Ablaze Labs

Building the African Economy

Business Requirements Document

Coffee Economics

Version 1.0

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Contents

1. Introduction

1.1 Purpose of the Document

The purpose of this Business Requirements Document is to outline the functional and nonfunctional requirements for the Coffee Economics App. This document ensures that all stakeholders have a clear understanding of the app's features, goals, and scope. By centralizing these requirements, this document facilitates alignment and effective collaboration throughout the development process.

1.2 Scope

The Coffee Economics App is designed to empower wet mill owners, managers, and other stakeholders in the coffee industry by providing tools to streamline operations, improve profitability, and make data-driven decisions. The app combines user-friendly interfaces and robust features to address key challenges faced by the coffee sector, particularly in remote regions.

Key functionalities include:

- Coffee Conversion Calculator: Assists in precise yield calculations across various processing stages (e.g., cherry to parchment, parchment to green coffee), enabling accurate production planning. The conversion process will encompass the transformation of coffee in various forms, including:
    a. Coffee cherries to pulped parchment
    b. Pulped parchment to washed wet parchment
    c. Coffee cherries to dried pod (Jenfel)
    d. Coffee cherries to washed dried parchment
    e. Pod to green coffee
    f. Parchment to green coffee
    g. Cherries to green coffee

The measurements or metrics used for these conversions will include kilograms (KG), Feresula, 60kg bags, and pounds. Each form of coffee is interrelated through the processing stages:

Coffee cherries serve as the starting point, which can be processed into pulped parchment, dried pods (Jenfel), or washed dried parchment. Pulped parchment can further be processed into washed wet parchment, which then dries to become washed dried parchment. Dried pods (Jenfel) and washed dried parchment are both intermediate forms that can be milled or hulled to produce green coffee. Green coffee is the final product derived from pods, parchment, or directly from cherries, depending on the processing method.

These interrelationships highlight the sequential and interconnected nature of coffee processing.

- Coffee Processing Cost Breakdown: Estimates coffee pricing by considering conversion rations (mentioned above), costs, profit margins, and quality, with best-practice benchmarks and export options. The detailed version further analyzes operational needs like labor, storage and processing capacity.
- Operation Planning Feature: Automates operational calculations by using minimal input data and applying handbook formulas to determine processing requirements, such as machine hours, number of coffee drying beds, warehousing, number of workers (like sorters, washers, and other), operational lead time, fermentation tankers, required water volume, etc…… based on capacity
- Global Coffee Stock Prices Display: Delivers real-time updates on coffee prices, categorized by region and type, with previous trends for market analysis. . The system shall **display metrics**, allowing users to view prices in **KG, LB, Feresula, and Kesha Yetekeshere**, ensuring flexibility for different market preferences.
- User Profile & Wet Mile Management: Allows users to setup profile and manage wet mill profiles up to 10 sites per person.

- Offline Functionality: Core features (conversion calculator, cost breakdown, operations planning) will work offline, with live data (e.g., global coffee prices) requiring an internet connection.
- Dual Language: the application will offer full app functionality in both Amharic and English language by providing a language toggle feature for seamless switching between languages.

This app aims to:

- Simplify operational workflows for wet mill owners and managers.
- Enhance financial planning with robust cost analysis tools.
- Reduce bottlenecks in production through optimized scheduling.
- Empower users with actionable market data to maximize profitability.

1.3 Document Conventions, Terms, and Definitions

This document adheres to specific conventions to maintain consistency and clarity. Standard practices are used throughout the document to ensure that information is presented clearly and is easily navigable. These conventions aid in emphasizing important sections, organizing content logically, and enhancing readability, thereby helping readers to efficiently understand and use the information provided.

Terms and Definitions.

- User: Any individual interacting with the Coffee Economics app.
- Wet Mill Owners: individuals managing coffee processing facilities.
- Conversion Rates: Metrics used to calculate output for different coffee processing stages.
- BRD (Business Requirements Document): is a formal document that outlines the business objectives, needs, and expectations for a project.
- UI (User Interface): refers to the visual and interactive elements of a system, application, or website that users engage with.

- API (Application Programming Interface): is a set of rules and protocols that allow different software applications to communicate with each other.
- Best Practice Benchmarks: Standard or user-defined values for cost inputs, profit margins, and pricing models used to validate data.

1.4 Intended Audience

Client: Understand the project's goals, requirements, and expected benefits. This section helps clients see how the system will meet their needs and deliver value.

Project Managers: Gain an overview of the project's scope, objectives, and requirements. This section helps them understand how various components of the system fit together and the overall project goals.

Tech Lead: Understand their role in overseeing the technical aspects of the system, including development, integration, and technical problem-solving. This section provides insights into the system architecture and technical requirements.

Developers: Obtain detailed guidance on the system's functionalities, design, and implementation. This includes understanding the technical specifications and how to develop features according to the outlined requirements.

Quality Assurance (QA) Testers: Ensure the system meets all requirements and handles errors effectively. This section helps them understand the scenarios they need to test, including normal and edge cases, and the expected outcomes.

