Green Gold

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Section 1. Project Overview .....
1.1 Project Description: .....
1.2 Project Scope .....
1.3 Assumptions. .....
1.4 Constraints.....

Section 2. Project Start-Up .....
2.1 Project Life Cycle .....
2.2 Methods, Tools, and Techniques.....
2.3 Estimation Methods and Estimates .....
2.4 Schedule Allocation .....
2.5 Resource Allocation .....
2.6 Functional and non-functional requirements ……

Section 3. Budget .....
3.1 Budget Allocation .....
3.2 Feasibility Analysis.....
3.3 Break-even Analysis.....
3.4 NPV Benefits vs NPV Costs .....
3.5 Risk Management .....

Section 4. Diagrams .....
4.1 Context Diagram .....
4.2 Data Flow Diagram .....
4.3 ERD Diagram .....
4.4 Schema .....

Section 1. Project Overview

1.1 Project Description:

1 - Problem Definition:

- Many factories that produce agricultural fertilizers face a problem, which is the lack of agricultural waste that they recycle into agricultural fertilizers.

2- Description:

- Our system integrates the delivery process between factories and farms, with farms displaying their waste, and companies bidding on this quantity of waste to obtain it, in addition to shipping partnerships that will transport this waste, and the company has a percentage of 2 percent of each agreement made through the application.

1.2 Project Scope:

- Our project aims to achieve the sustainability needed by these factories by connecting them to farms containing agricultural violations, accelerating the agreement process, saving effort, and creating an additional source of income for farms and shipping companies.

Project Includes
• Goods exchange: The highest bidder gets the agricultural waste and in return the farmer gets the money.
• Payment systems: The system will include an electronic payment system via InstaPay.
• Security systems: The application will contain a security protocol to protect users during the electronic payment process.
• Reporting: Monthly reports will be monitored for the operations carried out through the system.
• Save time: All procedures and operations will be automated electronically, which will help save time and effort.
Project Excludes
❖ Our system will be a mobile application, not a desktop application or a website.

Internal Deliverables	Description
1- Project Plan	- Identifies scope, schedule, resources, risks, and costs.
2- Economic Feasibility Study	- Determines whether the system is financially worth it.
3- Risk Management Plan	- Identifies potential risks that may affect the system and outlines strategies to minimize risks
4- DFD (Data Flow Diagram)	- Determines how data moves through the system.
5- ERD (Entity-Relationship Diagram)	- Illustrates the data structure of the system by showing entities, their relationships, and attributes

External Deliverables	Description
1- Register Screen	- Allows new users to create an account.
2- Login Screen	- Allows users to enter their username and password to access the system
3- Farm Screen	- Allows the farmer to add the product to the system
4- Factory Screen	- Allows factories to bid to purchase goods from the application
5- Transport Screen	- Allows shipping companies to offer offers to transport goods from the farm to the companies
6- Confirmation Screen	- A message is displayed to the user to confirm that your request has been successfully executed.

1.2 Assumptions.

Assumptions
• **Data Availability:** - Farmers will accurately input data about their agricultural waste (type, quantity, location). - Factories will submit realistic bids based on waste quality and market conditions.
• **Update Frequency:** - Farmers will regularly update waste availability (e.g., after each harvest). - Factories will adjust bids promptly in response to market changes.
• **User Location Access:** - All users (farmers, factories, shippers) will grant GPS access to the app: - Farmers: To pin waste locations precisely. - Shipping companies: To optimize transport routes.
Technology Access: -Users have stable internet connection to participate in auctions and access features. -Users have basic familiarity with smartphone usage and mobile applications.
Additional Project-Specific Assumptions : - User Commitment: - Farmers will honor sales to auction-winning factories. - Factories will pay promptly upon deal completion. - Waste Quality: - Listed waste will be suitable for fertilizer production (free of contaminants). - Communication: - All negotiations will occur within the platform (no off-platform deals).

1.3 Constraints

Constraints
1. Performance Constraints • There should be no delay in displaying the latest auction numbers, which could lead to system problems. • **Accuracy:** - Waste quantity/type data must be 96% accurate
2. Budget Constraints • The development budget is capped at $50,000 USD for Phase 1 of the project (Minimum Viable Product) , Due to financial limitations, the team may need to prioritize core functionalities and select cost-effective tools, technologies, and services.
3. Time Constraints: • MVP Launch Deadline: 2 months and 8 Days.
4. Resource Constraints: ➓ Technical Team: - Only 2 full-stack developers available. - 1 part-time logistics specialist. (The project may face delays if specialized roles (Back-End/Front-End) are required in future phases) Infrastructure: - Limited to Google Cloud free tier initially.

Section 2. Project Start-Up

2.1 Project Life Cycle

Phase	Activities	Sequence
Planning	• Forming the Project Team: Select team members for each aspect of the project (e.g., Flutter developers, logistics specialists, etc.). • Define problem and scope • Developing the Project Plan: Define resources, budget, and timeline. • Creating the Project Charter: Set clear objectives, responsibilities, and expected deliverables for the project.	**Phase 1**
Analysis	• System Requirements Analysis: Based on gathered data, define the systems required to support the agricultural waste auction. • Determine the needs and main points of each stakeholder (farmers, factories, shipping companies) • General recommendation on how to fix, enhance and replace current system • Produce a System Analysis Report highlighting gaps and opportunities	**Phase 2**

Design	- Designing the user interfaces for each type of user (farmers, factories, shipping companies) - Designing the database structure and data storage system - Integrating Google Maps API for location and route management - Developing required APIs for system integration - Designing the payment system and automatic commission deduction - Creating the user rating system and reporting violations	**Phase 3**
Implementation	- Developing the actual application using Flutter and Dart - Implementing and testing the system internally with the development team - Launching an initial version (MVP) to a limited group of users - Training users on how to use the new platform - Gathering feedback from early users and analyzing system performance - Making improvements based on actual usage and implementing necessary changes - Monitoring system performance and conducting regular maintenance	**Phase 4**

2.2 Methods, Tools, and Techniques

1- Methods:

Agile	There will be an initial meeting to agree on the basics of the system, and there will be a session at the end of each phase to review what has been implemented.

2- Tools:

Flutter	The main framework for building a cross-platform mobile application (Android & iOS) to connect farmers, factories, and shipping companies.
Google Cloud Storage	For storing and managing large datasets related to waste quantities, bids, and logistics details.
Google Maps API	To calculate and display shipping routes and enable geolocation features for farmers and shippers.
GitHub	**For version control and team collaboration**
Payment Gateway API (e.g., InstaPay)	**To handle transactions between farmers, factories, and shippers, and manage the 2% commission fee for each successful deal.**

3- Techniques:

Data Security	Implementing advanced security mechanisms to protect user data and financial transactions, such as encryption and HTTPS protocols to secure data during transmission.
API Integration	Connecting the platform with external services such as Google Maps for route optimization and payment gateways (e.g., InstaPay) for secure financial transactions.

Data Visualization	Presenting auction results, bid statistics, and pricing trends visually with graphs and charts to provide farmers, factories, and shippers with actionable insights.

