Acknowledgment

We hereby take this opportunity to express our gratitude towards the people who helped us in completing our project **“Farmer’s Income and Expenditure Application ”.**

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Content

Abstract

The Proposed system "**Farmer's Income and Expenditure Application**" addresses the challenges faced by farmers while maintaining his income and expenses incurred on household and Farming activities. This system will help Farmers to keep track on their finances effectively and easily.

The Application is useful for each and every farmer suffering from issues related income and expenses of farming as well as household activities ; it helps to manage / track / address every farmer activity with its expense during every stage of farming for a single crop.

The proposed system is developed using HTML, CSS, JavaScript, PHP and MySQL.

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Chapter 1

Introduction

Agriculture started around 12,000 years ago. Farming is a major activity in agriculture. Farmers have been practicing farming to sustain themselves. Despite this long history, farmers continue to face with the complex task of managing their income and expenses related to farming and household needs.

Farmers are people engaged in farming activities. Farming involves crop cultivation, growing crops, raising livestock and other agricultural allied activities.

These activities are performed to improve crop yield and aimed for better livelihood. Crop yield depends on different climatic conditions.

India's farming is diverse, with a wide variety of crops grown across different regions. The country ranks among the world's largest producers of rice, wheat, pulses, and cotton.

In India, farming is structured around three primary crop seasons: Kharif, Rabi, and Zaid. Each season corresponds to specific climatic conditions and agricultural practices. Farming practices vary significantly based on factors such as weather, soil, and land features.

There are 3 crop seasons in India.

Table 1.1 Crops Seasons in India

Crop seasons in India	Places
Kharif	Maharashtra, Assam, West Bengal, Orissa, Telangana, Tamil Nadu and Kerala
Rabi	Maharashtra, Madhya Pradesh, Punjab, Uttar Pradesh, Haryana, Bihar, Rajasthan and Uttarakhand
Zaid	Uttar Pradesh, Punjab, Haryana, and Gujarat.

Maharashtra, a state in western India, has regions with semi-arid and arid climates. In these areas where water is scarce, farmers typically grow crops like millets (bajra and jowar),

pulses (tur, chana, masoor), oilseeds (groundnuts, soybeans), and cotton. These crops are chosen because they can survive with less water.

Dhule district, located in Maharashtra, is mostly semi-arid zone. This district experiences hot, dry summers and mild winters, with low and erratic rainfall. Despite these challenges, agriculture is crucial in Dhule, and farmers primarily cultivate drought-resistant crops like millets, pulses, and oilseeds.

Kapadne and **Devbhane** are villages located in Dhule district of Maharashtra, primarily experiencing a semi-arid or arid type of climate. Agriculture in these villages faces challenges such as unpredictable rainfall, water scarcity, and soil degradation. Farmers in these regions typically cultivate drought-resistant crops such as millets, sorghum, and pulses.

Table 1.2 Crops Grown in Devbhane village of Dhule District

Crop Seasons	Period	Crops grown
Kharif	June to October (Monsoon season)	Bajri, Corn, Cotton, Cotton irri, Groundnut, Kh. Jawar, Mung, Udid, Soyabean, Tur, Seasamum, Other Cereals
Rabi	Mid-November to April or May (End of Monsoon season)	Gram, Jawar, Maize, Paddy, Wheat, Other
Zaid	Between March and June (Summer season)	Watermelon, Tomato, Cucumber, Sugarcane.

Additionally, in Devbhane village, farmers cultivate peripheral crops alongside their main crops to enhance agricultural diversity and income sources. These peripheral crops include a range of vegetables like tomatoes, onions, and potatoes. Fruits such as watermelons, bananas, and papayas .

Table 1.3 Peripheral Crops Grown in Devbhane village of Dhule District

Crop Seasons	Period	Peripheral Crops grown
Kharif	Summer (March to June)	Tomatoes, cucumbers, capsicum, watermelons
Rabi	Monsoon (July to September)	Lady's finger, spinach, bananas, coriander, mint, curry leaves.
Zaid	Post-Monsoon to Winter (Oct-Feb)	Onions, potatoes, carrots, radishes, cauliflower, cabbage

In India, farming encompasses a wide range of crops suited to diverse climates and seasons. Despite this variety, farming practices across the country more or less are same. Farmers earn income from various sources related to their agricultural activities and then allocate these earnings towards expenses, which cover a spectrum of needs for both the farm and the family.

Income for a farmer refers to the money they receive from selling crops, livestock, dairy products, or other agricultural produce. On the other hand, expenses represent the money spent by the farmer on essentials such as seeds, fertilizers, pesticides, equipment maintenance, labor wages, household expenses, education, healthcare, and more.

Farmers sometimes spend more money than they make from farming because of uncertain weather and changing prices. Things like crops not growing well, prices going up and down, and bad weather can make this problem worse.

One of the enduring challenges farmers face is the lack of simplified systems for tracking and managing these income and expenses. Many rely on traditional methods or outdated record-keeping practices, which can be time-consuming and prone to errors.

From ancient times to the present day, farmers have had to balance income and numerous expenses, including seeds, equipment, livestock, labor costs, and household expenditures. These costs fluctuate with seasonal changes, market prices, and unexpected events like natural disasters or crop failures.

It's really important for farmers to keep careful records of how much money they make and how much they spend. This helps them know exactly where their money is going and how much profit they're making. As a result, maintaining accurate records of both income and expenses becomes crucial for every farmer.

Chapter 2

Literature Survey

2.1 Study of existing system

We met the farmers located in the village of "**Devbhane"**, which is situated 12 km from Dhule Taluka in Dhule district.

Devbhane is known for growing a variety of crops suitable for arid and semi-arid climates. These may include crops such as millets, sorghum (jowar), pulses like pigeon peas (tur dal), and oilseeds like groundnut (peanut) and sunflower.

These crops are well adapted to the dry and less fertile conditions typical of arid and semi-arid regions, This helps the farmers in Devbhane continue farming sustainably.

We met the Farmers named **Shri. Krushna Budha Desale** ,**Shri. Dnyaneshwar Vanji Desale, Shri. Jijabrao Shivaji Desale** of Devbhane village.

While discussing with these farmers, the following questions were asked :

Q1. Can farmers own multiple farms?

Q2. Are these farms located in different places?

Q3. If farms are located at different places how they remember it?

Q4. What factors influence the selection of crops by farmers?

Q5. How does the variety of crops grown in a farm change from one farm to another and from season to season?

Q6. What are the typical expenses incurred on farming?

Q7. What are the sources of income?

Q8. What crops are typically planted during the seasons like Kharif, Rabbi, and Zaid

Q9. Do farmers also prefer in horticulture crops?

Q10. Do they also consider growing flowers and vegetables ,If yes, which flowers and vegetables ?

Q11. Do they prefer mix cropping?

Q12. Do they prefer multi cropping?

Q13. What is main source of irrigation?

After discussing with them, we learnt that :-

Ans 1. A farmer can have multiple farms located at different locations.

Ans 2. Crops selection is usually based on market demands.

Ans 3. Crops grown can vary from farm to farm, season to season.

Ans 4. These Farms incur various expenses and generate income.

Ans 5. Expenses are spend on various materials and methods of farming.

Ans 6. The expenses spend are on farming and household activities.

Ans 7. Income and expenses are recorded manually by a farmer.

Ans 8. In kharif, they plant cotton, maize, bajra and onions.

Ans 9. In rabi, they plant gram, wheat, maize, onions, jowar and groundnut.

Ans 10. In addition, some farmers in the village still plant horticulture crops like bear fruit.

Ans 11. Some farmers prefer to grow flowers, vegetables.

For every crop that farmers grow, they need to perform different activities like land preparation, sowing, irrigation, weeding, pest control, fertilizing, and harvesting. The main source of irrigation is borewells and wells.

The farmer has different farms in various locations. Crops selection varies from farmer to farmer, location to location.

They record income from selling crops, livestock sales, renting equipment, renting machineries, egg production, dairy production, working as a labor . Expenses made on various methods of farming such are also recorded manually.

We collected information about which crops are grown in different seasons and the climatic environment suitable for different crops.

We also collected information about the different farming activities conducted by a farmer and the respective methods and materials required for these activities along with their prices.

We analysed overall expenses incurred from sowing to harvesting to sell of different crops such as cotton, soyabean, wheat, maize, etc by a farmer.

Along with the expenses related to farming, we also analysed the expenses spend for household purpose of a farmer such as groceries, education, medical, travelling, medical emergencies etc.

An example of **record of income** from crop maintained by the farmer is shown in fig 2.1-

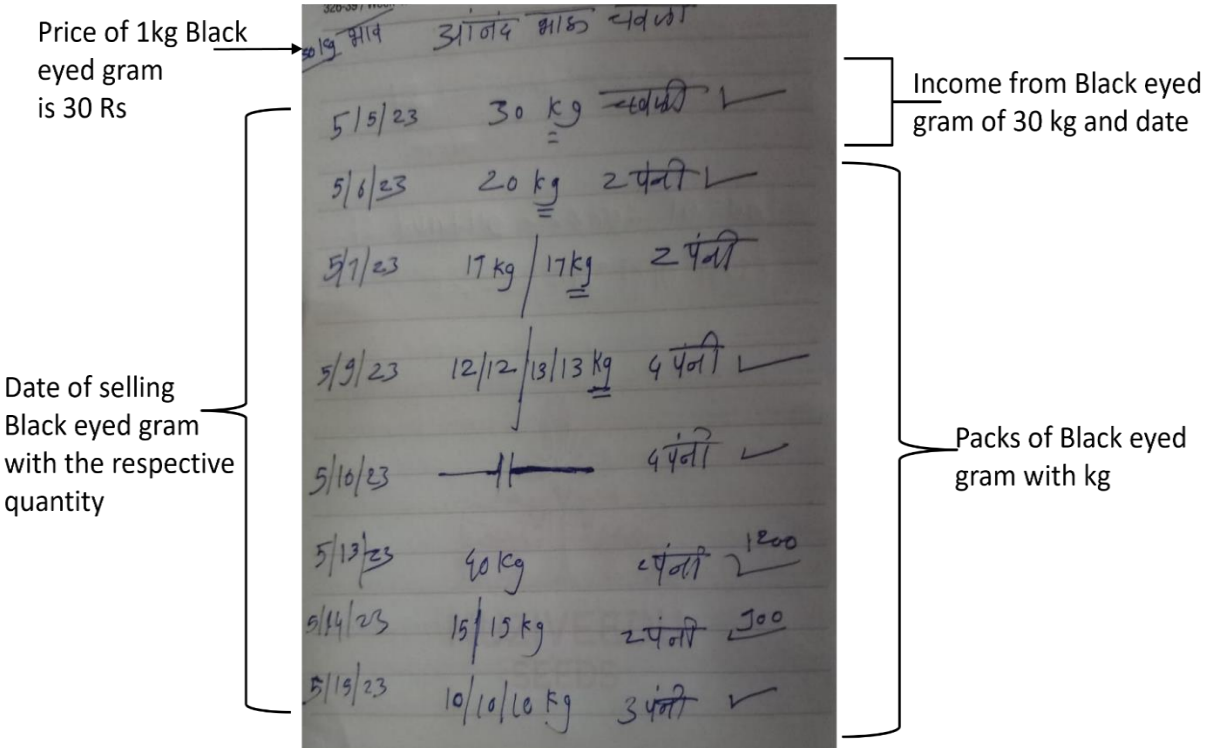


Fig.2.1 Manual Record of Income maintained by farmer

This manual record of income maintained by a farmer describes :

- The income generated from sell of farm produce(in this example generated from Black eyed beans).
- Date of sell.
- Quantity sold.
- Rate of sell(per kg)
- This record mention packaging and size of packaging also(पन्नी)

An example of **Record of expenses (farming and household)** maintained by the farmer-

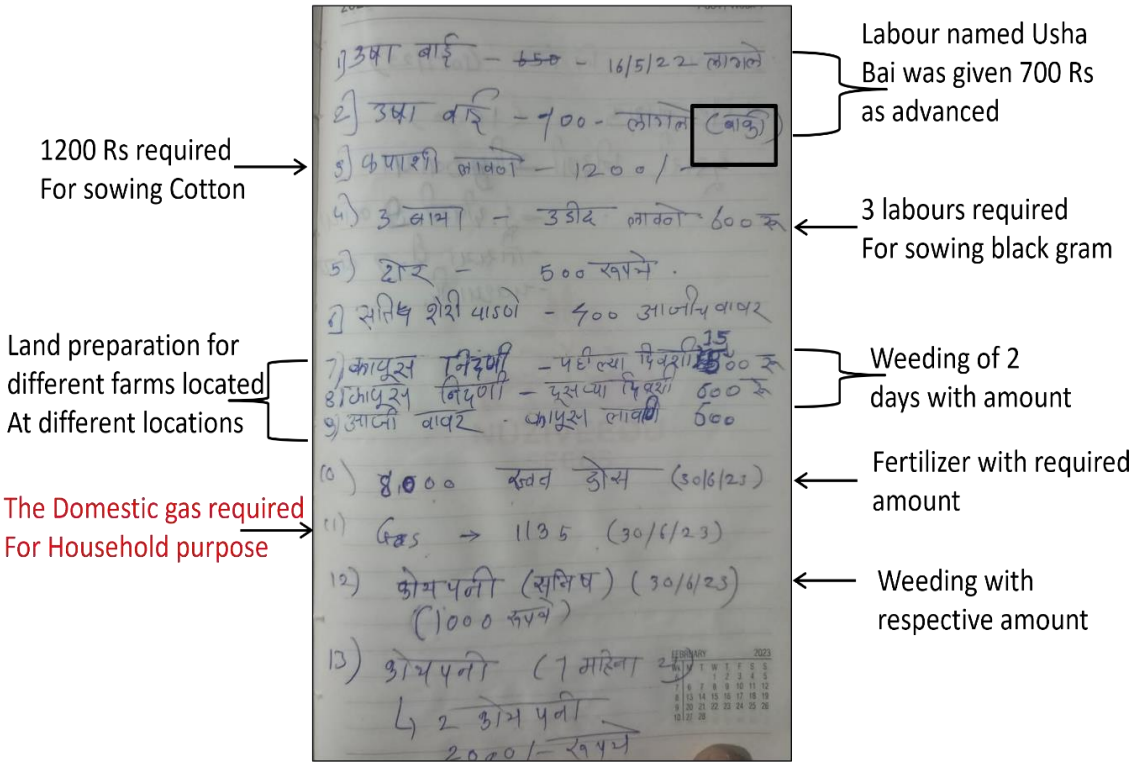


Fig.2.2 Manual Record of Expenses

The above manually recorded expenses describes

- The expenses of two farms are recorded together.
- Household and Farming related expenses are recorded together.
- Cotton and Black gram is cultivated in the respective farms.
- It specifies the advanced amount given to the labour named Usha Bai

- The price required for cultivating cotton and black gram with the respective dates is recorded.

