

Institute Of Universal Higher Studies



Project Proposal

Project Name: Latex Harvesting

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1. Background

Project Background:

The rubber latex collection industry plays a vital role in the agricultural sector, particularly in Sri Lanka. Client, Lalan Rubbers pvt Ltd, has been a key player in this industry for 10 years. Their operations involve the collection of rubber latex from various roots across the country, serving numerous farmers who rely on this industry for their livelihoods.

Current Challenges:

Despite its importance, the rubber latex collection process faces several challenges due to the reliance on outdated paper-based systems. These challenges include:

Manual Processes: The current system heavily relies on manual processes for recording latex collection, chemical distribution, and communication with farmers.

Inefficiency: The manual nature of the process leads to inefficiencies, including delays in communication, errors in data entry, and difficulty in tracking collection levels.

Limited Visibility: Lack of real-time visibility into collection levels and farmer requests makes it challenging for the company to optimize its operations and resources.

Customer Experience: Farmers often face inconvenience in requesting additional ammonia or communicating with the company due to the need for manual phone calls and paperwork.

Project Rationale:

To address these challenges and enhance the efficiency of rubber latex collection, Lalan pvt Ltd recognizes the need for a modern, digital solution. The proposed web application aims to revolutionize the way the company operates by:

Digitizing and automating key processes, including collection monitoring, chemical distribution, and communication with farmers.

Providing real-time visibility into collection levels, enabling proactive decision-making and resource allocation.

Improving customer experience by offering a user-friendly platform for farmers to interact with the company and request additional services.

Enhancing data accuracy and integrity through centralized storage and automated workflows.

Client Vision:

Lalan Rubbers pvt Ltd envisions a future where technology empowers their operations, streamlining processes, and driving growth in the rubber latex collection industry. By investing in this project, the company seeks to.

Stay competitive in the market by adopting innovative solutions that improve efficiency and customer satisfaction.

Build stronger relationships with farmers by offering them a convenient and transparent platform for conducting business.

Position themselves as industry leaders in sustainable agriculture by leveraging technology to optimize resource usage and reduce environmental impact.

- **Client Name:** Mr. Gajendra Kulasinghe
- **Email:** Kulasinghe@lalangroup.com
- **Designation:** Senior Executive of Collection Unit
- **Company:** Lalan Rubbers pvt Ltd

2. Problem and motivation

2.1. Problem Statement

The latex collection process at Lalan rubbers(pvt) ltd currently operates through manual procedures, resulting in inefficiencies, delays, and quality control challenges. These manual processes lead to errors in data recording, lack of real-time monitoring, and difficulty in coordinating field activities. As a result, the company faces several operational challenges, including:

Inefficiencies in Route Planning:

Manual route planning leads to suboptimal allocation of resources and inefficient collection routes, resulting in increased travel time and fuel consumption.

Quality Control Issues:

Lack of real-time monitoring and analysis of latex quality parameters such as Dry Rubber Content (DRC), Volatile Fatty Acid (VFA), and ammonia levels leads to quality control issues and customer dissatisfaction.

Billing Calculation Errors:

Manual calculation of billing based on collected latex quantity and quality parameters is prone to errors, leading to discrepancies in invoicing and revenue loss.

Communication and Coordination Challenges:

Limited communication channels and manual coordination processes result in delays, miscommunication, and inefficiencies in field activities, affecting overall productivity.

2.2. Motivation

The motivation behind addressing these challenges and implementing a web-based system for latex collection management stems from several factors:

Operational Efficiency:

By automating manual tasks, optimizing routes, and streamlining processes, the company aims to improve operational efficiency, reduce costs, and enhance overall productivity.

Quality Assurance:

Ensuring consistent quality of collected latex is essential for maintaining customer satisfaction and reputation. Real-time monitoring of quality parameters enables proactive measures to uphold quality standards.

Customer Satisfaction:

Enhancing communication channels, providing transparency in operations, and delivering timely service contribute to improved customer satisfaction and loyalty.

Revenue Optimization:

Accurate billing calculation and invoicing reduce revenue leakage and ensure fair and transparent transactions with customers, ultimately optimizing revenue generation.

