Final Report – Business Understanding

Idea Generation

CREATING MEANINGFUL EXPERIENCES

Applied Data Science & AI

Date

Breda University OF APPLIED SCIENCES

Index

Task 1.1: Market Research & Problem Definition

A. Market Research

- **What specific problems can my product or service solve for consumers?**

1. Ingredient recognition from dish photos

Many consumers struggle to identify ingredients in meals, especially when eating out, exploring unfamiliar cuisines or finding the dish's photo from internet. An AI-driven food classification tool could analyse dish images and list key ingredients, helping users make informed dietary choices.

2. Nutritional transparency and food safety

AI could classify dishes based on their nutritional content, allergens, and processing level, assisting people with dietary restrictions, such as diabetes, gluten intolerance, or with specific calorie goals.

3. Recognizing traditional Dutch dishes

Many people, including tourists and locals, struggle to identify specific Dutch foods when dining out or exploring new dishes. An AI-powered food recognition app can analyse dish images and provide names and descriptions of traditional Dutch meals, helping users make informed choices.

4. Enhancing Cultural and Culinary Awareness

Tourists and non-Dutch residents may be unfamiliar with traditional foods like bitterballen, stamppot, poffertjes, and haring. The app could offer explanations of these foods, their ingredients, and cultural significance.

- **What gaps or challenges exist in the current market or among competitors?**

1. Lack of Dutch Food-Specific AI Recognition

Existing food recognition apps focus on general international dishes, but few are tailored to Dutch cuisine. This project's AI system would fill this gap and provide accurate identification of local food.

2. Inconsistent labelling and classification

Many current food classification systems lack accuracy in recognizing multi-ingredient products, leading to confusion among consumers.
Source: https://pubmed.ncbi.nlm.nih.gov/39125452/

3. Lack of AI-driven personalization

While AI meal recommendation tools already exist, they do not fully integrate food classification with individual dietary needs, preferences and allergies.
Source: https://www.sciencedirect.com/science/article/pii/S2667305322000412#sec0024

4. High costs of premium services

52.2% of the diet and nutrition app market in 2024 consisted of paid subscriptions. Because of that many users were reluctant to pay for these services. Providing a high-quality free version with optional premium features could encourage more people to use the app and track their nutrition consumption by scanning their meals.

Source: https://www.grandviewresearch.com/industry-analysis/diet-nutrition-apps-market-report

5. Invisible ingredients

Dutch foods like kroketten (croquettes) and bitterballen contain hidden ingredients such as butter, oils, and fillers. AI could improve estimation by considering the dish's cooking method.
Source: https://pmc.ncbi.nlm.nih.gov/articles/PMC7859960/#sec1-11

- **Are existing products or services meeting consumer expectations? If not, what are they lacking?**

1. Users' reviews from Google Play Store

In the research conducted by https://pmc.ncbi.nlm.nih.gov/articles/PMC8103297/#ref7 , they evaluated and classified , using text mining and NLP techniques, over 70,000 user reviews of diet-tracking apps on Google Play Store. Although the overall rating for all apps was 4.4 out of 5, with individual app ratings ranging from 4.1 to 4.7, some features could still be improved to enhance the user experience. They found out that features like creating own food databases, by scanning products or meals, would be useful due to the users.

Source: https://pmc.ncbi.nlm.nih.gov/articles/PMC8103297/#ack1

B. Problem Definition

Current nutrition apps do not fully address Dutch food recognition, manual meal tracking, or customized dietary recommendations. Users want a fast, AI-powered tool to recognize Dutch dishes, analyse nutrition, and provide insights into allergens, ingredients, and meal suggestions.

Market research, based on the study about the analysis of 70,000 user reviews of diet-tracking apps, indicates that there is a growing demand for more user-friendly solutions with more advanced features. Addressing these issues the AI-powered food recognition app, which would be able estimate dish ingredients and save user's time could improve long-term healthy habits.

Task 1.2: Stakeholders

Consumers

Power: Moderate - They decide whether the app succeeds or fails through adoption, feedback, and reviews.
Influence: High - Their feedback and reviews shape future updates
Interest: High – Users are directly affected by the app's performance. They seek a convenient way to recognize Dutch food, track nutritional intake, and make informed dietary choices.
Expectations: User-friendly interface, accurate Dutch food recognition, and affordability.
Needs: Reliable food classification, quick meal tracking, affordability.
Preferences: Free or low-cost plans, highly accurate AI, cultural relevance to Dutch cuisine.

