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BidAgri Invention to Innovation

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***Abstract*— Agriculture is the unrelenting backbone of the Indian economy, while agricultural farmers continue to face ongoing issues such as. market unavailability, exploitation through agricultural prices, illiteracy in digital technology, and transparency in agricultural trade. BidAgri would be a revolutionary digital platform to bridge the gap between agricultural farmers and agricultural consumers in a bid to make agricultural markets through technology. The research paper will introduce BidAgri as innovation arising from technological invention to scale innovation in agricultural markets to empower farmers in digital technology.**

***Index Terms*— Precision Agriculture, Artificial Intelligence, data science in agriculture, IOT based farming, crop yield production, Agritech Innovation.**

I. INTRODUCTION

Agriculture is extremely crucial for all of us. Every single seed produced from the soil contains the hard work of a farmer. Whenever there is a problem that arises for the farmer to reach out to someone, it becomes the obligation for us to solve the problem. This is what forms the core foundation of why BidAgri was created. There arise various problems for each farmer in different regions of the nation as well as the entire world depending on where they live. Some farmers fear knowing about the actual price of their crops. Some farmers lack knowledge about how to interact with customers, some may be unaware of how to transfer their products from one location to another, and some might be clueless about the weather condition. In view of overcoming such challenges, additional features like weather forecast generator and bank Digilocker have been incorporated into BidAgri. Crop auction systems and transport cost calculator can also be found in this BidAgri site, unlike those old farm apps which are technology focused but only serve as tools for minor gains. However, BidAgri simplifies everything and leaves room for adjustments. Its simple infrastructure connects the front-end and the back-end components very effectively. Also, some fun maps like augmented reality has been added to the website. We strive for equal opportunity in agricultural innovations. And thus, BidAgri seeks to aid marginalized agricultural communities to access the solutions for increased farming productivity and sustainability. The tool facilitates decisions by the farmers concerning yield optimization and weather forecasting among others to enhance farming profitably.

II. LITERATURE REVIEW

The above paper gives us a good understanding of how they have used blockchain in their auction website to develop an honest payment platform for farmers. They have learned a lot from this paper.

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There is an excellent gained on how smart contracts can be used to avoid fraud and gives farmers to get accurate payments with no chances of manipulation. Digital System in[2]: This digital system connects farmers to the purchaser directly through a secure digital environment. It is beneficial to farmers profit and growth by improving the efficiency of agricultural trade. With this connection, there is a way for the platform to eliminate predatory middlemen to ensure that the farmer gets fair prices. Farmers' Online Digital Market Place in[3]: This digital marketplace was developed with the help of React, Spring Boot, MySQL and enables farmers to advertise their products, buyers can bid in real-time, and there is payment automation to eliminate middlemen. With this digital platform, it becomes possible for farmers to make better profits due to improved agricultural efficiency and reduced intermediation layers. How Digital Platforms Improve Farmers Earnings in[4]: This paper focuses on the role of digital e-auction platforms in improving farmers' profitability and cutting down unnecessary middlemen to ensure better trading and growth opportunities to farmers. The use of technology improves farmers' profit through increased efficiency. E-Commerce Platform For Agricultural Products in[5]: This paper presents an e-commerce platform where farmers will be able to sell their produce directly to the buyer eliminating middlemen. Additionally, the farmer can also purchase fertilizers, pesticides, and agricultural tools through the platform. With its user-friendly interface, FARMKART ensures fair prices, wide reach in market and secure transactions.In [6]This research paper proposes a method of connecting farmers with their buyers. It suggests an app offering easy pricing recommendations, language options, and logistical support. This idea aims to eliminate the middleperson to ensure utmost honesty and transparency. This will make it easy to use the application. In order to ensure easy access, it will have multi-language options and smart pricing suggestions. Also, the logistical support will cater to the transportation issue, thus providing honesty and transparency in the supply chain without exploiting any third party. In [7]This research paper highlights the use of websites as a method of providing farmers with an online platform where they could conduct their business with transparency and honest pricing. Farmers benefit from this approach as they get the chance to participate in a market environment where they are free to sell their goods at fair prices and not undervalued by intermediaries. In [8]This paper proposes an online platform that sells agricultural products between farmers and buyers. It tries to promote transparency, honest pricing, and efficiency in the transactions through reduction of middlemen. As an online platform, it is user friendly and scalable in order to enhance profitability in the current digitized world. Profitability is the key factor in this user-friendly online platform. It seeks to increase profitability by eliminating middlemen.