Competitive Advantage:

Embracing technological advancements and innovation in latex collection management positions the company as a leader in the industry, enhancing competitiveness and market positioning.

3. Aims & Objectives

3.1. Aim

The aim of the project is to develop and implement a comprehensive web-based system for managing the latex collection process at Lalan Rubbers (Pvt) Ltd, with the goal of enhancing operational efficiency, improving quality control measures, and maximizing customer satisfaction.

3.2. Objectives

Automate Manual Processes:

Develop automation mechanisms to replace manual tasks involved in route planning, order management, billing calculation, and reporting, reducing human errors and processing times.

Optimize Route Planning:

Implement algorithms for route optimization based on estate locations, tapping schedules, and bowser capacity constraints, ensuring efficient resource utilization and minimizing travel time.

Enhance Quality Control Measures:

Integrate real-time monitoring and analysis tools for latex quality parameters such as Dry Rubber Content (DRC), Volatile Fatty Acid (VFA), and ammonia levels, enabling proactive quality control measures and adherence to industry standards.

Improve Communication and Coordination:

Develop communication channels and collaboration tools for supervisors, field workers, and customers to facilitate seamless coordination, task assignment, and real-time updates on collection activities.

Streamline Billing and Invoicing Processes:

Implement automated billing and invoicing systems based on collected latex quantity and quality parameters, ensuring accuracy, transparency, and timely invoicing for customers.

Provide Customer-Centric Features:

Develop customer portals with features such as order placement, tracking, feedback submission, and invoice management, enhancing customer experience and satisfaction throughout the collection process.

Enable Data-driven Decision Making:

Implement reporting and analytics tools to generate actionable insights on collection performance, latex quality trends, customer feedback, and operational efficiency, empowering management to make informed decisions and drive continuous improvement.

Ensure Scalability and Flexibility:

Design the system architecture to be scalable and flexible, capable of accommodating future growth, changing business requirements, and technological advancements in the latex collection industry.

Ensure Security and Compliance:

Incorporate robust security measures and compliance mechanisms to safeguard sensitive data, protect against cybersecurity threats, and ensure compliance with regulatory standards and data protection laws.

Provide Training and Support:

Offer training sessions and ongoing support to users, including supervisors, field workers, and customers, to familiarize them with the system's functionalities and maximize its utilization and effectiveness.

