Sri Lanka Institute of Information Technology

Factory Management System

Project Proposal
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1. Introduction

1.1 Client and Company Background

Our Client is Niyandagala “Ambrosia” Tea Uva Co (Pvt) Ltd. Which is a tea factory situated in Welimada, Uva Province. This factory has had a well growth in past few years and it also has very good business connections around the world. There are nearly 400 employees work for the factory and about 30 staff members work in the management division. They collect large amount of tea leaves daily from small and large-scale suppliers all over the Uva province. Then the collected leaves are processed and stored in storerooms to be sold at the auction. All most all the tea they produce are sold at the tea auction while the rest are sold at the factory outlet for local customers. The main target of the client is the international market where he can sell his products to a higher rate. But there is a problem which slows down their growth rates competitively with other factories.

1.2 Problem Statement

The main problem is that they do not have an IT based system to run their operations or to keep their records on each section. Currently they are following a manual process to handle each and every task in the factory by maintaining books.
Specially,

- Employee details
- Supplier details
- Transport details
- Sales management details in physical tea shop
- Stock details
- Inventory details

are done manually.

And also, some calculations like,

- Calculating salary of employee
- Calculating EPF/ETF
- Calculating total expenditures went for different tasks

Are done by a manual process.

The client said that there is trouble in managing these operations manually because a simple mistake can affect the whole process and waste a long time to complete that task. So, there can be miscalculations and mistakes happen during this manual process. And also, daily transactions are kept in record books. It is a very difficult and time-consuming task to manage those records and the process is not efficient and effective.

In this factory process there is a huge collection of complex data which needs to be maintained in a specific manner. And there can be mistakes happen when entering data to the system manually. And it would be a major responsibility to manage many files. Then it would be a cause for the data inaccuracy. Hence, they do not have an automated system, the data cannot be accessed efficiently.

1.3 Solution

We decided to create a web-based system to this factory with an online database. Reason for choosing web application over the desktop application is that the client needs to access the system through the internet from anywhere at any time.

By keeping an accessible online database, they can search and access any past records they want. And also, their staff can save much more time with doing all the calculations through the system.

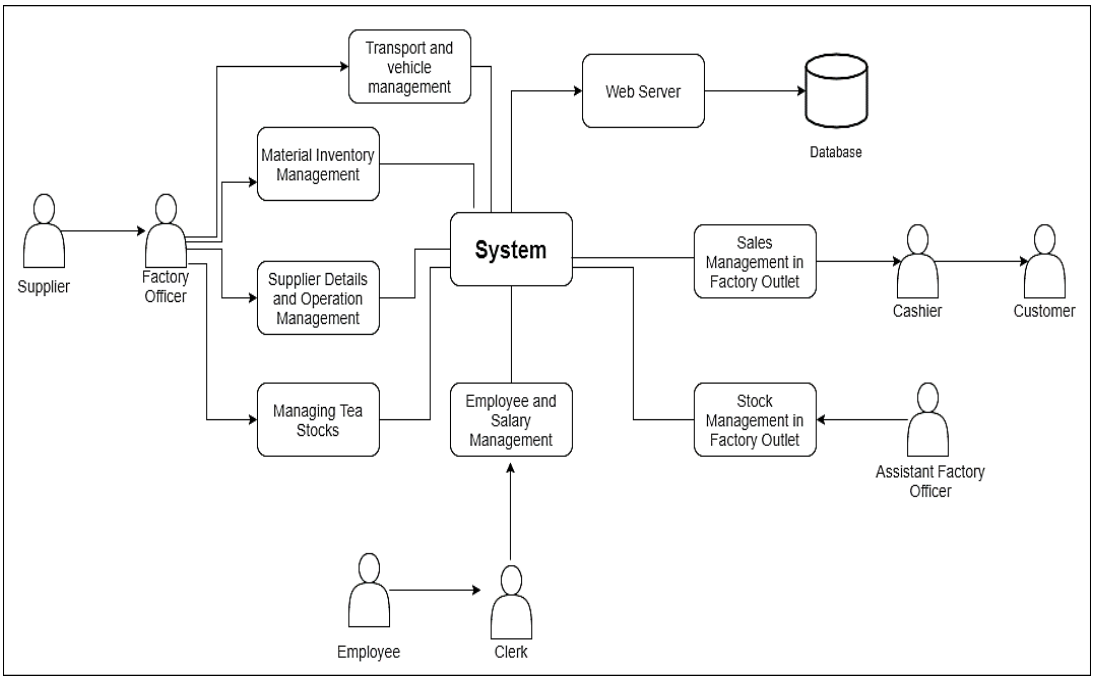
And another advantage of using an automated system is that the probability of occurring mistakes can be reduced. Therefore, by using this proposed system, the staff can manage their work efficiently and more accurately.