Product Owner: Oversee that the system aligns with the product vision and business needs. This section helps them ensure that the development aligns with strategic goals and user expectations.

2. Overall Description

2.1 User Classes and Characteristics

Wet Mill managers: users who manage the wet mill operations, monitoring costs & performing calculations, managing operational planning and accessing real-time market insights.

3. System Features

3.1 User And Wet Mill Management

3.1.1 User Profile Setup

Description

This feature allows users to set up profiles, allowing them to create and manage multiple wet mill profiles for simulating various operational scenarios. User profile data is stored locally on the device.

Functional Requirements

- Users can setup profile by inputting their username / name
- The system must store user profiles locally.

Use Cases

Use Case ID	UC-01
Use Case Name	User Profile Setup
Actors	Wet Mill Manager

Description	This use case covers the process of profile setting up a new user. The user's information is stored locally on the device.
Trigger	A new user launches the app
Preconditions	• The user opens the mobile application for the first time • The user views the onboarding screen
Postconditions	• A new user profile is successfully stored • The user is redirected to the wet mill setup or home page after successful profile set up.
Normal Flow	1. User Launches the App: a. The user downloads and opens the app. b. The system displays a Welcome Screen with profile setup option i. The welcome screen should acknowledge the app's development and key collaborators. 2. User Selects Sign Up: a. The user continues with profile setup b. The system presents a field to put their name / username c. Once the user enters the name and confirms, the system saves the profile locally. 3. The system displays a Credit and Disclaimer Notice outlining the terms of use. 4. The user reads and acknowledges the notice by clicking Agree & Continue. 5. System Confirms Successful profile setup: a. If profile setup is successful, the system displays a confirmation message: *"Your account has been successfully saved!"* b. The user is redirected to the wet mil Setup or Home Page.

Alternative Flow	• If the user already has a local profile, they are redirected to the home page instead of creating a new profile.
Exceptions	• If the app fails to save data locally (e.g., insufficient storage), an error message is displayed, prompting the user to free up space. • If the device is reset or the app is uninstalled, locally stored data will be lost

3.1.2 Site Operation Management (Wet Mill Profile Management)

Description

This feature enables users to manage operations at different wet mill sites. Users can add, edit, or modify wet mill profiles, and manage the settings for each site such as location, and other configurations.

Functional Requirements

- The system should allow users to manage up to 10 wet mill profiles.
- The system should enable users to add and edit wet mill profiles with key operational information.
- The system should validate the entered information during the creating, editing and deleting of coffee sites.
- The system should enable users to configure operational details for each wet mill.

Use Cases

Use Case ID	UC - 02
Use Case Name	Wet Mill Site Operation Management
Actors	Wet Mill Manager
Description	This use case covers the management of wet mill site profiles, including site information and other details.
Trigger	The wet mill owner wants to add a new site or modify existing one or delete one.
Preconditions	• The user must have an active login session. • The user must be on the wet mill site profile page.
Postconditions	• The system updates the profile list, reflecting any newly created, updated, or deleted profiles with a confirmation message.
Normal Flow	1. User Navigates to Wet Mill site Profile Management **Add New Wet Mill Site** 2. User clicks on the "Adds New Wet Mill" button : • The system displays a form with fields: ○ Site Name ○ Location ○ Business model**:** A drop-down list pre-populated with options:

	• Direct export • Supplier • Cooperative • Other (for share companies that export and supply, or farmer exporters operating at a small scale) 3. The user fills in the required fields and clicks Save. 4. The system validates all required fields. 5. If valid, the system saves the new wet mill information and displays a confirmation message. 6. If the limit is reached, the system notifies the user that the maximum number of wet mills has been created and prevents further account creation. **Edit Wet Mill Site** 1. User selects a wet mill profile from the list and clicks on edit 2. The system displays the current profile details in editable fields. 3. The user modifies necessary information and clicks Save. 4. System Saves Updates and Confirms Changes: • A confirmation message is displayed: "Your wet mill has been updated successfully." 5. User Reviews Updated Wet Mill Information: • The user sees the changes reflected in their wet mill profiles. **Deletes Wet Mill Profile** 1. The user selects a wet mill profile and clicks "Delete". 2. System prompts the user with a confirmation message:

	○ "Are you sure you want to delete this profile? This action cannot be undone." 3. User confirms deletion and proceeds with the action. 4. System validates the request and displays a success message: ○ "Profile deleted successfully." 5. System updates the user's wet mill list, removing the deleted entry. 6. The user is redirected back to the wet mill list page.
Alternative Flow	• The user decides not to proceed with the changes and clicks Cancel. • The system discards the changes and returns to the wet mill overview page.
Exceptions	• If the user enters incorrect or incomplete data, the system highlights the field and guides the user to enter valid information before proceeding.
Business Rules	• A user can create and manage up to 10 wet mill profiles.

3.2 Coffee Conversion Calculator

Description

The Coffee Conversion Calculator feature enables users to accurately convert coffee measurements across various processing stages. By entering values such as cherry weight, parchment weight, green bean weight, or any other stage weight, the calculator

automatically computes and displays the corresponding output for the selected coffee stage.