4. System overview

4.1. System overview diagram

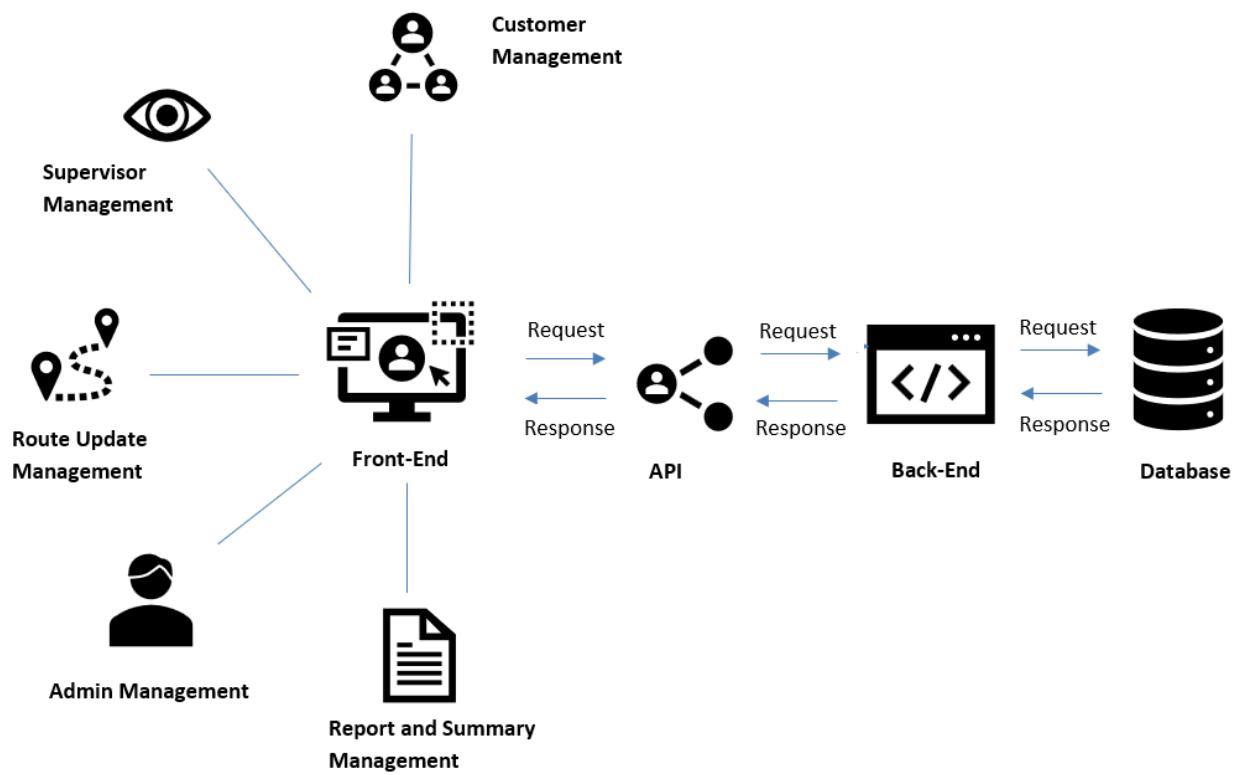


Figure 1. System Overview Diagram

4.2. Functional & Non-Functional Requirements

1. Customer management

Functional Requirement

- Customer Registration: Allow customers to register their details in the system, including name, contact information, all information what company wants, and address using correct details.
- Customer Profile Management: Enable customers to update their profile information and manage preferences.
- Latex Order Placement: Provide a feature for customers to place orders for latex tapping, specifying quantities and desired tapping dates.
- Order Tracking: Allow customers to track the status of their orders, including confirmation, tapping dates, and delivery schedules.
- Feedback Management: Facilitate feedback submission from customers regarding service quality, delivery timeliness, and overall satisfaction.

Non-Functional Requirement

- Performance: The system should be fast, even when lots of people are using it, so customers can quickly order things.
- Reliability: It should always work without suddenly stopping, so customers can trust it to place orders whenever they need to.
- Security: It should keep all personal information and orders safe from theft.
- Usability: It should be easy for customers to understand and use, with clear buttons and instructions, so they can place orders easily.
- Accessibility: Customers should be able to use it on different devices like phones or computers.
- Compliance: It must follow all rules and laws about keeping customer data safe and doing business fairly.

- Notification System: It should send customers messages about their orders, like when they've been received or when they'll be delivered.
- Performance Monitoring: The system should keep an eye on how customers use it and find ways to make it work better and be easier to use.

2. Supervisor Management

Functional Requirement

- Supervisor Registration: Allow supervisors to register their details in the system, including name, contact information, and assigned routes.
- Route Assignment: Enable administrators to assign specific routes to supervisors based on operational requirements.
- Daily Planning: Provide supervisors with tools to plan their daily activities, including estate visits, tapping schedules, and customer communication.
- Data Collection: Offer data entry interfaces for supervisors to input information related to latex collection, including quantities, DRC percentages, and sample details.
- Quality Control Checks: Implement checks and alerts for supervisors to monitor and address issues related to latex quality, such as high V.F.A levels or contamination.
- Reporting: Enable supervisors to generate reports on daily activities, estate-wise performance, and any operational challenges encountered.

Non-Functional Requirement

- Performance: The system should work fast, even with lots of data, so supervisors can plan routes and manage information quickly.
- Reliability: It should always work without unexpectedly stopping, so supervisors can smoothly handle field activities.

- Scalability: The system should handle more data and users in the future without becoming slower or harder to use.
- Usability: It should be easy for supervisors to use, with clear buttons and instructions to avoid confusion.
- Security: It must keep all information safe, like tapping details and reports, accessible only to supervisors.
- Integration: It should seamlessly work with other company systems for easy information sharing.
- Accessibility: Supervisors should access it from different devices like phones or computers, even outside the office.
- Compliance: It must adhere to all rules and laws regarding data security and proper business conduct.
- Data Backup and Recovery: Regularly save copies of all information for quick recovery in case of any issues.
- Training and Support: Provide guides and assistance to help supervisors learn and use the system effectively and solve any problems they encounter.