1.4 Benefits of the System

Following are the benefits that can be gained by implementing this system,

- Real-time data
  - Tea factory can take a reliable decision to build reports
- Available
  - 24/7 hours available
- Easy and Accurate
  - Accurate data can be accessed easily
- Helps to reduce cost
  - When using this system profit of the tea factory will be increase
- Administrator can take decisions easily
  - Make decisions using generated reports
- Data security
- Proper management
  - Employee (attendance, salary), suppliers, sales and stock, vehicle and transport
- Less manual records and reports
- Improve the effectiveness and productivity

2. System Overview Diagram



This is a web-based system, all the tasks are done through a web server and a database. Factory officer, clerk, cashier and assistant factory officer are the main users in the system. Managing Director has the authority to access overall system. They use the system to achieve different tasks.

- **Clerk** – Employee details registration and salary management
- **Factory Officer** – Transport and vehicle service management, material inventory management, supplier details management and Tea stock (final tea production) management
- **Cashier –** Sales management tasks in factory outlet
- **Assistant Factory Officer –** Stock management tasks in factory outlet

Customer, Employee and Supplier are not directly connected with the system. They are connected through the main users. All the main users are registered in the system as the staff members.

3. System Functions

3.1 Employee Management System

3.1.1 Employee Details and Attendance Management

This function comes under the main function “Employee Management System”. The clerk has to get details from the workers and enter their details and **Register** them as the workers of the factory When registering following details are collected.

- **Name**
- **Date of Birth**
- **NIC Number**
- **Contact Details**
- **EPF/ETF numbers**

If a worker is new to the factory, he/she will become a temporary worker for 3 months. After completing 3 months of his/her work, the system will display an alert to upgrade as a permanent worker. This is required because when calculating the salary after 3 months, additional features like EPF, ETF were added to the salary and also the employer was provided with an EPF number. Therefore, the system has to **Update** them. And also, can **Remove** employees when they resigned from the job.

The payroll system of the workers who work inside the factory are based on the total number of working days throughout the month. So, their daily attendance will be managed and calculated at the end of the month by the system.

The management staff of the factory face a huge difficulty in finding past records of the workers. So, it is important to maintain a profile for each worker including their basic details and working days. If a worker asks for financial assistance, the clerk can **Search** for the worker and take a decision.

3.1.2 Salary Management of Employees

There are two type of employees working in the factory,

1. **The factory staff members**
2. **The factory workers**

1. The factory staff members salary is a fixed salary based on their position in the factory. According to their position they will receive a basic salary, but the total salary of the staff members is made by multiple calculations.

   Those Calculations are as follows,

   - **ETF/EPF formats**
   - **Overtime hours of an Employee**
   - **Employee Loan**
   - **Employee Advance**

2. The factory worker has a daily fixed salary, So, their monthly salary will be based on their attendance. The daily attendance of the workers will be recorded from the employee registration system to the database. Then the salary management system will calculate their basic salary for the month based on their attendance, but their total salary will be considered after the calculation as given above.

3.2 Transport and Vehicle Repair Management System

This function is about the vehicles of the factory. The main objective of this function is intended to make an easy way to automate the vehicle details, because usually they record their vehicle details in books manually. All the vehicles should be registered to the system.

These vehicles daily travel in different routes to collect crops from suppliers. Before and after each trip, the meter readings are recorded to calculate the travel distance and fuel consumption. And with that they can calculate the expenditure for fuels of the month.

When they send the vehicle to the repairs, they have to set the expenditure for them monthly and when they send vehicle parts like tires for repairs, they send all the tires and keep them in store. So, the sent stock and available stock should be updated.