This record mention expenses incurred on household as well as on farming activities. At the same time, details about advances paid to labors are also mentioned here.

From the above discussion, income and expenses related with farming can be grouped based on farming activities.

Income sources and expenses for farming :

Incomes from farming:

- Crop Sales
- Livestock Sales
- Dairy Production
- Egg Production
- Renting Equipment
- Working as a Labour
- Renting Machineries

Expenses on Farming activities:

- Labours, Tractors, Sprayers
- Plastic mulch, Manure
- Drips, Pipes, Sprinklers
- Transportation of crops
- Crop Insurance
- Farm loan
- Electricity bill (Farm)
- Repair and maintenance

Farmers derive income from multiple sources within agriculture, including the sale of agricultural products such as crops and livestock, dairy production, egg sales, and renting out equipment and machinery.

On the other hand, farmers incur various expenses related to their farming activities. These expenses cover a range of materials and methods essential for farming, including labor costs, tractor usage, purchasing seeds, fertilizers, pesticides, and manure.

Sometimes, the expenses may exceed the income due to factors like unexpected costs or lower crop yields.

Effectively managing these income sources and expenses is crucial for the financial sustainability of farming operations. Farmers need to plan and budget wisely to make sure they earn enough to cover their expenses and save for the future of their farm and family.

Expenses for Household Activities:

- Medical
- Groceries
- Education
- Travelling and Transport
- Life, Health Insurance
- Personal Loan
- Electricity bill (House), Fuel
- Repair maintenance

In addition to Farming expenses, a farmer incurs household expenses, balancing both farming and household expenses is crucial for overall financial well-being of the farmer.

Household expenses typically include cost associated with housing, utilities(electricity, water, gas), groceries, transportation, travelling, medical, education, health insurance and various daily necessities.

Managing these expenses wisely is essential for maintaining financial stability within a household. Expenses related to farming and household activities of a farmer can be categorized separately, rather than recording them together.

These helps farmers to understand the specific costs associated with running the household versus those related to farming activities, it also helps in making informed decisions to optimize both personal and farming activities

The **Farming expenses** are incurred on various **farm activties(methods)**.Every method requires one or more equipment and /or material as mentioned below-

Table 2.1 Methods and Materials of Farming

Methods	Materials
Seed Selection	Seeds
Soil Preparation	Labour, Tractor, Rototiller, Manure,
Mulching	Labour, Sprayers, Plastic mulch
Planting	Labour, Tractor, Seeds / Saplings
Irrigation	Labour, Drips, Pipes, Sprinklers
Weeding	Labour, Rototiller, Hook curved
Fertilizing	Labour, Sprayers, Fertilizer, Gloves
Harvesting	Labour, Tractor, Harvestor

There can be various materials which are common for all farming activities as mentioned below. Also specific methods required for specific stage or farm activity are also mentioned in following table 2.2

Table 2.2 Common and Specific Materials of Farming

Common Materials	Specific Materials
Labours	Rototiller
Tractors	Manure & Compost
Sprayers	Plastic Mulch
	Drips, pipes, sprinklers
	Hooked curved
	Fertilizers
	Harvesters
	Seeds/saplings

2.1 Study of existing system

Through this literature survey, we explored a handbook titled "Farmer's Handbook on Basic Agriculture." This handbook provides comprehensive guidance and practical information on fundamental agricultural practices tailored for farmers.Our study of this handbook has equipped us with valuable knowledge to effectively manage income and expenses related to agricultural activities.

We studied **Farmer's Hand Book on Basic Agriculture** which provides a holistic perspective of scientific agriculture. It is a joint initiative to impart farmers with technical knowledge on basic agriculture published by **Mr. Max Baumann, Mr. Fredrick Oberthur, Mr. Ajit Kumar Desai, Dr. Sashidhar, Professor, Dr. Syed Ahmed Hussain, Mr. V. Gunasekaran, Dr. M.V. Shantharam.**

Farmer's Hand Book on Basic Agriculture

Chapter 4. Farm Management, Module 3 emphasizes the importance of managing Farmer's farm to generate sufficient income for sustaining themself.

Module 3. Manage your farm for enough income to sustain yourself.

Farm Planning : Farm planning is to help the farmers to move to a higher level of production and income, starting from where he/she is now with the resource available to him/her.

In this process, the farmer has to consider different types of enterprises like:

- Land based (agriculture production activities, pisciculture, plantation, seed production, etc.)
- Animal component based (diary, poultry, goatery, piggery, duckery, etc.)
- Nursery/orchard
- Non-land based (mushroom, apiculture, vermiculture, etc.)

Authors illustrated it with an example of crops like paddy, cotton and maize. These crops are used for comparison for one season. Farmers can grow the following combinations in a year:

- Paddy – Paddy (Kharif followed by Rabi)
- Paddy – Maize (Kharif followed by Rabi)

- The following Table 2.3 describes various farming methods along with the materials required for each method and their respective subtotals.

Table 2.3 Farming Activities Expense Sheet

Activity	Unit	Quantity	Price	Total (Rs.)
Preparatory cultivation				
a) Machine / labour	No of hours	8	800	6400
b) Animal / labour	Days	6	600	3600
Sub Total				**10000**
Seeds and sowing				
a) Cost of seed	Kgs	50 kgs	20	1000
b) Cost of seed treatment				50
c) Cost of sowing (Human Labour)	Days	25	200	5000
d) Cost of thinning/gap filling	Days	5	200	1000
Sub-Total				**7050**
Manures and Fertilizers				
a) Cost of organic & Green Manuring (In-situ plouging)				350
b) Application cost				100
c) Cost of fertilizer	Kgs	120 N	12	1440
		60 P	50	3000
		40 K	28	1120
d) Application cost (Human Labour Male)	Days	3	200	600
Sub-Total				**6610**
Weed control				
a) Cost of Manual weeding	Labour	30	200	6000
b) Cost of herbicide if any (butachlor)	Litre	2.5	200	500
Sub-Total				**6500**
Plant Protection				
a) Cost of bio-agents				
b) Cost of pesticides (Thiamethoxam/profenophos)	Litres	5	350	1750
Furadon-3G	Kg	15	60	900
c) Cost of Application	Labour	6	200	1200
Sub-Total				**3850**
Irrigation cost if any	Power	5 months	500	2500
Sub-Total				**2500**
Cost of harvest				
a) Combined harvester	Hours	4.5	1700	7650
Post harvest charges				
b) Cleaning and bagging (Human Labor)	days	10	200	2000
Sub total				**9650**
Total cost of cultivation				**46160**
Yield Kgs/Ha. and returns				
a) Qty. produced Qtls. per ha	qtls	50	1500	75000
b) Gross returns received per ha (Rs.)	Cart load	8	800	6400
c) Total cost involved per Ha (Rs.)				**81400**
d) Net returns per Ha (Rs.)				**46160**
e) Cost benefit ratio (Gross Returns divided by Total Cost)				**35240**

The Expenses sheet refers to includes information about the expenses incurred on farming methods, along with details such as quantity, units, price, and total needed for expenses.

Expenses Incurred: These are the costs associated with various farming activities, such as buying seeds, fertilizers, pesticides, equipment, labor wages, etc.

Quantity: This refers to the amount or volume of the item being purchased or used. For example, if you're buying fertilizer, the quantity could be in kilograms or litres, depending on the type of fertilizer.

Units: Units specify the measurement or unit of the quantity. For instance, if the quantity is in kilograms, the unit would be "kg."

Price: This is the cost per unit of the item. It represents how much you're paying for each kilogram, litre, or other unit of the product.

Total Needed for Expenses: This is the calculated total cost for each item based on its quantity and price. It's calculated by multiplying the quantity by the price per unit.

Table 2.4 Income and Expenditure Statement of Farming Activities

Crop	Unit	1 ha of Paddy	1 ha maize	1 ha Cotton
Production	Quintal	50 q	Main product = 40 q By Product (stover/ Straw) = 4 cart load	25 q
Income	Rs/ha	81400	42000	90000
Expenditure	Rs/ha	46160	31375	57154
Profit or Loss?	Rs/ha	+ 35240	+ 10625	+ 32846
		Profit	Profit	Profit
Rank		I	III	II

The table 2.4 suggests that growing paddy continuously (Paddy after Paddy) may bring the highest profit in the short term, followed by cotton and maize. However, relying solely on paddy-cotton farming isn't advisable. It's important for farmers to avoid planting the same crop repeatedly (continuous monocropping) to maintain soil health. Crop diversity and rotation are essential strategies to keep the soil fertile and ensure sustained profitability ove

the long term. By growing different crops in rotation, farmers can enhance soil nutrients, reduce pests and diseases, and ultimately achieve more stable and profitable farming outcomes. So, while paddy might seem profitable when grown repeatedly, it's better for the farm's long-term success to diversify crops and rotate them wisely.

Table 2.5 Expenditure Statement of Household Activities

Money Needs	Expenditures (Rs)	Period	Can be foreseen
Provisions (food, fuel and household items for an average family size of 5 members)	36,000 (3000 X12)	Each month	Yes
School fees Free education for primary school children			
Clothing			
School uniforms for 1 child	1,000	June	Yes
Clothing /year	5,000	April	Yes
Happy events			
Diwali /dussehra	1000	November	Yes
Baisakhi/Ugadi	1000	January	Yes
Unexpected events	3600	Each month @ Rs 300	No
Health expenditure	2400	Per year	No
Total expenditure	50000		

Table 2.5 provides a detailed breakdown of essential household expenses and their corresponding amounts and frequencies. School fees are earmarked for educational expenses, covering tuition and supplies as per the academic calendar. Clothing expenses are allotted for purchasing attire based on seasonal or individual requirements. The budget for happy events ensures funds are available for celebrating festivals and family occasions with decorations, gifts, and food. Additionally, a designated health expenditure budget covers medical consultations, medications, and emergencies, either annually or as required.

We analysed that the annual budget of Rs 50,000 covers essential expenses like food, fuel, household items, school fees, clothing, and festival celebrations. It also includes a monthly allowance for unexpected events and an annual health expenditure. This budget ensures that the family's basic needs are met while also providing for occasional expenses and unforeseen circumstances.

2.1.3 Motivation

Farmer's Wallet App

We also studied about an App which also records the income and expenditure of a farmer.

Farmer's Wallet App, Mr. Kirwana Fred of Bivatec Ltd., Uganda developed this app. This app was released on 23rd December 2018.

This app :

- Records farmer details.
- Provides facility to enter incomes and expenses
- This application helps farmers and create text reports that give information about their farm.
- Farmers can track expenses, income, and other relevant data on this app.

This app contains the following modules :

- Income module
- Expense module

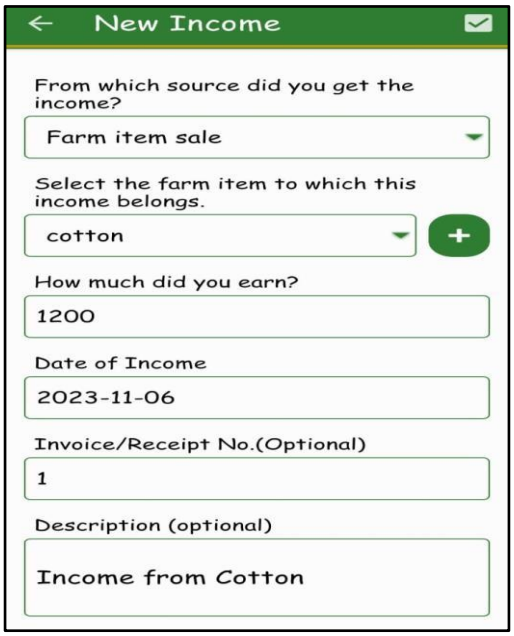


Fig.2.3 Income Module

The following module records the income details of a farmer such as income source, income amount , farm item (to which the income belongs), date of income and description which is optional.

The income details of a farmer are accepted in this module, which further helps to manage the data of a farmer.

