Blockchain-Enabled Prawn Quality Tracking System

Assignment:2

Course Title: System Analysis and Design

Course ID: CSE307

Submitted to:

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Information Gathering methods

Data collection is an integral part of developing software that accomplishes its goals. If we don't consider the thoughts and ideas of the software's users, we can't meet their needs. I've chosen three effective ways to collect data for my system: stories, interviews and questionnaires.

Story:

(1). It was a sunny morning and I was strolling through a busy fish market, mesmerized by the sight and sound of the ocean's bounty. Out of the corner of my eye, I spied a display of gleaming shrimp, their shells shimmering like jewels from the depths. I couldn't resist the temptation of a seafood feast and approached the vendor to take a closer look. My first thought was, are these shrimp really fresh? And if so, where did they come from? I was determined to get to the bottom of the mystery. I caught the vendor's eye and asked him a question. His eyes lit up as he told me stories about fishing boats, far-off shores, and hauls in the early mornings. But while he was entertaining me, I had a nagging feeling that there should be a better way to track the origin of each shrimp. I came up with the idea of a "Shrimp Origins Tracking System". With a newfound sense of purpose, I set out to build this system, motivated by the desire to share the stories behind our seafood. Every shrimp would have its own digital passport, eliminating any doubt about freshness or origin. My first fish market visit was fueled by curiosity. One misgivings turned into an adventure of discovery, leading to a more open and transparent seafood experience for everyone.

Findings from Story:

- The original encounter at the fish market brought to light a problem that is shared by many customers: the **ambiguity around the provenance and freshness** of seafood, in this case, prawns.
- It's a sign that consumers **don't know enough** about the seafood they're buying.
- The vendor's experience led to the development of the "**Shrimp Origin Assurance System**," your solution to the problem you're facing.

(2). On a warm summer afternoon, I found myself attending a lavish wedding reception at a picturesque coastal resort. As the party drew to a close, a beautiful spread of food was revealed. On one plate, I noticed a plate of shrimp cocktails. The shrimp were neatly arranged in glass bowls with an ice-covered base. The aroma of the shrimp tantalized my senses. My first thought was, Is this shrimp as fresh as it looks? I approached the buffet table with a bit of curiosity. As I picked up a shrimp, I looked at its texture and color to see if it was fresh. The more I examined it, the more I wondered where it came from. I decided to chat with the catering staff. I wanted to know more about where the shrimp came from and how they were handled. I asked one of the chefs about the shrimp and how they got to the banquet. The chef, wearing a white hat, told me that they got the shrimp that morning from local fishermen. He explained how they handled and

prepared the seafood to make sure it was of the highest quality for their guests. While the chef's explanation was comforting, I wondered if there was any way to independently verify his claims. That's when an idea hit me. I remember reading about blockchain and its potential to make supply chains more transparent and traceable. What if blockchain could be used to track every step of a shrimp's journey, from when it's caught to when it arrives at your wedding reception?

Findings from Story:

- A common concern shared by consumers – the uncertainty about the freshness and quality of seafood, even in upscale settings.
- The doubts about the shrimp's freshness and origin, despite the appealing presentation, indicate a lack of transparency and information available to consumers.
- The experience with the shrimp buffet sparked the idea of using blockchain technology to address the lack of transparency in the seafood industry.

Interviewing:

In order to understand our stakeholders better, we decided to meet them. In the interview, we presented our app and explained how it works. We asked a mix of open and closed ended questions. We used the Pyramid method to organize the questions. We asked questions based on the user's perspectives and insights on the issues they faced while buying sweets. This information helps us to understand what our users need and how our solution can meet their needs. By having these conversations with the users we hope to get a better idea of what they need from our application. It is important to understand our users and what their interests are so that we can decide if they will use our System.

Interview: Local Consumer

1. How frequently do you consume prawn?
2. Do you know about blockchain technology?
3. What are some of the features that you want to see in the prawn blockchain application?
4. How much do you care about traceability and traceability of the prawn products' origin?
5. Do you want to pay more for the prawn products that have verified traceability based on blockchain?
6. How do you feel about the app's UI and design? Any ideas for improvements?
7. How easy is the app to use?
8. How satisfied are you with the prawn product's quality information, freshness and sourcing?

Interview: Retailer

1. How do you think a blockchain-based prawn traceability solution could benefit your retail business?
2. How easy is it to use the retailer features in the app?
3. What features would you like to see in the app that would help you manage your inventory and sales better?
4. How much importance do you attach to the accuracy of the information that the app provides in your sales plan?
5. How likely is it that you would recommend this app to your network of retailers?
6. What elements of the app's design and interface are most attractive or need to be improved?
7. How happy are you with how the app supports managing returns and handling customer inquiries?