When registering the vehicles, the employee should be able to **ADD** particular vehicle details to the system such as,

- **Vehicle number**
- **Date**
- **Driver name**
- **Meter readings**
- **Number of kilometers driven**
- **Year**
- **Month**
- **Description**

The system can **Retrieve** and **Update** the vehicle details by using the read and update function. If the management staff wants to remove vehicle details from the system **Delete** function will lead to that.

3.3 Supplier Details & Operation Management

This Functionality is created to manage the Suppliers of the factory. First, suppliers should register to the system. When registering, suppliers should provide details such as,

- **Name**
- **Route**
- **NIC Number**
- **Tea Category**
- **Phone number**
- **Address**
- **Bank**
- **Account No**

to the Factory Manager who is responsible for registering suppliers into the system. Then the Factory Manager will fill those details and register them into the system. After successfully registering, the **Supplier ID** will be given for each supplier.

All Those suppliers are in Uva Province. There are mainly 5 routes and a few sub routes that factory lorries go to every day to collect tea crops. And there are nearly 700 suppliers in those routes. There are Large scale suppliers and Small-scale suppliers. For ease of managing those Suppliers, they are categorized under two sections**.**

- **By Route**
- **By Scale (Large-scale / Small-scale)**

Suppliers can supply their crops stocks to the factory lorries at collection stations initiated in their routes. Details of the stocks such as,

- **Supplier ID**
- **Stock type**
- **Weight**
- **Received date**
- **Received time**

will be recorded at that time. The Clerk will take those stock details and **Add** or **Update** suppliers stock details. After Stock was added, auto-generated **Stock ID** assigned to the stock.

When a Supplier is resigned from the factory, Supplier records can be **Deleted**.

Supplier payments are based on the supplied crops amount for a period of month. Payments are done monthly, and payments can be sent to Suppliers' bank accounts or they can collect them as cash or a cheque from the factory main office. Monthly salary invoice is **Generated** for each supplier through the system.

3.4 Inventory management

This function is to manage fresh tea leaves, right after getting them delivered to the factory. After getting rid of the bad tea leaves manually, they are stored in custom made trays. One square feet of a tray can hold 2.5kgs of tea leaves. The weight of the tea leaves must be recorded as it will give a rough idea about the weight of the final product. Only a ¼ of weight can be produced from 1 unit of fresh tea leaves. So right after storing tea leaves on a tray,

- **The suppliers id**
- **Date and Time when the fresh tea leaf batch got stacked in the tray**
- **Temperature**
- **Humidity**
- **Tray ID**
- **Date and Time when the batch get sent to the machine**

Must be **added**. If a new batch of tea leaves by another supplier is added to the tray, the details must be **updated**. The fresh tea leaves stay there until they are withered. It takes some time for a leaf to get withered. The time and date are recorded when the inventory is stored. The humidity and the temperature also affect the process of withering the leaves. There are some tools used in the storeroom to control the temperature and the humidity. Those two factors should also be recorded in the system. When a tray is getting full, the system alerts that they must move to a new tray. When a batch of tea leaves are withered, they can be recognized by the color, the strength of the leaf and some other factors. Once a supervisor declares that a batch of tea leaves are withered, they are sent to the machine to be dried and prepared as a final product. After a batch of tea leaves come out as a final product a report is **generated** showing the following details,

- **What time they stacked the fresh tea leaves**
- **What time they sent the withered tea leaves to the machine**
- **Weight of the tea leaves**
- **Expected product weight**
- **Product weight**
- **Types of final tea products and their weight (BOPF, DUST1, D1 etc...)**

After generating the report, it can be either saved in the database or **deleted**.

3.5 Final tea production stock management

This function is useful to manage tea production details of the factory. Mainly it contains **Add / Update** details of the production and calculate value of the tea production. Factory officer record the production details daily, according to each tea category.

There are many tea categories like OPA, OP, OP1, BOP, BOPF, etc. These categories have several kinds of values in the tea auction. 97% of Total weekly production of the factory is sent to the auction sales and the rest of the 3% is sent to the local tea shop as a factory outlet. Factory officer prepare the tea stock every week according to the daily tea production to sell in the auction. There are two types of auction sales. They are,

- **Main sale**
- **Ex-State Sale**

Factory use the Ex-State sales method to sell their final product in auction and these sales are done through samples of tea stock. The tea factory and the buyer are connected through a broker. These auction sales are done through a broker. There are several registered brokers in the Colombo tea auction and Sri Lanka Tea Board. It has several rules and regulations to manage each tea factory production in the county. Weekly total tea production has several types of tea categories (above mentioned) and each category is considered as a stock. Because of that the total tea products have several stocks. The factory officer sends a sample of tea stock to the broker and he sells the stock in the auction according to the tea sample details. Factory officers record these production stock and broker details. After the auction, sale broker sends a report of sales details to the factory officer. Factory officer must record these production values and update these values according to the auction sales. According to the broker's sales report factory officer or clerk calculate the total production value. Then the clerk calculates the total profit of the factory earned monthly.

