's like having a group of friends who understand exactly what you're going through. They can share advice on things like which tools to use or how to make crops healthier. This helps everyone become better at farming. Besides learning from each other, this connection is also a great way for farmers to support each other emotionally. Farming can sometimes be tough, but having a group of people who get it makes a big difference. They can celebrate successes together and lend a helping hand during tough times. In a nutshell, the farmer-to-farmer connection is like having a big friendly community of farmers. They share knowledge, help each other out, and make farming feel less lonely. It's a win-win for everyone involved in agriculture.

2.5 Farmer-to-Buyer Connection–

Helping farmers sell their crops directly to customers or companies can be a game-changer for agriculture. One cool way to do this is by using online platforms or apps made just for farmers. These platforms work like virtual markets, connecting farmers directly with people or businesses who want to buy their fresh crops. Imagine using something called blockchain – it's like a super secure way of keeping track of all the transactions. This helps farmers and buyers trust each other more because they can be sure about where the crops are coming from and their quality. This way, farmers get fair prices, and customers know exactly what they're getting. Using digital payments and online shopping systems can make things even easier. Farmers can receive their money quickly and safely without needing middlemen, making sure they get paid fairly for their hard work. Direct selling also lets farmers hear directly from customers. They can find out what people like, what they want more of, and adjust their farming methods accordingly. It's like a direct conversation between farmers and the people who eat their crops. In the end, using new and smart ways for farmers to sell their crops directly brings big changes to how agriculture works. It's not just about helping farmers make more money; it's about making the whole system fairer, more transparent, and better for everyone – farmers and customers alike.

3. CONCLUSIONS

In summary, our Precision Farming App is like a helping hand for Indian farmers facing tough challenges in agriculture. The struggles of farmers, including heartbreaking stories of suicides, show the urgent need for solutions. Our app steps in as a solution, offering a bunch of features to make farming easier and more successful. Looking back, Indian farming has changed a lot—from old ways to the Green Revolution and now, advanced technology. The app fits into this journey by combining traditional wisdom with new ideas, focusing on sustainable and precise farming. Selling crops has been a big problem for farmers, with a broken system that often leads to unfair prices. Our app tackles this issue by connecting farmers directly to buyers through online platforms and secure technology. This makes the selling process fairer and more transparent, benefitting both farmers and buyers. Talking about technology, our app is a handy tool for farmers. It helps them track their crops, detect diseases, and gives personalized recommendations. These features deal with the many challenges farmers face, making farming more efficient, reducing costs, and promoting sustainable practices. To put it simply, our Precision Farming App is not just about technology—it's a hope for Indian farmers. It aims to create a future where technology and traditional farming work together, bringing success to every farmer.

As we start this exciting farming journey, the goal is clear: to make farming smart, sustainable, and prosperous for years to come.

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