Interview: Distributor

1. How has the adoption of a blockchain solution affected your prawn distribution processes?
2. What is your opinion on the app's ability to offer real-time visibility of product movement?
3. Have you encountered any difficulties integrating the blockchain data into your distributed systems?
4. What additional features could improve your distribution efficiency inside the app?
5. What is the importance of data accuracy and information flow in your distribution processes?
6. How does the app help you coordinate with different stakeholders in your supply chain?
7. How satisfied are you with the customer service of the app?
8. Does the app solve problems related to stock management and demand forecasting?

Questionnaire:

Using Google Forms, we created an online questionnaire and sent out invites to the general public and some of our stakeholders to answer a series of questions about sweets. The answers we got from each participant will allow us to quickly and easily assess the public's preferences. In addition, the survey allowed us to collect specific information about the challenges people face while searching for investors.

Survey Form:

E-Shrimp (Blockchain-Enabled Shrimp Quality Tracking System)

E-Shrimp is a smart quality tracking app that **tracks down the journey of shrimp** data and the state of the shrimp, like freshness, color changes, pH Level, temperature, and so on. This survey aims to learn more about your thoughts and experiences with regard to measuring prawn quality, existing procedures, and possible **blockchain implementation**. Your feedback will assist us in creating a user-friendly app that improves your ability to choose prawns wisely.

artcellartcell71@gmail.com Switch accounts

Not shared

* Indicates required question

Email: *

Your answer

Gender: *

- ◯ Male
- ◯ Female
- ◯ Other:

Age: *

- ◯ 15 to 20
- ◯ 21 to 25
- ◯ 26 to 30
- ◯ 30 to 35
- ◯ 36 to 40
- ◯ Other:

Which country are you located in? *

Your answer

Have you ever purchased or consumed shrimp? *

- ◯ Yes
- ◯ No

How often do you buy shrimp? *

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Occasionally
- ◯ Never

What factors do you consider when assessing the quality of shrimp? (Select all that apply) *

- ☐ Color
- ☐ Odor
- ☐ Texture
- ☐ Packaging information
- ☐ Source/Origin
- ☐ Certification labels

What challenges do you face in determining the freshness and quality of shrimp before purchasing? (Select all that apply) *

- ☐ Lack of transparent information
- ☐ Difficulty in identifying spoilage
- ☐ Trustworthiness of seller claims
- ☐ Limited knowledge about Shrimp quality
- ☐ Inconsistent quality across purchases

How do you currently check the quality of prawns/shrimp before purchasing? (Select all that apply) *

- ☐ Visual inspection
- ☐ Smelling
- ☐ Touching
- ☐ Relying on seller's reputation
- ☐ None, I don't check

On a scale of 1 to 10, how confident are you in your ability to accurately assess the quality of prawns/shrimp? *

- ◯ 1 (Not confident)
- ◯ 2
- ◯ 3
- ◯ 4

Are you familiar with the concept of blockchain technology? *

- ◯ Yes
- ◯ No
- ◯ Maybe

Would you trust a system that uses blockchain to track the quality and origin of prawns/shrimp? *

- ◯ Yes
- ◯ No
- ◯ Not Sure

Would you be interested in using a mobile app that allows you to scan a QR code on prawn/shrimp packaging to access detailed information about its quality and origin? *

- ◯ Yes
- ◯ No
- ◯ Maybe

What features would you like to see in an app designed to help you assess prawn/shrimp quality? (Select all that apply) *

- ☐ Clear quality indicators
- ☐ Source information
- ☐ Processing history
- ☐ User reviews/ratings
- ☐ Allergen information

Do you have any concerns about using technology, like an app, to assess prawn/shrimp quality? (Select all that apply) *

- ☐ Privacy/security concerns
- ☐ Difficulty using technology
- ☐ App reliability
- ☐ Lack of smartphone/accessibility

What factors might prevent you from adopting a blockchain-based prawn quality tracking app? (Select all that apply) *

- ☐ Lack of awareness about blockchain
- ☐ Limited access to smartphones
- ☐ Data privacy concerns
- ☐ App cost

On a scale of 1 to 10, how likely are you to use an app that provides blockchain-enabled prawn quality tracking? *

- ◯ 1 (Not likely)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Very likely)

Is there anything else you would like to share about your experiences with prawn/shrimp quality or potential solutions?