Tourists and expatriates in the Netherlands

Power: Moderate – Their use and recommendations can influence adoption. They have limited direct control over app features.
Interest: High – Many tourists and expatriates struggle with Dutch food terminology and ingredients, making food recognition useful for dietary restrictions and preferences.
Expectations: Language-friendly UI, translation features, and reliable ingredient recognition.
Needs: Accurate identification of Dutch dishes, possible allergen warnings, and cultural insights.

Health and fitness enthusiasts

Power: High – They can drive popularity and usage through communities.
Influence: High - Nutrition tracking and ingredient transparency are essential for their dietary goals.
Interest: High – They rely on nutrition tracking to meet health goals.
Expectations: Accurate calorie tracking, seamless app integration, meal recommendations
Needs: : Scientific accuracy in food recognition, goal tracking, habit support
Preferences: Fitness app compatibility, easy food logging, social sharing

Dietitians and Nutritionists

Power: High – As trusted health professionals, they influence consumer trust and can recommend the app to patients.
Influence: Moderate – They are trusted by health-conscious consumers.
Interest: High – They require accurate ingredient recognition for advising clients on nutrition and meal planning.
Expectations: Reliable ingredient recognition.
Needs: Trustworthy AI recommendations, customization for clinical applications
Preferences: Scientific backing, precise food labelling

Medical and Dietary Research Institutions

Power: High – They can validate the app's accuracy and contribute valuable nutritional data. Their endorsement can enhance credibility.
Interest: Moderate – Their primary interest is research and data collection rather than daily consumer use.
Expectations: High AI accuracy, secure data collection, research potential
Needs: Large-scale nutritional datasets, algorithm transparency
Preferences: Reliable research access, ethical data use

Dutch Food Industry, Restaurants

Power: High – These stakeholders can contribute to the food database, form partnerships, and influence app adoption by featuring it in their menus.
Influence: Moderate – They can promote app among customers.
Interest: Moderate – While transparency in food labelling is beneficial, their focus remains on business operations rather than tech adoption.
Expectations: Food recognition compatibility with restaurant menus.
Needs: Increased customer engagement, transparency in nutrition labelling.
Preferences: marketing partnerships

- Using the above information, prioritize and categorize stakeholders within the *Business-to-Consumer Power-Interest Matrix* (Figure 1). Explain the relationship between stakeholders and their respective positions within the matrix.

SUBJECTS Low Power High Interest	**PLAYERS** High Power High Interest
Consumers, Tourists and expatriates: They are highly interested in the app but have limited power in decision-making. Their influence comes from providing feedback and driving app adoption. Their expectations for affordability and user-friendliness should be prioritized to ensure engagement.	**Health and Fitness Enthusiasts:** These users are trendsetters in the fitness and nutrition space. They have the power to drive app popularity through communities and social influence. Their needs for scientific accuracy should be met. **Dietitians and Nutritionists:** As trusted professionals, they influence consumer choices and

	can advocate for the app's credibility. Ensuring precise food labelling and AI accuracy will strengthen their trust in the product.
CROWD Low Power Low Interest **General Public (Non-Users, Passive Observers)**: This group consists of people who may not actively use the app but could become potential users in the future. While they don't have direct influence, they may be swayed by recommendations from key players.	**CONTEXT SETTERS** High Power Low interest **Medical and Dietary Research Institutions**: While they have the power to validate the app's accuracy, their interest is moderate since they focus on research applications. Collaboration with these institutions can enhance the app's credibility. **Dutch Food Industry (Restaurants, etc.)**: Their participation could improve meal classification accuracy and branding, but their primary focus is on business operations. Forming strategic partnerships with these entities could enhance food database accuracy and increase user engagement.

Figure 1. *Power-Interest Matrix*

- Identify **the main stakeholder** and explain their needs, priorities, and expectations, as well as the reason behind their need to solve the problem. Explain why it will be **beneficial** for the company to address this problem, focusing on this "main stakeholder". Use statistical data and justifications to support your answers.

Main Stakeholder: Consumers

Needs: Accurate food recognition, quick meal tracking, affordable access
Priorities: AI accuracy, privacy, seamless app experience
Expectations: Reliable classification, user-friendly interface, and personalized insights.