2.3 Estimation Methods and Estimates

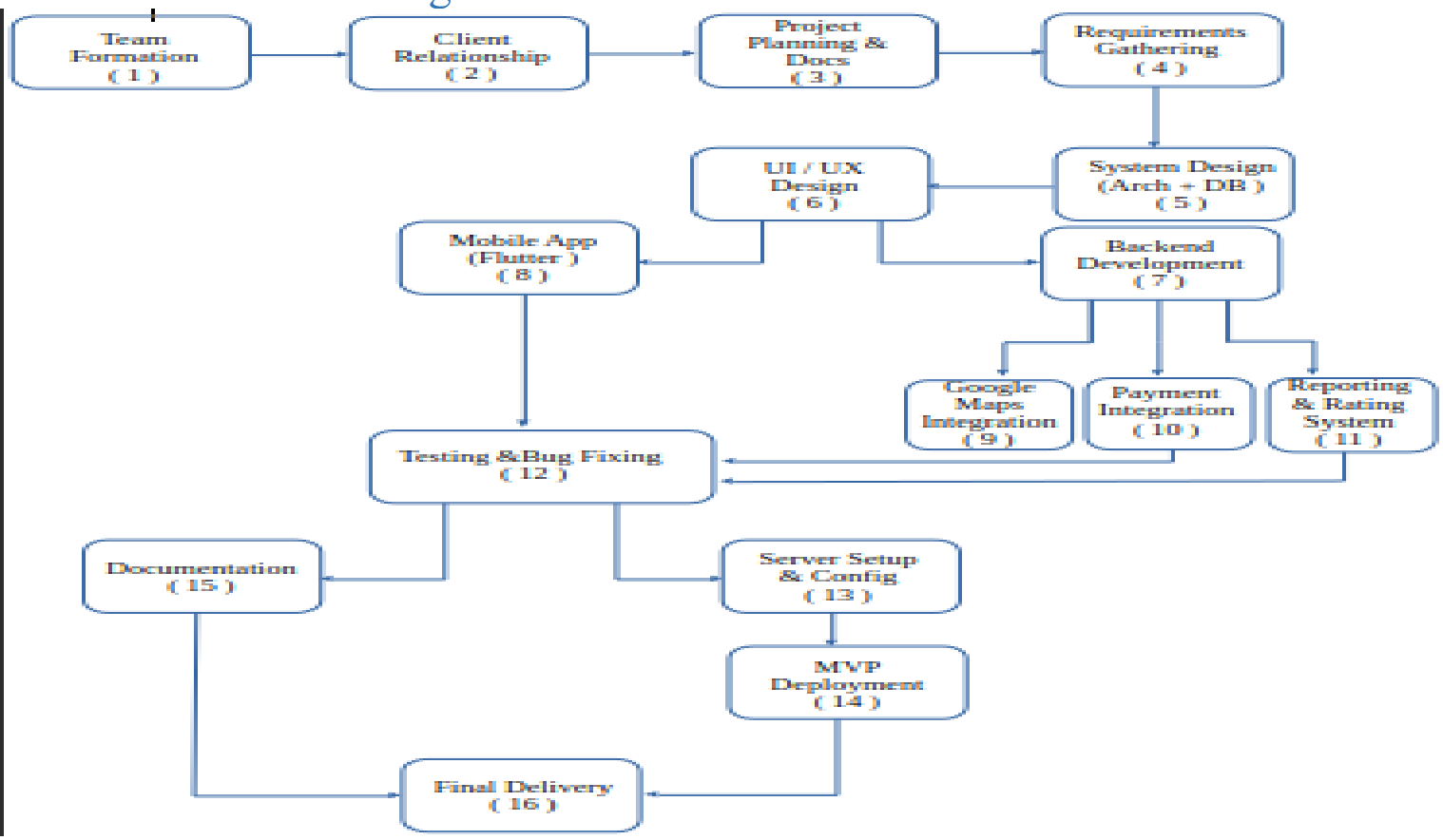
Estimation Methods and Estimates	
Description	- A process of analyzing the best and worst conditions for all system properties, such as time, budget, etc., to help us anticipate the best and worst conditions and try to avoid the worst possible conditions. [**Best** / **Most Likely** / **Worst**]
Effort in hours	**Best Estimate:** 2000 hours **Most Likely Estimate:** 2500 hours **Worst Estimate:** 3000 hours
Schedule in calendar months	**Best Estimate: 2.5** months **Most Likely Estimate: 4** months **Worst Estimate: 6** months
Budget in dollars	**Best Estimate: $110,000** **Most Likely Estimate: $130,000** **Worst Estimate: $150,000**
Level of Uncertainty	15%

2.4 Schedule Allocation:

Task	Duration (Days)	Depend On	TE (Earliest Start)	TL (Latest Start)	Slack (TL - TE)	Critic pass
Team Formation	3	-	0	0	0	yes
Client Relationship	5	1	3	3	0	yes
Project planning & Docs	4	2	8	8	0	yes
Requirements Gathering	6	3	12	12	0	yes
System Design (Arch + DB)	4	4	18	18	0	yes
UI / UX Design	5	5	22	22	0	yes
Backend Development	8	6	27	27	0	yes
Mobile App	6	6	27	27	0	yes
Google Maps Integration	2	7	35	38	3	No
Payment Integration	2	7	35	38	3	No
Reporting & Rating System	3	7	35	35	0	Yes

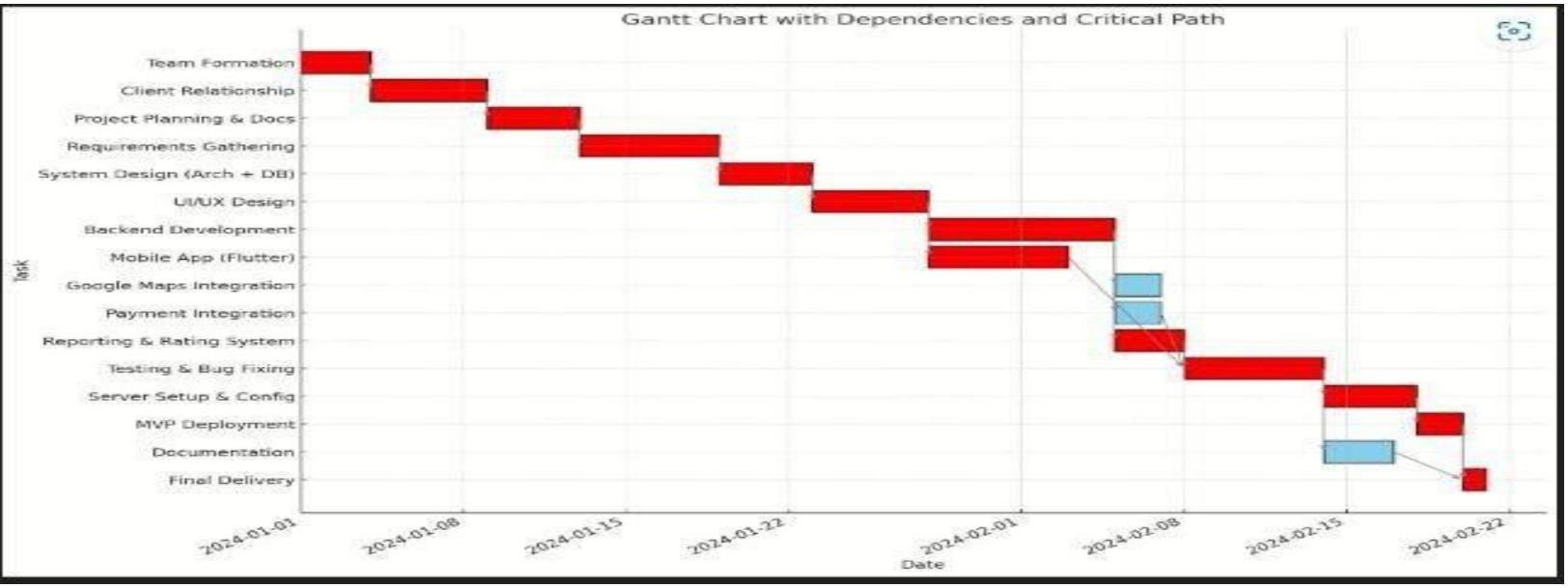
Testing & Bug fixing	6	8,10,11	38	38	0	yes
Server Setup & Config	4	12	44	44	0	yes
MVP Deployment	2	13	48	48	0	yes
Documentation	3	12	44	47	3	No
Final Delivery	1	14,15	50	50	0	yes