Functional Requirements

- Users can input raw coffee quantities, including cherries, parchment, or green beans.
- The system should validate inputs to ensure they are numeric.
- Users can select from multiple units of measurement, such as kilograms, pounds, or metric tons.
- The system should compute and provide the calculated output for the requested conversion.

Use Cases

Use Case ID	UC - 03
Use Case Name	Coffee Conversion Calculator
Actors	Wet Mill Manager
Description	This use case explains how users convert and calculates coffee weights across processing stages
Trigger	The user wants to convert a coffee weight from one processing stage to another
Preconditions	• The application is installed and running • The user access the coffee conversion calculator menu
Postconditions	• The user sees the calculator output for the selected coffee stage

Normal Flow	1. User Navigates to the Coffee Conversion Calculator a. The user navigates to the Convert section. b. The user selects the Coffee tab. 2. The user selects the input coffee type and unit (e.g., Cherry, KG). 3. The user enters the amount of input coffee (e.g., 1000 KG of Cherry). 4. The user selects the desired output coffee type and unit (e.g., Green Coffee, KG). 5. The system uses the following coffee conversion ratios in respect of cherries.

	Ratio to 1 kg cherry	Ratio
Cherry	1 : 1	1
Pulped Parchment	1.8 : 1	0.55
Wet Parchment	2.6 : 1	0.39
Dry Parchment	5.0 : 1	0.20
Unsorted Green Coffee	6.3 : 1	0.16
Export Green	6.9 : 1	0.14

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Ready table

Processing Stage	input → Output	Ratio
Fresh cherry → Dried pod	Wet → Sun-dried (Jenfel)	4:1-5:1
Dried pod → Green coffee	Hulling	1:25:1

6. If the user inputs the cherry volume to convert to any desired stage, the system will multiply the cherry volume by the conversion factor (ratio) for the selected output stage.
   For e.g.

   If the user wants to convert 3000 kg cherry to wet parchment, then the system will fetch the conversion factor provided for wet parchment and multiply it by the cherry volume.
   Conversion factor: 2.6 : 1 or (0.39)
   Cherry weight: 3000 kg
   Wet parchment weight = cherry weight x conversion factor = 3000 kg x 0.39 = 1170 kg

7. If the user wants to convert from any stage (other than the cherry stage) to another stage, the system will determine the conversion rate based on the provided data. Since the conversion factors are relative to cherry weight, the system will:
   - Fetch the conversion factors for both the input and output stages.
   - Calculate the conversion rate by dividing the output stage conversion factor by the input stage conversion factor.
   - Multiply the input stage volume by the conversion rate.
   - Display the final output.

	For e.g. If the user wants to convert 200 kg of pulped parchment to unsorted green coffee, then the system will fetch the conversion factor provided for both Pulped Parchment and unsorted green coffee. Pulped Parchment: Conversion Factor = 0.55 Unsorted Green Coffee: Conversion Factor = 0.16 Conversion Rate = 0.16 ÷ 0.55 = 0.2909 Then the system will calculate the unsorted green coffee from the 200 kg of pulped parchment Pulped parchment weight: 200 kg Unsorted green coffee weight = pulped parchment x conversion rate = 200 kg x 0.2909 = 58.18 kg

Alternative Flow	• If the user enters an invalid weight (e.g negative or non-numeric input):
	  ○ The system displays an error message and prompts the user to enter a valid weight
	• If the user wants to reset the input:
	  ○ The user can clear the input and enter a new value

Exceptions	
Business Rules	• The conversion calculations must follow industry-standard weight conversion rations

	• The calculator should only accept positive numerical inputs • The user should not be able to modify the predefined conversion formula

Use case table for the unit conversion

Use Cases

Use Case ID	UC - 05
Use Case Name	Coffee unit conversion
Actors	Wet Mill Managers
Description	Allows users to convert values between different Units.
Trigger	The user selects unit conversion tab
Preconditions	The user has launched the app and navigated to the " Convert -> Unit " section.
Postconditions	The user sees the unit calculator output
Normal Flow	**User Opens the Convert Screen** • The user navigates to the "Convert" section from the bottom navigation bar. • The system displays two tabs: **Coffee and Units**. **User Selects a Conversion Category**

	• The user taps on the unit tab:
	  ○ **Units**: Converts between different general units of measurement.
	• The system highlights the selected category.
	
	User Selects the Source Unit
	
	• The user taps the dropdown menu under the first input field.
	• The system displays a list of available units based on the selected category.
	• The user selects a unit (e.g., Kilograms for weight conversion).
	
	User Selects the Target Unit
	
	• The user taps the dropdown menu under the second input field.
	• The system displays a list of compatible units for conversion.
	• The user selects the desired target unit (e.g., Feresula).
	
	User Inputs a Value to Convert
	
	• The user types a numerical value into the input field.
	• The system dynamically calculates and updates the converted value in real time.
	
