Task-2

AI Product Service Prototype Development and Business/Financial Modelling

Team 1

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Step 1: Prototype Selection

In this section, we evaluate our idea of *AI-Powered Crop Disease Prediction and Agricultural Solutions* based on three criteria: feasibility, viability, and monetization. We use data or evidence from various sources to support our assessment.

- **Feasibility:** Our idea is feasible because it can be developed in the short term future (2-3 years), using the available technology and resources. For example, we can use Plantix, a crop disease diagnosis app that uses AI and image recognition, as a reference point for our idea. Plantix has been successfully deployed in several countries and has helped millions of farmers diagnose and treat crop diseases. We can also use AgroStar, an agritech platform that connects farmers with agronomy experts and quality inputs, as a reference point for our idea. AgroStar has been providing farmers with customized crop advice and direct product delivery through its app. We can leverage the existing technologies and frameworks, such as Python, Keras, TensorFlow, and React Native, to develop our app. We can also collaborate with agricultural organizations and research institutions to collect and curate data on crop diseases and treatment options.

- **Viability:** Our idea is viable because it is relevant and able to survive in the long term future (20-30 years), considering the market trends, customer needs, and environmental factors. For example, the global agricultural market is projected to grow by 5.66% (2023-2028) resulting in a market volume of US$4.86tn in 20283. The global fertilizer market amounted to more than 193 billion U.S. dollars in 2021, an increase of roughly 12 percent in comparison with the previous year. It is forecast that the fertilizer market will surpass 240 billion U.S. dollars by 2030. These figures indicate a high demand and potential for our app, which can provide farmers with accurate and timely information on crop diseases and treatment recommendations, as well as direct product delivery. Moreover, the impact and challenges of climate change, pests, and diseases on crop production and food security are increasing, which require innovative solutions to enhance crop health and resilience. Our app can help farmers adapt to these changes and improve their productivity and profitability.

- **Monetization:** Our idea can be monetized directly, meaning that we can generate revenue from our product or service itself, rather than from other sources such as advertising, data, or partnerships. We have identified three main revenue streams for our app: margin and commission from fertilizer companies, consultation fee with experts, and freemium model. These are reasonable and realistic ways to monetize our product, and we will explain how they will create value for our customers, investors, and partners in the revenue model section.

Step 2: Prototype Development

User Interface: The user interface (UI) is the part of the app that the user interacts with directly. It includes features such as a camera for taking pictures of affected plants, a form for entering data about the crop and affected area, and a display for showing the disease diagnosis and treatment recommendations. Here are some parts of our UI:

- **Camera screen:** This screen allows the user to capture images of affected plant parts and upload them to the app.
- **Form screen:** This screen allows the user to enter data about the crop and affected area, such as the crop type, the location, the size of the area, and the symptoms.
- **Result screen:** This screen shows the disease diagnosis and treatment recommendations, based on the image and data analysis. It also provides options for ordering the recommended agricultural products or booking a consultation with an expert.

Features and Functionalities: The app offers the following features and functionalities:

- **Image-based disease diagnosis:** The app uses machine learning algorithms, such as SVM and CNN, to analyze the images and identify the disease with high accuracy.
- **Treatment recommendations:** Based on the disease diagnosis, the app provides personalized treatment recommendations, including recommended fertilizers, chemicals, or organic matter.
- **Product delivery:** The app allows the user to order the recommended agricultural products directly from the app. The app aggregates products from multiple fertilizer companies and delivers them to the user through third-party logistics providers.
- **Expert consultation:** The app allows the user to book consultations with agricultural experts through the app. The experts provide guidance on disease management, crop care, and other agricultural practices.