Network Diagram:



Critical Path: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 11 → 12 → 13 →14 → 16

Gantt Chart:


Gantt Chart with Dependencies and Critical Path
Team Formation
Client Relationship
Project Planning & Docs
Requirements Gathering
System Design (Arch + DB)
UI/UX Design
Backend Development
Mobile App (Flutter)
Google Maps Integration
Payment Integration
Reporting & Rating System
Testing & Bug Fixing
Server Setup & Config
MVP Deployment
Documentation
Final Delivery
Task
2024-01-01
2024-01-08
2024-01-15
2024-01-22
2024-02-01
2024-02-08
2024-02-15
2024-02-22
Date

2.5 Resource Allocation:

Resource	Skill Set Requirements
Analyst	**1.** SQL **2.** Data visualization **3.** Critical thinking **4.** Math and Statistics **5.** communication
Database Designer	- Design ERDs - Normalize Data - Integration with Backend - SQL Writing
Mobile App Developer	- Flutter Framework - Dart Language - API Integration - UI Customization
Inspectors	- Testing Strategies (Manual & Automated) - Bug Tracking

UI/UX Designer	- UI Prototyping - Wireframing - User Flow Design - Interaction Design

Project manager	- Risk Management - Team Organization - Communication - Scheduling

2.6 Functional and non-functional requirements:

Functional Requirements	Non-Functional Requirements
User Management	Performance
Farmer Features	Scalability
Factory Features	Security
Shipping Company Features	Usability
Auction System	Reliability
Notifications	Maintainability

Section 3. Budget

3.1 Budget Allocation

Activities	Budget ($)
Requirements Gathering	9,850.00
Project Documentation & Planning	10,500.00
System Design (Architecture + Database)	5,200.00
UI/UX Design	6,300.00
Backend Development	13,200.00
Flutter Mobile App (Multi-user)	8,000.00
Google Maps Integration	2,000.00
Payment Integration (InstaPay or similar)	1,000.00
Rating & Reporting System	950.00
Testing (Functionality + User Testing)	1,200.00
MVP Deployment (Launch)	6,000.00
Server Setup	18,000.00
Miscellaneous Tools & Licenses	36,000.00

Economic Feasibility Analysis

- **Benefit per year** = 162,000$
- **Discount rate** = 14%
- **Recurring cost per year** = 91,000$
- **One-time cost** = 132,000$

3.2 Feasibility Analysis

	Year Of Project										
Feasibility	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Total**
Net economic benefit	162,000	162,000	162,000	162,000	162,000	162,000	162,000	162,000	162,000	162,000	
Discount rate (14%)	0.8772	0.7695	0.6750	0.5921	0.5194	0.4556	0.3996	0.3506	0.3075	0.2697	
PV of benefits	142,105	124,654	109,345	95,917	84,138	73,805	64,741	56,791	49,816	43,699	845,011
One-time cost	132,000										
Net economic cost	223,000	91,000	91,000	91,000	91,000	91,000	91,000	91,000	91,000	91,000	
Discount rate (14%)	0.8772	0.7695	0.6750	0.5921	0.5194	0.4556	0.3996	0.3506	0.3075	0.2697	
PV of costs	195,614	70,022	61,422	53,879	47,263	41,458	36,367	31,901	27,983	24,547	590,456
Overall NPV	254,555										
Overall ROI	0.4311										

3.3 Break-even Analysis:

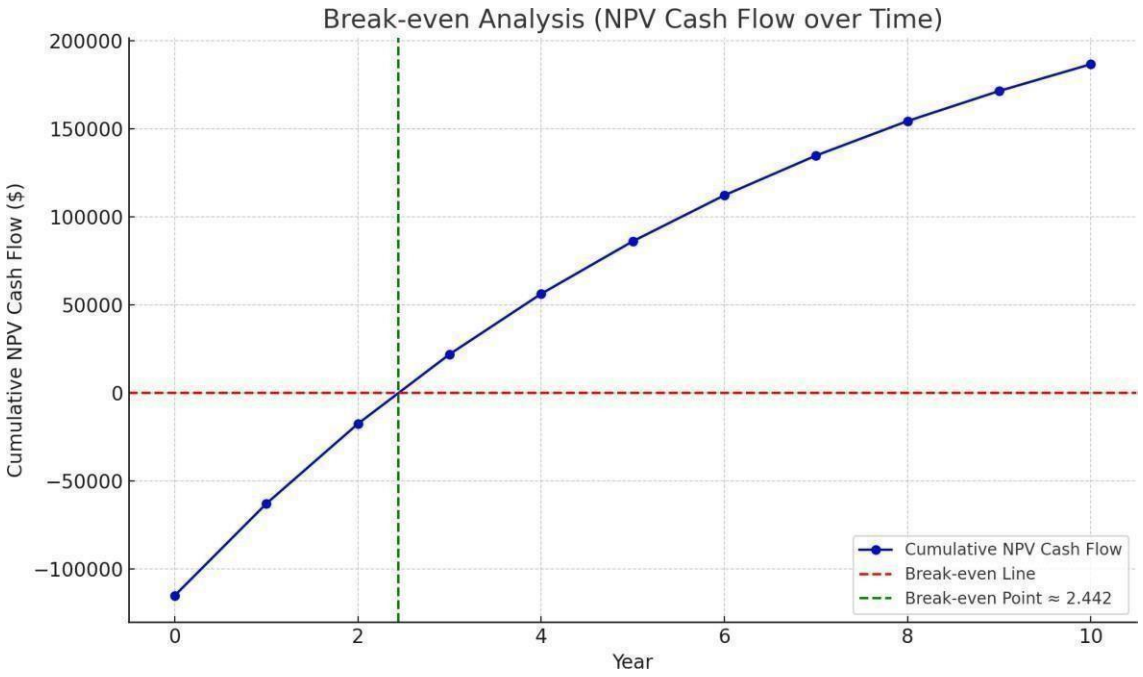
Yearof Project	0	1	2	3	4	5	6	7	8	9	10
Yearly PV cash flow ($)	115,000	52,174	45,369	39,451	34,305	29,831	26,114	22,556	19,614	17,056	15,199
Overall NPV cash flow ($)	115,000	62,826	17,457	21,994	56,299	86,130	112,069	134,625	154,239	171,295	186,126