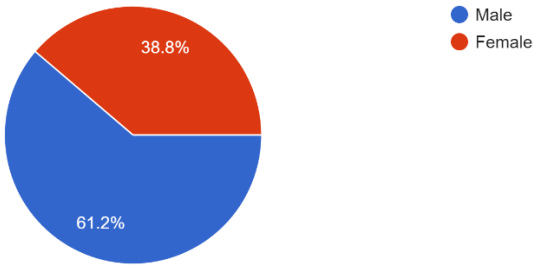
Your answer

Submit Clear form

Survey Result:

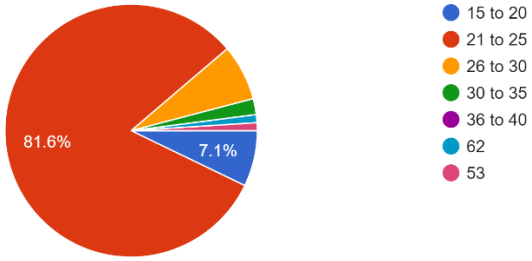
Gender:

98 responses



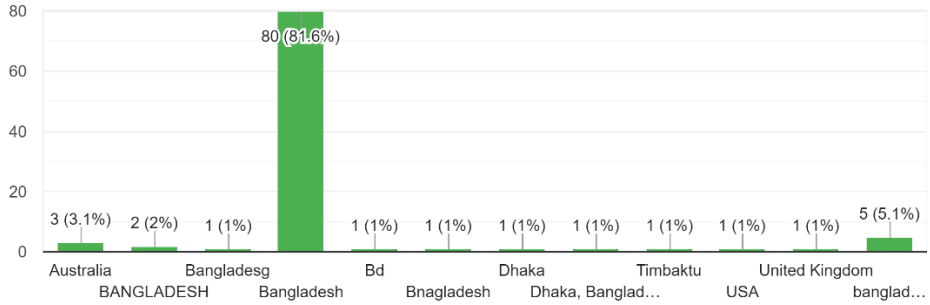
Age:

98 responses



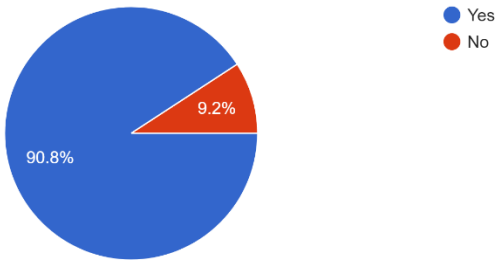
Which country are you located in?

98 responses



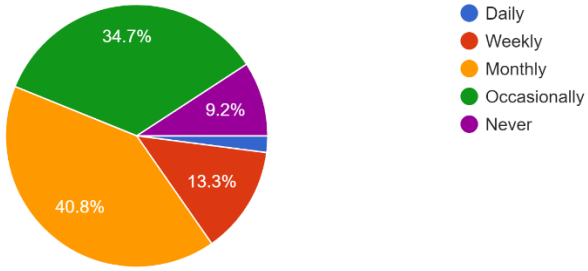
Have you ever purchased or consumed shrimp?

98 responses



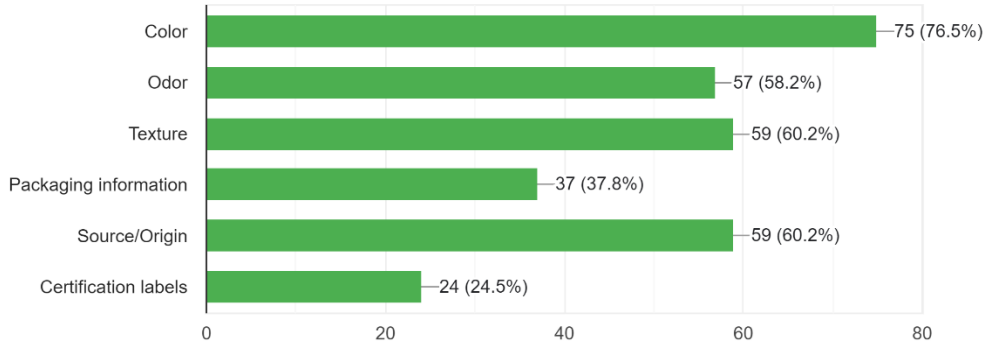
How often do you buy shrimp?