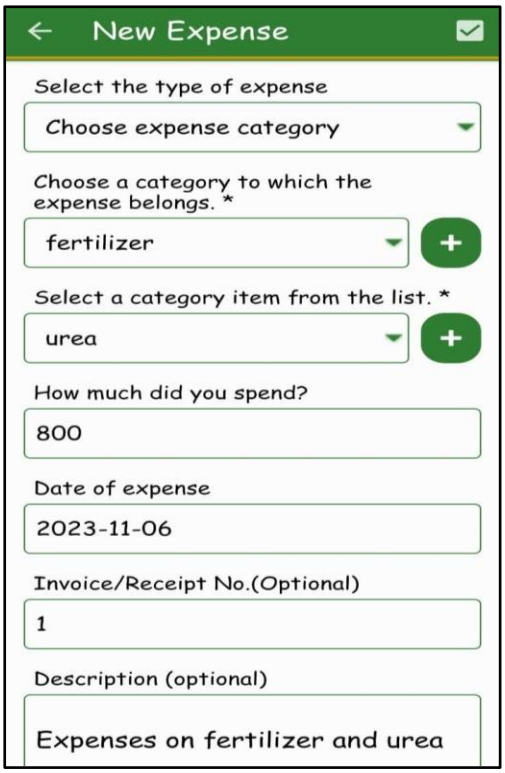


Fig.2.4 Expense Module

The following module accepts the type of expense(category),selects a category to which the expense belongs, selects a category item from the list, expense amount, date of expense and even the description which is optional.

This helps to track the expenses of a farmer spend on various Farming Activities.

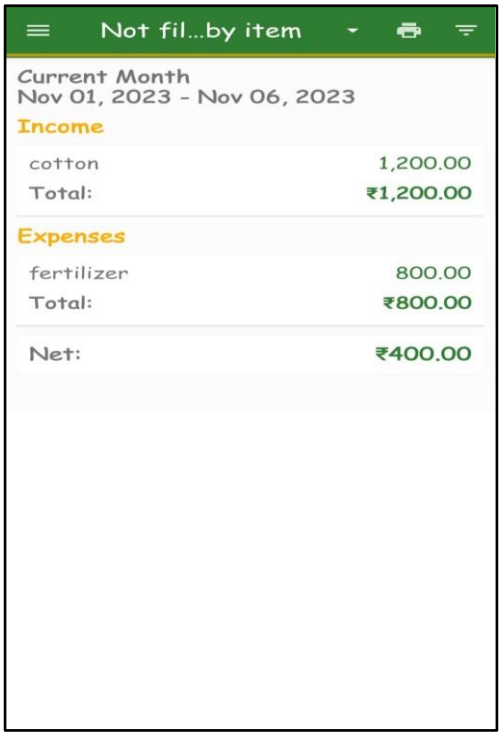


Fig.2.5 Displaying Income and Expenses

This module displays the total income generated from with the respective date, it also displays the total expenses amount and the expenses spend on with the respective date. The net here means the amount left from the income after spending the expenses.

Here it indicates that total income generated is 1200Rs which is generated by selling cotton and also displays the expense amount which is 800Rs spend on fertilizers. The net indicates the remaining amount which is 400Rs.

The From and To date is also displayed to indicate the income generated and expenses made.

2.2 Limitations of existing system

Manual record-keeping for income and expenses of farmers comes with several limitations that can significantly impact financial management and decision-making.

Record Keeping :

- Income and expenses on both – farming and household are clubbed together in a single record.
- When all income (like money earned from selling crops) and expenses (like buying seeds or paying for farm equipment) are mixed with household expenses (like groceries or utilities), it becomes hard to see how much money is specifically related to farming. This can make it tricky to understand the financial health of the farm itself.
- Organizing and categorizing expenses and income can be more challenging when done manually, leading to confusion.
- Difficult to maintain farm location wise income and expenses .If a farmer owns or manages multiple farms or fields in different locations, keeping track of income and expenses for each specific location can be a challenge.

- **Farmer Error** : Farmers can make mistakes while recording income / expenses, in calculation which can lead to inaccurate financial records. Incomplete Records: Missing or incomplete entries are very common. This leads to an inaccurate information of farming.

Time-Consuming : Keeping manual records is time-consuming. Inefficiency: Searching for specific information or generating reports from manual records can be inefficient and time consuming.

Data Security: Manual records can be lost, damaged, risking the loss of important financial information.

Lack of Analysis: Manual records may not support the detailed analysis of farm finances, which can help in making future decisions and improving profitability.

2.3 Problem Identification

Problems of farming related income

- Farmer is unable to arrange income based on categories(of income sources).
- Farmer is unable to access income records by specific time periods (like month/year).
- Also unable to manage income from farms across different locations.
- In spite of record keeping, farmer is not able to take informed decision based on historical data.

Problems of farming related expenses

- Farmer cannot track specific expenses related to farming activities such as soil preparation, sowing, fertilizing, harvesting, and materials like tractor labor, fertilizer, etc.
- Farmer is unable to arrange expenses based on categories(methods of farming).
- Farmer is unable to find expenses according to particular month/year.
- Cannot find if the crop will be profitable or not by analysing the previous record of a farmer and so wise decisions can't be predicted.
- Also, cannot find the expenses spend on different farms located at different locations.
- In spite of record keeping, farmer is not able to take informed decision based on historical data.
- Tracking expenses becomes difficult which in turn leads to overspending. These problems paralyses the farmer's decision making.

Problems of Household related income

- Farmer is unable to arrange income based on categories(of income sources).
- Farmer is unable to access income records by specific time periods (like month/year).
- In spite of record keeping, farmer is not able to take informed decision based on historical data.

Problems of Household related expenses

- Farmer is facing difficulty in identifying expenses for specific categories like groceries, utilities, medical, education, and other essential categories.
- Farmer is unable to arrange expenses based on categories.
- Farmer is unable to find expenses according to particular month/year.
- Tracking expenses becomes difficult which in turn leads to overspending. These problems paralyses the farmer's decision making.

2.4 Problem Definition

To develop a web based application that will facilitate the record keeping for farmer

a) related with farming income and expenses
b) related with household income and expenses

To achieve this , proposed system will provide -

a) Detailed categorization of income and expenses
b) Provision to maintain income and expense details
c) Generation of income and expenses reports

This will guide farmer in taking wise decisions to improve livelihood by increasing profit.

Chapter 3

Scope of the Project

3.1 Scope of the project

Farmer's Income and Expenditure Application help farmers to manage their income and expenses of farming as well as household activities. This application will efficiently handle income generated from various sources including crop sales, livestock, renting equipment as well as machineries, and other farming activities. It also tracks expenses associated with farming activities(seed selection, soil preparation, fertilizing, weeding) such as labor, tractor, seeds, fertilizers, sprayers, etc.

Additionally, the application enable farmers to manage household expenditures such as groceries, utilities, medical, travelling, and personal expenses. By capturing real-time income and expense data, the application provides detailed reports that categorize and analyse financial activities related to both farming and household. These reports empower farmers to make informed decisions for future planning.

The Farmer's Income and Expenditure Application is designed to streamline financial management for farmers, providing a comprehensive platform to track income and expenses related to both farming activities and household needs. Following are the key features of this application :

1) **Income Management:**
    - **Farming Income:** Record sales of crops, livestock, and other agricultural products.
    - **Household Income:** Track earnings from farm work, pensions, or other sources.
2) **Expense Tracking:**
    - **Farming Expenses:** Log costs for seeds, fertilizers, equipment, labor, and maintenance.
    - **Household Expenses:** Manage expenditures on utilities, groceries, education, healthcare, etc.
3) **Detailed Reporting:**
    - Generate detailed reports of income and expenses summarizing financial activities for farming and household activities to understand profitability and take wise decisions.

Chapter 4

Methodology

4.1 Requirements Gathering and Analysis

Farmer's Income and Expenditure Application, we utilized the Waterfall model as the development approach. The Waterfall model is a sequential software development process, where progress flows steadily downwards through defined phases. Here are the Software Development Life Cycle (SDLC) phases applied for this application:

Phase 1. Requirements Gathering and Analysis : During the requirements gathering phase for the Farmer's Income and Expenditure Application, we focused on understanding the specific needs and expectations of farmers to effectively manage their income and expenses.

4.1.1 Farmer Requirements:

The system should accept the Farmer details.

4.1.2 Farm Requirements

The system should accept the farm details.

The system should record the information of various farms located at different locations.

It should accept and store the necessary details for each farm.

4.1.3 Crop Requirements

The system should accept the crop details for each farm.

The system should record the information of various crops cultivated in different farms located at different locations.

It should accept and store the necessary details for each crops.

It should accept the crop details according to type of season (Kharif Rabbi and Zaid) and type of Farming.

4.1.4 Income Requirements for Farming and Household:

The system should accept the income of a farmer depending on various farms.

The system should record the income of a farmer related to farming and household activities.

The system should categorise income based on the income sources.

The system should provide detailed reports of income of a farmer depending on various farms.

The system should generate a detailed report of income of a farmer according to the specified dates.

The system should generate reports of income related to farming and household activities.

The system should categorise the income of farming and household related activities.

4.1.5 Expense Requirements for Farming and Household:

The system should categorise expenses, material wise and method wise.

The system should categorise the expenses of farming and household related activities.

The system should accept the expenses of a farmer depending on various farms.

The system should record the expenses of a farmer related to farming and household activities.

The system should provide detailed reports of expenses of a farmer depending on various farms.

The system should help to improve profitability of various crops by analysing the previous record/historical data.

The system should help to analyse the previous record of a farmer this will guide farmer to take wise decisions.

The system should generate a detailed report of expense of a farmer according to the specified dates.

- **System Requirements**

  Operating System : Windows OS Platform: Visual Studio Code

  Languages : HTML / React, CSS, JavaScript, PHP

Database : MySQL

- **Hardware Requirements**

Processor: INTEL i3 Processor Core

Hard Disk: 500 GB (min)

Apache Web Server

Chapter 5:
Details of designs, working and processes

Phase 2. System Design :

For Farmer's Income and Expenditure Application, the System Design phase involved creating a robust architecture, database structure, and user interface that catered specifically to the requirements gathered from farmers.

Here, We translated requirements into a system design that outlines the application's structure, components, and functionality.

Firstly we defined the database schema to efficiently store income, expenses, and farmer’s data.

We identified the necessary data entities such as income sources (e.g., crop sales, livestock sales), expense categories (e.g., seed selection, soil preparation, fertilizing)of farming activities as well as of household activities(eg., medical, grocery, education, emergency).

Based on the identified requirements, We defined the core functionalities of the application such as :

- Farmer Management
- Farm Management
- Crop Management
- Income Management
- Expenses Management
- Report Generation