Break even Point occurs between year 2 and year 3

Break even Point = (45,369 - 17,457)/45,369) = 0.615

Break even Point occurs at 2.615

Break even graph



3.4 NPV Benefits vs NPV Costs

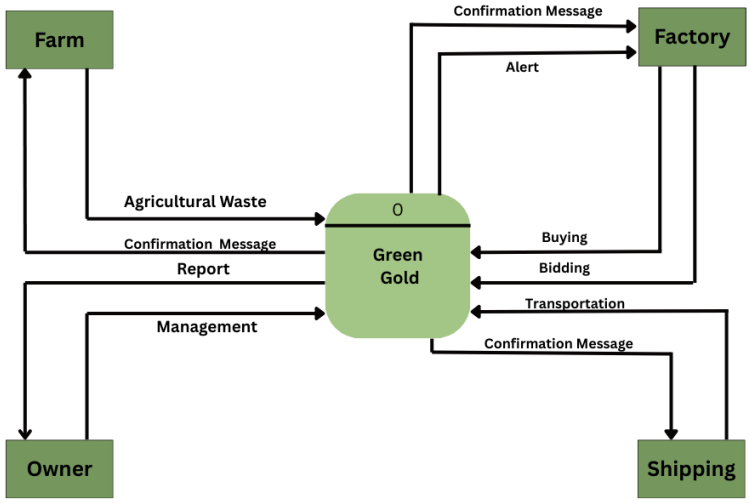
Years	NPV Benefits ($)	NPV Cost ($)
0	0.00	115,000.00
1	117,391.30	180,217.39
2	219,470.70	236,928.17
3	308,235.39	286,241.88
4	385,422.08	329,123.38
5	452,540.94	366,411.63
6	510,905.16	398,836.20
7	561,656.66	427,031.48
8	605,788.40	451,549.11
9	644,163.83	472,868.79
10	677,533.76	491,407.65

3.5 Risk Management

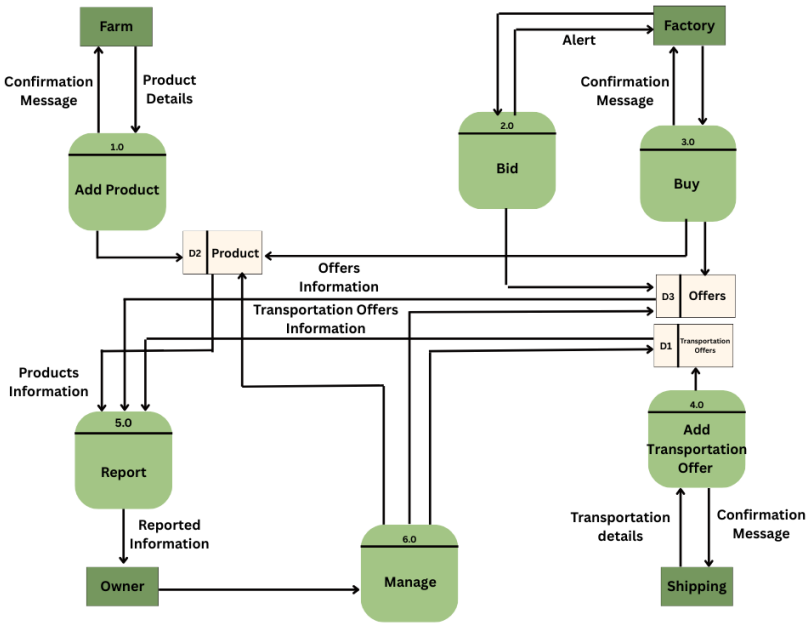
Risk Description	Probability	Impact	Strategy
System Downtime during Auction	Medium	High	Use real-time backups and cloud based failover systems to ensure continuity
Payment Gateway Failure	Low	High	Integrate multiple payment providers
Fake or Fraudulent Bids Medium	Medium	Medium	Implement identity verification and real-time bid validation logic
Delay in Feature Integration (e.g. Google Maps)	Medium	Low	Keep integration modular and allocate buffer time in the schedule
Difficulty in Real-Time Notifications	Medium	High	Use Firebase Cloud Messaging with testing under load conditions

Section 4. Diagrams

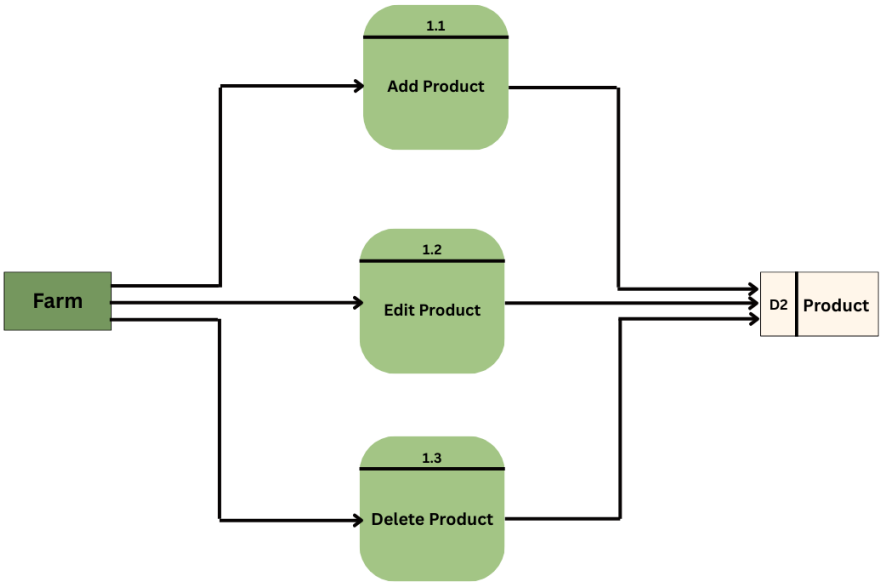
4.1 Context Diagram:



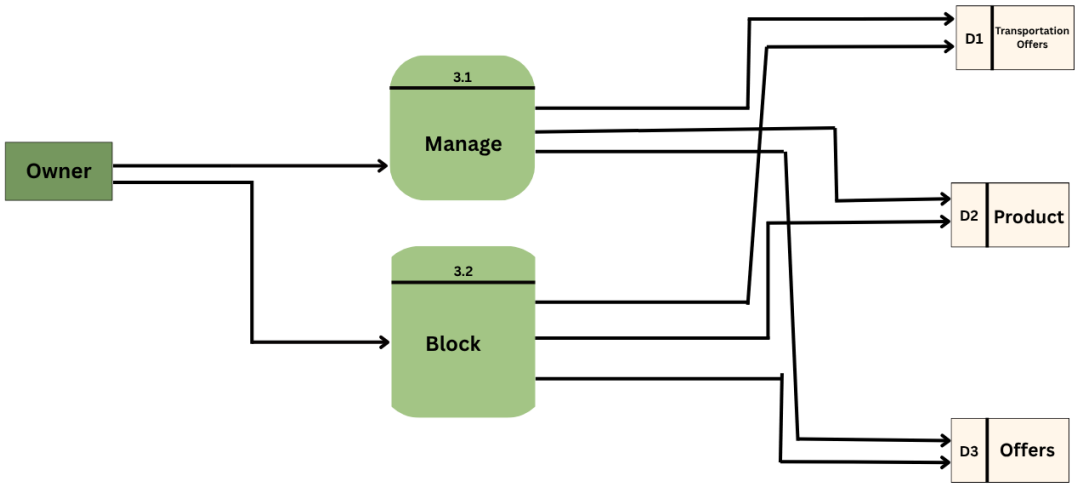
4.2 Data Flow Diagram (Level 0) :

