# ONLINE MARKET PLACE FOR ORGANIC FOODS USING BLOCKCHAIN

Project ID: 19_20-J 06

**Software Requirement Specifications (SRS)**

**for the component**

**'Storing Supply chain Details using Block chain Technology'**

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# DECLARATION

I hereby declare that the project work entitled "**ONLINE MARKET PLACE FOR ORGANIC FOODS**", submitted to the Sri Lanka Institute of Information Technology is a record of an original work done by me, under the guidance of our supervisor **Dr. Dharshana Kasthurirathna.** This project work is submitted in the partial fulfillment of the requirement for the award of the degree of Bachelor of Science (Special Honors) in Information Technology. The Results embodied in this report have not been submitted to any other University or Institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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# 1 Introduction

## 1.1 Purpose

The purpose of document is the to specify the requirements to the following component of the system "**Online Supermarket Place**" which will be implemented as a result of the research project "**Storing Supply chain Details using Blockchain Technology**".

- Identifying all the stake holders related to supply chain

- Store all details of each product in the block chain.

The document contains Identification of the problem in previous work based, statement of work, project plan or schedule, Research constraints, specified deliverables, technical approach of the component, assumptions, interfaces, etc. used to develop this system.

## 1.2 Scope

At present, most people tend to choose organic food either voluntarily or involuntarily. However, there is no clear way for the customers to identify organic foods in the existing market. This has led to deterioration of the health and lifestyle of customers. We are going to propose a system which aim is supporting to identify fresh and organic foods distinctly from other products.

Our solution is to develop a web application in order to record supply chain related details beginning from manufacturer to customer using blockchain technology and also, customers can visit the web application and place their orders according to their preferences while looking to the supply chain of related products. Furthermore, customers able to scan the QR codes stick on the products which redirect to a web page which holds product's supply chain details. Customers can comment on products which they like to consume & according to those comments, a review is provide on those comments by using "Sentiment Analysis". [1]

As the main objectives of this document is focus on identifying stakeholder engaged with the supply chain and store all details related products with ease by ensuring that all steps from food production to delivering it to the customer are transparent and reliable.

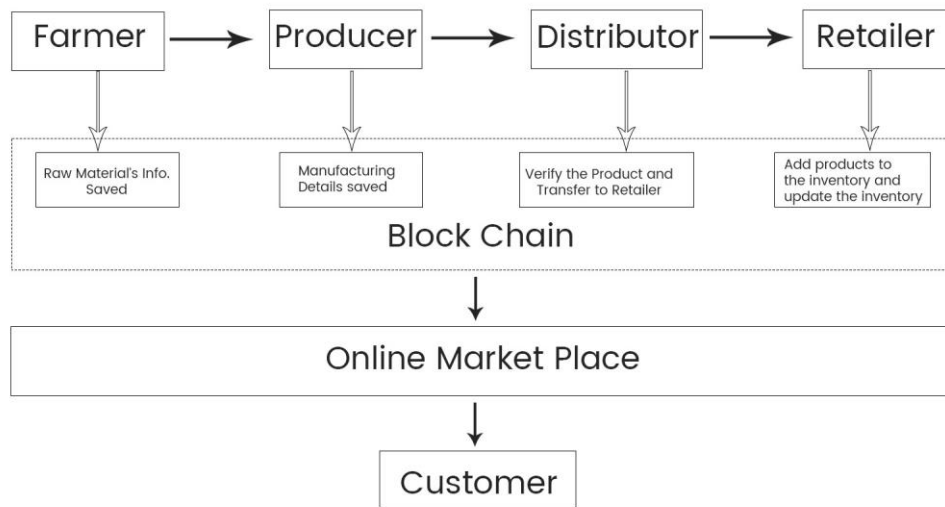**Figure 1:Overview of the System Feature**

## 1.3 Definitions, Acronyms, and Abbreviations

| SRS | Software Requirement Specification |
|-----|-----------------------------------|
| GUI | Graphical User Interface |
| PC | Personal Computer |
| AWS | Amazon Web Services |
| EC2 | Elastic Compute Cloud |

**Table 1: Definitions, Acronyms, and Abbreviations**

## 1.4 Overview

The remainder of this document will illustrate the requirements of the "Storing supply chain details using Block Chain" overall description of them and their perspectives and functionalities. Furthermore, it will discuss functional requirements, non-functional requirements, performance requirements and design constraints.

The rest of the section of this document is organized as follow, product such as system interfaces, user interfaces and hardware interface etc. System review summary or major functionalities users and the characteristics of the system and the background of the general factors affected the functionality of the component in discuss in relation of the complete product.

## 2 Overall Descriptions

This section gives an overview of the components of the system. Basic functionalities of the components and how its behavior with other systems will be explained. Interaction with stakeholders and what are the functionalities available for each type of stakeholders will also be explained here as well as the constraints and assumptions.

## 2.1 Product perspective

When researching about existing systems and methodologies, which incorporates the idea of the system in discuss several commercially available functioning systems and reasonable research approaches were encountered. Actually, there are some existing projects that related to this. Some applications such as "Halal Traceability and Halal Tracking Systems" [1] and "". These applications only identified and store supply chain details. According to our system, it is not only identifying the supply chain details but also track all steps from food production to delivering it to the customer are transparent and reliable and also our system can able to trace the source of illegal activities such as fake commodities and illegal labor.

There are some applications using Block chain technology that related to our system but they are having many issues when interacting with stakeholders. One research application is "**Blockchain based Wine Supply Chain Traceability System**" [2]. This research has used the block chain technology to trace the supply chain but they having drawbacks when providing user-friendly user interfaces to the stakeholders. According to our system, when stakeholders interacting with the application, they will have user friendly interfaces which will easy to use.