5.1 System Diagram

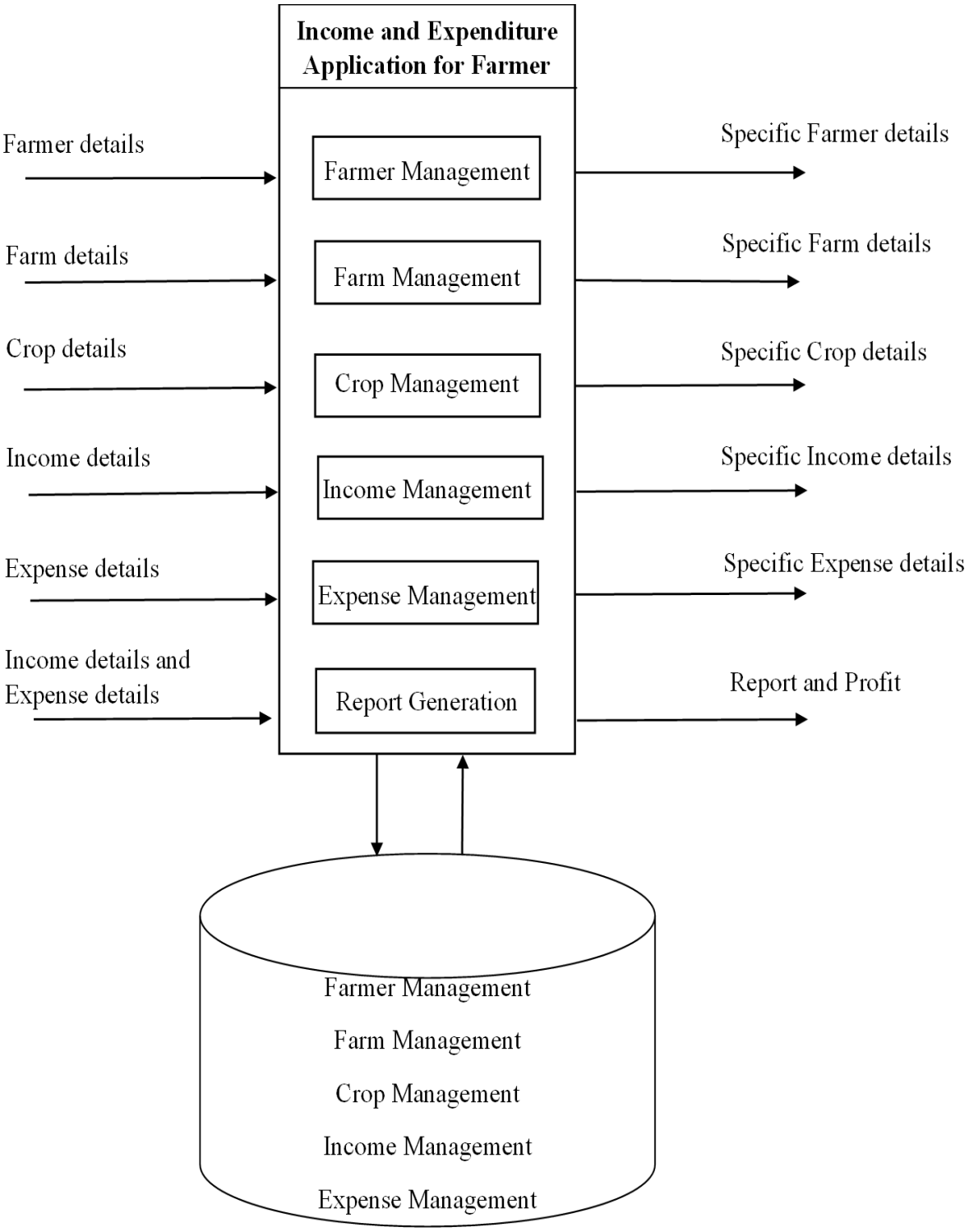


Fig.5.1 System Diagram

- **Farmer Details**: This collects information about the farmer..
    - **Farm Management Module:** The Farm Management Module is responsible for handling farm-related data. It accepts and manages details related to various farms, including: Farm Locations, Farm Size, Farm Name and Survey Numbers.
    - **Crop Management Module:** This module focuses on crop-specific details. It tracks information related to different crops grown on the farms, including crop types, farming methods, and crop sizes.
    - **Income Management Module:** The Income Management Module handles income-related data. It accepts details about various income sources, such as salaries, investments, or other earnings. Include: Date of Income, Income Source, Income Name and Amount.
    - **Expense Management Module:** This module deals with various expenses related to farming and household activities. It accepts details about different types of expenses, such as seeds, fertilizers, machinery, and household costs. Fields include: Expense Category, Expense Name**,** Quantity**,** Units and Total Cost
- **Report Generation** :Provides detailed report of Income and Expenses of Farming as well as Household Activities.

5.2 Use Case Diagram

Fig. 5.2 Use Case Diagram

Actors:

- **Farmer**: Represents the user (the farmer).
- **System**: Refers to the Income and Expenditure application**Use Cases**:
- **Register**: The farmer can register an account.
- **Login**: The farmer can log in to the system.
- **Verification**: The system verifies the farmer's identity.
- **Farming Activities**:
    - **Record Farm Details**: The farmer can input information about their farm.
    - **View Farm Details**: The farmer can retrieve farm-related data.
    - **Record Crop Details**: Allows the farmer to log details about crops.
    - **View Crop Details**: Provides access to crop-related information.
- **Household Activities**:
    - **Record Expense**: The farmer records household expenses.
    - **View Expense Report**: Retrieves expense-related reports.
    - **Record Income**: Allows the farmer to input income data.
    - **View Income Report**: Provides income-related reports.
    - **Categorize Expenses**: Helps classify different types of expenses.
    - **View Profit**: Displays profit information.

5.3 E-R Diagram

The Entity-Relationship (E-R) diagram for the Farmer's Income and Expenditure Application illustrates the relationships between key entities. The diagram shows that each farmer can have one associated farm, multiple income sources, and multiple expense categories.

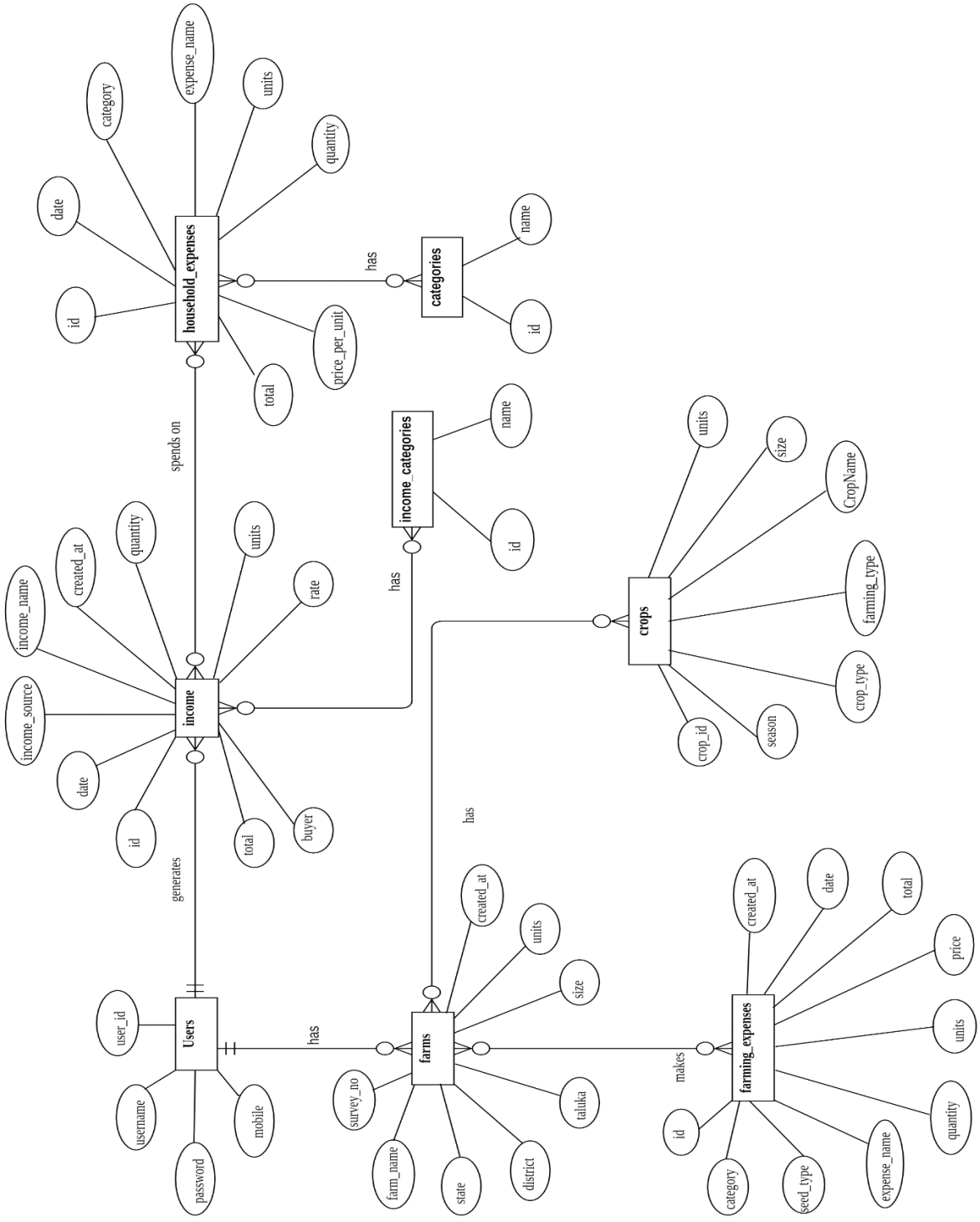


Fig. 5.3 ER Diagram

1. Farmer:

   Attributes:

   a) id: A unique identifier for each farmer.
   b) name: The name of the farmer.
   c) contact_number: The phone number of the farmer.
   d) address: The address of the farmer.

2. Farm:

   Attributes:

   a) id: A unique identifier for each farm.
   b) name: The name or label of the farm.
   c) location: Geographical details (state, district, taluka).
   d) size: The size of the farm (e.g., in acres).

3. Crop:

   Attributes:

   a) id: A unique identifier for each crop.
   b) type: The type of crop (e.g., wheat, rice, corn).
   c) farming_method: The method used for cultivating the crop.
   d) size: The area of land dedicated to this crop.

4. Income:

   Attributes:

   a) id: A unique identifier for each income record.
   b) source: The source of income (e.g., salary, investment).
   c) amount: The value or quantity of income.

5. Expense:

   Attributes:

   a) id: A unique identifier for each expense record.
   b) category: The type of expense (e.g., seeds, fertilizers).
   c) amount: The cost or quantity of the expense.

5.4 List of Tables

The database for the Farmer's Income and Expenditure Application named “project” is designed to efficiently manage financial data related to farming and household activities. It consists of 8 tables, each serving specific purposes to support the application's functionalities.

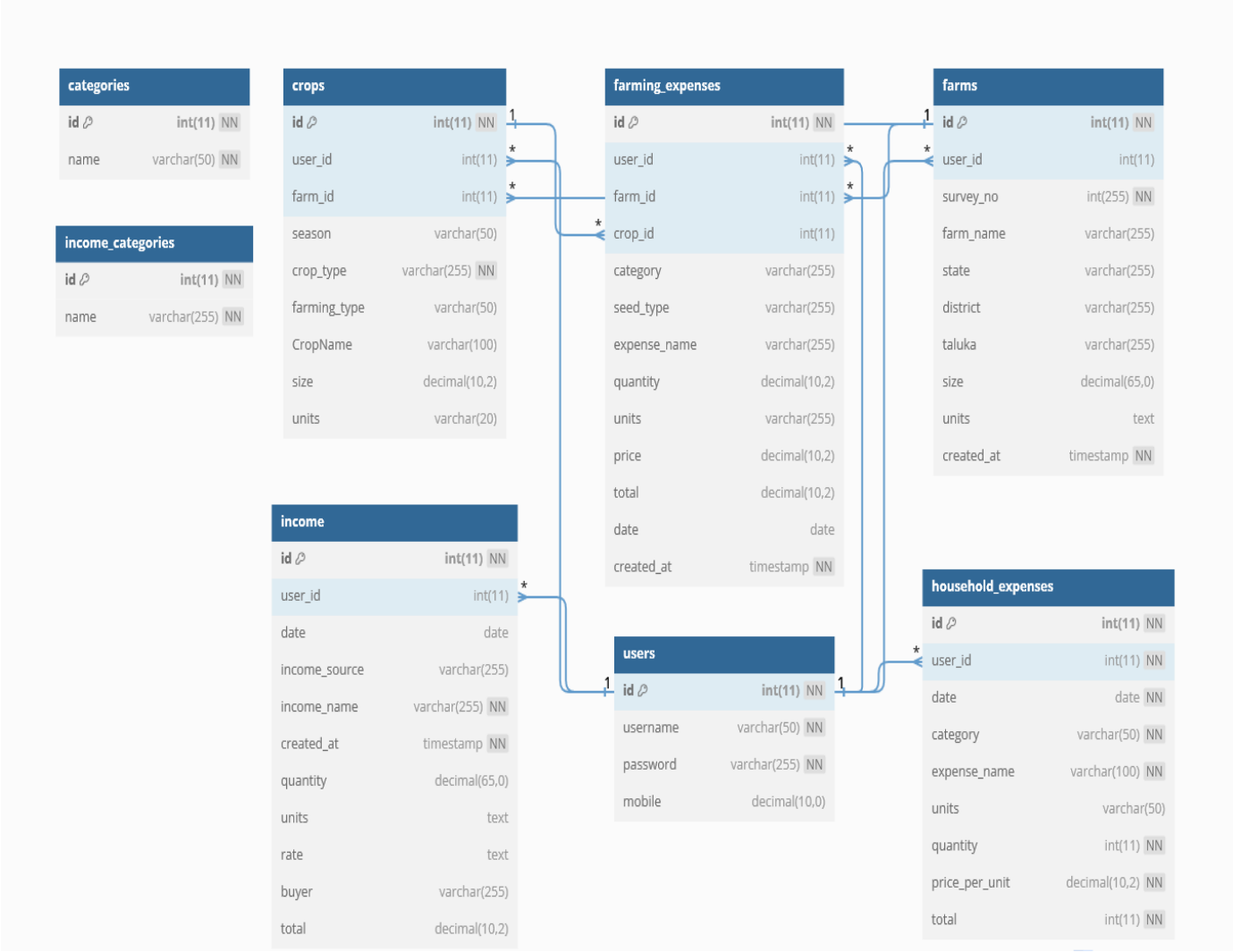


Fig 5.4 Database Structure

Table 5.1 List of Tables

Sr. No.	Table Name	Description	Fields
1	users	This Table contains the Farmer details which will help to keep a record of farmer	a) user_id b) username c) password d) mobile
2	farms	This Table in the database contains information about various farms at different locations.	a) farm_id b) survey_no c) farm_name d) state e) district f) taluka g) size h) units i) created_at
3	crops	This table in the database contains information about various types of crops.	a) crop_id b) season c) crop_type d) farming_type e) CropName f) Size g) units
4	income	The Income Table is designed to store records of various income sources.	a) id b) date c) income_source d) income_name e) created_at f) quantity g) units h) rate i) buyer j) total
5.	farming_ expense	This Table is designed to record various expenses related to farming activities.	a) id b) category c) seed_type d) expense_name e) quantity f) units g) price h) total i) date j) created_at

Sr. No.	**Table Name**	**Description**	a) **Fields**
6.	Household expenses	This Table is designed to record various expenses related to household activities.	b) id c) date d) category e) expense_name f) quantity g) units h) price_per_unit k) total
7.	categories	This Table is designed to store information about different categories and to add new categories to expense related to farming.	a) id l) name
8.	income_ categories	This Table is designed to store information about different categories and to add new categories to income related to household.	a) id m) name

Chapter 6:

Results and Applications

In Farmer's Income and Expenditure application, farmers can efficiently manage both their income and expenses of farming activities as well as household activities through dedicated sections on the website. This farmer's income and expenditure application has been developed using a combination of HTML, CSS, JavaScript, and PHP with input details provided in Marathi for easy understanding by farmers.