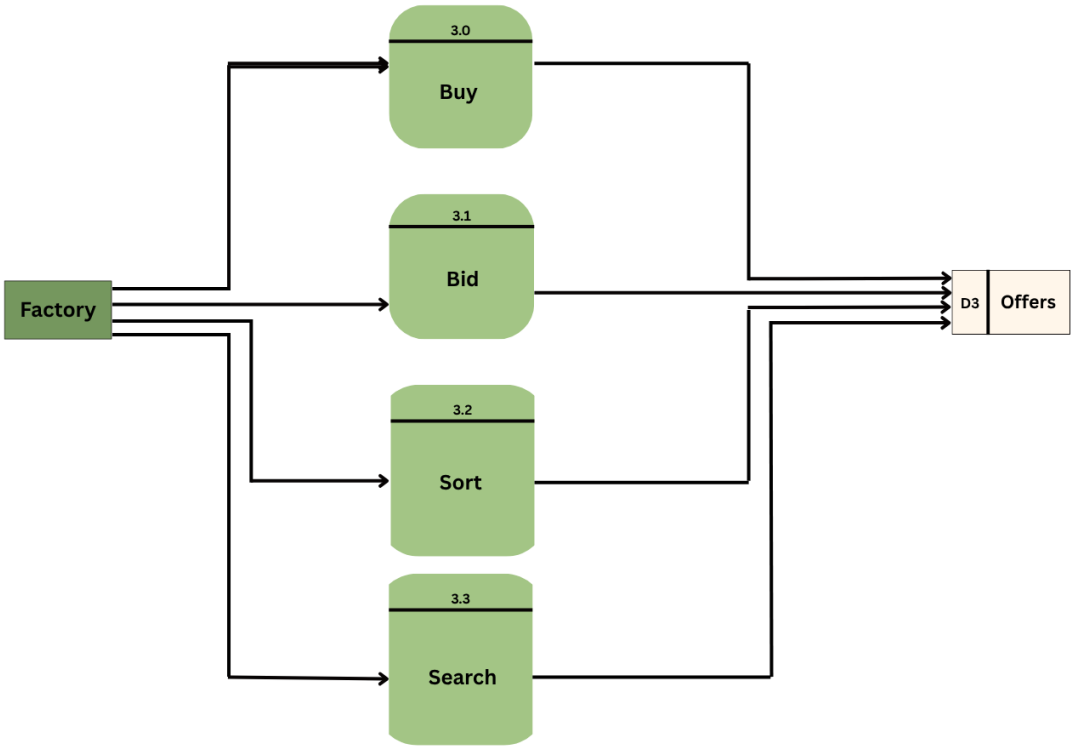


4.3 Data Flow Diagram (Level 1) :

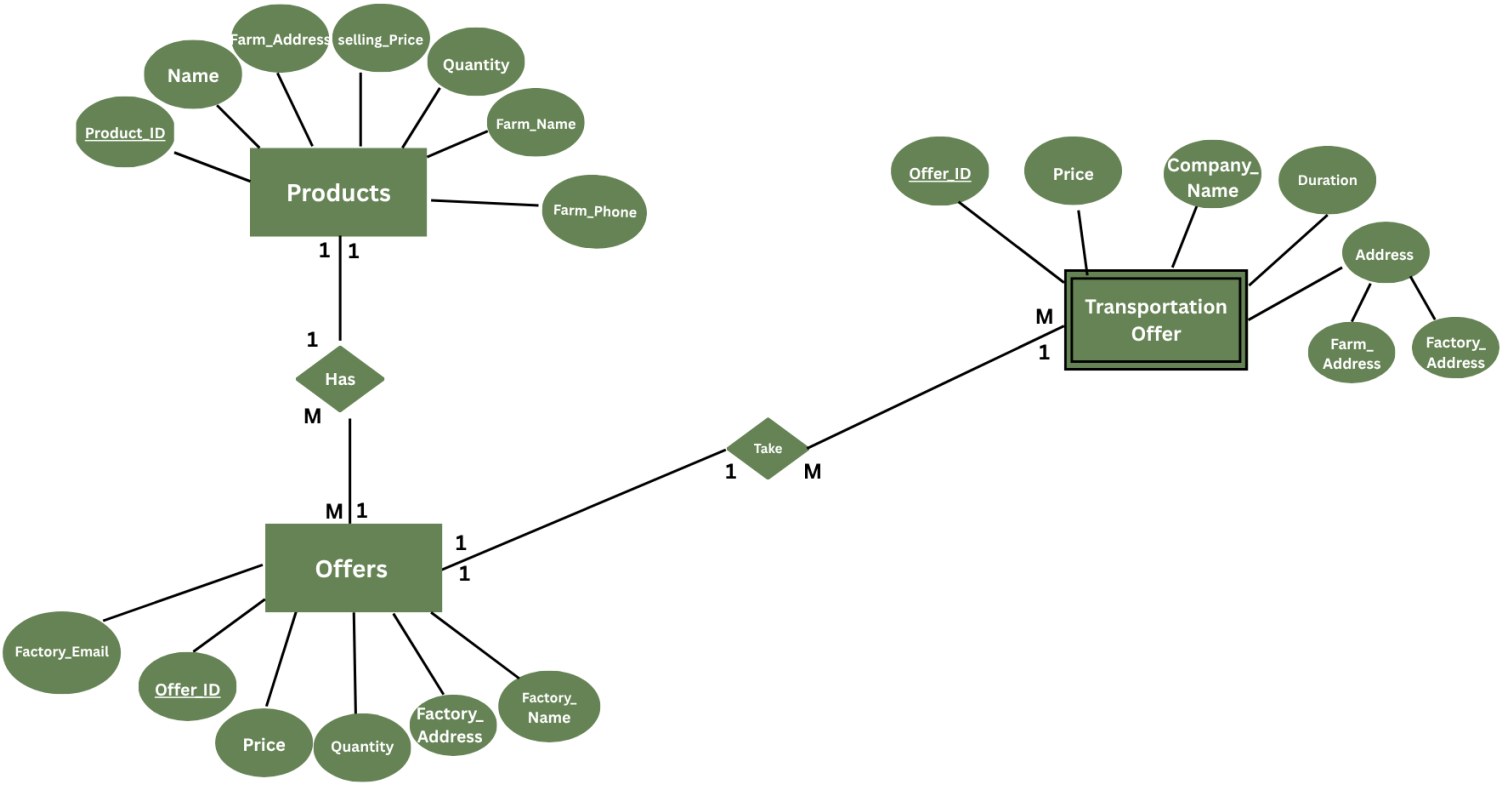


4.1
Add Transportation Offer
4.2
Edit Transportation Offer
4.3
Delete Transportation Offer
Shipping
D2
Transportation Offer