### 2.1.1 System interfaces

In our proposed system we have planned to develop web application. This web application contains the Blockchain, Sentiment Analysis and Ontology parts. In order to give our delivery service to our customer we have to implement mobile application as well. Further we intend to develop android application and IOS application.

### 2.1.2 User interfaces

- Interface for the Farmers.
- Interface for Producers/Manufactures.
- Interface for Distributors.
- Interface for Retailers.
- Interfaces for Administrators.
- Interface for Customers.

### 2.1.3 Hardware interfaces

The system to be developed does not require any special hardware integrations for functioning as it is a web-based application and mobile application. However, an electronic device such as a PC or a tablet device which can connect to the internet service will be needed to access the application.

### 2.1.4 Software interfaces

- o AWS EC2
- o Visual Studio Code
- o WebStorm

### 2.1.5 Communication interfaces

For site server should have over 100Mbps internet speed to because the system not only sending the data to client but to some external interfaces as well. For end user at least 1Mbs speed to use without any lag.

### 2.1.6 Memory constraints

Server should initially have 1GB size and according the usage it should be expandable.

### 2.1.7 Operations

- o User will be needed to login to the web application using given authentication details.
- o User can search any product through the web application which they willing to buy.
- o User can view the product details which they like to buy after search through the web application.
- o User should follow the declared procedure on the GUI to generate the Block chain reports through the web application

### 2.1.8 Site adaptation requirements

- o Elements in the Graphical user interface must contain self-descriptive and easily understandable names.

- o User interface must exist in two different languages English and Sinhala.
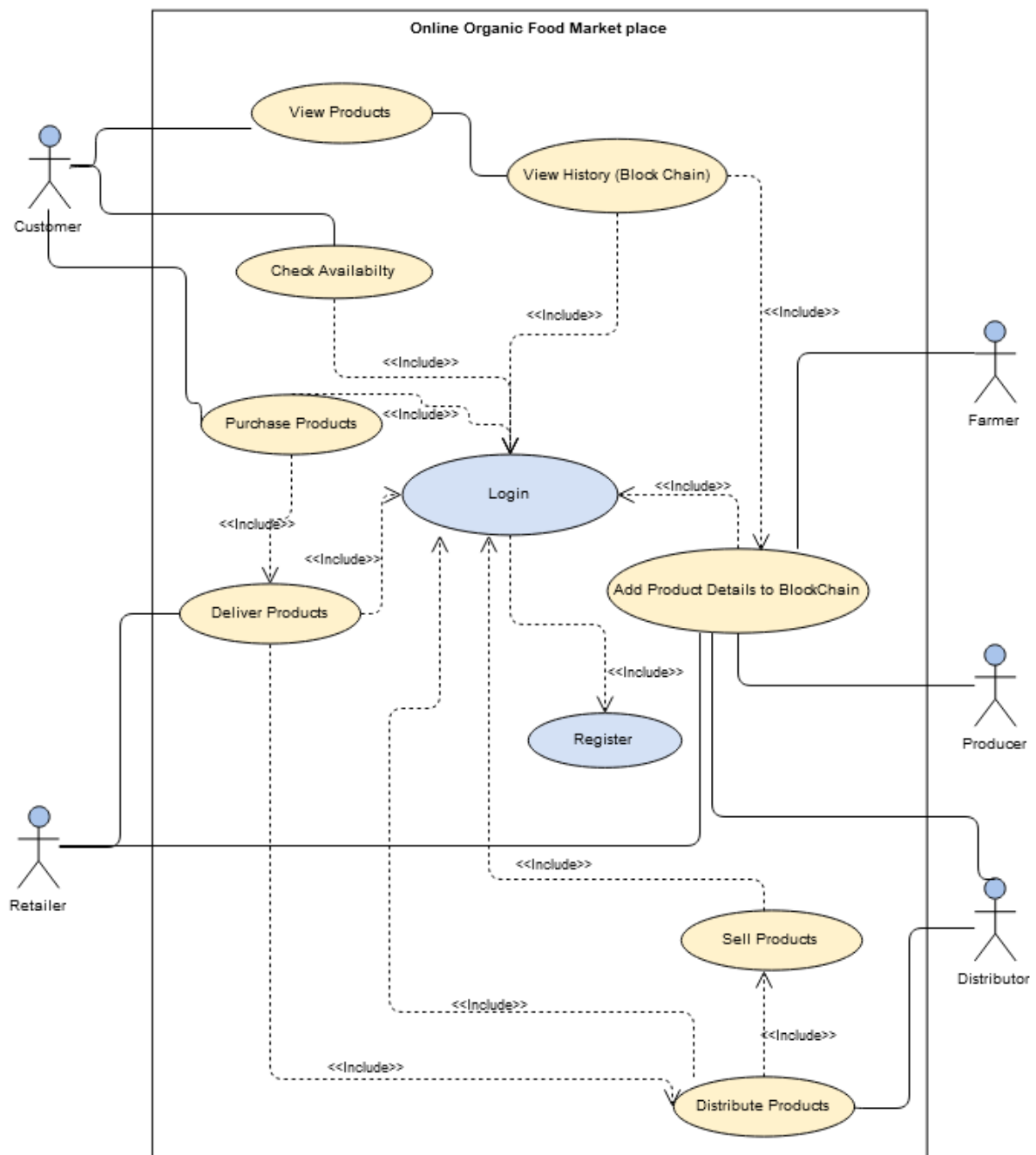
## 2.2 Product functions

### 2.2.1 Use Case Diagram



**Figure 2:Use Case Diagram**

## 2.2.2 Use Case Scenarios

| Use Case Name | View Products |
|---|---|
| Actor | Customer |
| Pre-Condition | User Must Login to the System |
| Main Scenario | o Use case Starts when customer log into the system. <br> o System fills Product Details from the Database. <br> o User can view the Product Description. |