98 responses



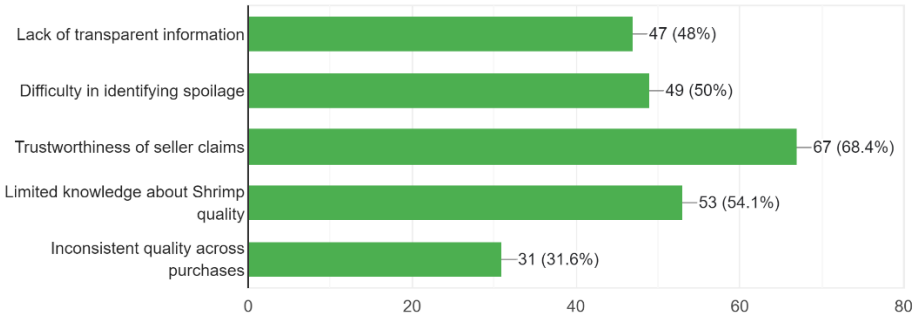
What factors do you consider when assessing the quality of shrimp? (Select all that apply)

98 responses



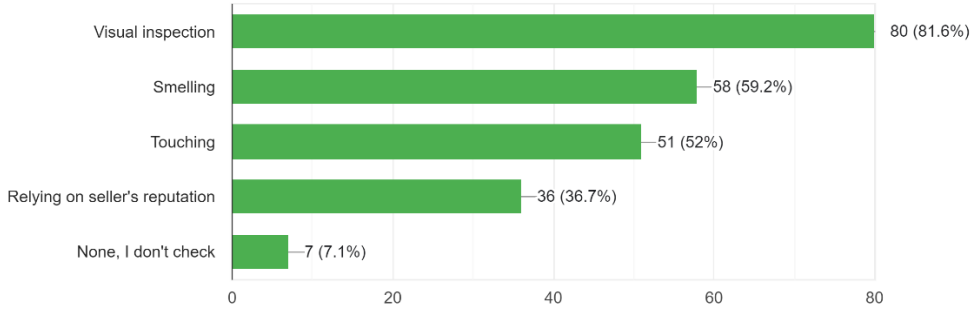
What challenges do you face in determining the freshness and quality of shrimp before purchasing? (Select all that apply)

98 responses



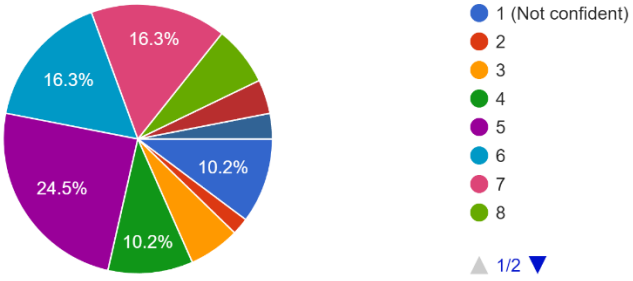
How do you currently check the quality of prawns/shrimp before purchasing? (Select all that apply)

98 responses



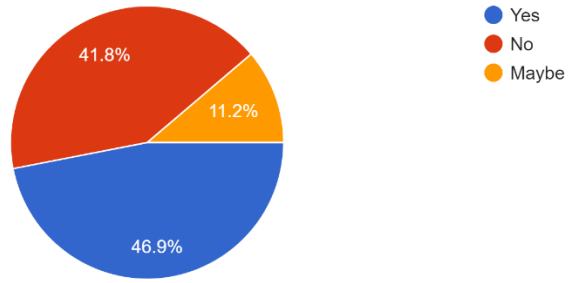
On a scale of 1 to 10, how confident are you in your ability to accurately assess the quality of prawns/shrimp?

98 responses



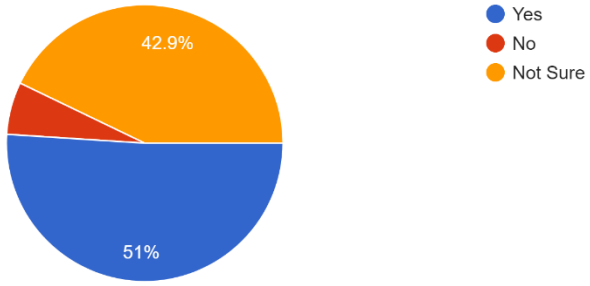
Are you familiar with the concept of blockchain technology?