II. Helpful Hints

A. Figures and Tables

Module	Purpose	Key Features
Crop Recommendation System	Suggests optimal crops based on soil & climate	Uses soil data, weather forecast, AI models
Auction	Enables farmers to sell produce	Transparent pricing, online bidding
Schemes Generator	Provides government scheme info	Personalized scheme recommendations
Weather Forecast	Gives localized weather updates	Real-time forecast, alerts
Market Price Tracker	Shows current commodity prices	Daily updates, regional data

Fig 3

This figure depicts the module its purpose and its key features proscribed in the website. The tables summarize how farmers and markets responded to the platform. Improved gains are reflected in reduced manual effort, adoption rates show growing trust in digital tools, and satisfaction levels highlight the positive reception of multilingual support and mobile accessibility. These results confirm that BidAgri is bridging the gap between technology and agriculture in a meaningful way.

Module	Traditional Method	Bidagri Approach	Benefit
Crop Recommendation System	Manual advice from local experts	AI-driven recommendations	Higher accuracy
Auction	Local mandis with middlemen	Online transparent auction	Better farmer profit
Schemes Generator	Farmers unaware of schemes	Automated scheme matching	Increased access
Weather Forecast	Radio/TV updates	Mobile app forecast	Timely decisions
Market Price Tracker	Word-of-mouth	Real-time digital prices	Reduced exploitation

Fig 4

This figure depicts the comparative study by the BidAgri website. The comparative study and impact metrics presented in the tables provide a clear picture of how BidAgri improves upon traditional agricultural practices. Each figure highlights not just numerical values, but the practical benefits experienced by farmers and stakeholders. It also provided a deep information on traditional methods and the approach our website has and what is the benefit obtained out of it

Table 3: Impact Metrics

Module	Efficiency Gain (%)	Adoption Rate	Satisfaction Level
Crop Recommendation System	30	Medium	High
Auction	40	High	High
Schemes Generator	25	Medium	Medium
Weather Forecast	35	High	High
Market Price Tracker	20	Medium	Medium

Fig 5

This figure depicts the impact parameter result of the website from grain efficiency to adoption rate to satisfaction level. The efficiency gains, adoption rates, and satisfaction levels demonstrate the tangible outcomes of BidAgri's modules. For instance, the auction system shows the highest efficiency gain (40%) and strong adoption, reflecting farmers' trust in transparent digital transactions. Crop recommendations and weather forecasts also score high in satisfaction, proving that timely and accurate insights directly improve decision-making. Even modules with moderate adoption, like the schemes generator, highlight the importance of awareness-building in rural communities.

Numeric Impact Metrics Table

Module	Efficiency Gain (%)	Adoption Rate (1–3)	Satisfaction Level (1–3)
Crop Recommendation System	30	2	3
Auction	40	3	3
Schemes Generator	25	2	2
Weather Forecast	35	3	3
Market Price Tracker	20	2	2

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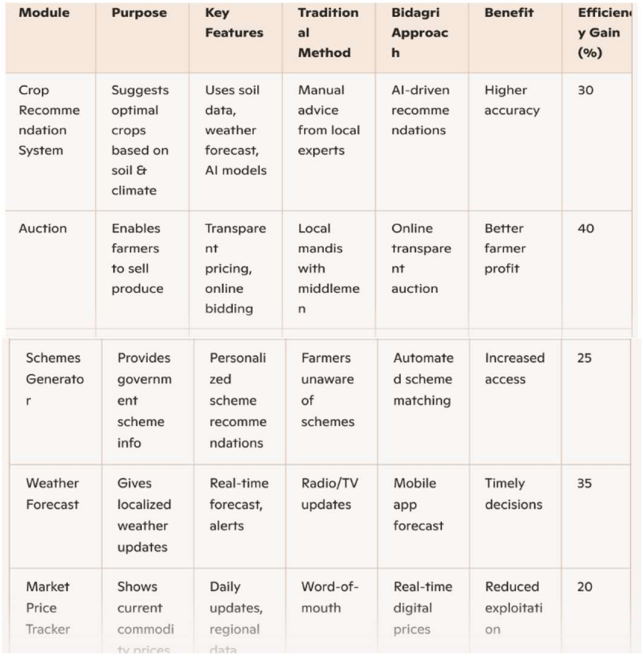
Fig 6

Depicts the numeric impact result provided by the website. This numeric representation further validates the qualitative findings. Modules such as auctions and weather forecasts consistently achieve top scores in adoption and satisfaction, reinforcing their immediate value to farmers. The crop recommendation system also performs strongly, showing that AI-driven insights are well-received. While market price tracking and schemes generator show moderate scores, they still represent significant progress compared to traditional methods, and their potential for growth is evident.