**Table 2: Use Case Scenario I**

| Use Case Name | Check Availability |
|---|---|
| Actor | Customer |
| Pre-Condition | User Must Login to the System |
| Main Scenario | o Use case Starts when customer log into the system. <br> o System fills Product Details from the Database. <br> o Using the check availability button user can view remain stock of the product. |

**Table 3: Use Case Scenario II**

| Use Case Name | Purchase Product |
|---|---|
| Actor | Customer |
| Pre-Condition | User Must Login to the System |
| Main Scenario | o Use case Starts when customer log into the system. <br> o User select the product to purchase. <br> o System Promote a Message before Finalize. <br> o User Confirms the Message. <br> o Use case ends when hash value is added to Block Chain and system prompts a successful massage. |

**Table 4: Use Case Scenario III**

| Use Case Name | View Product History |
|---|---|
| Actor | Customer |
| Pre-Condition | User Must Login to the System |
| Main Scenario | o Use case Starts when customer log into the system. <br> o System fills Product Details from the Database. <br> o User click the History Button. <br> o Use case ends when system Retrieve Product History from Blockchain. |

**Table 5: Use Case Scenario IV**

| Use Case Name | Add Details to Block Chain |
| --- | --- |
| Actor | Farmer, Producer, Retailer, Distributor |
| Pre-Condition | User Must Login to the System |
| Main Scenario | <ul><li>Use case Starts when required Details Fills into the Text Fields.</li><li>User Clicks submit Button.</li><li>System Check for Validation.</li><li>System Promote a Message before Finalize.</li><li>User Confirms the Message.</li><li>System add the hash value in Block Chain.</li></ul> |

**Table 6: Use Case Scenario V**

| Use Case Name | Distribute the Products |
| --- | --- |
| Actor | Distributor |
| Pre-Condition | User Must Login to the System |
| Main Scenario | <ul><li>Use case Starts when click on Requested Products.</li><li>Fill the Text Fields with required Product Details to deliver.</li><li>User Clicks submit Button.</li><li>System Check for Validation.</li><li>System Promote a Message before Finalize.</li><li>User Confirms the Message.</li><li>Use case ends when hash value is added to Block Chain and system prompts a successful massage.</li></ul> |