The sample code can be accessed here:
Google Colab
Github

Step 3: Business Modeling

Our business model describes the three main revenue streams that we will generate from our app: margin and commission from fertilizer companies, consultation fee with experts, and freemium model. These are reasonable and realistic ways to monetize our product, and we explain how they will create value for our customers, investors, and partners:

1. **Margin and commission from fertilizer companies:** The app will earn a margin on the sale of fertilizers and other agricultural products. Additionally, it will receive a commission from fertilizer companies for promoting their products. This revenue stream will create value for our customers by providing them with quality products at competitive prices, and for our partners by increasing their sales and market share. According to a report by Grand View Research, the global fertilizer market amounted to more than 193 billion U.S. dollars in 2021, an increase of roughly 12 percent in comparison with the previous year. It is forecast that the fertilizer market will surpass 240 billion U.S. dollars by 2030, growing at a compound annual growth rate (CAGR) of 3.1% from 2022 to 2030. The report also states that the Asia Pacific region accounted for the largest share of the market in 2020, with 60.4%, followed by North America with 12.4%. These figures indicate a huge potential and demand for our app, which can cater to the needs of farmers in different regions and crop types. We can estimate our revenue from this stream by using the following formula:
   Revenue1 = (Average order value * Number of orders) * (Margin + Commission)

2. **Consultation fee with experts:** Farmers will pay a consultation fee to access the expertise of agricultural experts through the app. This revenue stream will create value for our customers by providing them with professional guidance and advice on disease management, crop care, and other agricultural practices. According to a survey by AgriTech India, 82% of farmers are willing to pay for expert consultation, and the average amount they are willing to pay is Rs. 500 per consultation. The survey also states that the main reasons for seeking expert consultation are pest and disease management, soil and water management, and crop selection and rotation. These reasons align with the value proposition of our app, which can help farmers address these challenges and improve their outcomes. We can estimate our revenue from this stream by using the following formula:
   Revenue2 = Average fee * Number of consultations

3. **Freemium model:** The app will offer a limited number of free predictions to farmers. For additional predictions and access to premium features, farmers will need to subscribe to a paid plan. This revenue stream will create value for our customers by providing them with more accurate and comprehensive information and services, and for our investors by increasing our customer base and retention. According to a report by Statista, the global

freemium app market is expected to reach 189.6 billion U.S. dollars by 2024, growing at a CAGR of 18.5% from 2019 to 2024. The report also states that the average conversion rate of freemium users to paid users is 2.4%, and the average retention rate of paid users is 80%. These figures indicate a high potential and opportunity for our app, which can attract and retain customers with its value proposition and features. We can estimate our revenue from this stream by using the following formula:
Revenue3 = Average subscription fee * Number of paid users

- We can assume that our total revenue is the sum of our three revenue streams, which is:
Total Revenue = Revenue1 + Revenue2 + Revenue3

- We can assume that our total cost is the sum of our fixed and variable costs, which include the development, maintenance, marketing, and operational costs of our app. We can estimate our total cost by using the following formula:
Total cost = Fixed cost + (Variable cost * Number of users)

- **Pricing and Profitability Strategy:** We will use a cost-plus pricing strategy, which means that we will set our prices based on the cost of production plus a desired profit margin. We will also use a dynamic pricing strategy, which means that we will adjust our prices based on the demand, supply, and competition in the market. We will aim for a profit margin of 20%, which is reasonable and competitive for our industry. We can calculate our profit by using the following formula:
Profit = Total Revenue - Total Cost

Competitive Analysis: We can compare and contrast our revenue streams with our competitors or similar products, and highlight our competitive advantage and differentiation. Here are some examples of competitive analysis:

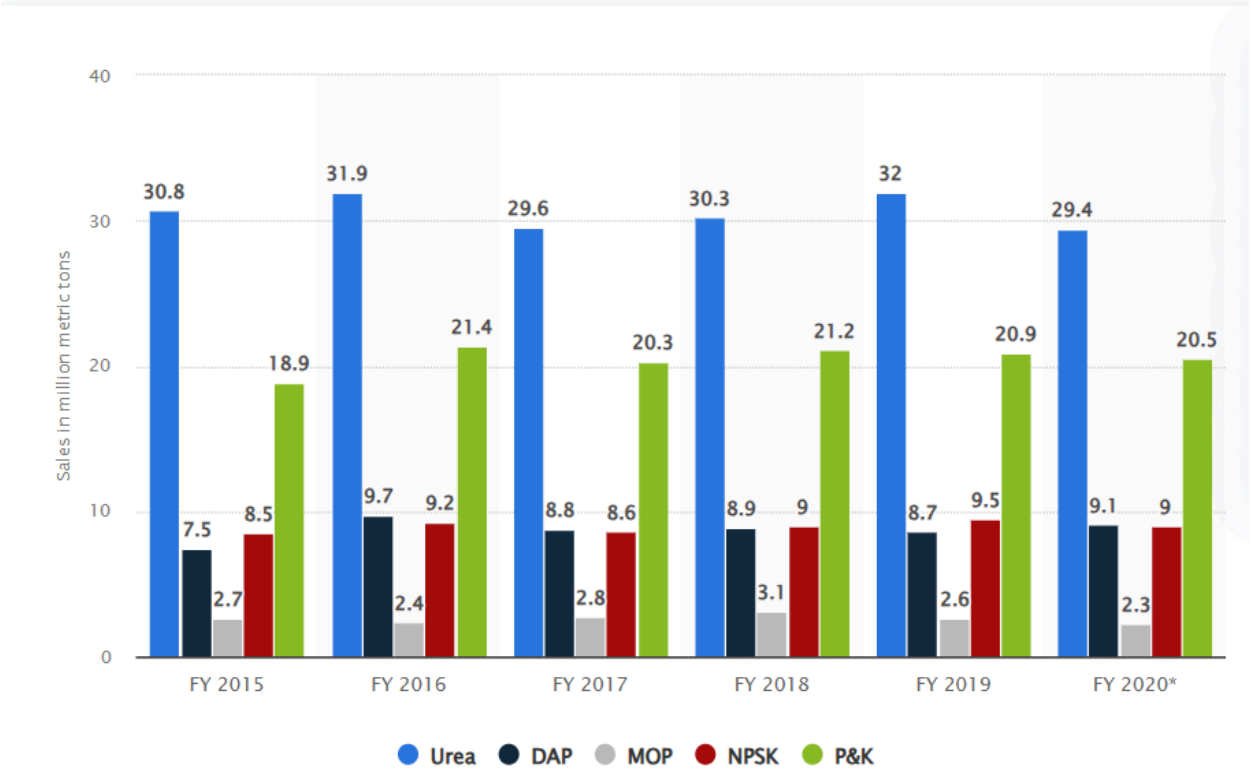
- Plantix generates revenue from advertising, data, and partnerships. It does not charge users for its predictions or recommendations, nor does it provide direct product delivery or expert consultation. Our app has a competitive advantage over Plantix by offering a more comprehensive and personalized solution, and by monetizing directly from our product or service.
- Farmkey generates revenue from product delivery and commission from fertilizer companies. It does not provide image-based disease diagnosis or treatment recommendations, nor does it offer expert consultation or a freemium model. Our app has a competitive advantage over Farmkey by offering a more accurate and timely diagnosis and treatment, and by providing more value and options to our customers.
- AgriApp generates revenue from product delivery and expert consultation. It does not provide image-based disease diagnosis or treatment recommendations, nor does it offer a margin or commission from fertilizer companies or a freemium model. Our app has a

competitive advantage over AgriApp by offering a more reliable and relevant diagnosis and treatment, and by creating more revenue streams and partnerships.

- Agrio generates revenue from a subscription model and a commission from fertilizer companies. It provides image-based disease diagnosis and treatment recommendations, but it does not offer direct product delivery or expert consultation. Our app has a competitive advantage over Agrio by offering a more convenient and comprehensive solution, and by providing a freemium model and a consultation fee.

Step 4: Financial Modeling:

Sales volume of fertilizers in India from financial year 2015 to 2020, by type(in million metric tons)



- **Indian Fertilizers Market**

Study Period	2016 - 2030
Market Size (2024)	USD 43.32 Billion
Market Size (2030)	USD 62.83 Billion
Largest Share by Crop Type	Field Crops
CAGR (2024 - 2030)	6.39 %
Fastest Growing by Crop Type	Horticultural Crops

Major Players

Coromandel

IFFCO

ICL

NFL

*Disclaimer: Major Players sorted in no particular order

- **Indian Fertilizers Market, % CAGR, By Crop Type 2022-2028**