98 responses



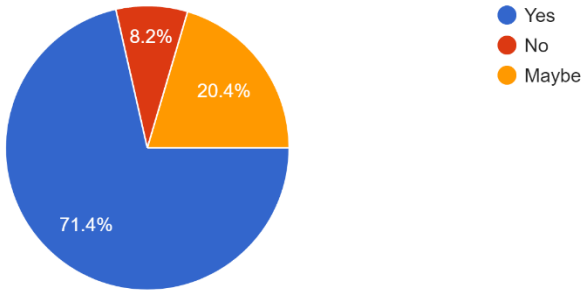
Would you trust a system that uses blockchain to track the quality and origin of prawns/shrimp?

98 responses



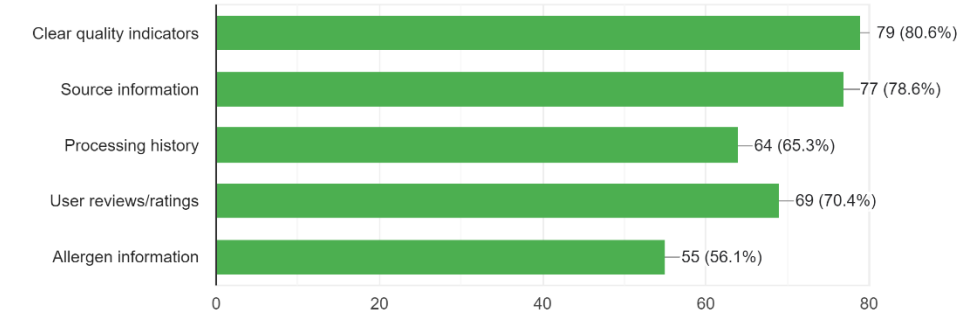
Would you be interested in using a mobile app that allows you to scan a QR code on prawn/shrimp packaging to access detailed information about its quality and origin?

98 responses



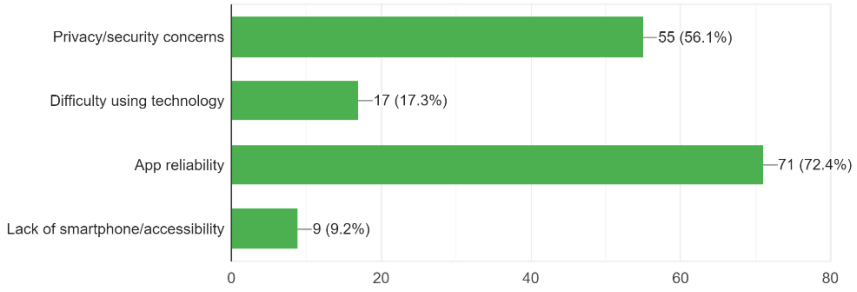
What features would you like to see in an app designed to help you assess prawn/shrimp quality? (Select all that apply)

98 responses



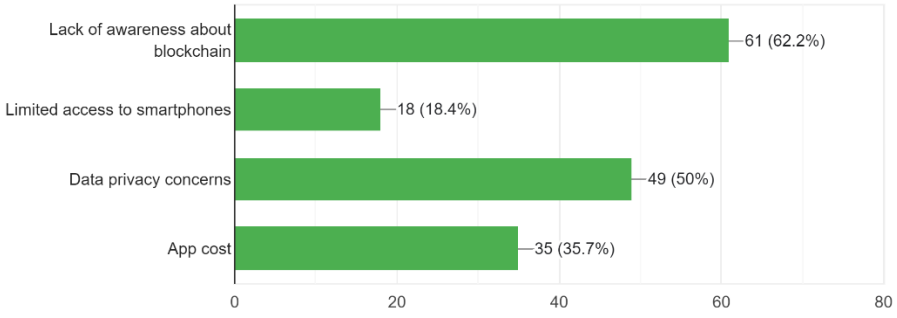
Do you have any concerns about using technology, like an app, to assess prawn/shrimp quality? (Select all that apply)