1. **Farming Activities :** Farmers can keep track of their farming income and expenses related to various agricultural operations such as seed selection, soil preparation, planting, irrigation, fertilizing, weeding, monitoring, and harvesting. This section enables farmers to record and monitor their farming finances, including income from crop sales and expenditure on farming inputs.
2. **Household Activities :** Apart from farming, the application allows farmers to manage household expenses such as daily expenditures, utility bills, and other household-related costs. This section helps farmers maintain a comprehensive view of their overall financial activities, ensuring effective budgeting and financial management for both farming and household needs.

Farming Activities

Interface

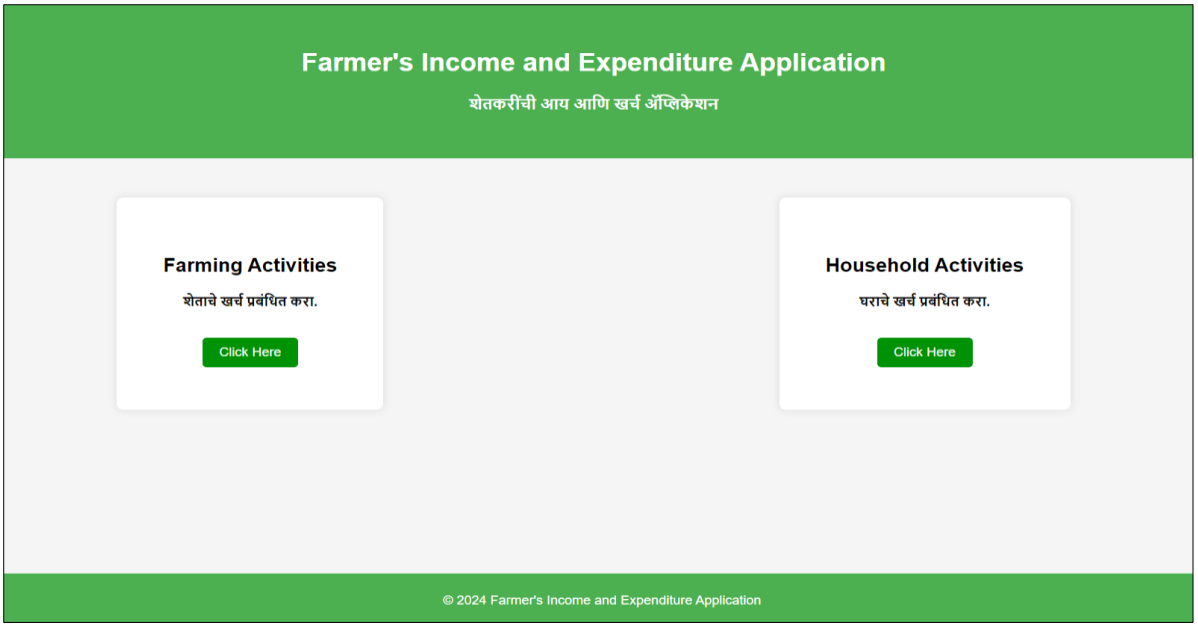


Fig 6.1 Interface for Managing Farming and Household activities

As a farmer have various income sources and expenses related to both farming activities as well as household needs. This web page is designed to help farmer to manage and track farming as well as household income and expenses.

Farming Activities: Here, the farmer can manage income (eg. crop sales, livestock sales, Renting equipment or machineries) and expenses(eg. Fertilizers, sprayers, labor, tractor) directly related to farming activities.

Household Activities: This section allows farmer to track income and expenses related to household activities including medical, education, travelling, grocery, emergency.

Farm Management module

Add Farm Details

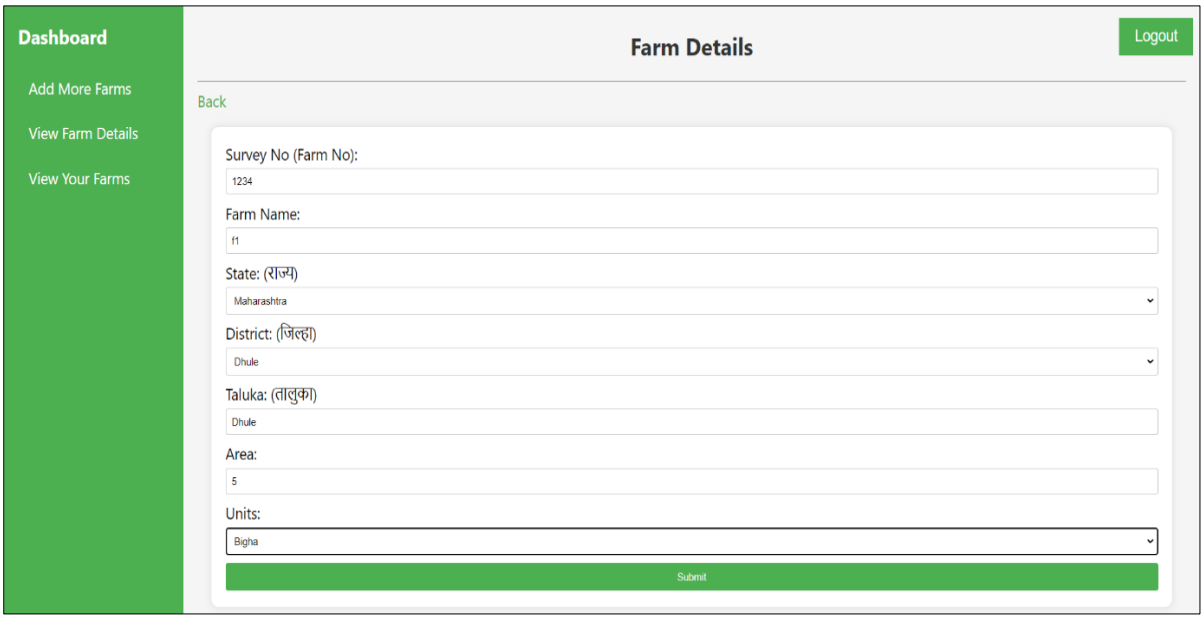


Fig 6.2 Add Farm Details

To effectively manage farming income and expenses, it's important to gather comprehensive farm details. This includes essential information such as survey number, farm name, location (state, district, taluka), and size (in acres, hectares, or other units). These details are crucial for accurately tracking farm-related finances and operations.

The webpage add_farm.php is designed to accept and validate farmer input for these farm details. Through the use of regular expressions and PHP's preg_match() method, the input data is verified for correctness before being stored in the database.

```
// Construct SQL query

$sql = "INSERT INTO farms (user_id, survey_no, farm_name, state, district, taluka, size, units, created_at) VALUES ('$user_id', '$survey_no', '$farm_name', '$state', '$district', '$taluka', '$size', '$units', NOW())";

// Execute SQL query

if ($conn->query($sql) === TRUE) {header('Location: view_farm.php');}

else {echo "Error: " . $sql . "<br>" . $conn->error;}
```

This snippet constructs an SQL query to insert farm details (**survey_no**, **farm_name**, **state**, **district**, **taluka**, **size**, **units**, **created_at**) into the **farms** table.

The **NOW()** function is used to insert the current timestamp (**created_at**).

If the SQL query execution is successful, it redirects the user to **view_farm.php**; otherwise, it displays an error message.

View farm Details

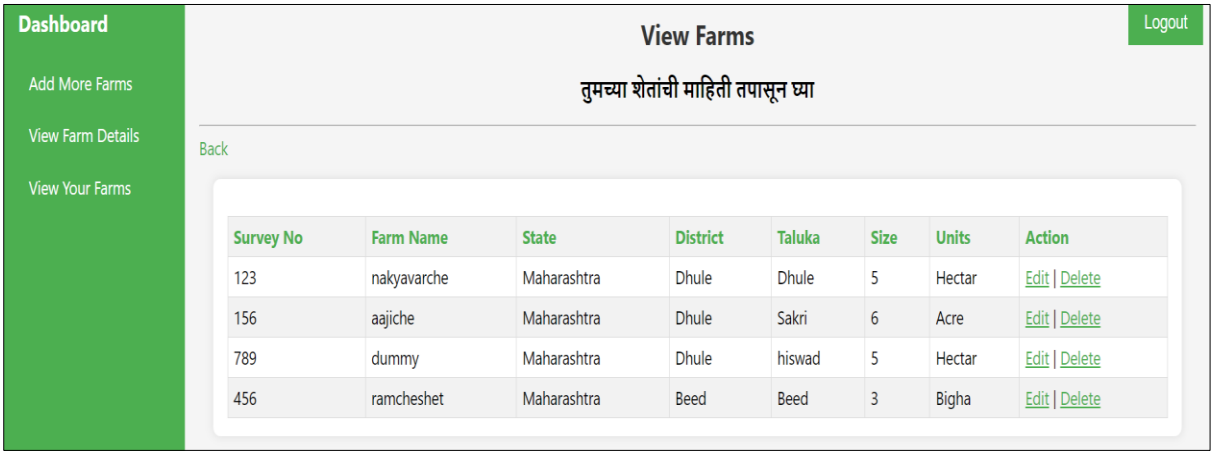


Fig 6.3 View Farm Details

The **view_farm.php** page retrieves farm data from the database based on the logged-in farmer's session. The farmer's **user_id** is retrieved from the session to customize SQL queries and fetch only the farm information associated with that specific farmer.

The data is then displayed in a tabular format on the webpage, providing the farmer with a clear overview of their farms and associated details.

The displayed farm information includes essential details such as survey number, farm name, location, and size, among others, all linked to the farmer's **user_id**.

Additionally, **view_farm.php** provides options for the farmer to edit or delete specific farm entries. Clicking on the edit button redirects the farmer to an edit page (**edit_farm.php**) where modifications can be made using straightforward SQL update statements. Similarly, the delete option leads to a delete confirmation page (**delete_farm.php**) containing a simple SQL delete statement to remove the selected farm entry from the database.

```
$user_id = $_SESSION["user_id"];

$sql = "SELECT * FROM farms WHERE user_id = '$user_id'";

$result = $conn->query($sql);
```

This snippet retrieves all farm records from the database where the **user_id** column matches the currently logged-in user's ID stored in **$_SESSION["user_id"]**. The SQL query is executed using **$conn->query($sql)**, and the resulting records are stored in **$result** for further processing or display on the webpage.

Crop Management module

Add crop details

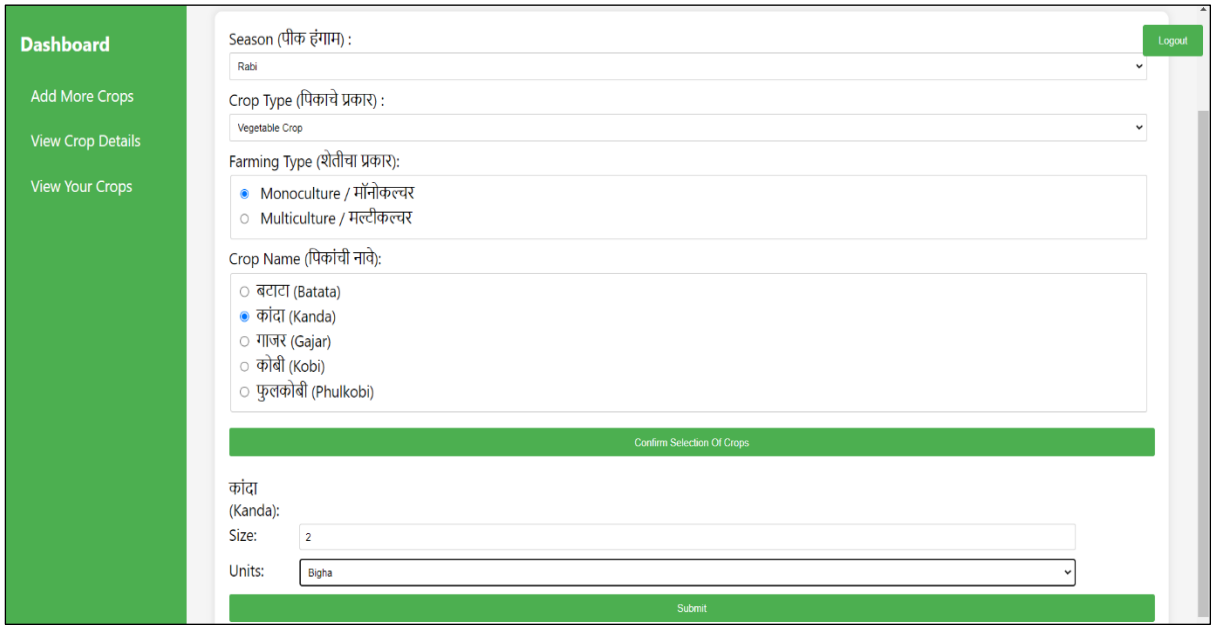


Fig 6.4 Add Crop Detail

After selecting a farm from **view_farm.php**, the user is directed to **add_crops.php**, where detailed crop information specific to the chosen farm is inputted. On this page, the user begins by selecting the appropriate season for crop cultivation, which filters the available crop options based on seasonal suitability. Next, the user specifies the type of farming method employed on the farm, choosing between monoculture (mono) or multiculture (multi). This selection impacts the types and combinations of crops that can be chosen for cultivation.