3. Vehicle, Workers, Route Management

Functional Requirement

- Vehicle Management: Allow administrators to register vehicles used for latex collection, including registration details, tank numbers, and maintenance records.
- Worker Management: Provide tools for administrators to manage worker assignments, including drivers, helpers, and security personnel.
- Route Update: Enable supervisors to update route information as needed, including changes in estate assignments, tapping schedules, and route optimizations.
- Maintenance Scheduling: Implement a system for scheduling and tracking vehicle maintenance activities to ensure fleet reliability and safety.
- Resource Allocation: Enable administrators to allocate resources effectively, including vehicles, workers, and equipment, based on operational needs and priorities.

Non-Functional Requirement

- Performance: Efficient handling of concurrent users and minimal latency.
- Scalability: Ability to accommodate growth in vehicles, workers, and routes.
- Reliability: Minimal downtime and continuous operations.
- Security: Robust protection of sensitive data and user authentication.
- Availability: High availability with redundant components.
- Usability: Intuitive user interface requiring minimal training.
- Accessibility: Support for users with disabilities
- Maintainability: Modular design and well-documented code for future updates.

4. Admin Management

Functional Requirement

- Vehicle Management: Allow administrators to register vehicles used for latex collection, including registration details, tank numbers, and maintenance records.
- Worker Management: Provide tools for administrators to manage worker assignments, including drivers, helpers, and security personnel.
- Route Update: Enable supervisors to update route information as needed, including changes in estate assignments, tapping schedules, and route optimizations.
- Maintenance Scheduling: Implement a system for scheduling and tracking vehicle maintenance activities to ensure fleet reliability and safety.
- Resource Allocation: Enable administrators to allocate resources effectively, including vehicles, workers, and equipment, based on operational needs and priorities.

Non-Functional Requirement

- Scalability: The system should handle more vehicles, workers, and routes without getting slow.
- Reliability: Admins should always be able to register vehicles, manage workers, update routes, schedule maintenance, and allocate resources without the system crashing. Data should stay safe and not get lost.
- Security: Only authorized admins should access vehicle and worker management. Data about vehicles, workers, routes, and resources should be kept safe from unauthorized access.
- Usability: The system should be easy for admins to use without needing much training. It should be simple to manage vehicles, workers, routes, maintenance, and resources.
- Accessibility: Admins should be able to use the system from different devices and places, even if they're not in the office.

5. Report and Summary Management

Functional Requirement

- Report Generation: Provide tools for generating various reports, including daily activity reports, estate-wise performance summaries, and quality control metrics.
- Data Visualization: Implement data visualization tools to present key metrics and insights in an easy-to-understand format, such as charts, graphs, and dashboards.
- Summary Analysis: Enable administrators and supervisors to analyze summary data, identify trends, and make informed decisions regarding operational improvements and resource allocation.
- Export and Sharing: Allow users to export reports and summaries in different formats (e.g., PDF, Excel) and share them with relevant stakeholders, both internally and externally.

Non-Functional Requirement

- Speed: The system needs to create reports and summaries quickly, so users don't have to wait long.
- Dependability: The system should work well all the time, not crashing or losing information, so users can always get to their reports and summaries.
- Safety: User information, like reports and summaries, should be kept safe from people who shouldn't see it.
- Flexibility: Users should be able to change how their reports and summaries look to fit what they need.
- Easy to Use: It should be simple for anyone to use the platform without any confusion.
- Compatibility: Reports and summaries should work on any phone, tablet, or computer.
- Accessibility: Everyone, including people with disabilities, should be able to use the platform easily.
- Simple Instructions: Users should have clear directions on how to use the platform and its features.
- Data Safety: The system should save copies of information regularly and be able to get it back if something goes wrong, so nothing important is lost.

4.3. Technical Requirements

- **Frontend languages and frameworks:**
 - **React:** Used for creating interactive and dynamic user interfaces.
 - **HTML, CSS, JavaScript, Bootstrap:** Basic technologies for structuring web pages, styling them, and adding interactivity. Bootstrap provides ready-made design elements for responsive web design.