98 responses

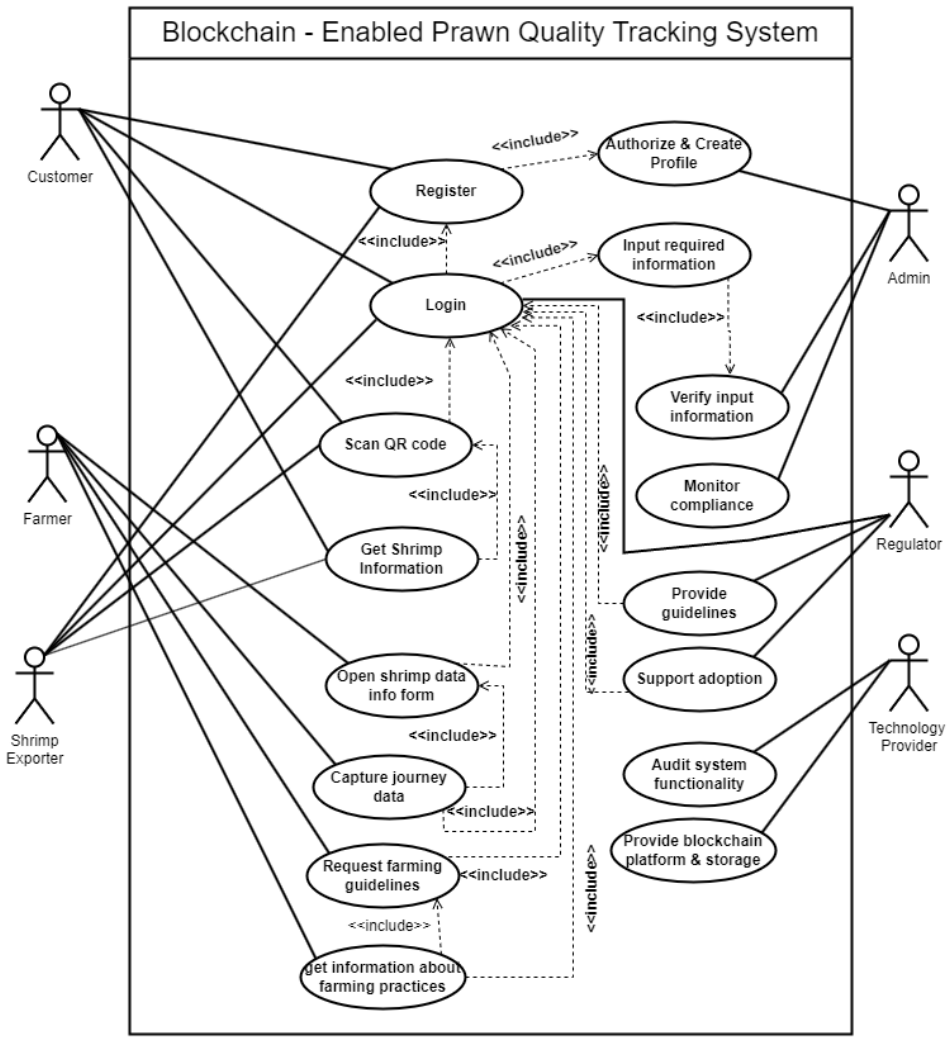


What factors might prevent you from adopting a blockchain-based prawn quality tracking app? (Select all that apply)

98 responses



2) Use Case Diagram



3) Normal Scenarios For Use Cases

3.1 Scenario 1

Use case name:	Register	UniqueID: SA-00001
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator.	
Stakeholder:	Customer, Exporter, Regulator, Admin.	
Description:	User registers in the app as Customer, Regulator or Distributor.	
Triggering Event:	User inputs required information and click register button.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The registration interface loads.		
2. Selects user type.		User wants to register as customer, Regulator or Distributor
3. User enters the following information: Email, User type, username, mobile Number, address, password etc.		Personal information of user like User type, username, Mobile Number, password, email, password.
4. Clicks the submit button.		All required information must be filled up.
5. If all information is correct then user will be registered to the system.		
6. A unique id will be given to the user and a confirmation message will be shown to the user interface.		Unique id and a confirmation message.
Preconditions:	User needs to have idea about the features of the app.	
Postconditions:	User must carefully input all required information while registering.	
Assumptions:	User wants to use the app.	
Success Guarantee:	Participant has registered for login and create an account.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to register for the login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Medium.	

3.2 Scenario 2

Use case name:	Login	UniqueID: SA-00002
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator, Admin.	
Stakeholder:	Customer, Exporter, Regulator, Admin.	
Description:	User Login in the app as Customer, Regulator or Distributor.	
Triggering Event:	User inputs Email, Password and click register button.	
Trigger type:	External.	
Steps Performed (Main Path):		Information for Steps:
1. The login interface loads.		
2. Selects user type.		User wants to login as customer, Regulator or Distributor
3. User enters the following information: Email and password.		At first input email address, then enter password.
4. Clicks the login button.		All required information must be filled up.
5. If all information is correct then user will be login to the app.		
Preconditions:	User needs to have idea about the features of the app.	
Postconditions:	User must carefully input email and password while Login.	
Assumptions:	User wants to check some products.	
Success Guarantee:	Participant has login and check the products authenticity.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Low.	