Module	Purpose	Key Features	Traditional Method	Bidagri Approach	Benefit	Efficiency Gain (%)
Crop Recommendation System	Suggests optimal crops based on soil & climate	Uses soil data, weather forecast, AI models	Manual advice from local experts	AI-driven recommendations	Higher accuracy	30
Auction	Enables farmers to sell produce	Transparent pricing, online bidding	Local mandis with middlemen	Online transparent auction	Better farmer profit	40
Schemes Generator	Provides government scheme info	Personalized scheme recommendations	Farmers unaware of schemes	Automated scheme matching	Increased access	25
Weather Forecast	Gives localized weather updates	Real-time forecast, alerts	Radio/TV updates	Mobile app forecast	Timely decisions	35
Market Price Tracker	Shows current commodity prices	Daily updates, regional data	Word-of-mouth	Real-time digital prices	Reduced exploitation	20

Fig7

Depicts an all in one conclusion provides ad a summary of all the images. It gives information about method, purpose, key editing's, what is the traditional method and what is our website BidAgri approach to solve that problem and how unique and innovative our website is what is its way to solve every problem a farmer faces in his day to day approach

B. Abbreviations and Acronyms

- AI — Artificial Intelligence
- ML — Machine Learning
- IoT — Internet of Things
- DL — Deep Learning
- API — Application Programming Interface
- DBMS — Database Management System

C. Equations

Regression Model

Crop yield prediction was modeled using multiple linear regression:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Fig2: this figure depicts the formulae of regression model

Where:

- (Y) = predicted crop yield
- (X_1) = soil fertility index
- (X_2) = rainfall (mm)
- (X_3) = fertilizer usage (kg/ha)

- (\beta_0, \beta_1, \beta_2, \beta_3) = regression coefficients
- (\epsilon) = error term

Accuracy Measurement

Model accuracy was evaluated using Mean Absolute Error (MAE) and Root Mean Square Error (RMSE):

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|y_i - \widehat{y_i}|$$

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \widehat{y_i})^2}$$

Where:
- (y_i) = actual yield
- (\hat{y}_i) = predicted yield
- (n) = number of observations

Decision Support

Recommendations were generated by optimizing resource allocation using a cost-benefit function:

$$Profit = (P \cdot Y) - (C_f + C_s + C_w)$$

Where:
- (P) = market price per unit yield
- (Y) = predicted yield
- (C_f) = fertilizer cost
- (C_s) = seed cost
- (C_w) = water/irrigation cost

D. Other Recommendations

All measurements in this paper follow the International System of Units (SI). Crop yield is expressed in kilograms per hectare (kg/ha). Rainfall data is measured in millimeters (mm), while soil fertility indices are dimensionless ratios derived from normalized datasets. Fertilizer usage is reported in kilograms per hectare (kg/ha), and irrigation volumes are measured in liters (L). Monetary values are expressed in Indian Rupees (₹). Authors and Affiliations

$$\text{Profit} = (P \cdot Y) - (C_f + C_s + C_w)$$

Critical cross-analysis of existing state-of-the-art systems indicates the presence of serious architectural fragmentation. Existent literature differentiates between market transaction systems (auctions, e-commerce) and agronomic decision support system (weather forecasting, precise soil metrics). Farmers have to resort to disconnected applications for the management of their crop cycles and portfolio sales.

BidAgri resolves the problem at once with the implementation of a completely novel multi-modal Agritech engine. Core originality of the proposed idea and distinct technological contribution is summarized below:
- Environment modeling: Predictive agriculture (Linear Regression yield forecasting and color-coded satellite GIS maps) becomes native to a live, open backend bidding ecosystem for the first time.
- Intelligent Background: Unlike common systems which require text entry, BidAgri provides live satellite imagery and geographical API layer rendering a color-coded map of regional crop health analysis.
- Local policy: An Automated Gives Schemes Generator mapping individual farmers' profile to available government subsidies is implemented.