	System Displays the Converted Value
	
	• The system performs the conversion based on predefined conversion rates.
	• The converted result is displayed below the input fields.
	• The result includes:
	  ○ The original value and unit.
	  ○ The converted value and unit.

	○ A "Clear All" button to reset the inputs.
Alternative Flow	**User Does Not Select a Source Unit** • If the user attempts to enter a value without selecting a source unit, the system displays a validation message: ○ *"Please select a unit to convert from."* **User Does Not Select a Target Unit** • If the user selects a source unit but not a target unit, the system prompts: ○ *"Please select a unit to convert to."* **User Enters an Invalid Input** • If the user enters a negative number or non-numeric characters, the system displays a warning message: ○ *"Invalid input. Please enter a valid number."* • The conversion is not performed.
Exceptions	
Business Rules	• The field should accept only numerical values.

3.3 Coffee Operational Planning

Description

The **Operations Planning Feature** enables users to set production targets and allocate resources towards achieving specific output goals. This feature helps **wet mill owners and managers** optimize workflows.

Functional Requirements

- The system should ask users to input:
    - The green beans the user wants to produce this season.
    - Then the system should let the user select the conversion unit (e.g. kg/Lbs/F).
    - Pulping machine type (Disk pulper, Drum Pulper – either horizontal or vertical, and screen pulper)
        - And the user is also required to input the disk type: it should either be 1 disk or 3 disk.
        - The user must input the number of pulper machines.
        - The user must also enter the average number of hours the machine operates.
    - Fermentation tank details.
        - The user is required to enter the length, width and depth of the fermentation tank.
        - The user must enter the number of fermentation tanks.
        - The user must enter the number of hours the fermentation tank operates.
    - Drying space.
        - The user is required to enter the number of drying tables.
        - The user can input the drying bed size but it can also be system default. So this is an editable form.
        - The user can input the dry parchment days but it can also be system default of 11. So this is also an editable form.

- The system should have an output of:
    - Convert green coffee beans to cherry weight using the standard ratio, which tells the user to buy that much cherry. And also convert to other standards using the ratio.
    - Determine the number of bags required (1 bag = 60 kg of green coffee).
    - The total transportation cost.
    - The drying space days.
    - The fermentation days.
    - The pulping days.
    - The total days required to finish all the operations.

Use Cases

Use Case D	**UC - 05**
Use Case Name	Operation Planning Feature
Actors	Wet mill owners, managers
Description	This use case explains how users plan for coffee production by inputting key parameters to estimate required resources.
Trigger	The user selects the “Plan” tab from the app menu.
Preconditions	The system must have predefined conversion ratios and equipment specifications. The system must allow input of all required production components.
Postconditions	The system calculates and displays required resources for the target production volume.
Normal Flow	User Opens the Plan Screen The user navigates to the "Plan" option from the menu. The system displays the coffee production planning interface. User Inputs Green Coffee Bean Production Goal The system prompts the user to enter the desired production volume. The user enters the amount in the preferred unit (kg/Lbs/F). User Selects Pulping Machine Details The user selects the pulping machine type (Disk pulper, Drum Pulper – horizontal/vertical, or Screen pulper). The system displays an additional option for disk type. The user selects the disk type (1 disk or 3 disk).

	The user enters the number of pulper machines. The user inputs the average number of hours the pulping machines operate per day. System Calculates Pulping Days The system converts the entered green beans to cherry. If necessary, the system converts the cherry volume to kg. The system calculates the daily pulping capacity: - *Daily Pulping Capacity = Pulper Hourly Capacity (Mt) × Average No. of Hours × Number of Pulper Machines* The system calculates the number of days required for pulping: - *Pulping Days = Cherry Amount / Daily Pulping Capacity* User Provides Fermentation Tank Details The user enters the length, width, and depth of the fermentation tank. The user specifies the number of fermentation tanks available. The user enters the number of hours the fermentation tank operates per day. System Calculates Fermentation Days The system converts the cherry amount to wet parchment using a predefined conversion ratio. The system calculates the daily fermentation capacity: - *Daily Capacity = (Length × Width × Depth × Mt per m³ × Number of Tanks) ÷ Number of Days Fermenting (Rounded up)* The system calculates the number of fermentation days: - *Fermentation Days = Wet Parchment Amount / Daily Capacity* User Provides Drying Space Details The user enters the number of drying tables.

	The user can input the drying bed size (Length × Width) or use the system default. The user can input the drying period (days) or use the system default (11 days). System Calculates Drying Days The system converts wet parchment to dry parchment using a predefined conversion ratio. The system calculates the daily drying capacity: - *Daily Capacity = Length × Width × Dry Parchment kg/m² × Number of Drying Tables ÷ Average Drying Period × 5* The system calculates the number of drying days: - *Drying Days = Dry Parchment Amount / Daily Capacity* System Calculates and Displays Total Processing Days The system sums the pulping, fermentation, and drying days and displays the total number of processing days. System Calculates Required Bags and Transportation Cost The system calculates the number of bags needed (assuming 60kg per bag) based on the overall cherry volume. The system prompts the user to enter the transportation cost per bag. The system calculates the total transportation cost: - *Total Transportation Cost = Number of Bags × Cost per Bag* User Reviews and Adjusts Inputs The system displays the estimated results, including: - Total processing days - Required number of bags - Total transportation cost

	The user reviews the results and makes adjustments if necessary. The system updates the calculations dynamically based on any changes made by the user.
Alternative Flow	If invalid inputs are entered, the system prompts the user to correct missing or incorrect values.