**Table 7: Use Case Scenario VI**

## 2.2.3 Activity Diagram
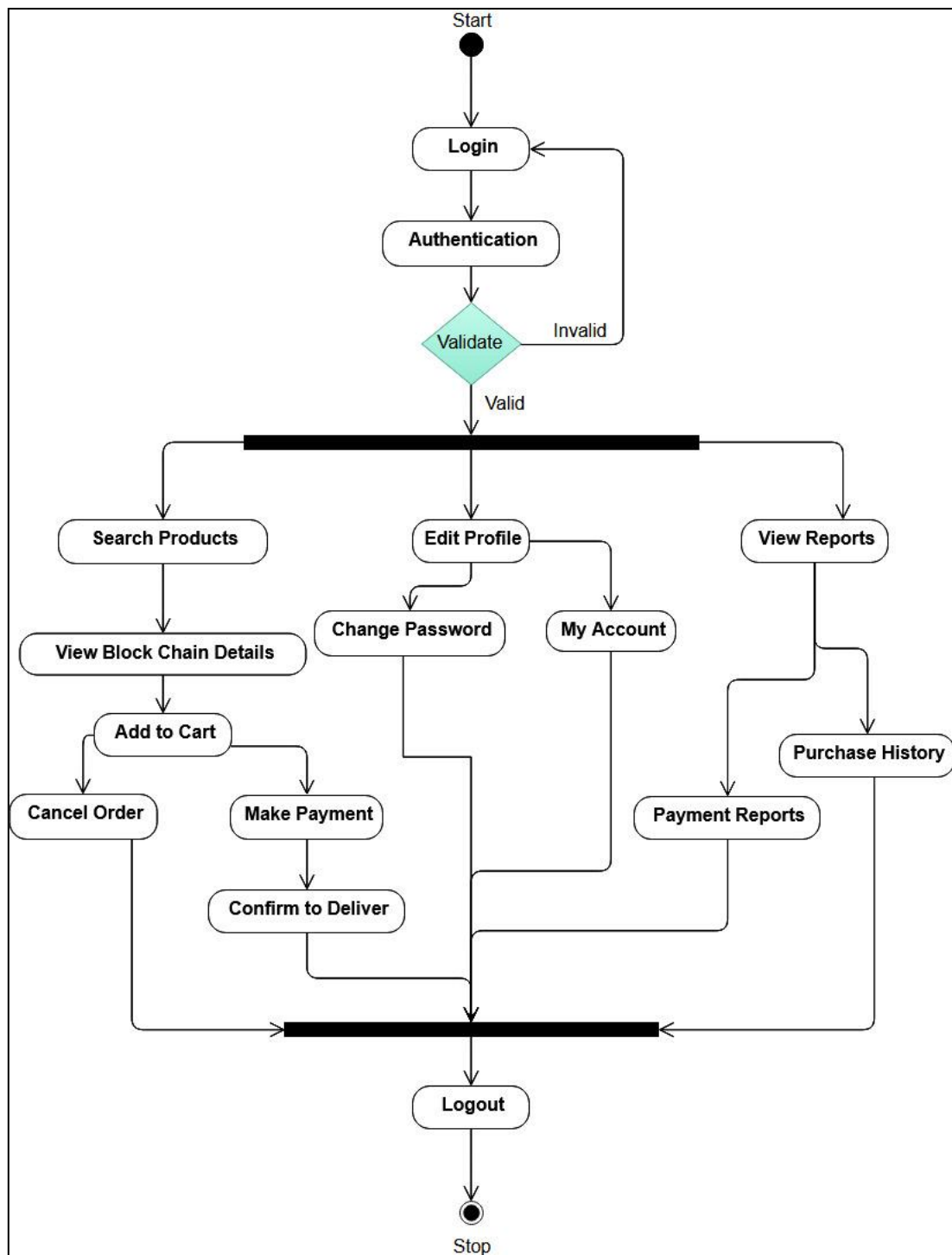
**Figure 3: Activity Diagram**

## 2.2.4 Sequence Diagram [3]
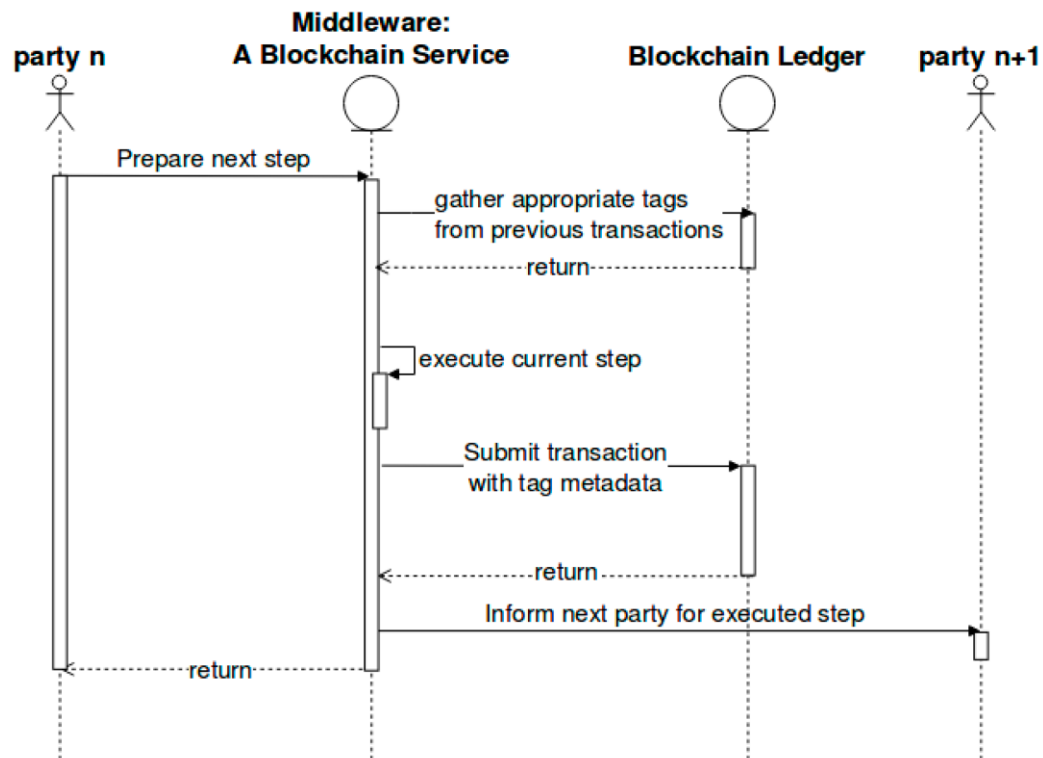


**Figure 4: Sequence Diagram**

*Figure 4 - One supply chain freight stage (stage number n+1) as a blockchain transaction. Every stage's functionality is automated by the "Middleware", and thus, the parties that participate in each stage (a single one in the input and another one in the output) have a small interaction with it; for instance, the driver confirms that the transportation was completed by receiving the appropriate transaction hash, or the employee confirms that certain materials were kept refrigerated, as expected, by collecting the corresponding transaction hashes and others. Here, party n participates in stage n+1 input (and already in stage n output) while party n+1 participates on stage n+1 output (and stage n+2 input).*