Following the farming method selection, the user proceeds to choose the specific crops intended for cultivation on the farm. For each selected crop, the user enters the size or area allocated within the farm, specifying units such as acres, hectares, bigha and square metres.

View crop details

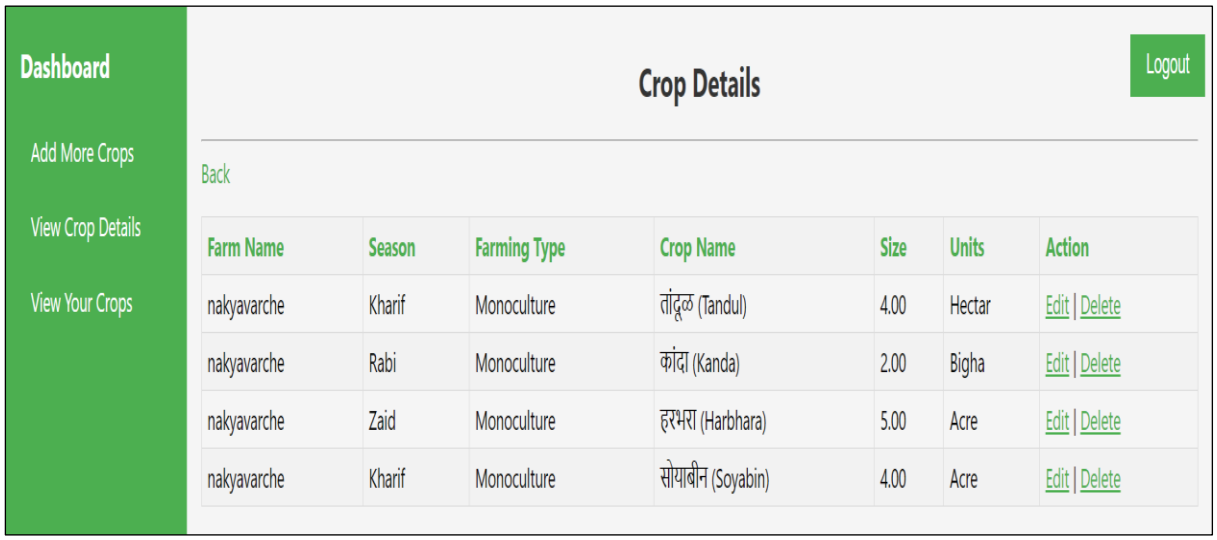


Fig 6.5 View Crop Details

Following the crop entry process on **add_crops.php**, the next step leads the farmer to **view_crop.php**, where the entered crop data associated with the selected farm is displayed in a structured format.

Upon accessing **view_crop.php**, the page retrieves crop data from the database linked to the specific farm and farmer's **user_id**. This data includes details such as crop type, size, season, and farming method that were entered on **add_crops.php**. The farmer can even edit and delete the crop details.

View crop details

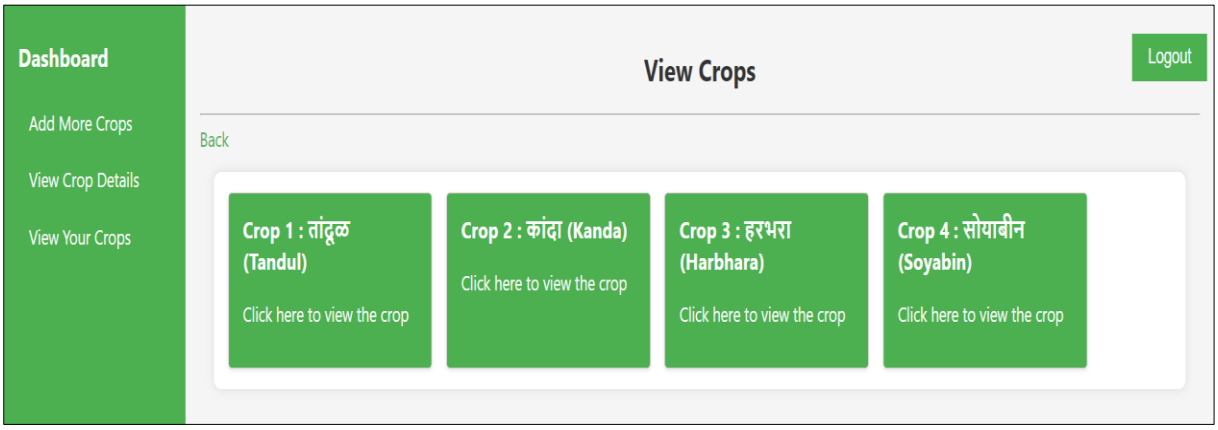


Fig 6.6 View Crops

In **view_crop.php**, farmers can view all the crops cultivated in a particular farm, allowing them to proceed with managing their income and expenses related to these crops.

Income Management

Add income details

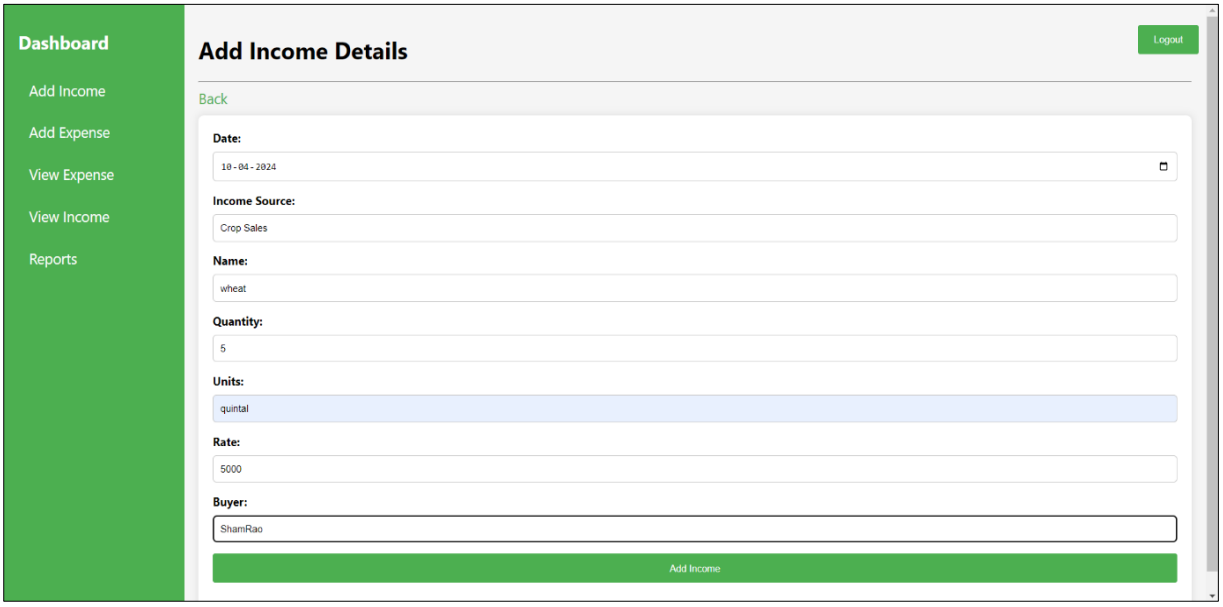


Fig 6.7 Add Income Details

The **add_income.php** page allows farmers to record income details related to their farm activities. Farmers input specific information such as:

- **Income Source:** (e.g., crop sales, livestock sales)

- **Particulars:** Details about the source (e.g., crop type, livestock breed)
- **Date:** When the income was earned
- **Quantity:** Amount sold (e.g., kilograms, number of livestock)
- **Units:** Measurement type (e.g., kilograms,grams)
- **Rate:** Price per unit
- **Buyer:** Who purchased the products

This data undergoes validation to ensure accuracy before being stored in the database, linked to the farmer's account. **add_income.php** helps farmers maintain clear financial records and make informed decisions about crop planning and pricing.

View income details

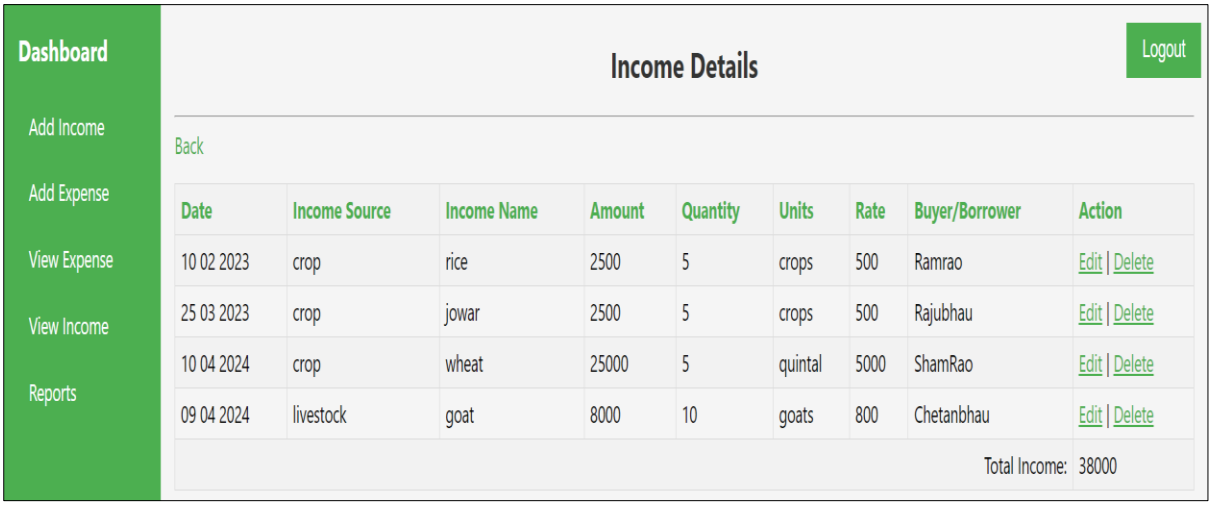


Fig 6.8 View Income Details

The **view_income.php** page allows farmers to access and manage income details related to their farm activities. When farmer visits view_income.php, income information linked to their account (user_id) is retrieved from the database and displayed in a structured table format on the webpage.

Each row in the table represents a specific income entry, including details such as the income source (e.g., crop sales, livestock sales), particulars (specific details about the income source), date of the transaction, quantity sold, units of measurement, rate (price per unit), and buyer information.

Expense Management

Add expense details

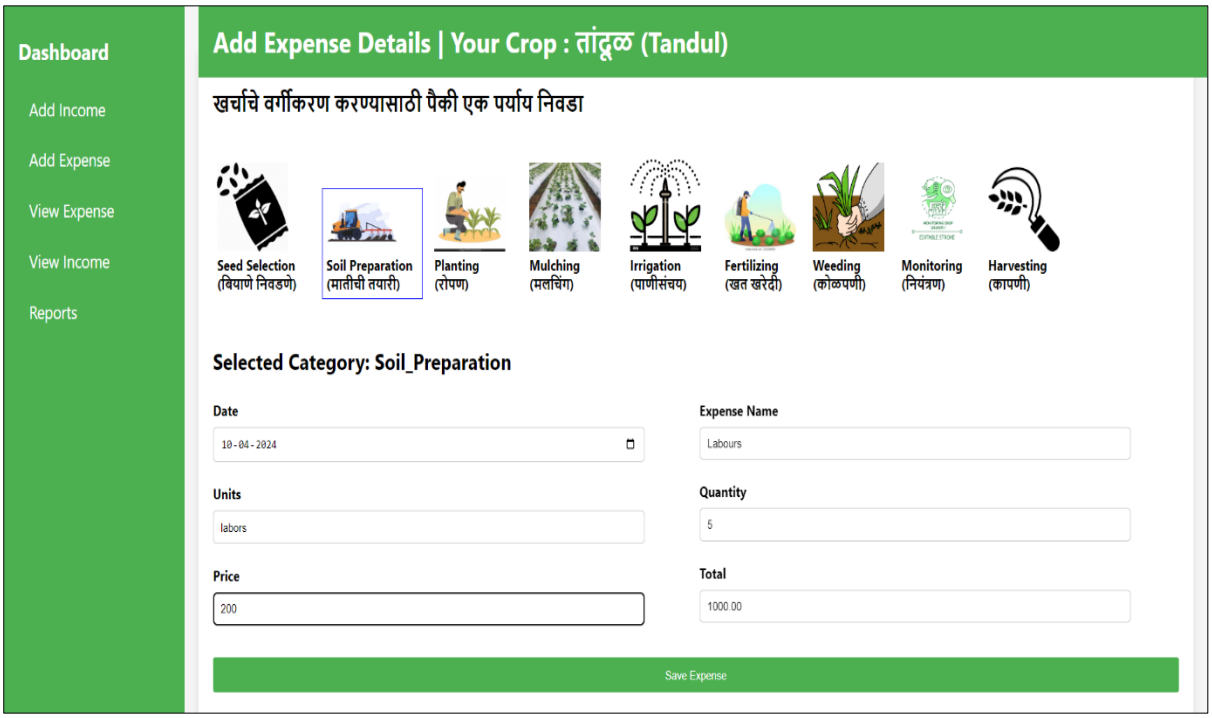


Fig 6.9 Add Expense Details

The **add_expense.php** page provides farmers to input detailed expense information related to specific farming activities. Farmers begin by selecting a method of farming from a predefined list, such as seed selection, soil preparation, planting, or fertilizing.