Exceptions	• If the user leaves a required field empty, the system highlights the missing field and displays:
	  ○ *"Please fill in all required fields before proceeding."*
	• If the user enters invalid values, the system displays:
	  ○ *"Invalid input detected. Please enter a valid number."*

Business Rules	Scheduling must prioritize maximum resource efficiency.

3.4 Coffee Price Calculator

3.4.1 Basic Price Calculator

Description

The Basic Price Calculator helps users calculate the final coffee selling price by inputting key cost factors, using a model to ensure accurate pricing. It flags deviations from best practices, allows currency selection, and provides options to save, view, or download a cost breakdown in PDF format for sharing.

Functional Requirements

- The system shall calculate the basic price by using the provided calculation.
- The system must allow users to input key cost factors such as:
    - The desired volume of coffee to procure, with a drop down options for the user to select from (e.g., red cherries, parchment, green coffee, pod/Jenfel).
    - Drop-down of different unit measures (E.g, Feresual/KG/lb/Kesha).
    - The coffee type purchase price (per KG; average or season-starting).
    - Quality Premium / Second Payment(Optional additional incentive).
    - Total variable costs for the season (could be transportation costs, Jute bag).
    - Other operational costs.
    - The users are required to enter conversion ratios (E.g. cherry to parchment) along with the selected coffee stage .
- The system displays the calculated break-even price for the selected coffee stage.
- Then the system will require for the user to enter Desired profit margin (%).
- The system will apply formulas to estimate the final selling price based on input costs.
- The system must compare the user inputs against best practice pricing benchmarks after the break-even price is calculated.

- The system must flag any cost inputs that deviate from the best practices and allow users to view the details of the flagged inputs.
- The system must apply a defined calculation model to process the input data and determine the final coffee selling price.
- If any cost input deviates from the best practices, the system flags it.
- If the user clicks the flagged tab then the system displays a pop-up message to the user suggesting the user to set the inputs based on the best practices.
- The system should provide an option to change the selling price to different currencies from ETB(Optional).
- The system fetches real-time exchange rates and, optionally, displays the current coffee selling price in the chosen currency.
- The system validates all numerical inputs to ensure they are entered correctly.
- The system must allow users to save their pricing calculations for future reference.
- The system will calculate and display the cherry break-even price.
- Users can download a PDF Cost Breakdown Document (CBD) excluding the profit margin.

Use Cases

Use Case ID	UC - 05
Use Case Name	Basic Price Calculator
Actors	Wet Mill Managers
Description	This use case explains how users calculate the basic calculation method by inputting key cost factors, conversion ratios, and profit margins.

Trigger	The user wants to calculate the selling price of coffee based on input costs
Preconditions	• The application is installed and running • The system must load default best practice pricing benchmarks. • The system must allow input of all required pricing components.
Postconditions	• The system calculates and displays the final selling price in different currencies with price per KG/LB/FERESULA/KESHA (60KG bag). • The system shows deviations from best practices • The user can save or export the pricing details as a PDF

Normal Flow	User Navigates to the Basic Price Calculator
	• The user logs into the Coffee Economics App and selects the "Calculator" option. Then select the basic calculation tab.
	User Inputs Pricing Details
	• The system displays a pricing form where the user can enter all the input fields needed for the basic coffee calculator.
	  ○ The user selects the purchased coffee type from the drop down menu.
	  ○ The user inputs the volume of the selected coffee type(KG).
	  ○ The user inputs the purchase price.

	○ The user enters the Quality premium / Second Payment if available. ○ The user provides other variable costs (such as utilities, drying bed in terms of price, labor, hulling cost) for the operating season. ○ The user inputs the ratio for the conversion to the output coffee type. (e.g. cherry to parchment 18%) ○ The user then enters/inputs fixed Operating expenses(such as labor (management) and annual maintenance). ● The system will calculate the basic price and display the break-even price in birr. ● The user inputs the profit margin (%) ● The system then calculates the profit margin and displays the final price. ● The system then displays the final selling price. ● The user has the option to change to the preferred currency. **The calculation is done as follow**: ● The system first calculates the break-even price. ○ The system adds the purchase price, other variable cost, quality premium / Second Payment (if available), and fixed operating cost. ○ Then the system will divide the added amount to the selected coffee type volume multiplied by the ratio input the user entered (cherry to parchment, etc). ○ The system will display the calculated break-even price

