**Project Initialization and Planning Phase**

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| Date | 24 June 2025 |
| Team ID | xxxxxx |
| Project Title | Predicting plant growth stages with environmental and management data using power bi |
| Maximum Marks | 3 Marks |

**Project Proposal (Proposed Solution) template**

This project proposal outlines a solution to address a specific problem. With a clear objective, defined scope, and a concise problem statement, the proposed solution details the approach, key features, and resource requirements, including hardware, software, and personnel.

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| **Project Overview** | |
| Objective | The objective of this project is to analyse key environmental and input-based variables affecting plant growth and develop an interactive visualization platform that supports precision agriculture. Through effective data collection, analysis, and presentation, the system will help users understand optimal growing conditions and implement better cultivation strategies. Ultimately, the goal is to bridge the gap between data and field practices to enhance productivity and sustainability. |
| Scope | The scope of this project includes the end-to-end development of a plant growth monitoring system, starting from data gathering and preprocessing to analysis, visualization, and reporting. It will cover the integration of datasets related to soil type, water schedules, temperature ranges, humidity levels, and sunlight exposure. The system will also include modules to compare fertilizer effectiveness and track growth milestones across different conditions. Deliverables include interactive dashboards, automated reports, a recommendation engine, and evaluation tools. Real-time sensor data integration, AI-based forecasting, and mobile app deployment are considered out of scope for this phase and will be addressed in future enhancements. |
| **Problem Statement** | |
| Description | Modern agriculture generates large volumes of data related to soil conditions, irrigation patterns, weather variables, and crop performance. However, much of this data remains underutilized due to poor structuring, limited analytical capabilities, and the absence of user-friendly visualization tools. Important growth influencers—such as soil type, water frequency, humidity, temperature, and sunlight—are often not analysed in relation to each other. This creates a gap in understanding how these variables interact and impact plant development across different environments. Additionally, there is no centralized platform for stakeholders to monitor trends, compare inputs like fertilizers, or receive timely alerts based on environmental thresholds. |
| Impact | The lack of an intelligent monitoring system leads to missed opportunities in improving agricultural efficiency and productivity. Farmers may overuse water, apply inappropriate fertilizers, or plant crops in suboptimal soil without realizing the consequences. This not only affects crop yield and quality but also contributes to resource wastage and environmental degradation. By addressing these issues, the proposed solution will enable stakeholders to make informed decisions based on evidence and data trends. It will support precision agriculture, enhance resource efficiency, and ultimately improve sustainability and profitability across the farming lifecycle. |
| **Proposed Solution** | |
| Approach | The project will follow a modular, sprint-based development approach starting with data collection and preprocessing, followed by analytical modelling, visualization, and evaluation. The process includes:   * **Data Collection & Preprocessing**: Gather data related to environmental variables and plant growth milestones from available datasets. * **Data Analysis**: Use statistical and comparative analysis to identify patterns, correlations, and growth influencers. * **Dashboard Development**: Create interactive dashboards using Power BI to present visual insights. * **Feature Implementation**: Add comparison tools, alert systems, and export functionalities. * **Evaluation & Feedback**: Conduct performance evaluation and update the system based on user feedback. |
| Key Features | The system will include a range of features designed to support data-driven decision-making in agriculture. Interactive dashboards will allow users to view and compare metrics like humidity, temperature, and sunlight across different soil and water conditions. Growth influencer analysis will highlight the impact of various inputs such as fertilizer type and irrigation frequency. Users will also be able to track environmental trends over time and receive condition-based recommendations for optimizing plant health. Reports can be exported in Excel or PDF format for record-keeping or sharing. In future phases, the platform may include real-time alerts to notify users of unfavorable environmental conditions, further enhancing its role as a smart farming assistant. |

**Resource Requirements**

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| **Resource Type** | **Description** | **Specification/Allocation** |
| **Hardware** | | |
| Computing Resources | CPU/GPU specifications, number of cores | |  | | --- | | 4 vCPUs (cloud VM), GPU  not required; scalable cloud  compute on Azure/AWS |  |  | | --- | |  | |
| Memory | RAM specifications | 8–16 GB RAM per machine; cloud compute with 16 GB RAM for dashboard rendering |
| Storage | Disk space for data, models, and logs | e.g., 1 TB SSD or cloud storage (Google Drive, AWS S3, OneDrive) |
| **Software** | | |
| Frameworks | |  | | --- | | Backend/data frameworks |  |  | | --- | |  | | Power BI (for dashboard), Python (optional: Flask or Streamlit for custom tools) |
| Libraries | |  | | --- | | Analytical and data processing  libraries |  |  | | --- | |  | | |  | | --- | | pandas, numpy, scikit-learn,  matplotlib (for preprocessing or  modelling) |  |  | | --- | |  | |
| Development Environment | IDE, version control | |  | | --- | | Jupyter Notebook, Visual Studio  Code, Git & GitHub for version  management |  |  | | --- | |  | |
| **Data** | | |
| Data | Source, size, format | Kaggle dataset,  Local agricultural datasets, CSV/Excel format, ~50 MB; expandable to cloud feeds |