## 2.2.5 Overview of Function Flow
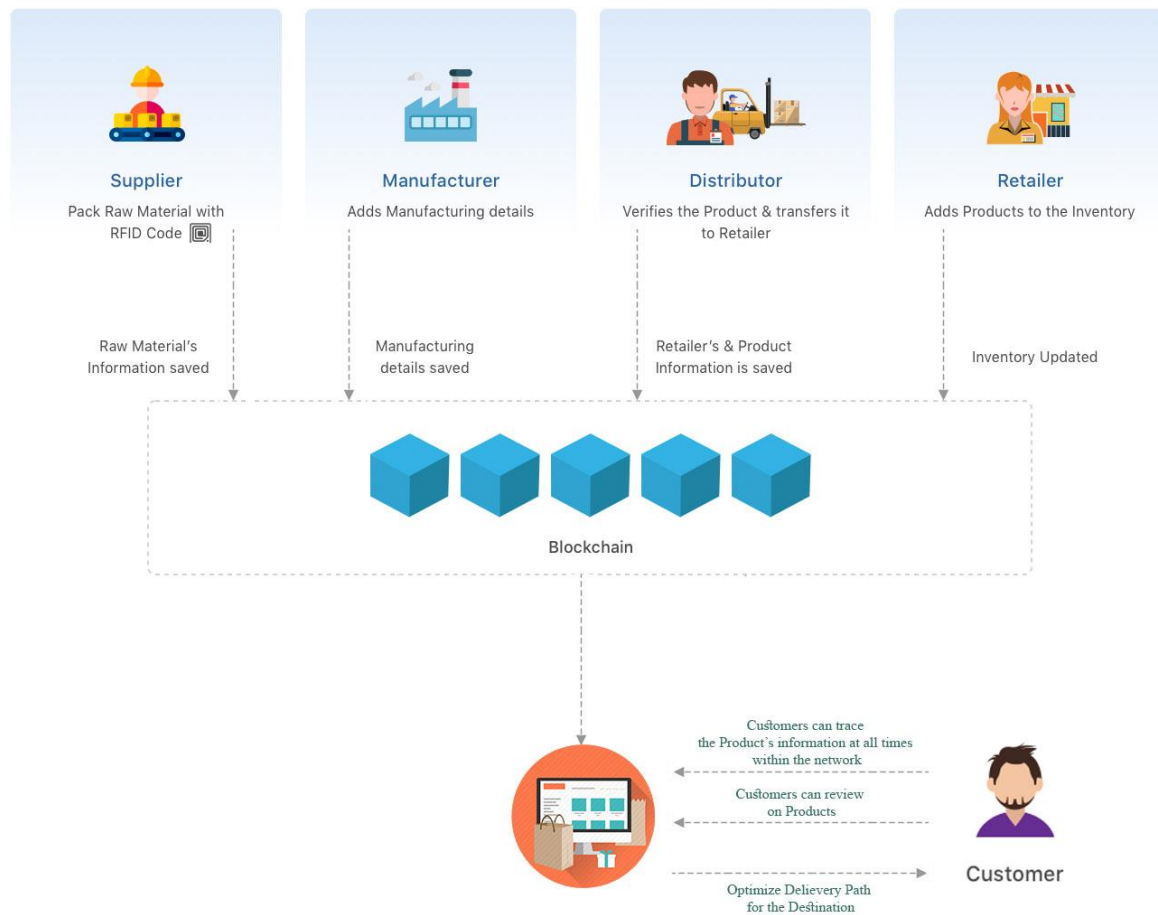
**Figure 5: Overview of Function Flow**

## 2.2 User characteristics

Stakeholders who are interacting with the supply chain process with the basic knowledge in using a computer/Tablet device is intended to use this component

## 2.4 Constraints

- o Lack of Documentation on Blockchain Development.

- o To communicate within Application and the central server there should be proper web servers with high performing speed. Computer internet connection should be fast and should not be down to communicate with the web server.

## 2.5 Assumptions and dependencies

- o Assuming user has a basic idea of handling operations in the Computer.

- o Assume that more functionalities will be added to the application in future.

- o Assuming the performance of the RAM and the processor of the computer will be sufficient for running the application.

## 2.6 Apportioning of requirements

We are planning to build the block chain for supply chain process and web application modules initially. Because those functionalities are the core of the system. And also, we are planning to develop block chain report generation function, sorting accordance to product manufacturing process in web application.

# 3 Specific Requirements

## 3.1 External interface requirements

### 3.1.1 User interfaces



**Figure 6: User Interface 1**
*User Interface 1 – Customer will have user-friendly GUI to search and choose products to Purchased.*
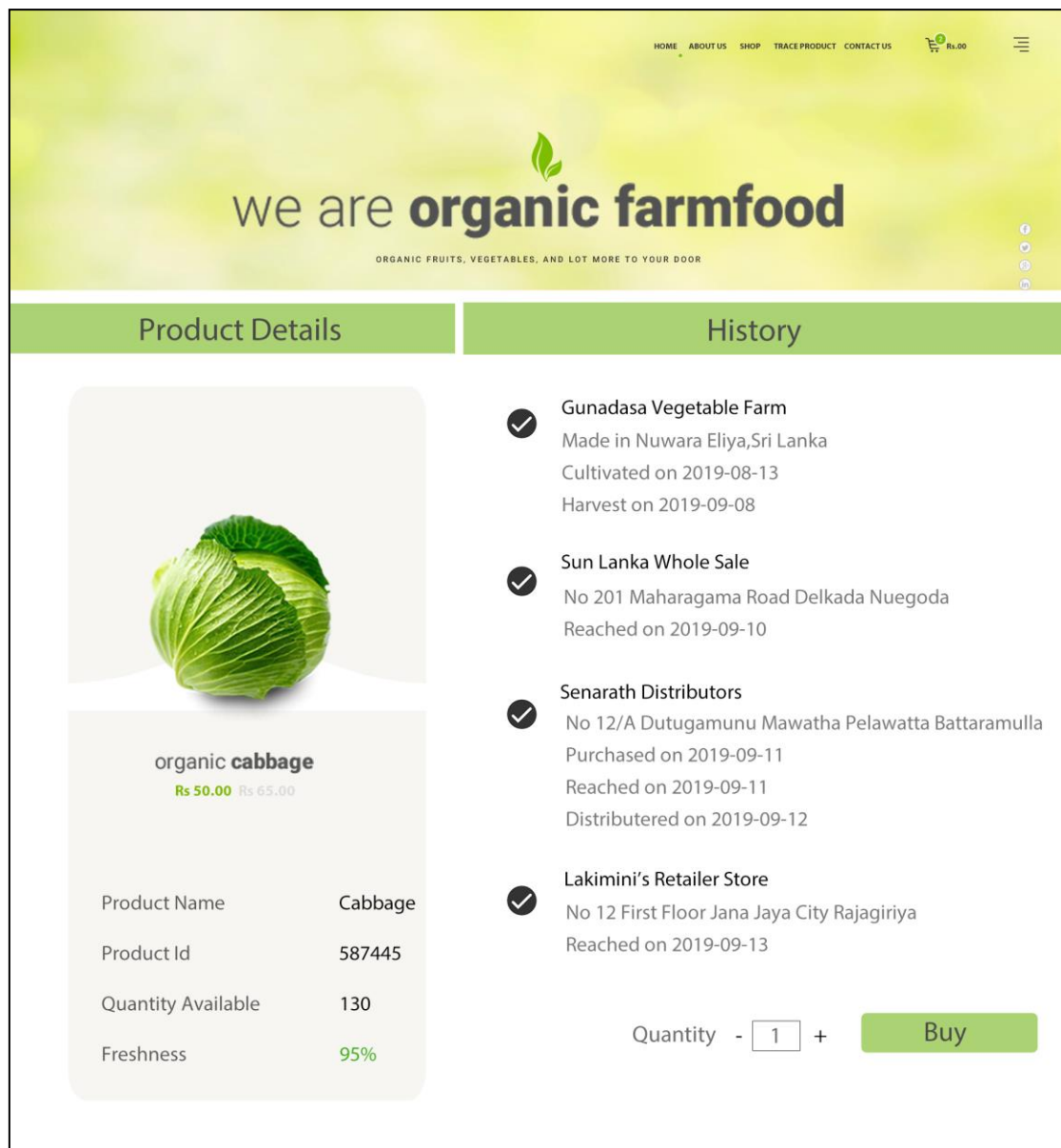
**Figure 7 : User Interface 2**