	○ If the user wants to view it in kg then the system then divides the output by 17 if it wants to convert it to kg. ● The system will calculate and display the profit. ○ Then the system will take the break-even price then multiply it by the profit margin from the user input. This will display the profit. ● The system will calculate and display the final selling price. ○ The system then takes the profit and adds it to the break-even price to display the selling price. ● The system calculates the cherry break-even price by the following calculation: ○ The user Enters the latest market price for 1 Feresula (17 kg) of parchment coffee. ● Then the System Retrieves Best Practice Processing Costs ● Then the system Uses standard conversion ratios drive from the conversion table: ○ E.g. ● Fresh Cherry → Dry Parchment (5 : 1 ratio) ● Cherry → Export Green (6.9 : 1 ratio) ○ Cost structure: 80%-85% of total cost comes from cherry purchases(this is taken from the benchmark table). ● Then the System Calculates Revenue Per kg of Parchment

	● Formula: Revenue per kg parchment=Market Price of Feresula / 17 ● The system then Determines how much revenue is generated per kg of parchment coffee. ● Cherry required per kg parchment: 1 kg÷0.20=5 kg cherry/kg parchment ● Maximum cherry price based on revenue: Revenue per kg parchment / 5 ● Break-even Cherry Price Calculation: ○ 80% cost share: (Revenue per kg parchment×0.80) / 5 ○ 85% cost share: (Revenue per kg parchment×0.85) / 5 ● System Displays the Predicted Cherry Price Range ***P.S The total procurement includes: cherry price, quality premium, broker costs, second payment, Jute & Plastic Bags, Transport costs.*** ● The system displays the final price. ● The system displays the current coffee selling price in the chosen currency(Optional). System Loads and Cross-Checks Against Best Practices(TNS provided benchmarks) ● The system loads default best practice pricing benchmarks set by TNS

- The system cross-checks the best practice against the break-even price after calculating the break-even price.

	As a % of total
Cherry purchase	80-85%
Cherry Transport and Commission	3-5%
Labor (Full-Time)	2-3%
Labor (Casual)	3-5%
Repairs and Maintenance in-season	1-2%
Fuels and Oils	<1%
Other Expenses	4-6%

- To ensure accuracy, the system **will compare the cherry price with the benchmarks and flag the user entered coffee stage price range (benchmark should be between 80-85%)** if it falls outside the expected best practice range.
- The system must compare and flag the **fixed operating cost** if the user input value is more than or less than the benchmark (**benchmark should be between 3-5%**).
- The system must compare and flag the **other variable cost** if the user input value is more than or less than the benchmarks set by TNS(**benchmark should be between 6-10%).**
- The system must compare and flag the **other estimated expenses (**remaining other expenses**)** if the user input value is more than or less than the benchmarks set by TNS(**benchmark should be between 4-6%).**

	• If the input price for the above values are **higher or lower than the benchmark**, the system:
	  • The field will be Flags.
	  • When the flag is clicked, a pop-up **message** indicating the deviation is shown.
	  • The system then suggests an adjustment based on the best practice range.
	• The user can either adjust the input or **proceed with the flagged value** as entered.
	
	P.S The best practice are checked form the break-even price calculated
	
	User Saves/Exports the Data
	
	• Once satisfied with the adjustments, the user will select the wet mill from a drop-down and save the calculation for future reference.
	• The user should be able to save the data since it's offline since the data will be stored in local storage.
	• The user also has the option to export the price breakdown as a PDF Cost Breakdown Document (CBD) (excluding profit margin) for sharing purposes.
	
	Edit Basic Calculation Model
	
	• The user can review the saved pricing breakdown at any time.
	• If the user wants to modify the saved calculation:
	  ○ The user can navigate to the calculation menu and click on the save button

	○ The user will come across lists of saved calculations. ○ The user can open one selected file ○ Adjust the input values. ○ The system recalculates the final selling price and updates the break-even price. ○ The updated cost breakdown is displayed. ● If the user chooses to export the updated data: ○ User can save the new calculated price ○ The system generates a new **PDF Cost Breakdown Document (CBD)**. ● The system ensures only the most recent calculation is stored and accessible for future reference. Process Completion ● The system confirms that the calculation has been successfully saved or exported by displaying a confirmation message. ● The user then exits the calculator, with the saved price breakdown accessible for future review.
Alternative Flow	If Invalid Inputs are entered then the System prompts the user to correct missing or incorrect values.
Exceptions	If the user enters non-numeric values where numbers are required, the system displays an error message.
Business Rules	● Ensure accurate conversion factors for coffee processing.

	• The system ensures that the suggested price covers all costs and includes profit.

3.4.2 Advanced Price Calculator

Description

The **Advanced Price Calculator** provides a detailed cost breakdown for coffee pricing, considering all processing expenses. Users input key details such as procurement volume, purchase price, processing costs, labor, fixed costs and more. The system ensures precise calculations for variable costs and break-even price while allowing unit and currency conversions after the output.

Functional Requirements

- The user can create an Advanced price breakdown for the coffee considering all the costs involved in processing that batch.
- The user should provide basic information about the business to conduct during the harvest season.
- The system allows users to input the key data for the upcoming harvest seasons, including:
    - The desired volume of coffee to procure, with a drop down options for the user to select from (e.g., red cherries, parchment, green coffee, pod/Jenfel).
    - Drop-down of different unit measures (E.g, Feresual/KG/lb/Kesha).
    - Estimated coffee type purchase price.
    - Quality premium(Optional).