- **Backend programming languages frameworks:**
 - **Node.js:** Enables server-side programming using JavaScript, known for its scalability and efficiency.
- **Databases:**
 - **MySQL:** A widely used database system for storing and managing data efficiently.
- **version control:**
 - **GitHub:** An online platform for version control, collaboration, and managing code repositories using Git.

4.4. System Requirements

Hardware Requirements:

- Client Devices: Desktops, laptops, tablets, or smartphones with modern web browsers (e.g., Chrome, Firefox) for accessing the web-based system
- Devices should have sufficient processing power and memory to run the web application smoothly

Software Requirements:

- Server: Windows Server
- Client Devices: Compatible with Windows or mobile operating systems (iOS, Android)
- Web Server:
 - Configuration for serving dynamic content and handling HTTP requests
 - Database Management System (DBMS):
 - MySQL Server for storing and managing data

- Installation and configuration of the DBMS software on the server
- Development Tools:
 - Integrated Development Environment (IDE) such as Visual Studio Code for coding and debugging
 - Git for version control and collaboration

4.5. Comparison Table

Functional Requirement	Customer Management	Supervisor Management	Vehicle, Workers, Route Management	Admin Management	Report & Summary Management
Customer Registration	<input checked="" type="checkbox"/>				
Latex Order Placement	<input checked="" type="checkbox"/>				
Order Tracking	<input checked="" type="checkbox"/>				
Supervisor Registration		<input checked="" type="checkbox"/>			
Route Assignment		<input checked="" type="checkbox"/>			

Daily Planning & Data collection		<input checked="" type="checkbox"/>			
Vehicle Management			<input checked="" type="checkbox"/>		
Worker Management			<input checked="" type="checkbox"/>		
Maintenance Scheduling				<input checked="" type="checkbox"/>	
Route Update			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Report Generation					<input checked="" type="checkbox"/>
Summary Analysis					<input checked="" type="checkbox"/>
Exports and sharing					<input checked="" type="checkbox"/>

Table 1. Comparison Table

5. Literature Review

Generic Customer Relationship Management (CRM) Systems:

Pros: CRM systems offer robust tools for managing customer interactions, including communication and data management.

Cons: They may lack specialized features for managing specific tasks like latex collection and route optimization.

Fleet Management Software:

Pros: These systems focus on vehicle tracking, route optimization, and maintenance scheduling.

Cons: They may not include features for customer interaction or billing, which are crucial aspects of latex collection management.

Customized Logistics Management Systems:

Pros: Tailored solutions can be designed to meet specific needs, including latex collection and customer interaction.

Cons: Development costs can be high, and implementation may be complex and time-consuming.

Summary of Existing Systems:

While there are existing systems available that address aspects of latex collection management, such as CRM systems for customer interaction and fleet management software for vehicle tracking, none provide a comprehensive solution tailored specifically for the needs of this client. Existing systems may lack critical features like integrated customer and supervisor management, route update management, and specialized billing and reporting functionalities required for efficient latex collection operations.

6. Methodology

6.1. Methods

Requirements Gathering Phase:

- Talk to people involved in using or managing the system to understand what they need and expect from it.
- Write down everything they tell you about managing customers, supervisors, vehicles, routes, administrators, and reports.

Use Case Modeling:

- Figure out all the different ways people will use the system, like registering customers or planning routes.
- Think about who will use the system the most and what they'll do with it.

Prototyping:

- Make simple versions of the system to see how it will work and what it will look like.
- Show these versions to people who will use the system and change them based on what they say.

Design Phase:

- Draw diagrams to show how the system will be organized and what it will do.
- Make sure the system looks good and is easy to use for people who will use it.
- Plan how information will be stored in a way that makes sense for the system.

Development Phase:

- Write the code to make the system work, using languages like HTML, CSS, and JavaScript for how it looks and acts, and Node.js for the background work.
- Use tools to help build the system, like React.js for making it interactive and MySQL to store information.
- Keep track of changes to the code so that everyone working on it can see what's been done.

Testing Phase:

- Test each part of the system to make sure it works right.
- Check to see if different parts of the system work together correctly.
- Test to make sure the system is easy to use, works well, and is safe.

Integration Phase:

- Connect the system with any other systems it needs to work with, like sharing information with other programs.