*User Interface 2 — Customers who have logged into the system can view the products details Along with the details from farmer to retailer shop (block chain Details) and also freshness of the product according to number of days that the product in the market after the harvest.*
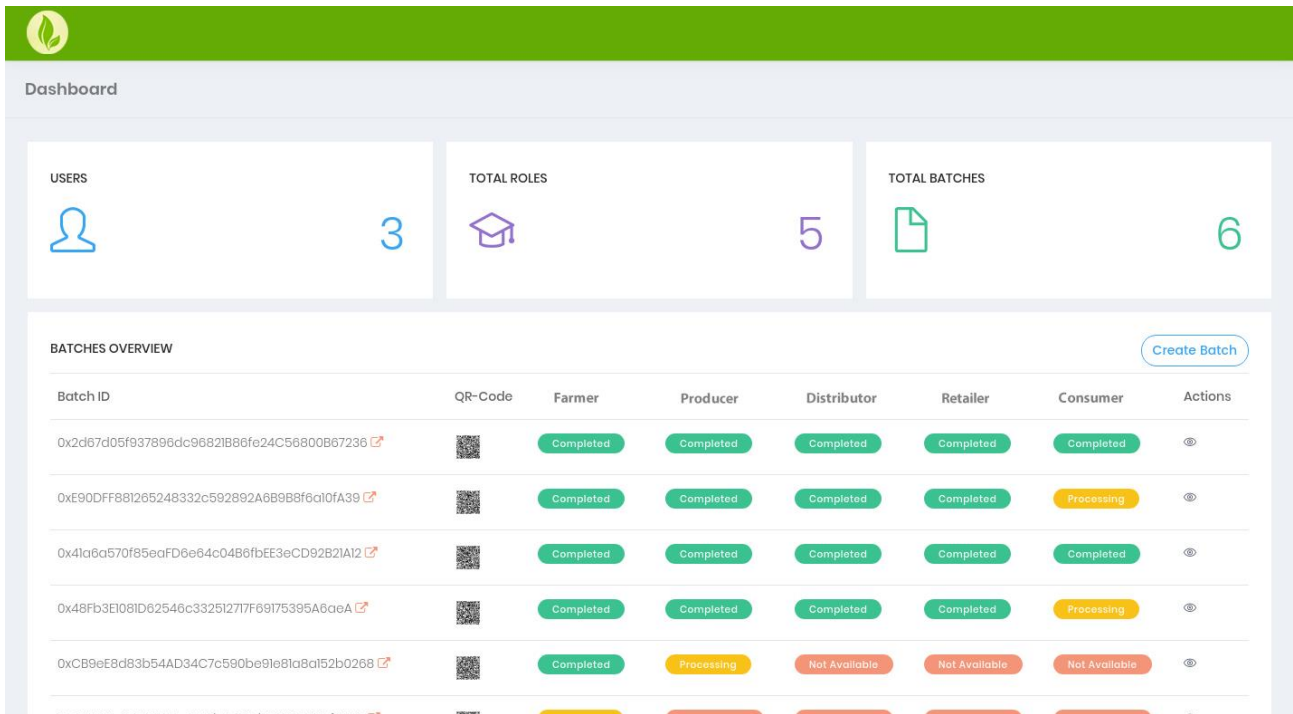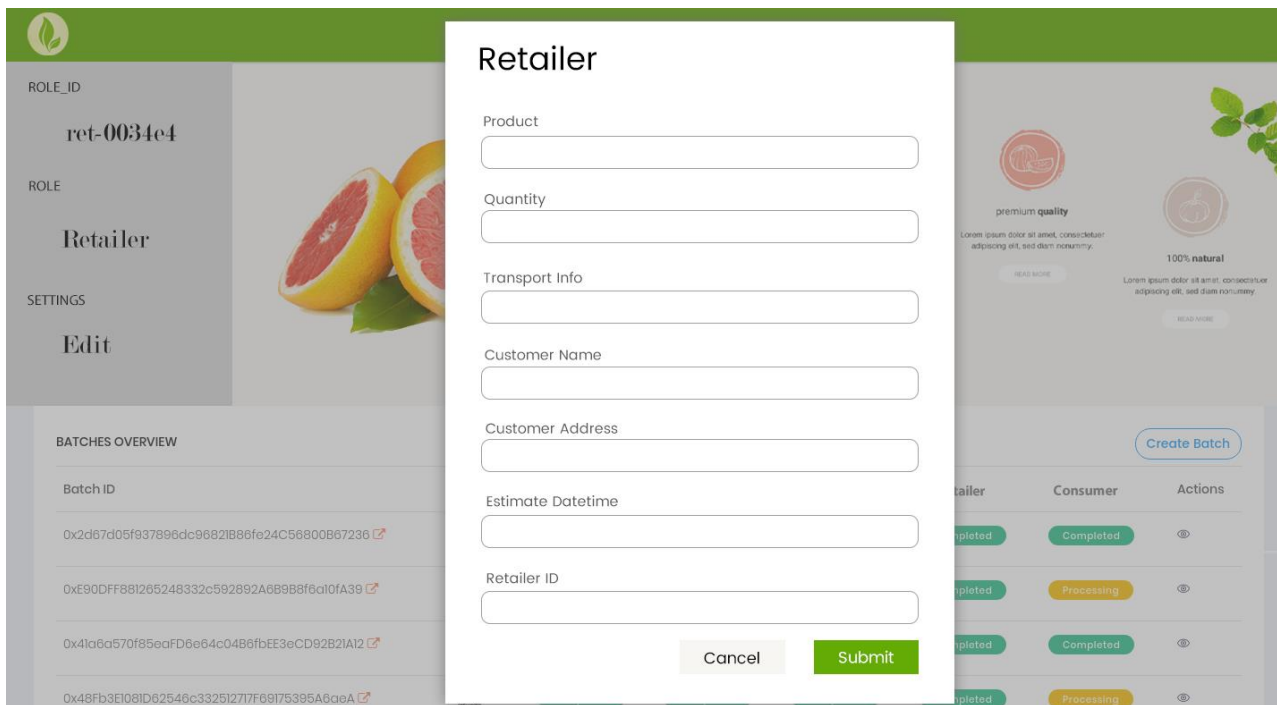
**Figure 8 : Admin Panel Interface**