Beneficial for the company

Market Demand:

- The global food app market was valued at $4.7 billion in 2023 and is expected to grow at a CAGR of 21.9% from 2024 to 2030 due to increasing health awareness.
  Source: https://www.grandviewresearch.com/industry-analysis/diet-nutrition-apps-market-report

- A study of 70,000 user reviews on Google Play Store found that people want AI-driven food recognition to replace tedious manual logging.
  Source: https://pmc.ncbi.nlm.nih.gov/articles/PMC8103297/

Competitive Edge:

- Manual food logging is a major frustration among users. Existing apps rely on barcode scanning or database searches, which are time-consuming. An AI-powered image recognition system can simplify this process by instantly identifying foods from photos.
  Source: https://www.sciencedirect.com/science/article/pii/S2667305322000412#sec0024

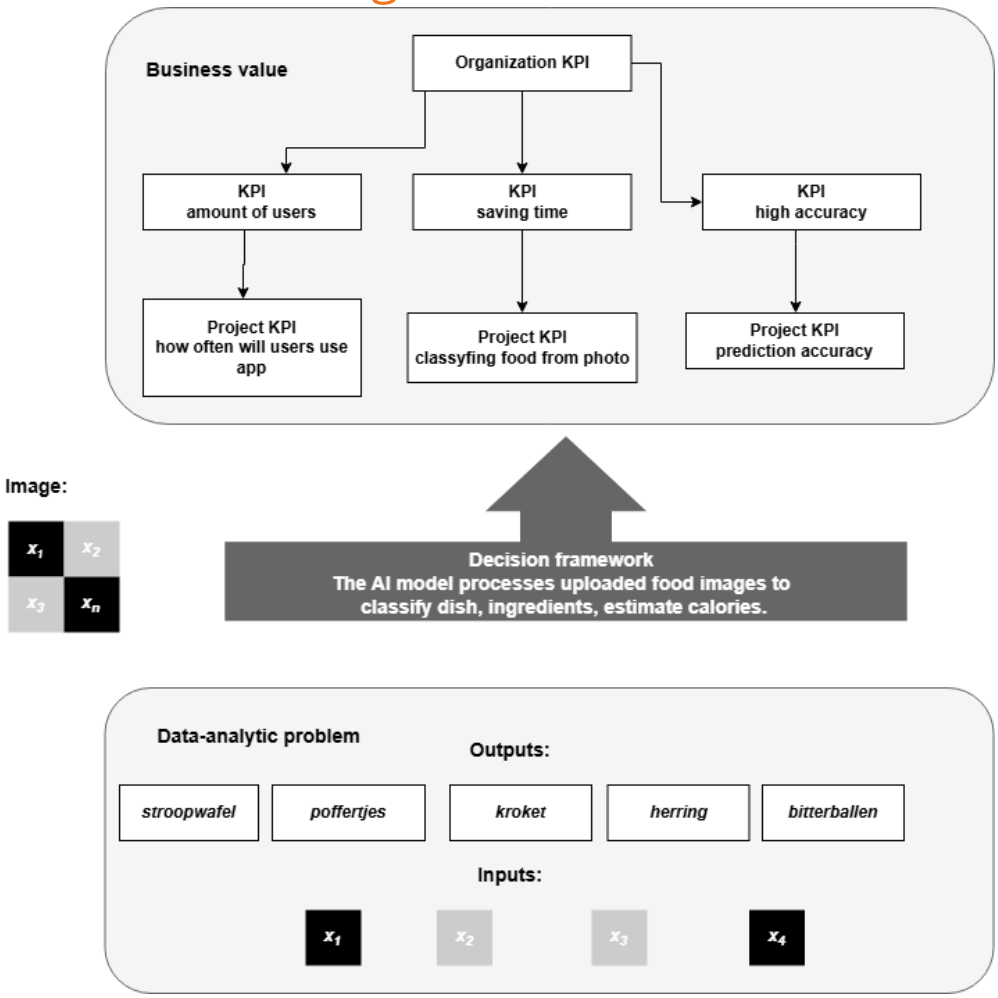
- Many apps fail to personalize meal recommendations based on individual dietary preferences, allergies, or goals. An AI-powered model can solve this gap.
  Source: https://pubmed.ncbi.nlm.nih.gov/39125452/

Long-Term revenue potential:

A free version would attract a large user base, leading to subscription-based premium features, with fitness apps and meal services for research institutions and food companies.

By prioritizing consumers, the app ensures high adoption rates, strong engagement, and long-term sustainability in the competitive nutrition-tech market.

Task 1.3: DAPS Diagram



Questions:

1. How will the project contribute to the organization's goals?

- The app captures a niche market (Dutch cuisine recognition) and taps into a growing global nutrition app industry. Current apps do not specialize in Dutch cuisine, giving the organization a first-mover advantage.
- By simplifying food tracking with AI, it reduces the manual burden on users, leading to higher adoption and retention.
- Monetization through premium subscriptions, data partnerships with research institutions, and collaborations with restaurants.
- Establishing credibility through collaboration with dietitians and nutritionists.