    - Second payment(Optional).
    - Brokers(Optional).
    - Jute & Plastic Bag
    - Transport Cost
    - Fuels and Oils
    - Processing Expenses such as:
        - Labor
        - Utilities
        - Low-grade Hulling cost
        - Drying bed equipment
    - Fixed costs:
        - Labor (management)
        - Annual Maintenance
    - Other variable costs
        - Parchment Transport
- The system will have the value of the Planned conversion ratio to achieve.
- Based on these inputs, the system calculates and displays the pre-tax Break-even price.
- The user can convert the output to other unit measures or currencies.
- The system ensures all input values are numeric.
- The system Allow users to generate and export a Detailed Cost Breakdown Report (DCBR) that includes:
    - Break-even price per KG based on cost and conversion estimates
- The system must compare the user inputs against best practice pricing benchmarks after the break-even price is calculated.
- The system must flag any cost inputs that deviate from the best practices and allow users to view the details of the flagged inputs.
- If any cost input deviates from the best practices, the system flags it.

- If the user clicks the flagged tab then the system displays a pop-up message to the user suggesting the user to set the inputs based on the best practices.
- The Users then can review the calculated operational requirements.

Use Cases

Use Case ID	UC - 06
Use Case Name	Advanced Price Calculator
Actors	Users
Description	This use case explains how users can input key cost and operational details to generate an advanced coffee price breakdown for an upcoming harvest season. The system calculates operational needs based on planned procurement volume, conversion ratios, and estimated costs.
Trigger	The user selects Advanced price calculator from the app menu.
Preconditions	The system must allow users to input planned procurement volume, conversion ratios, and estimated costs.
Postconditions	The system successfully calculates and displays the required resources and operational needs.

Normal Flow	**User Navigates to the Advanced Price Calculator** 1. The user logs into the Coffee Economics App and selects the "Calculator" option. The user then selects the Advanced calculation tab. **User Inputs Advanced Pricing Details** 2. The system displays a pricing form where the user can enter all the input fields needed for the advanced coffee calculator. 3. User enters the following input values: a. The user selects the purchased coffee type from the drop down menu. b. The user inputs the desired volume (KG). c. The user selects from the drop-down the coffee type purchase price (per KG; average or season-starting). d. Estimated coffee type purchase price per KG. e. Estimated quality output (G1, G2, commercial and ungraded) in percentage. f. Second payment plan per KG (if applicable). g. Other estimated expenses. **System Processes the Inputs and Calculates:** **Procurement Cost Calculation** • The system calculates the total procurement cost by adding the selected coffee type purchase price, quality

premium/broker costs/ second payment(Optional), jute & plastic bags and transport costs.

Processing Cost Calculation

- The system calculates the total processing cost by adding the labor cost, utilities cost, low-grade hulling cost and drying bed equipment cost.

Other Variable Cost

- The system calculates the other variable cost by adding the parchment transport and other variable costs.

Variable Cost Summary

- The system calculates the variable cost summary by adding the total procurement cost, processing cost and other variable cost.

Variable Cost Calculation

- The system calculates the variable cost by dividing the variable cost summary to the output of the coffee stages ratio the user entered (i.e. cherry to parchment if the initial volume of the cherry is 300,000kg then according to the coffee wet mill excel the ratio of cherry to parchment is 18% which results in 54,000kg) divided by 17.
    - I.e. Variable Cost = total variable cost ÷ (output of the ratio / 17)

Pre-tax Break-even Price Calculation

- Then the system will calculate the pre-tax Break-even Price by adding the variable cost summary and the total fixed cost divided by the *output* of the ratio divided by 17. ***(you can refer to the above calculation found on the variable cost calculation to find what the output ratio means).***
  - I.e. Pre-tax Break-even Price = total variable cost + total fixed cost ÷ (output of the converted ratio / 17)

Best practice

- The system loads default best practice pricing benchmarks set by TNS .
- The system should compare with the best practice after the cost break-down is calculated.
- The system cross-checks the break-even price against the benchmarks specified by TNS provided below.

	As a % of total
Cherry purchase	80-85%
Cherry Transport and Commission	3-5%
Labor (Full-Time)	2-3%
Labor (Casual)	3-5%
Repairs and Maintenance in-season	1-2%
Fuels and Oils	<1%

	Other Expenses 4-6% • To ensure accuracy, the system **will compare the user entered data to the above benchmark table for all the inputs and flag the data** if it falls outside the expected best practice range. **User Reviews the Advanced Pricing and Operational Breakdown** ○ The system presents the calculated pricing breakdown, allowing the user to review variable costs, fixed costs, break-even prices, and other calculations. ○ If needed, the user can adjust the inputs and recalculate. **User completes the process.**
Alternative Flow	If Invalid Inputs are entered then the System prompts the user to correct missing or incorrect values.
Exceptions	If non-numeric values are entered in number fields, the system displays an error message.
Business Rules	The system must ensure accurate conversion factors for coffee processing.