Owner
3.1
Manage
3.2
Block
D1
Transportation Offers
D2
Product
D3
Offers

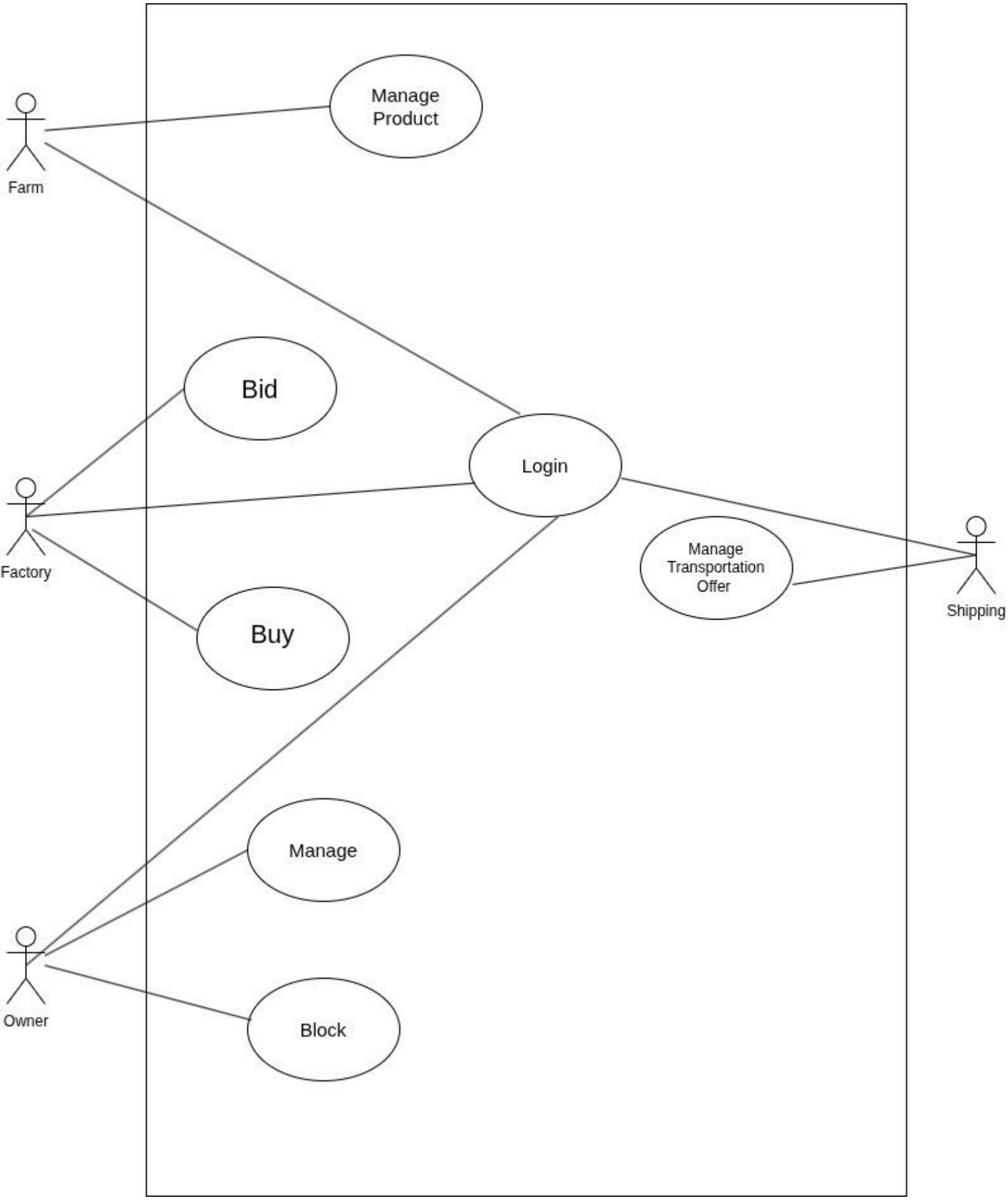

3.0
Buy
3.1
Bid
3.2
Sort
3.3
Search
Factory
D3
Offers

4.4 ERD Diagram:

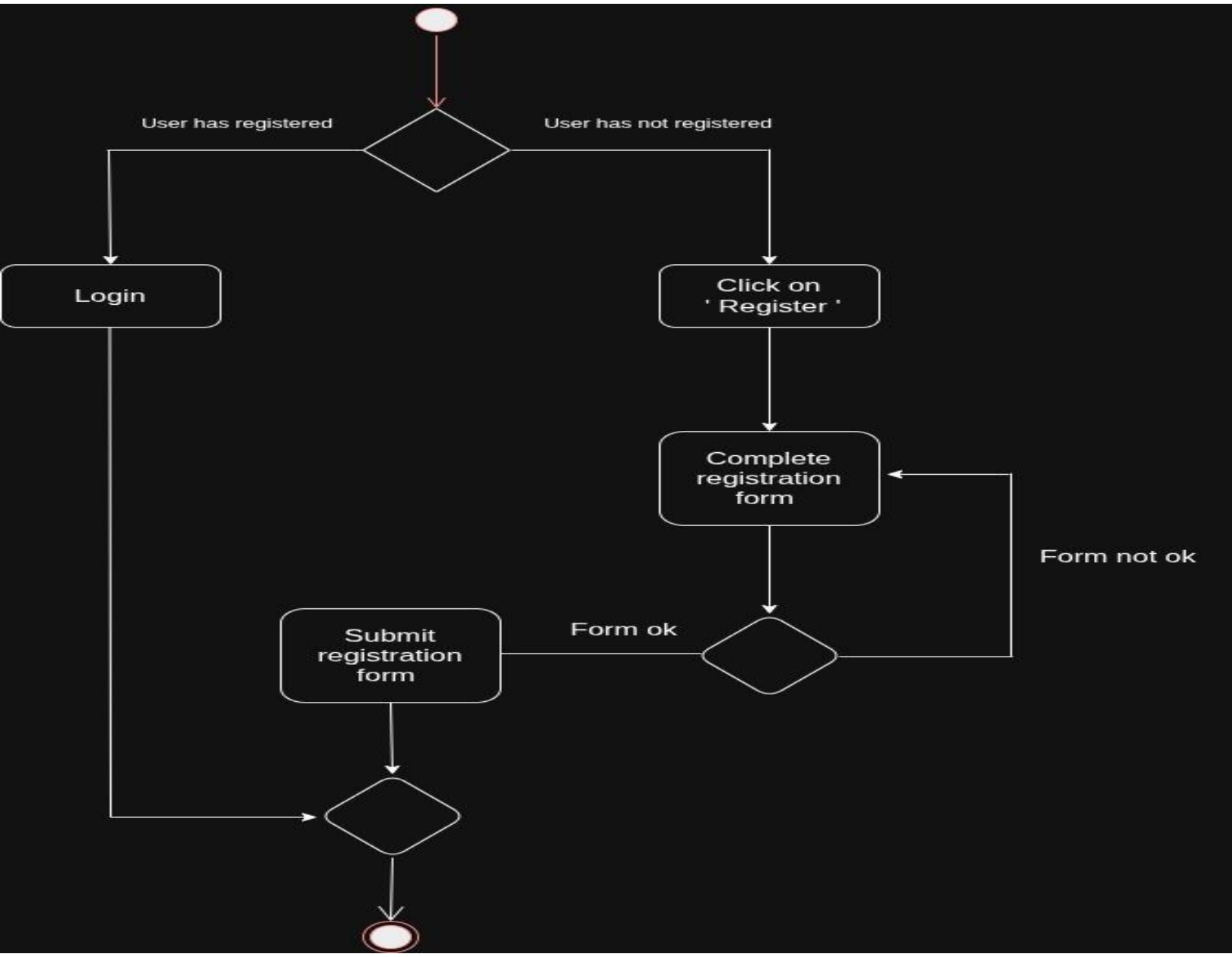


4.5 Schema:

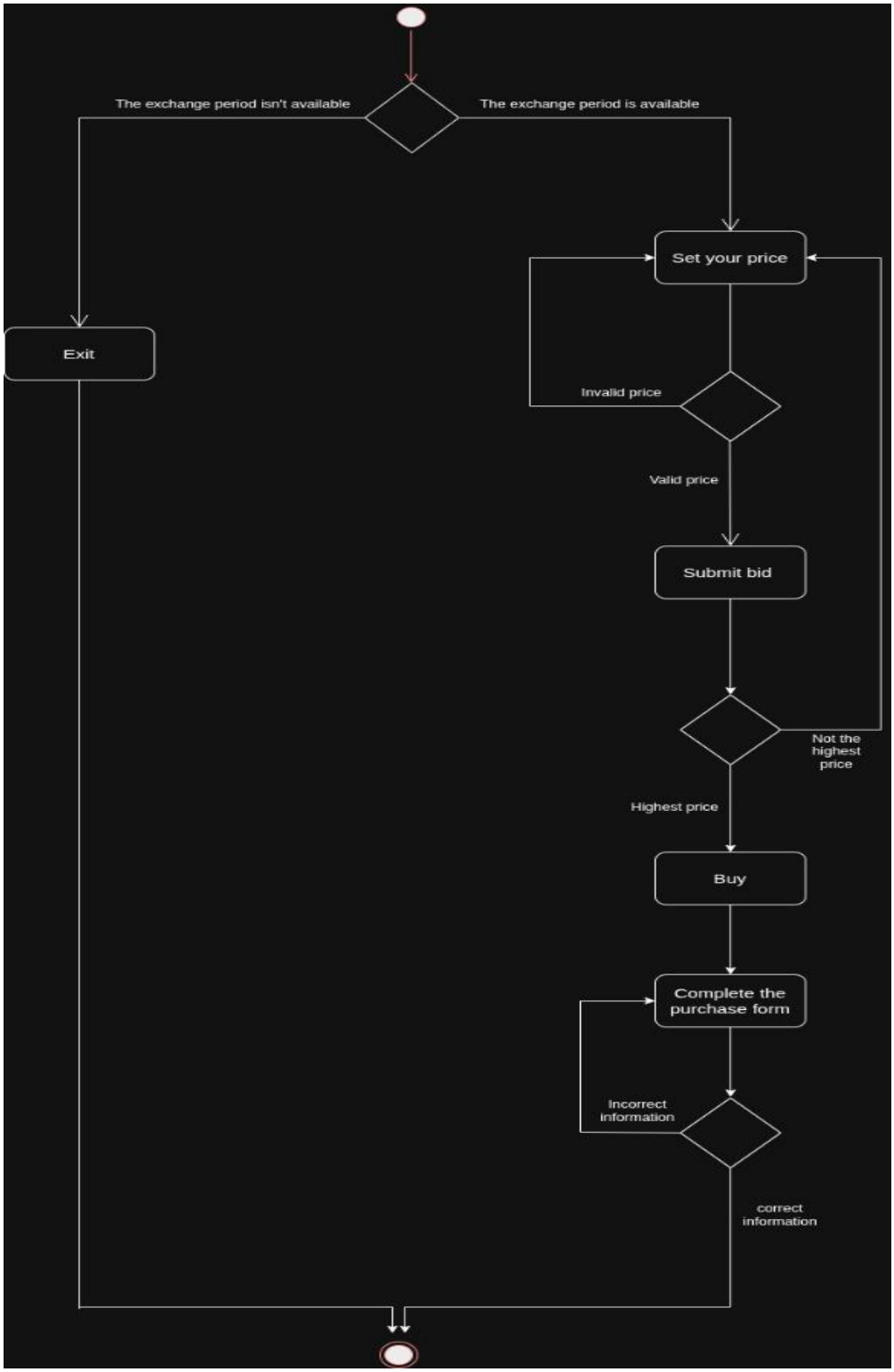
4.6 use-case-diagram:


Manage Product
Farm
Bid
Login
Factory
Manage Transportation Offer
Shipping
Buy
Manage
Owner
Block