**Figure 9: Distributor Interface**

**Figure 11: Retailer Interface**



**Figure 10: Producer Interface**
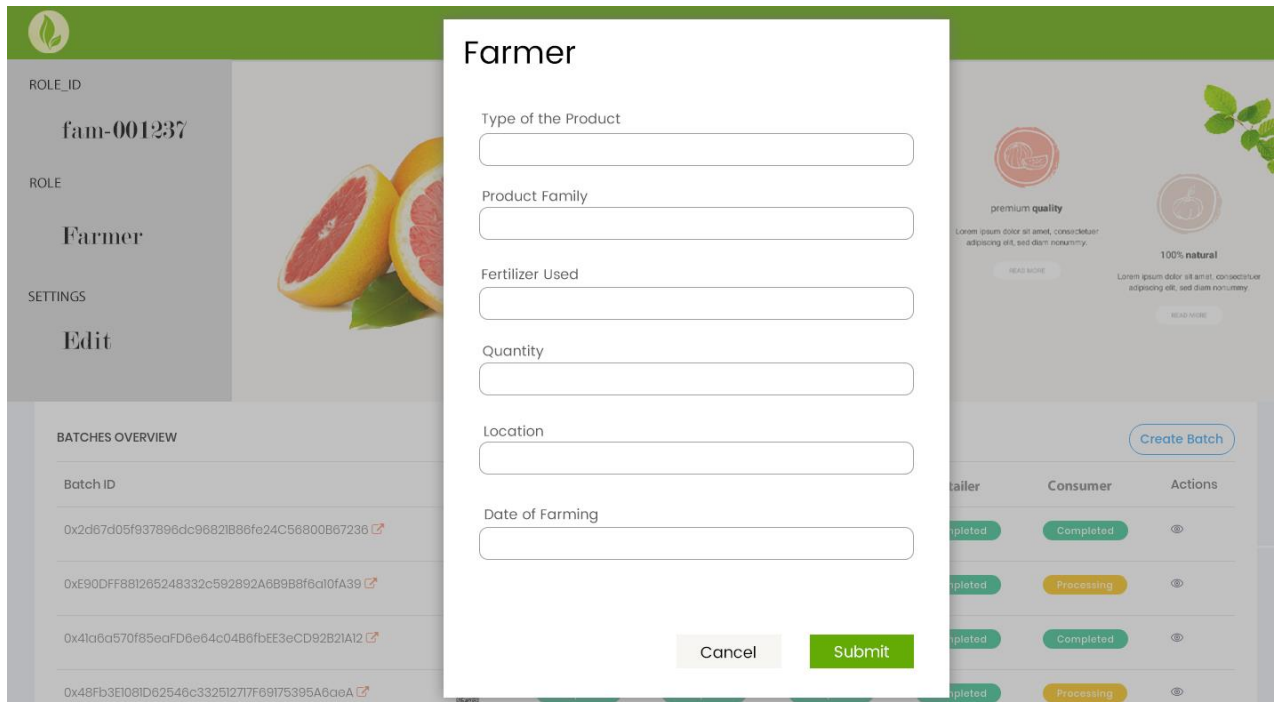
**Figure 12: Farmer Interface**

## 3.1.2 Hardware interfaces

Hardware items which the system deals with are mentioned below:
- o   Computer or Smart with internet Connection.

## 3.1.3 Software interfaces

Software which the component deals with are mentioned below:
- o   AWS EC2
- o   Visual Studio Code
- o   WebStorm

## 3.1.4 Communication interfaces

For site server should have over 100Mbps internet speed to because the system not only sending the data to client but to some external interfaces as well. For end user at least 1Mbps speed to use without any lag.