Based on the chosen farming method, the input fields dynamically adjust to capture the required materials and details for that specific activity. For example, if the farmer selects "seed selection," relevant fields may include seed type, seed name quantity, units, and price per unit. Similarly, choosing "soil preparation" might prompt fields for expense name(tractor, labor equipment used), quantities, units and associated costs.

The below code snippet dynamically constructs an SQL query to insert farming expense data into the **farming_expenses** table based on the selected expense category.

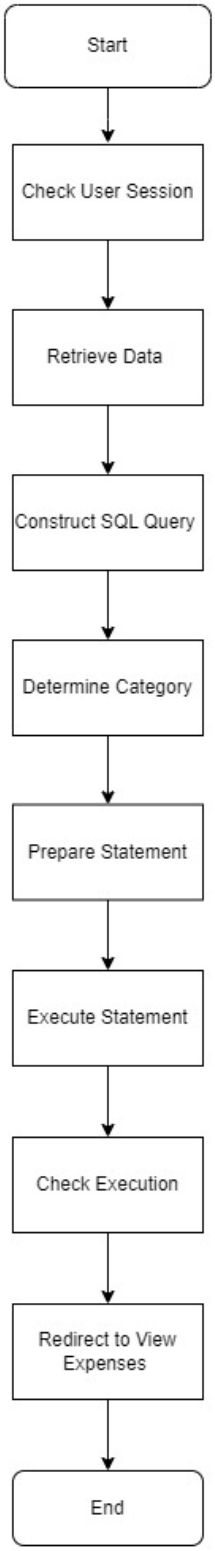
```
$sql = "INSERT INTO farming_expenses (user_id, farm_id, crop_id, category, quantity, price, total, date";

// Determine specific columns and values based on expense category

switch ($category)
```

```
case "Seed_Selection":
        $sql .= ", seed_type, units)";
        $values = "VALUES (?, ?, ?, ?, ?, ?, ?, ?, ?)";
        $stmt = $conn->prepare($sql . $values);
        $stmt->bind_param("iiisdddsss", $_SESSION['user_id'], $farmID, $cropID, $category, $quantity, $price, $total, $date, $croptype, $units);
        break;
    default:
        $sql .= ", expense_name)";
        $values = "VALUES (?, ?, ?, ?, ?, ?, ?, ?)";
        $stmt = $conn->prepare($sql . $values);
        $stmt->bind_param("iiisdddss", $_SESSION['user_id'], $farmID, $cropID, $category, $quantity, $price, $total, $date, $expense_name);
 break;}
// Execute prepared statement to insert data
if ($stmt->execute()){
header("Location: view_expenses.php?cropId=$cropID");
exit();}
else { echo "Error: " . $stmt->error;}
$stmt->close();
```

The following flowchart outlines the process of handling expense insertion in a PHP application.



1. Check User Session (Logged In): True (User Logged In): Continue with processing the expense. False (User Not Logged In): Redirect the user to the login page.

2. Fetch Farm and Crop IDs from Session: Retrieve necessary information (farm ID, crop ID) from the session data.

3. Fetch Crop Name and Type from Database: Query the database to get the details (name, type) of the selected crop.

4. Construct SQL Query: Based on the submitted form data, construct the SQL query for inserting expense details into the database.

5. Prepare and Bind Parameters: Prepare a SQL statement with placeholders for the parameters (farm ID, crop ID, expense details).

6. Execute Prepared Statement: Bind the actual values to the prepared statement and execute it to insert the expense data into the database.

7. Check Execution Result:

- True (Success): If the SQL execution is successful, redirect the user to view the expenses page.

- False (Error): If there's an error during SQL execution, handle the error and display an error message.

8. Redirect to View Expenses Page: After successful insertion, redirect the user to view the expenses page.

9. Error Handling: If any error occurs during the process (e.g., invalid session, database error), display an appropriate error message to the user.

Fig 6.10 Expense Flowchart

View expense details

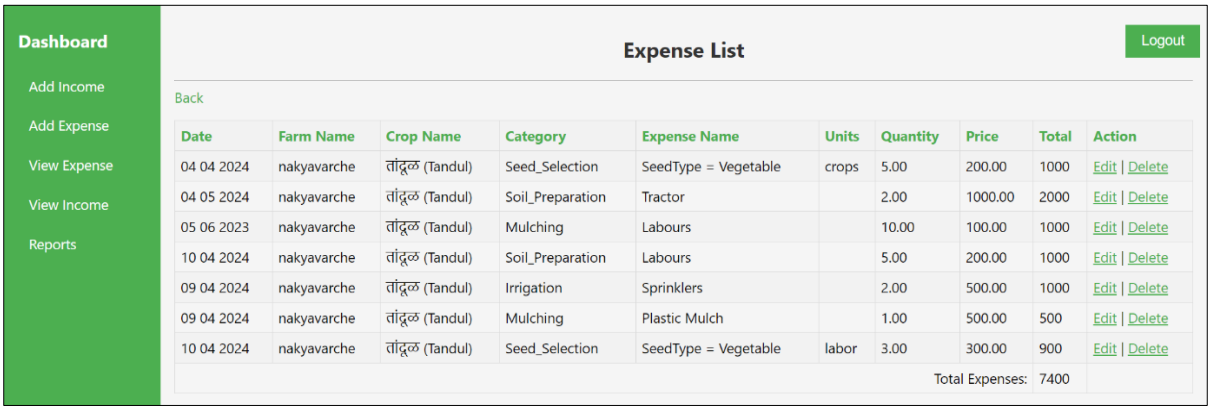


Fig 6.11 View Expense Details

The **view_expense.php** page is designed to allow farmers to access and manage their farm expense details efficiently. When farmers access **view_expense.php**, expense information associated with their account (**user_id**) is retrieved from the database and displayed in a structured tabular format on the webpage.

Each row in the table represents a specific expense entry, including essential details such as the method of farming, materials used, date of expense, quantity, units, and cost per unit. This presentation allows farmers to quickly review and analyze their expense data in a comprehensive manner. It also allows farmers to edit as well as delete the details.Also the total expenses made on respective farming methods is also displayed.

Report Generation

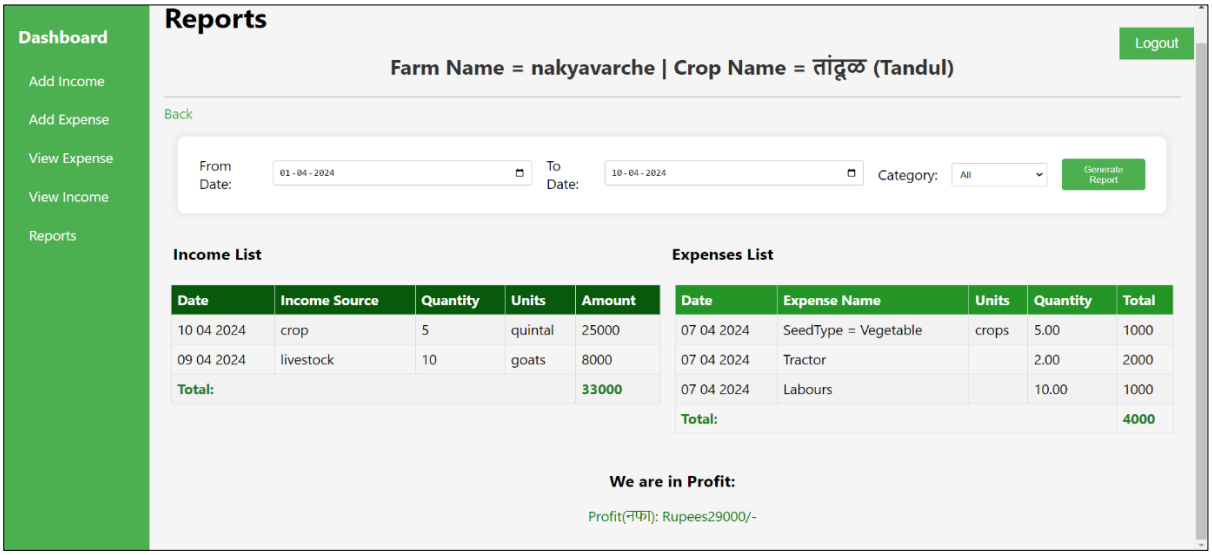


Fig 6.12 Report Generation

The report generation module allows farmers to generate income and expenses reports based on specified start(from) and end(to) dates, along with selected categories of farming activities. This functionality enables farmers to analyse financial data effectively and make informed decisions about their farming operations since profit or loss are mentioned.

```
$profitLoss = $totalIncomeAmount - $totalExpensesAmount;

if($profitLoss>=0){echo'<center><h3>We are in Profit:</h3></center>';

    echo '<center><p style="color: green;">Profit (नफा): Rupees ' .
$profitLoss . '/-</p></center>';

} else { echo '<center><h3>We are in Loss:</h3></center>';echo
'<center><p style="color: red;">Loss (तोटा): Rupees ' .
abs($profitLoss) . '/-</p></center>';}
```

This snippet calculates the profit or loss (**$profitLoss**) by subtracting total expenses (**$totalExpensesAmount**) from total income (**$totalIncomeAmount**). If the profit is greater than or equal to zero, it displays a message indicating "We are in Profit", along with the profit amount. If the profit is negative (indicating a loss), it displays a message indicating "We are in Loss", along with the absolute value of the loss amount.

Household Activities

Income Management

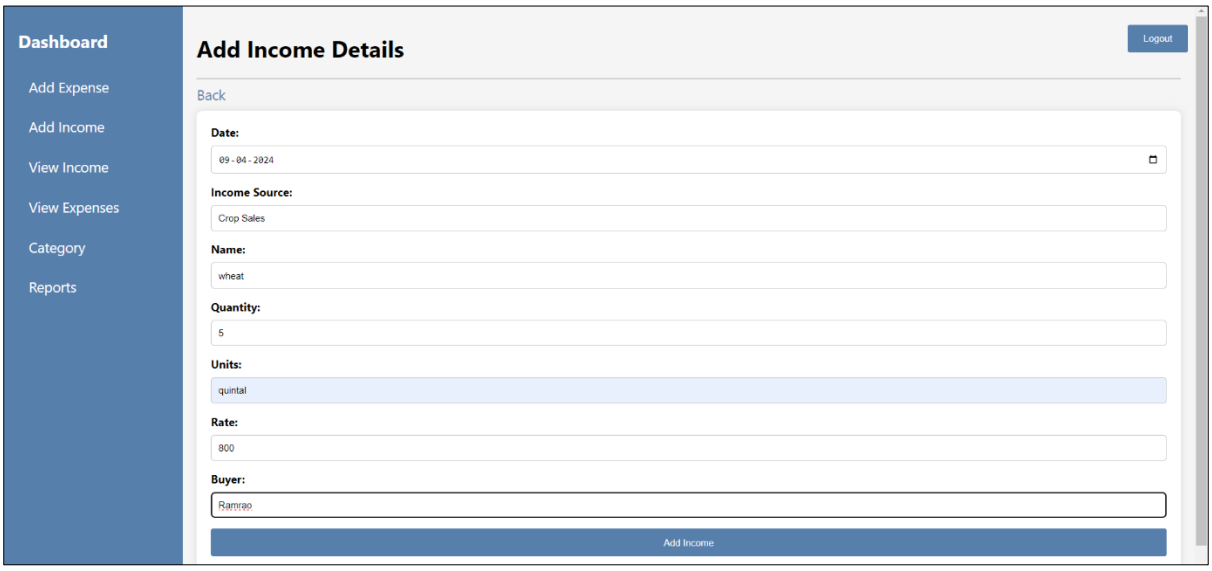


Fig 6.13 Add Income Details

The **add_income.php** page allows farmers to record income details related to their farm activities. Farmers input specific information such as:

- **Income Source:** (e.g., crop sales, livestock sales)
- **Particulars:** Details about the source (e.g., crop type, livestock breed)
- **Date:** When the income was earned
- **Quantity:** Amount sold (e.g., kilograms, number of livestock)
- **Units:** Measurement type (e.g., kilograms,grams)
- **Rate:** Price per unit
- **Buyer:** Who purchased the products

This data undergoes validation to ensure accuracy before being stored in the database, linked to the farmer's account. **add_income.php** helps farmers maintain clear financial records and make informed decisions about crop planning and pricing.

View income details

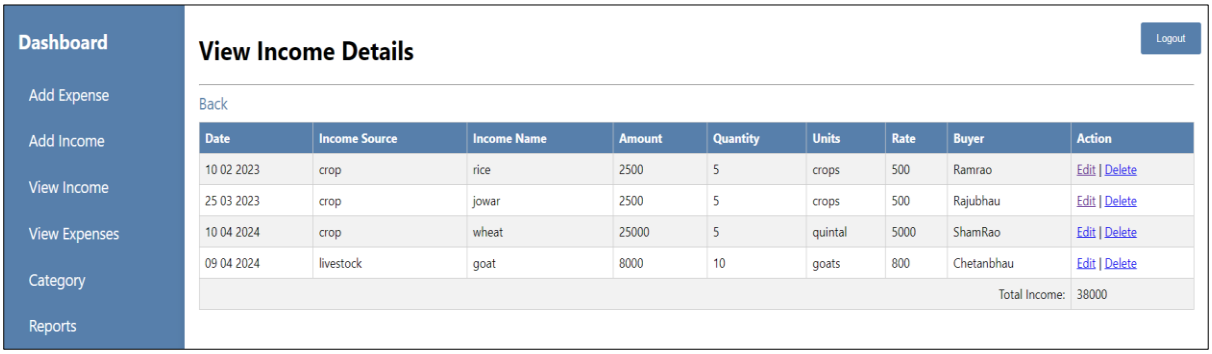


Fig 6.14 View Income Details

The **view_income.php** page allows farmers to access and manage income details related to their farm activities. When farmer visits view_income.php, income information linked to their account (user_id) is retrieved from the database and displayed in a structured table format on the webpage.Each row in the table represents a specific income entry, including details such as the income source (e.g., crop sales, livestock sales), particulars (specific details about the income source), date of the transaction, quantity sold, units of measurement, rate (price per unit), and buyer information.