- Factory officer can **Add** daily production details to the system.
- According to the daily production details factory officer can prepare the weekly total production. Then he can easily send 3% to the tea shop and prepare 97% to sell in the auction.
- Factory officer must **Add** broker details and tea sample details for each stock through the system before sending it to the auction.

- Then he needs to **Update / Delete** these stock details according to the brokers auction sales report.

If the stock is not sold in the auction factory officer has to resend a sample and wait until the broker's auction sales report.

- According to the broker's report details, the factory officer or clerk can Calculate the production value through the system.

- Total production cost value and total profit of the factory is calculated by the clerk or factory officer through the system at the end of the month. Also, the system generates total production reports, total profit reports and total production valuation reports.

3.6 Factory Outlet Management

3.6.1 Stock management of the factory outlet

In this function, users of this system will be able to **Add, Delete, Edit** and **View** the stock of the tea categories.
When the factory outlet receives 3% of the whole production, users should be able to enter the tea category and the weight to the system.
Then the system compares the packing of past records and calculates the number of packets which can be packed from the received categories giving the priority to the fast-moving categories. After completing the packing of the system calculated tea packets of each category, the system will alert remaining tea amounts and the number of packets that can be produced using remains and displays in the system. After packing them, number of packets in each category will enter the system.

- **BOPF – 1kg, 500g, 400g, 200g**
- **DUST 1 – 1kg, 500g, 400g, 200g**
- **DUST 2 – 1kg, 250g**
- **FGS – 1kg, 500g**

Also, the system should allow the user to review the stock balance while transactions are being done.
The system should alert the user when its order level is reached. System should **generate** daily, weekly, monthly and annual reports to the user.

3.6.2 Sales Management of the factory outlet

"Sales Management of the factory outlet", function is a sub system of factory management system. Tea shop sales 3% of the daily factory outcoming tea products for the local customers. Currently they are handling all the functions in sales manually, by using an automated system they can manage the functionalities more effectively and accurately.

When a customer order items, users has to **Enter** the buying items for the system. After that, the system will **Generate** the total bill amount of the transaction. If a customer asks for a bill, the user gives a command to print the bill.

User will be able to **Delete** and **Updates** the system. User can **View** the prices table, workers who are registered to the system, view the transactions, view income (daily, monthly and annual). System will automatically generate the income of the factory outlet daily.

Mainly the user will be able **To Insert, Delete, Update** and **Retrieve** the data.