## 3.2 Classes/Objects



**Figure 13: Class Diagram**

## 3.3 Performance requirements

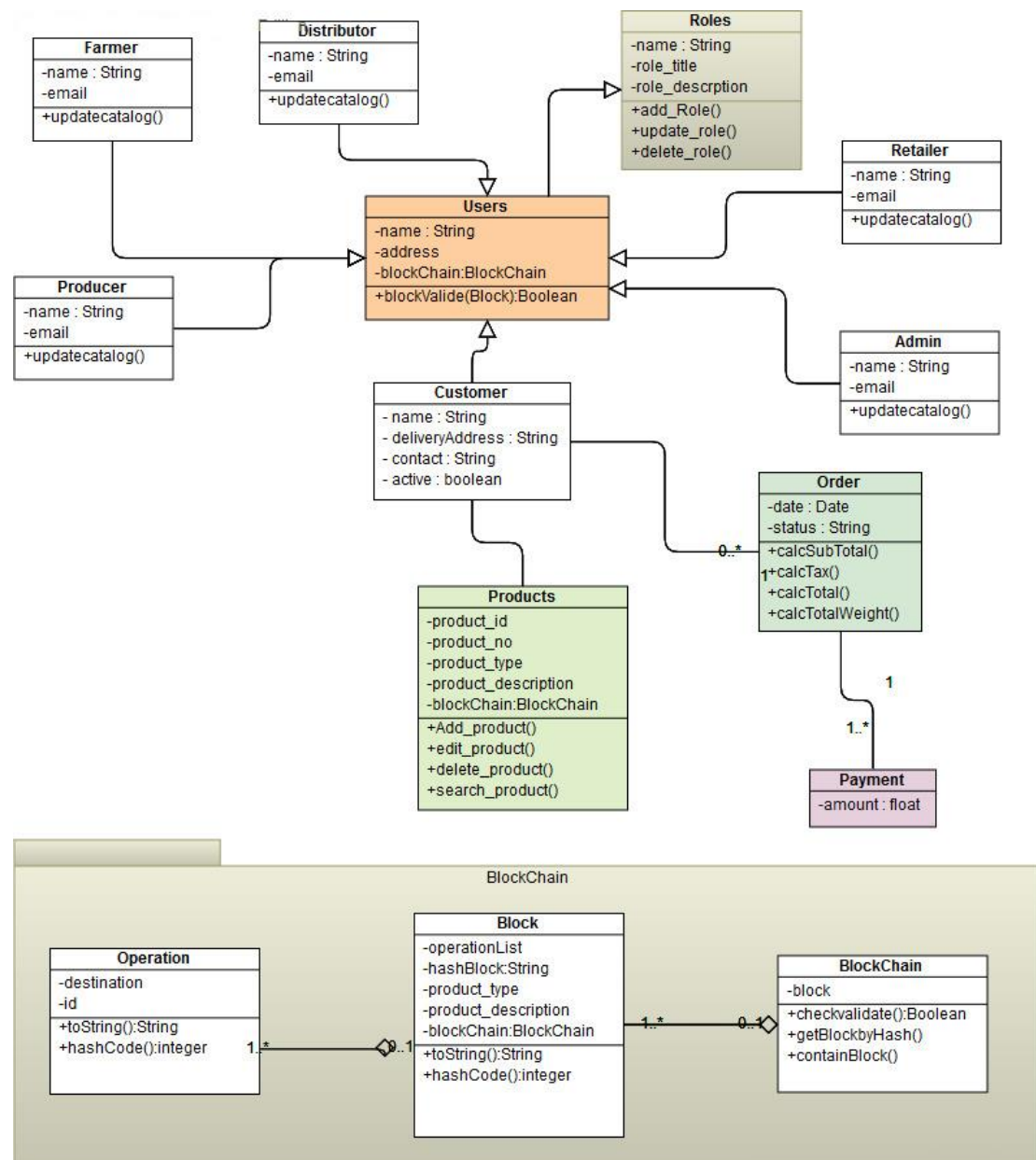Initiate when a user clicks the any button the system will be provided the result within 2 – 3 seconds. Processing speed may change according to the Net connection speed of the mobile phone, processing speed of the mobile device and the Ram of the mobile device.

- o Computer/tablet with at least 1.0GHz processing power with 1 core and 50MB of RAM. Approximate Internal memory space of 100MB is recommended for the application and cache.

- o Internet access with more than 512kbps Internet bandwidth.

- o Resolution 720x1280 pixels (Optional)

## 3.4 Design constraints

Design has to be compatible with existing centralized Internet.

## 3.5 Software system attributes

### 3.5.1 Reliability

Reliability is the quality of being trustworthy or of performing consistently well of the application. Basically, that is how much a user can depend on the application. The propose application is developing to provide a reliable and efficient service to the users. All the latest configurations and technology is used to provide the service accurate and, in less time.

### 3.5.2 Availability

Actually, any user who wishes to try the application will be satisfied without any failure. The propose web application work on any operating system.

### 3.5.3 Security

The customers can get all the details about the products without any configurations. All they have to do is visit the application by agreeing to the policies. There will be authentication and authorization techniques use by the application to prevent unauthorized access. Authentication will be done using Login Password and there will be access privilege application for the authenticated users.

### 3.5.4 Maintainability

Maintainability is defined as the probability of performing a successful repair action within a given time. In other words, maintainability measures the ease and speed with which a system can be restored to operational status after a failure occurs. Application code will be well commented and documented for any further development.

## 3.6 Other requirements

### 3.6.1 Modifiability

This component should be modified or update without affecting other components of the system.

### 3.6.2 Accessibility

User interfaces of our market Place is user-friendly and easily accessible by any user of the system.

# 5 References

[1] S. Zailani, Z. Arrifin, N. A. Wahid, R. Othman and Y. Fernando, "Halal Traceability and Halal Tracking Systems in Strengthening Halal Food Supply Chain for Food Industry in Malaysia (A Review)," *Journal of Food Technology,* vol. 8, no. 3, pp. 74-81, 2010.

[2] K. Biswas, V. Muthukkumarasamy and W. L. Tan, "Blockchain based Wine Supply Chain Traceability," 2017.

[3] A. Litke, D. Anagnostopoulos and T. Varvarigou, "Blockchains for Supply Chain Management: Architectural Elements and Challenges Towards a Global Scale Deployment," *Logistics,* vol. 3, no. 1, p. 5, 2019.

[4] [Online]. Available: https://www.visual-paradigm.com/guide/uml-unified-modeling-language/uml-aggregation-vs-composition/.