2. What is the direct benefit of applying the decision framework?

The main benefit of using the decision framework is that it helps create the app in a way that meets both business goals and user needs. It guides decisions on what features to include, how to price the app, and

how to keep users engaged. It ensures that the AI model is trained properly to recognize Dutch foods accurately. Additionally, it helps the company find the best ways to make money, form useful partnerships, and improve the overall user experience, leading to more people using the app and long-term success.

3. For what decisions or actions will the model be used?

- Identifying Dutch dishes and their nutritional content.
- Optimizing features based on user feedback and behavioural analysis, suggesting recipes.
- Determining subscription models and premium features based on user demand.

What agent takes decisions?

- AI Model: Determines food classification, ingredient breakdown, and calorie estimation.
- App User: Decides on meal choices based on provided insights.
- Organization's Business Team: Defines pricing, marketing strategies, and partnerships.

When are decisions taken?

- When a user scans a meal, the model provides an instant food recognition result.
- Pricing, feature updates, and partnerships are reviewed periodically.

What is the unit of analysis?

- Individual Food Images: The AI model analyses images to classify meals and ingredients.
- User Profiles: Tracks dietary preferences, meal history, activity and engagement.

Intervention in x's?

- Ensuring that AI model accurately recognizes Dutch cuisine.
- Enhancing user interaction and experience.
- Adjusting features, pricing, and marketing based on user feedback.

4. What will the model predict?

- Identifying Dutch dishes from an image, determining likely ingredients in a dish.
- Estimating calories, macronutrients, and allergens.

5. What is the type of relationship?

Correlational: The AI model identifies patterns in food images to classify dishes.
Causal: Nutritional intake tracking can influence health outcomes.
Deductive: Food classification relies on pre-existing knowledge and training data.

6. What are potential predictors/features?

- Colour, texture, shape, and presentation of food items.
- Common ingredients associated with Dutch dishes.
- User Dietary Preferences: like allergies, calorie goals, and cuisine preferences.
- Whether the dish is restaurant-served, home-cooked, or processed.

Task 1.4: Idea Generation

Define the main idea for your application and align it with your market research, business value, and consumer needs.

- Thoroughly explain and justify your idea, starting with the problem definition and its link to the final product.

The main idea for the application is an is an AI-powered Dutch food recognition and nutrition tracking app that allows users to take a photo of a Dutch dish, instantly identify the ingredients, and receive detailed nutritional insights, allergen warnings, and cultural information.

Many consumers, especially tourists, expatriates, and health-conscious individuals, struggle to identify Dutch foods due to unfamiliar ingredients, language barriers, or dietary restrictions. This app will bridge the gap by leveraging AI-driven image recognition and food classification to provide users with accurate ingredient breakdowns, calorie estimations, and meal recommendations based on their dietary preferences.

- Explain how your final product will address the needs of your main stakeholder.

The current food and nutrition apps in the market lack specialized recognition for Dutch cuisine. Many food-tracking apps focus on barcode scanning or pre-defined food databases, making it difficult to log traditional or restaurant-served meals. This results in inaccurate nutritional tracking and a frustrating user experience.

Saving time:

AI-powered image recognition eliminates the need for manual food logging. Instead of searching for meals in a database, users can simply take a photo, and the app will instantly classify the dish.

Enhancing accuracy:

The app will use AI-trained models specifically on Dutch cuisine, ensuring high recognition accuracy. The app will not only recognize the dish but also analyse common hidden ingredients and preparation methods (e.g., if a dish is typically fried in butter or oil).

Providing affordability:

A free version with essential features will make the app accessible to a broader audience, with possibility to pay for additional benefits.

- Provide and explain the business value that your application will deliver to the company or industry.

1. **Capturing a growing market**:

   The global nutrition app market is projected to grow at a CAGR of 21.9% from 2024 to 2030. By addressing key consumer pain points, the app can capture a significant share of this expanding market. Studies show that consumers want AI-driven food tracking to replace manual logging.

2. **Driving user engagement,**:

   Users prefer free or low-cost apps with optional premium features. By offering a free version, the app will attract a large user base, while premium features will generate revenue.

3. **Partnerships:**

Collaborations with restaurants, fitness apps, and nutrition brands create monetization opportunities (e.g., offering restaurant-verified nutritional data, sponsored meal plans).

4. **Generating long-term revenue**: Revenue streams will include:
   - **Subscription fees**: Premium features like advanced analytics, personalized meal plans, and ad-free experiences.
   - **Data monetization**: Aggregated, anonymized data can be sold to research institutions or food companies for market analysis and product development.
5. **Enhancing brand credibility**:

   By collaborating with dietitians, nutritionists, and research institutions, the app will gain credibility and trust among health-conscious consumers.

References

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- ScienceDirect, 2022. Mobile health application and its effects on promoting healthy behaviors and managing chronic diseases
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