Deployment and Maintenance Phase:

- Put the system into use where people can access it, making sure it's safe and works well.
- Plan out all the steps needed to keep the system working well over time, including fixing problems and adding new features.

6.2. Project Plan (Gantt Chart)

Id	Task	w1	w2	w3	w4	w5	w6	w7	w8	w9	w10	w11	w12
01	Requirement Gathering	Green											
02	Project charter		Yellow										
03	Project presentation			Cyan									
04	UI design				Pink								
05	ER diagram					Blue							
06	Coding & development						Red	Red	Red				
07	Integration & testing									Pink			
08	Final report writing										Cyan	Cyan	
09	Final Presentation & viva											Purple	

Table 2. Gant Chart

6.3. Work Breakdown Structure

Name	Function	Description Of the Function
M.A. Aslin	Customer Management	<ul style="list-style-type: none"> • Tapping Details • Previous details • Home • Contacting with company • Chemical Details • Customer logging and registration • Ordering
J.D. M.D. Hansaja	Supervisor Management	<ul style="list-style-type: none"> • Filling Bill • Daily root latex updating • Route information • Individual customer Reports & bills • Individual information • Supervisor logging • Bill handling
K.A.D. K. Subhashani	Vehicle, Workers, Root update management	<ul style="list-style-type: none"> • Logging • Seen next day roots, centrifuge transport, garage • Available vehicle, helpers, drivers, • According to request asking for root or grige or,cl for helpers driver's vehicle using priority • Night work assign • Adding delete edit helper driver, supervisor • see last roots
E.S. A. Gimhani	Admin Management	<ul style="list-style-type: none"> • Logging • Helper, driver, supervisor adding and remove

		<ul style="list-style-type: none"> • supervisor, helper, customer contact and send all approving bills for customer from email • All details approval • HVFA short identify and send alert for supervisor • chemical usage management • All total dry rubber management • All make bill seen for sing • Route wise details see
K.G. Harshika	N.	<p>Bill calculation Report and summary Management</p> <ul style="list-style-type: none"> • Logging • lab report entering (drc, vfa, nh3) of both vehicle tank and estate side • weight bill entering • litter short calculation using tally sheet and weight bill • 1st dry rubber content short or acc calculation using lab report and tally sheet • 2% acc making and drc deduction • original bill update and sent to admin for approve • month cost sheet update

Table 3. Work Breakdown Structure

7. Evaluation Methods

User Testing:

- Usability Testing: Real users try out the website to see how easy it is to use, like placing orders or tracking deliveries.
- User Satisfaction Surveys: Users are asked for feedback to understand how much they like using the website.

Task Completion Testing:

- Users are tested on completing important tasks like signing up, ordering, and tracking orders to make sure the website works well for them.

Load Testing:

- Checking how well the website performs when many users are using it at once, especially during busy times.

Scalability Testing:

- Testing if the website can handle more users and data over time without slowing down.

Response Time Testing:

- Measuring how quickly the website responds to actions like clicking buttons or loading pages.

Functionality Testing:

- Functional Testing: Making sure all the website's features work correctly without any problems.

Regression Testing:

- Checking that updates to the website don't cause any new issues or break existing features.

Compatibility Testing:

- Testing the website on different devices and browsers to make sure it works well everywhere.

Security Testing:

Data Encryption Testing:

- Checking if sensitive information is properly protected when it's sent or stored.

Access Control Testing:

- Making sure only the right people can access certain parts of the website.

API Testing:

- Testing how well the website communicates with other systems or services it connects to.

Data Integrity Testing:

- Checking that information stays accurate as it moves around the website.

Business Rules Testing:

- Checking if the website follows all the important rules set by the people in charge, like how orders are processed.

Compliance Testing:

- Making sure the website follows all the rules and standards it needs to, like keeping data safe and following environmental regulations.

Evaluation Criteria:

Acceptance Criteria:

- Specific standards are based on what the project needs and what the people involved want.

Key Performance Indicators (KPIs):

- Measuring how well the website performs using things like how easy it is to use, how fast it responds, and how much users like it.

Evaluation Results:

- Writing down what was found during testing to figure out what needs to be improved and how to make the website better in the future.

8. References

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