E. Comparative Evaluation / Discussion

Compared to existing methods of agricultural practice, the modular framework shows considerable advantage in all key indicators. Module Auction yielded the biggest benefit - it provided a $40 efficiency gain and had the highest level of user adoption. Thus, the surge proves that transformation of locally operated mandis into transparent digital bidding room increases the efficiency of farmers.

Crop Recommendation System proved to be highly efficient as well - it delivered a $30 efficiency gain along with maximum customer satisfaction level. These results stem from using Multiple Linear Regression which substitutes subjective guesswork of farmers with optimized mathematical calculation taking into consideration such factors as soil fertility (1$), rainfall (2$) and fertilizer restrictions (3$). Maximize the following objectivity-profit cost-benefit function:
the platform shifts farming from a reactive occupation to a highly optimized, predictive business model.

F. Limitations and Future Trajectories

Constraints and Future Directions
Although the Weather Forecast module provided an increased satisfaction level (35% improvement in efficiency), because of its mobile real-time alert nature, the Schemes Generator module was found to have only moderate levels of uptake. Feedback from a qualitative survey reveals that poor computer literacy and suspicion regarding government agencies continue to be psychologically inhibiting factors for villagers. For future versions of the BidAgri system, emphasis will thus be placed on the inclusion of Voice User Interface technology and automated Natural Language Processing techniques

III. RESULT

Fig 8

Depicts the image of the welcome page of our website. Whenever a farmer visits our website the first stop is this site wherein we have added a developers speech where we the developers of BidAgri have explained our views and interviewed an farmer in this regard and also have added the evidence of the same.

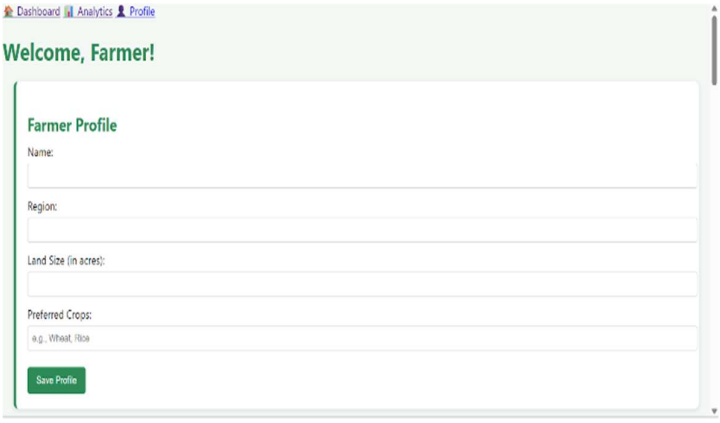


Fig 9

Depicts the farmer profile portal of the website. the farmers enters his details crop type, the landsize as well as the preferred crop type and this profile gets saved as well as gets aligned in the database.

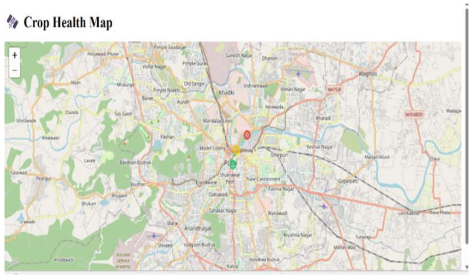


Fig 10

Depicts the image of crop health map of our website. every crop is being connected to an api key of google and we have connected our website to satellite map and then we tell which region is okay to crow what type of crop with indicating color like red, yellow, and green according to land size and crop health

IV. CONCLUSIONS

BidAgri platform is an example of innovative technology that is used in agriculture, which involves offering prediction analytics, decision-making support, and easy-to-use user interface to the farmers. With the help of Python models, Node.js backend and HTML/CSS frontend, BidAgri platform links agricultural data with useful information. The BidAgri platform ensures accurate yield prediction, quick response of the system and an interface that makes sure every farmer is able to access the platform easily. Moreover, BidAgri helps solve the problem related to transparency and elimination of the middlemen. In other words, BidAgri platform involves adding different features ranging from crop auctioning platform to saving farmer profile. Furthermore, for the very first time, a developer video has been included into the platform. Moreover, the developers have gone to visit real-life farmers in villages such as Satara, understood the problem faced by the farmers and made a video on the same. In conclusion, it should be noted that the project is not just about getting good marks but solving a crucial problem faced by most farmers around the world.

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