3.3 Scenario 3

Use case name:	Scan QR Code	UniqueID: SA-00003
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator.	
Stakeholder:	Customer, Exporter, Regulator.	
Description:	User Scan QR code for check the products authenticity.	
Triggering Event:	User Click “Open Scanner” and scan the QR code.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The Dashboard interface loads.		
2. Click Open Scanner button.		
3. Camera will be open to scan the QR code.		A QR code will be scanned instantly .
4. A windows will be open that indicating authenticity of the shrimp information include Freshness Percentage, Temperature, PH Level, Color Changes, Harvesting time and so on.		
Preconditions:	User needs a smart phone with build in camera.	
Postconditions:	User must carefully input all required information while registering.	
Assumptions:	User wants to use the app.	
Success Guarantee:	Participant has registered for login and create an account.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to register for the login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Medium.	

3.4 Scenario 4

Use case name:	Provide Guidelines	UniqueID: SA-00004
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Regulator.	
Stakeholder:	Regulator, Farmer.	
Description:	Regulator will provide guidelines for farmers about harvesting the shrimp.	
Triggering Event:	User Input the guideline data and click submit button.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The dashboard interface loads.		
2. Selects provide guidelines.		
3. Select type of guidelines.		Attach the valuable data that include guidelines.
4. Clicks the submit button.		Required data must be filled up.
5. A pop up will be showed following “Guideline submitted successfully”		
Preconditions:	User needs to have idea about the features and steps of the app.	
Postconditions:	User must carefully input required data.	
Assumptions:	User wants to provide guidelines about harvesting the shrimp.	
Success Guarantee:	Participant has submitted the necessary file and get a pop up notification.	
Minimum Guarantee:	Participant has submitted the files.	
Requirements Met:	Allow users to be able to regulate the app using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Low.	

4) Alternative Scenarios

4.1 Scenario 1

Use case name:	Register	UniqueID: SA-00001
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator.	
Stakeholder:	Customer, Exporter, Regulator, Admin.	
Description:	User registers in the app as Customer, Regulator or Distributor.	
Triggering Event:	User inputs required information and click register button.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The registration interface loads.		
2. Selects user type.		User wants to register as customer, Regulator or Distributor
3. User enters the following information: Email, User type, username, mobile Number, address, password etc.		Personal information of user like User type, username, Mobile Number, password, email, password.
4. Clicks the submit button.		All required information must be filled up.
5. If any information is not correct then an error message will be shown that information is not valid and which information is invalid is also shown. Then prompted to enter valid information.		Error message, invalid information.
6. The user will enter correct information and continue with the registration.		Correct information.
7. A unique id will be given to the user and a confirmation message will be shown to the user interface.		Unique id and a confirmation message.
Preconditions:	User needs to have idea about the features of the app.	
Postconditions:	User must carefully input all required information while registering.	
Assumptions:	User wants to use the app.	
Success Guarantee:	Participant has registered for login and create an account.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to register for the login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Medium.	

4.2 Scenario 2

Use case name:	Login	UniqueID: SA-00002
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator, Admin.	
Stakeholder:	Customer, Exporter, Regulator, Admin.	
Description:	User Login in the app as Customer, Regulator or Distributor.	
Triggering Event:	User inputs Email, Password and click register button.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The login interface loads.		
2. Selects user type.		User wants to login as customer, Regulator or Distributor
3. User enters the following information: Email and password.		At first input email address, then enter password.
4. If any information is not correct then an error message will be shown that information is not valid and which information is invalid is also shown. Then prompted to enter valid information.		Error message, invalid information.
5. The user will enter correct information and clicks the login button.		Correct information.
6. If all information is correct then user will be login to the app.		
Preconditions:	User needs to have idea about the features of the app.	
Postconditions:	User must carefully input email and password while Login.	
Assumptions:	User wants to check some products.	
Success Guarantee:	Participant has login and check the products authenticity.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Low.	