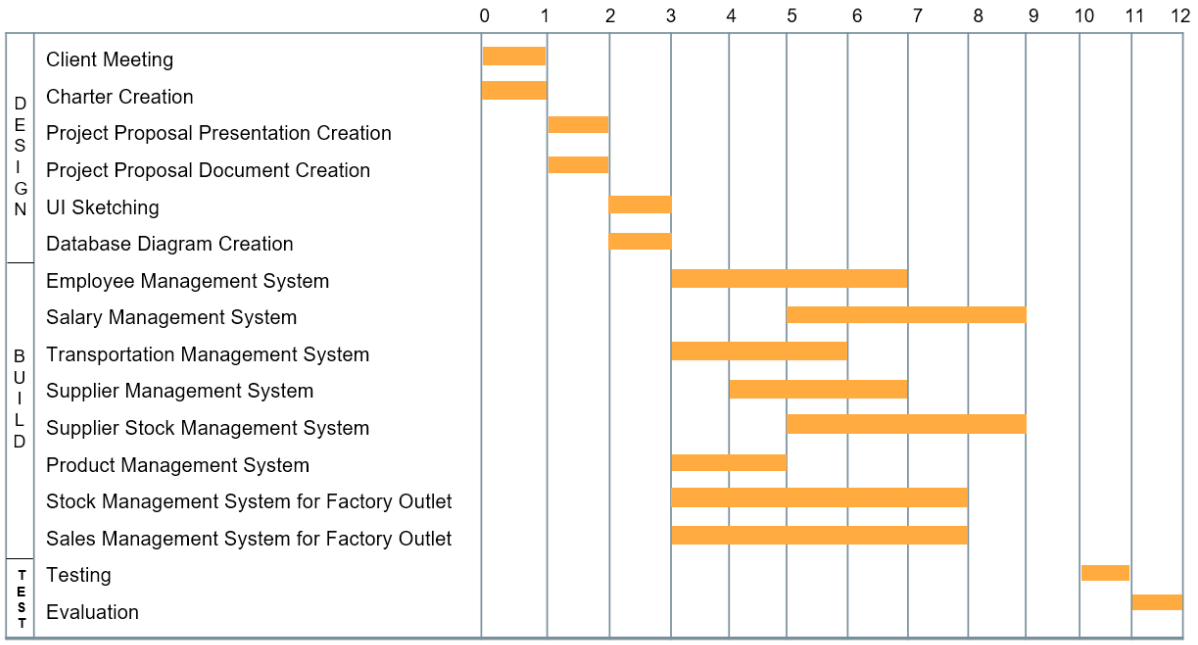
- **Insert the sold item list**
- **Calculate the total price of the item list**
- **Calculate the daily income**
- **Update the total income**
- **Display income reports**
- **Display sold items details**

Users will insert the sold items, then the system will generate the transaction calculation. Also, users can view the daily total income of the factory outlet. System will update the total income. System will display the reports and the sold items details.

4. Tools and Technologies

Programming language	Python 3
Front End Development	HTML5, CSS, JavaScript
Server-Side Web Application Framework And Application Programming Interface (back end)	Django
Database Management System	MySQL
Administration Tool for The Database	phpMyAdmin

5. Gantt Chart



6. Work Breakdown Structure

	Student ID & Name with initials	Brief Description of the Function
1	IT19000336 Mudannayake I.G.M.J.	**Employee Details and attendance management** • **Add** employee details to the system • **Update** employee details • **Delete** resigned employees • **Retrieve** employee details and display as profiles • Manage daily attendance of workers and calculate total working days of the month.
2	IT19008110 Perera L.A.V.U.	**Employee salary management** • **Add** OT hours and advances to employees • **Update** rates of salaries according to the government salary rates • **Retrieve** full reports of all employee salaries monthly and annually • **Delete** salary records of resigned employees • Get all the daily attendance of workers and calculate the monthly salary
3	IT19046976 Amarawansa T.N.W.	**Transport and Vehicle Repair Management** • **Add** Vehicle details to the system • **Update** Vehicle details • **Retrieve** Vehicle details • **Delete** unwanted records • Calculating total expenditures went for vehicle repairs and fuel for a month
4	IT19039350 Siriwardana S.M.T.N.	**Supplier Details & Operation Management** • **Add /** Register Suppliers to the System • **Update** Supplier details, Supplier stock details • **Delete** resigned suppliers' details, old stock details • Calculate suppliers' payments • **Generate** Supplier payment invoices

5	IT19210148 Wijethunga R.M.	**Inventory management** • **Add** Inventory details • **Update** Inventory details • **Generate** reports about the inventory stock and the final product stock • **Delete** unwanted reports
6	IT19362854 Abeygunawardana S.L.	**Managing tea stocks (Final Production)** • **Add** daily tea production details, Tea stock sample details and broker details • **Update** stock details according to the broker's auction sales report, current stock details • **Delete** unwanted records • **Calculate** the production value according to the broker's auction selling report, daily/weekly/monthly production. • **Generate** reports according to the production details changes.
7	IT19009728 Amaranayake W. N. S.	**Stock management of the factory outlet** • **Add** tea category, the weight and number of packets to the system, a new category (when needed) • **Update** current stock, reorder level • **Delete** unwanted records • **Generate** reports of stocks • Calculate stock balance
8	IT19041926 Onella Natalie P.A.D.	**Sales Management of the factory outlet** • **Add** buying items to bill • **Update** bill amount, income and price table • **Delete** unwanted records • **Generate** Bills, Transaction / Income reports