Add expense details

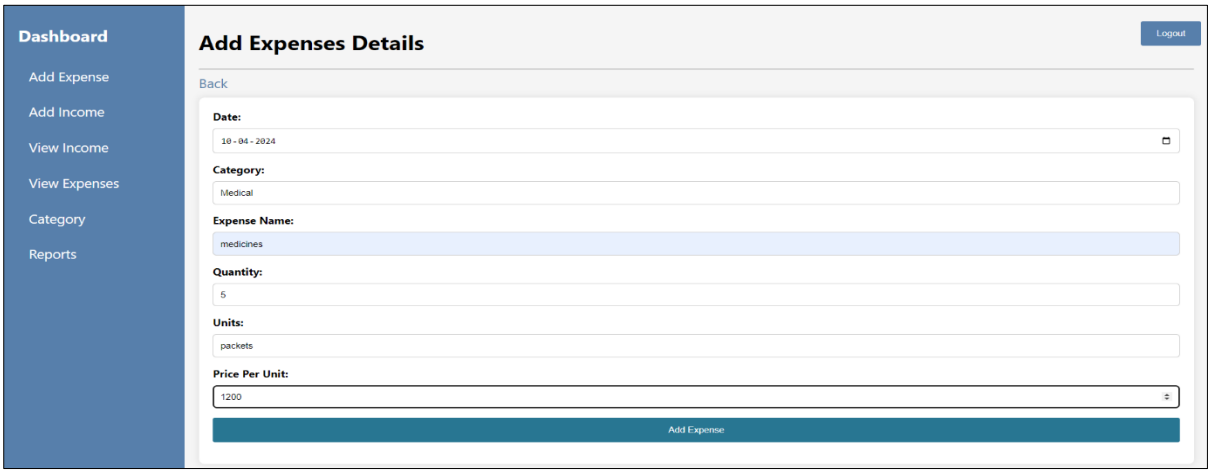


Fig 6.15 Add Expense Details

For efficient management of household expenses, farmers can utilize the **add_household_expense.php** interface to input detailed information related to various expense categories such as medical, education, traveling, groceries, utilities, and more.

The expense entry process involves selecting a specific expense category from predefined options and providing details including the expense name (particulars), quantity, units of measurement, price per unit, and automatically calculated total expense amount.

View expense details

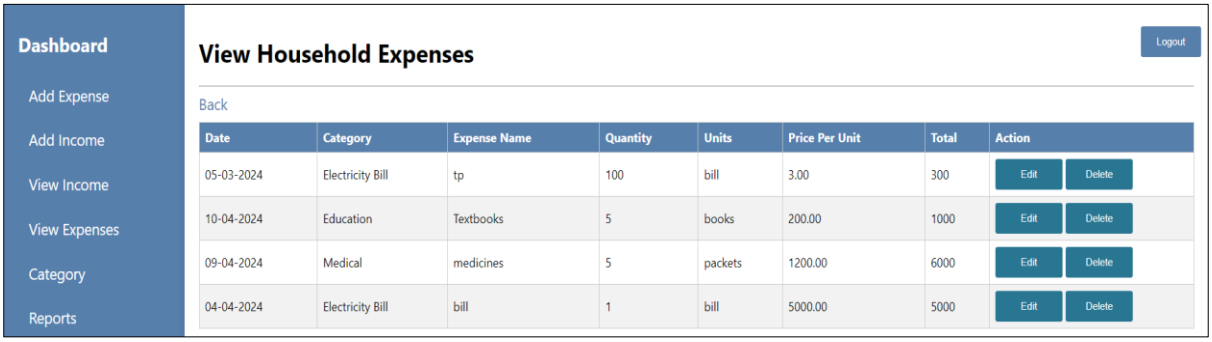


Fig 6.16 View Expense Details

In the expense management, farmers can access the **view_expense_details.php** page to conveniently view all their expense details in a tabular format, facilitating efficient expense tracking and management. Upon accessing this page, expense information associated with the farmer's account (**user_id**) is retrieved from the database and displayed in an organized table on the webpage.

Category Management

Add category details

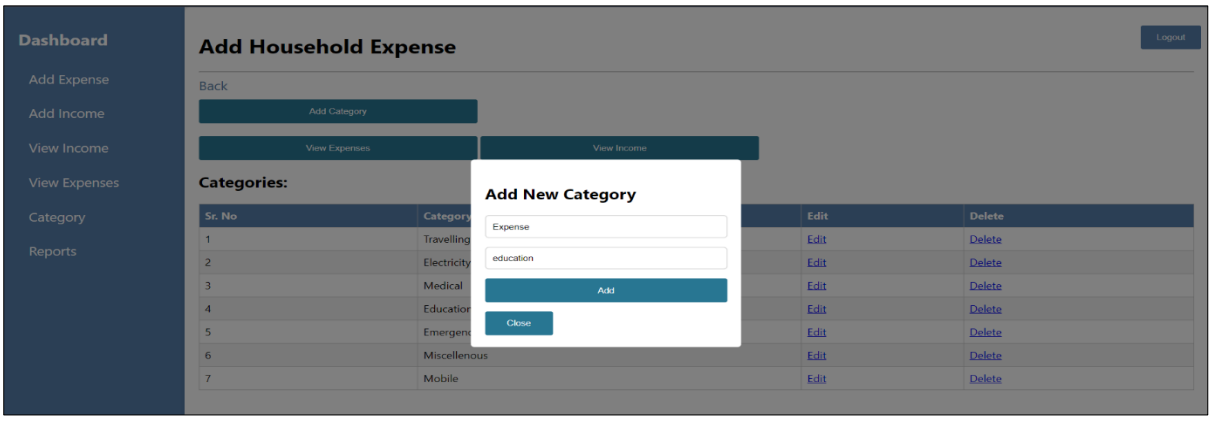


Fig 6.17 Add Category Details

To facilitate category management for household activities, farmers can add and manage categories for both income and expenses. This allows farmers to customize and organize their financial records effectively.

View category details

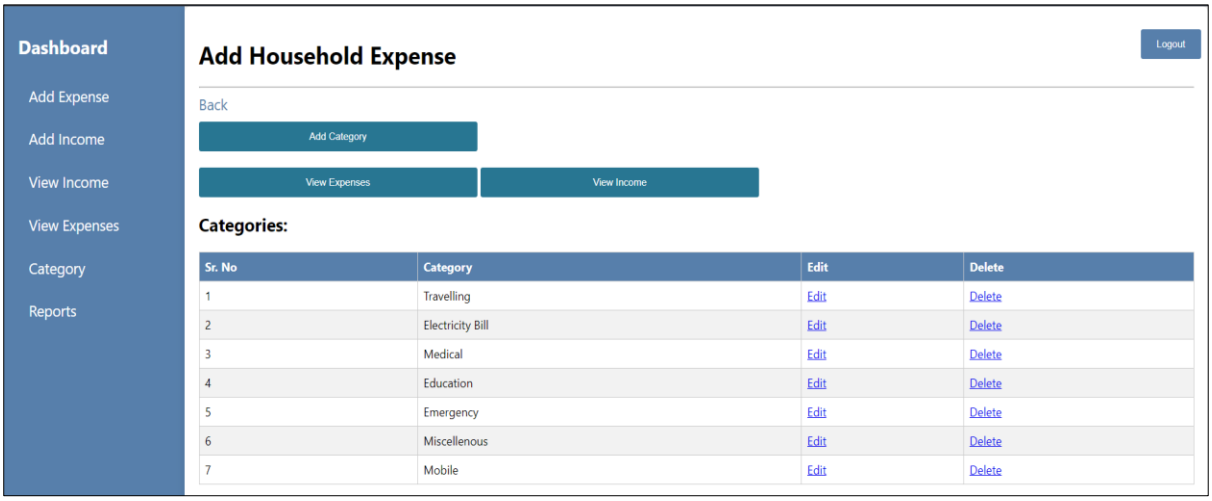


Fig 6.18 View Category Details

This feature allows farmers to view detailed income and expenses category information within the application. Additionally, farmers can edit or delete specific details as needed, providing flexibility and control over their financial records. This capability empowers farmers to maintain accurate and up-to-date financial data, enabling informed decision-making.

Report Generation

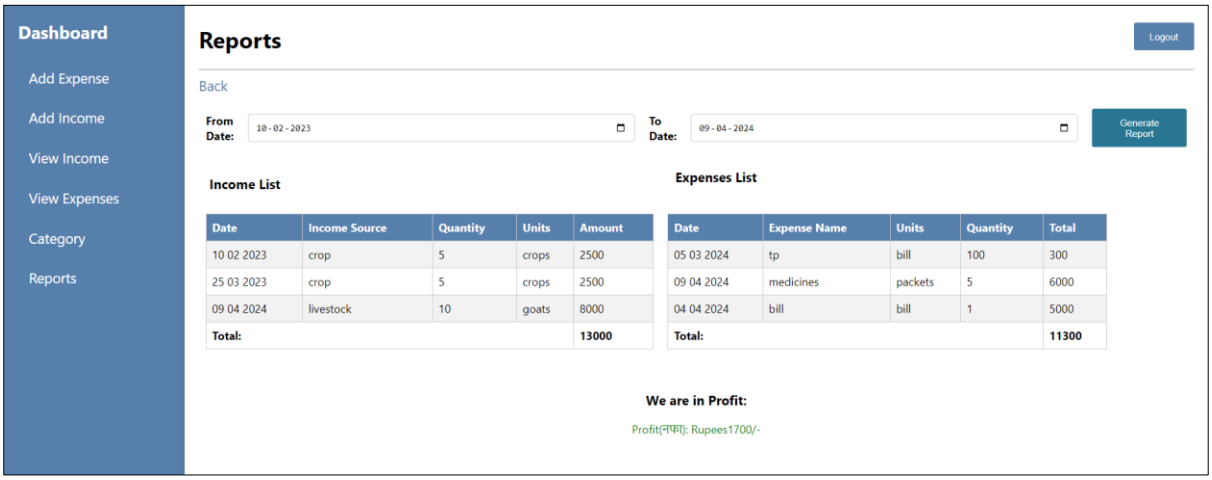


Fig 6.19 Report Generation

The report generation module allows farmers to generate income and expenses reports based on specified start(from) and end(to) dates. This functionality enables farmers to analyse financial data effectively and make informed decisions about their Household operations since profit or loss are mentioned.

```
$profitLoss = $totalIncomeAmount - $totalExpensesAmount;

if($profitLoss>=0){echo'<center><h3>We are in Profit:</h3></center>';

    echo '<center><p style="color: green;">Profit (नफा): Rupees ' .
$profitLoss . '/-</p></center>';

} else { echo '<center><h3>We are in Loss:</h3></center>';echo
'<center><p style="color: red;">Loss (तोटा): Rupees ' .
abs($profitLoss) . '/-</p></center>';}
```

This snippet calculates the profit or loss (**$profitLoss**) by subtracting total expenses (**$totalExpensesAmount**) from total income (**$totalIncomeAmount**). If the profit is greater than or equal to zero, it displays a message indicating "We are in Profit", along with the profit amount. If the profit is negative (indicating a loss), it displays a message indicating "We are in Loss", along with the absolute value of the loss amount.

Chapter 7

Conclusion and Future scope

Conclusion :-

- In conclusion, the Farmer Income and Expenditure Application provides a valuable tool for farmers to manage their finances effectively.
- By tracking income sources and monitoring expenditures, farmers can make informed decisions to improve their financial health.
- Overall, this application is a beneficial resource for farmers aiming to optimize their income and expenditure management

Future Scope :-

1. The Application can be made available for all over India
2. It can be made available in various languages as per various regions
3. It can even store the data related to Advance Payments of labors

Chapter 9

References and Bibliography

• References:-

- Farmer names with whom we discussed for the requirements as well as the the knowledge of every farming activity :
    1. Krushna Budha Desale
    2. Dnyaneshwar Vanji Desale
    3. Jijabrao Shivaji Desale
    4. Budha Chatur Desale
    5. Hiralal Nanabhau Mali
    6. Pralhad Nathu Mohan
    7. Amol Jayant Desale
    8. Suresh Panduang Desale
    9. Sanjay Madhukar Desale

- Farmers Wallet Application
    - Mr. Kirwana Fred of Bivatec Ltd., Uganda developed this app

- Farmer's Hand Book on Basic Agriculture
    - Dr. P. Chandra Shekara
    - Dr. N. Balasubramani
    - Dr. Rajeev Sharma
    - Dr. Chitra Shukla
    - Dr. Ajit Kumar
    - Bakul C. Chaudhary