3.5 Global coffee stock price display

Description

This feature provides users with real-time coffee price trends from different international markets, allowing them to make data-driven pricing decisions. The system will fetch and display prices from an open API and allow users to customize their view based on region, currency, unit, and date.

Functional Requirements

- The system shall fetch real-time coffee price data from an open API for three regions (USA, EU, East Asia).
- The system shall display the latest coffee price based on the selected zone.
- The system shall support historical price lookup based on a selected date.
- The system shall update the price display when the user selects a different zone, date, currency, or unit.
- The system shall convert the fetched price to the selected currency (ETB/USD).
- The system shall convert the price based on the selected unit (KG, LB, Feresula, etc.).
- The system shall present price trends in a graphical format (line chart or bar chart).
- The system shall display a button linking to the Ethiopian Commodity Exchange (ECX) website.
- The system shall display the last updated price if no internet connection is available.
- The system shall notify users when API data is temporarily unavailable.
- The system shall validate date input to ensure valid historical price lookup.
- The system shall provide a drop-down menu for selecting a custom zone.
- The system shall provide a date picker to allow users to view past price trends.
- The system shall provide a currency selector to toggle between ETB and USD.
- The system shall provide a unit selector to switch between KG, LB, and Feresula.

Use Cases

Use Case ID	UC - 07
Use Case Name	Global Coffee Stock Prices Display
Actors	Users
Description	This use case explains how users access global coffee stock price data, categorized by custom zones, to make informed business decisions.
Trigger	The user navigates to “Home” page
Preconditions	• The system must be connected to an external API to fetch live coffee stock prices. • The user must have an internet connection to fetch live data
Postconditions	• The system successfully retrieves and displays updated coffee stock prices. • The user can switch between different regions, currencies and units • The system displays a graph of price trends for easier analysis • The user can visit the ECX website for more details

Normal Flow	User Navigates to the Global Coffee Prices Feature 1. The user logs into the Coffee Economics App and lands on the home page System Fetches Live Coffee Price Data 2. The system connects to an external market API to retrieve the latest coffee prices. 3. The user selects a preferred custom zone from the drop-down menu. 4. The system fetches and displays the latest coffee price for the selected zone 5. The user selects a desired data from a date picker to see historical prices 6. The user selects a preferred currency from the currency picker 7. The user selects a preferred unit from the unit picker System Displays Price Information 8. System updates the displayed price and renders a price trend graph User Views Stock Prices and Trends. 9. The user can redirect to the ECX price website by clicking the button.
Alternative Flow	If the User Selects a Different Zone or Currency ● The user changes the selected region or currency.

	• The system re-fetches the data and updates the display accordingly. If the User Selects a Different Unit • The user changes the unit. • The system will then update the display accordingly. User gets notification • If internet is connected • API data is unavailable • If date selected is invalid
Exceptions	Data fetching error: the system alerts the user and retires to fetch data again when it's convenient.
Business Rules=	• The system retrieves and updates coffee prices from an open API. • Users can check prices for past dates using the date picker. • The system plots price trends over time to help users spot fluctuations. • Prices dynamically update based on selected currency and unit. • A button links users directly to the Ethiopian Commodity Exchange (ECX) website.

4. External Interface Requirements

4.1 User Interface

The Coffee Economics App will provide a consistent user experience tailored for mobile users, with offline functionality emphasized for remote accessibility. Key features include:

- Simplified Navigation: Streamlined interface to enable intuitive access to tools like the Coffee Conversion Calculator, Cost Breakdown, and Global Coffee Prices.
- Localization: Support for Amharic and English, allowing seamless switching between languages.
- Offline Access: Core features, including cost calculations and planning tools, are fully operational without internet connectivity.

4.2 Hardware Interface

The app will primarily operate on:

- Mobile Devices: Smartphones and tablets with basic hardware specifications to ensure compatibility.
- Internet Connection: Required for syncing data and updating global coffee prices.

4.3 Software Interface

Integration with external and internal software systems, including:

- Operating Systems: iOS and Android for mobile devices.
- APIs: Real-time global coffee price data fetched via APIs with caching functionality for offline use.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

The app will ensure optimal performance with the following standards:

- Offline Responsiveness: All offline features, including the Coffee Conversion Calculator, must execute within 1 second.
- Global Pricing Updates: Real-time data retrieval and caching within a maximum of 5 seconds under standard internet conditions.

- Scalability:The system must support a large number of concurrent users without performance degradation.
- Uptime: The app should maintain a high level of availability to ensure users can access it whenever needed.
- Reliability: High availability, especially for offline operations.
- Security: Sensitive data (personal and business) must be stored securely, following industry standards and regulations.

5.2 Software Quality Attributes

- Usability: A clean, user-friendly interface tailored for minimal learning curves.
- Reliability: Offline functionality guarantees usability in remote areas with unreliable internet.
- Localization: Full app functionality in Amharic and English.
- Maintainability: Modular design ensures efficient updates and scalability.