4.3 Scenario 3

Use case name:	Scan QR Code	UniqueID: SA-00003
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Customer, Exporter, Regulator.	
Stakeholder:	Customer, Exporter, Regulator.	
Description:	User Scan QR code for check the products authenticity.	
Triggering Event:	User Click “Open Scanner” and scan the QR code.	
Trigger type:	External.	
Steps Performed (Main Path):		**Information for Steps:**
1. The Dashboard interface loads.		
2. Click Open Scanner button.		
3. Camera will be open to scan the QR code.		A QR code will be scanned instantly .
4. If the user can’t have internet access at that time, then the scan will fail.		Error message.
5. After reconnecting the internet, the code will be scanned in an instant.		
6. A windows will be open that indicating authenticity of the shrimp information include Freshness Percentage, Temperature, PH Level, Color Changes, Harvesting time and so on.		
Preconditions:	User needs a smart phone with build in camera.	
Postconditions:	User must carefully input all required information while registering.	
Assumptions:	User wants to use the app.	
Success Guarantee:	Participant has registered for login and create an account.	
Minimum Guarantee:	Participant was able to login.	
Requirements Met:	Allow users to be able to register for the login using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Medium.	

4.4 Scenario 4

Use case name:	Provide Guidelines	UniqueID: SA-00004
Area:	Blockchain-Enabled Prawn Quality Tracking System.	
Actor(s):	Regulator.	
Stakeholder:	Regulator, Farmer.	
Description:	Regulator will provide guidelines for farmers about harvesting the shrimp.	
Triggering Event:	User Input the guideline data and click submit button.	
Trigger type:	External.	
Steps Performed (Main Path):		Information for Steps:
1. The dashboard interface loads.		
2. Selects provide guidelines.		
3. Select type of guidelines.		Attach the valuable data that include guidelines.
4. If the selected type cannot match the file format, then an error message will be shown that the file format does not match, and which format can be valid is also shown.		Error message.
5. The user will enter correct data format and continue the process.		Correct information.
6. Clicks the submit button.		Required data must be filled up.
7. A pop up will be showed following “Guideline submitted successfully”		
Preconditions:	User needs to have idea about the features and steps of the app.	
Postconditions:	User must carefully input required data.	
Assumptions:	User wants to provide guidelines about harvesting the shrimp.	
Success Guarantee:	Participant has submitted the necessary file and get a pop up notification.	
Minimum Guarantee:	Participant has submitted the files.	
Requirements Met:	Allow users to be able to regulate the app using a secure Web site.	
Outstanding Issues:	Track multiple product at a time.	
Priority:	High.	
Risk:	Low.	

5) Functional Requirements

Functional requirements outline the specific functionalities and capabilities that the shrimp blockchain system should possess to fulfill the needs of stakeholders. A few functional specifications for the shrimp blockchain project are listed below:

- Users can create accounts, including producers, exporters, regulators, retailers, and consumers.
- Authenticate users when they log in to the system.
- Admin can see and control the users. Like added or delete a user.
- Farmers can input catch journey data, including location, time, quantity, and fishing method.
- QR codes provide consumers with access to prawn journey details through scanning and shrimp quality can be tracked.
- The system enables real-time updates of prawn data throughout the supply chain.
- Regulatory authorities have access to audit and verify data as needed.
- Regulators can provide guidelines about shrimp farming practices.
- The system offers user guides and support resources to assist users in understanding its functionalities.
- Technology Providers can audit system functionality and check whether the system working perfectly or not.

6) Non-Functional Requirements

Non-functional requirements define the qualities and characteristics that the shrimp blockchain system should possess to ensure its effectiveness, security, and user experience. Here are some specifications for the shrimp blockchain project that are not functional:

Security and Privacy:

- To protect sensitive data stored on the blockchain, the system needs to include strong encryption measures.
- To avoid unauthorized access to prawn data, strict user authentication and permission procedures should be used.
- To protect user privacy, compliance with data protection laws such as GDPR should be guaranteed.

Performance and Scalability:

- A large number of transactions should be processed by the blockchain system without a noticeable performance hit.
- The system's response time should stay within reasonable bounds as both the number of users and the volume of data grows.
- A high level of dependability is required for the system in order to reduce downtime and guarantee reliable access to the data.

- Mechanisms for redundancy and failover ought to be set up to deal with probable system breakdowns.

Usability and User Experience:

- The user interface of the blockchain application should be simple to use and accommodating to users of different technological backgrounds.
- Actions taken inside the program should respond quickly, resulting in a smooth user experience.

Auditability and Transparency:

- For the objectives of accountability and transparency, every action taken within the system should be recorded and auditable.
- Smart contracts' modifications, transaction histories, and access logs ought to be saved and accessible.

Compliance with Standards:

- Industry requirements for data security, blockchain technology, and data exchange protocols should be followed by the system.
- Additionally, it must adhere to all applicable laws, rules, and guidelines for the prawn business as well as for online transactions.

Resilience and Disaster Recovery:

- In the event of system failures or natural disasters, the system should have systems in place for data backup, recovery, and continuity.