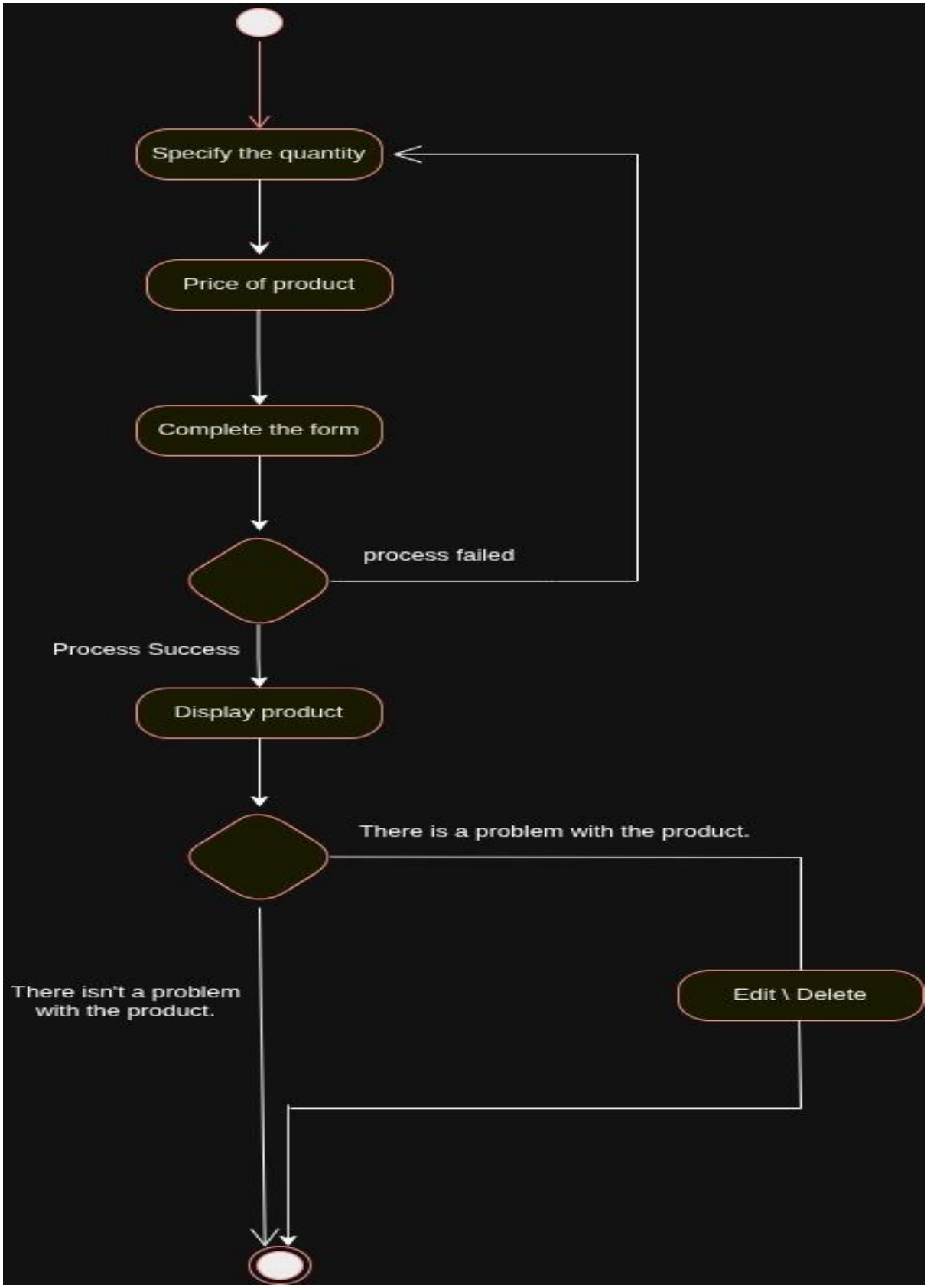
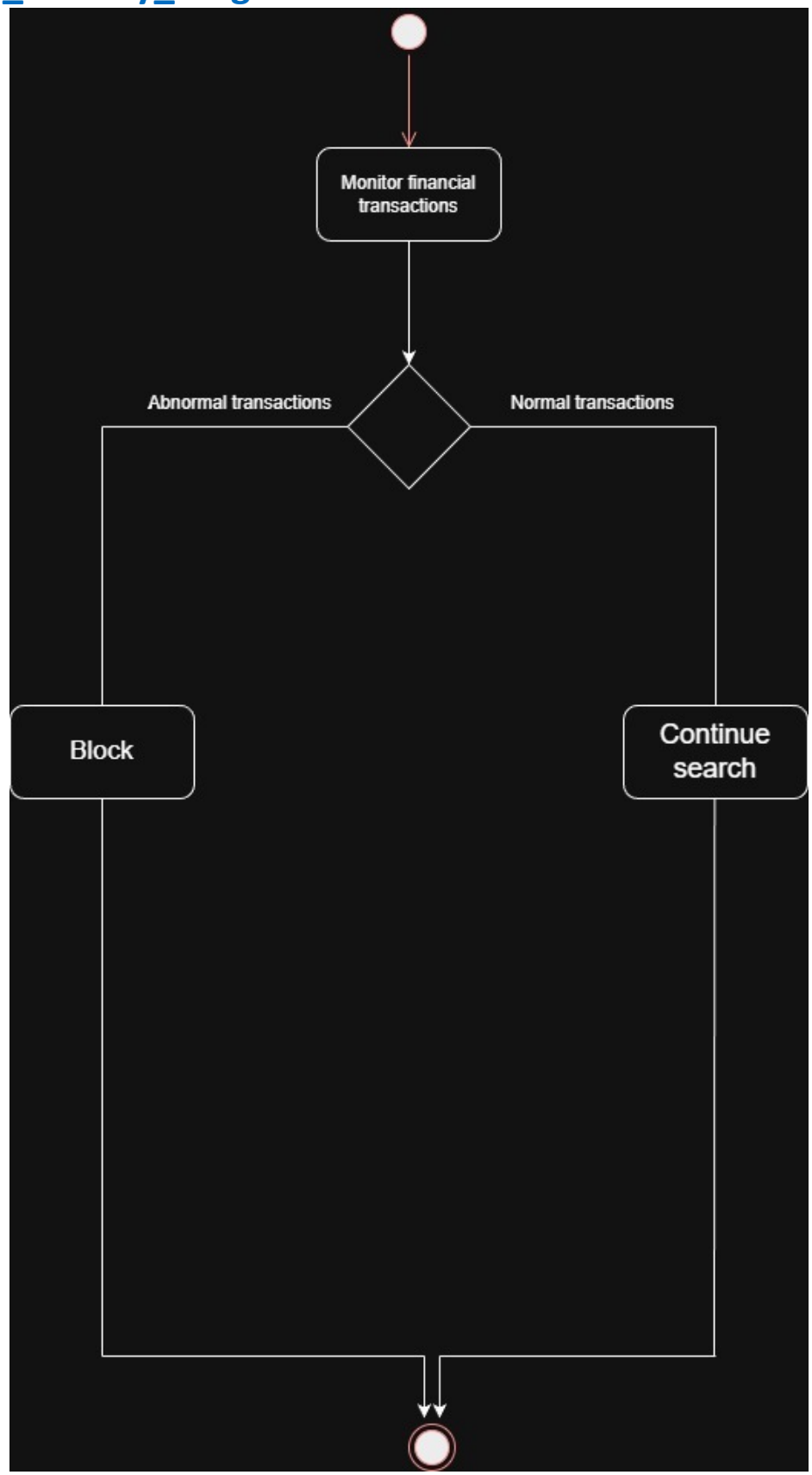
4.7 Login_Activity_Diagram:



4.8 Manage_Product_Activity_Diagram



4.9 Buy-Bid_Activity_Diagram



5- Manage-Block_Activity_Diagram