**Chapter 1:**

**Introduction**

1. Introduction

In the dynamic and competitive domain of rice milling, using an ERP system can greatly improve how work is managed and decisions are made. An ERP system helps organize and automate important tasks like buying paddy, managing the milling process, keeping track of stock, and checking quality. For rice mills, this system ensures that everything is handled smoothly, from getting raw paddy to delivering finished rice. By storing all data in one place and making it easy to use, an ERP system helps mill owners use resources wisely, reduce waste, and meet customer needs more effectively. Using ERP technology doesn’t just make work easier; it helps the rice mill grow, stay competitive, and work more efficiently.

## Opportunity & Stakeholders

### Stakeholders

* Owner
* Supplier
* Customer
* Employees

### Opportunities

Streamlined Operations: :

* ERPNext provides a single platform to manage important tasks like procurement, inventory, milling, sales, and finances.
* It helps remove unnecessary steps, reduces mistakes, and improves overall work efficiency.

Real-Time Insights:

* ERPNext gives a clear view of all operations through detailed reports and easy-to-understand analytics, helping owners make smart decisions and manage the mill proactively.

Improved Inventory Management:

* ERPNext ensures accurate inventory tracking, helping avoid mistakes and keeping stock levels at the right amount.

Lower Costs:

* ERPNext helps save money by automating tasks, reducing paperwork, and using resources more efficiently, which lowers expenses and increases profits.

## Motivations and challenges

### Motivations:

In today’s competitive rice milling industry, the motivation to improve operational management comes from the significant challenges of using manual and paper-based processes. These old methods often result in errors and delays in tasks like paddy procurement and milling schedules, which can disappoint customers and lead to missed business opportunities. Moreover, direct contact with suppliers and handling payments through cheques, cash, or online transfers not only creates inefficiencies but also lacks transparency, complicating financial oversight and accountability.

### Challenges:

Relying on manual and paper-based methods slows down operations and leads to frequent mistakes. It becomes difficult to plan properly and grow effectively this way. Moving to digital systems is a smart choice as they improve accuracy, streamline processes, and provide valuable data for better decision-making. Addressing these challenges is crucial to making operations more efficient, saving costs, and helping the business grow and stay competitive in the long term.

### Objectives:

The main goal of this project is to implement an ERP system that simplifies and connects different tasks in the rice mill to improve efficiency, help make better decisions, and support business growth.

Specific objectives include:

* Automate inventory management to keep track of stock levels, including updates from suppliers and production.
* Integrate financial features to manage payments, track earnings, and calculate costs within the ERP system.
* Implement a customizable system that can handle both custom orders and standard stock orders.
* Evaluate how well the system works by gathering feedback from users and tracking key metrics like processing time and inventory accuracy.

### Solution Overview:

The proposed solution involves configuring ERPNext to include features specifically designed for the rice mill’s operations, such as:

* **Customer and Supplier Management:** Detailed management of buyers and suppliers, helping track orders, payments, and communication more effectively.
* **Custom Purchase Orders:** Tailored purchase orders to manage the procurement of paddy and other materials, ensuring a smooth supply chain and timely availability of raw materials.
* **Automated Material Checks:** Automated tracking of materials like paddy, rice, and byproducts, ensuring the right quantities are available and reducing errors.
* **Integrated Financial and Inventory Management:** Linking financial data with inventory management to track expenses, income, and stock levels accurately.
* **Custom Workflows**: Streamlined processes across milling, procurement, packaging, and stock management, ensuring efficient production planning, timely order fulfillment, and accurate inventory updates.

**Chapter 2:**

**Literature Review**

# Literature / Market Survey

## Definition and Evolution

ERP systems are comprehensive software solutions that help integrate and streamline various business processes within an organization. In the rice milling sector, ERP systems have evolved from simple material management systems to complex solutions that handle everything from procurement and production planning to inventory management and financial tracking.

.

## Benefits in Manufacturing

Studies and industry practices highlight several advantages of using ERP systems in rice mills:

* **Operational Efficiency**: Streamlined processes, such as automatic updates on paddy procurement, milling, and order fulfillment, lead to faster production cycles and better use of resources.
* **Inventory Management**: Improved control over stock levels of raw paddy, finished rice, and byproducts, reducing waste and ensuring timely availability for production.
* **Cost Control:** Better visibility and management of costs, including paddy purchasing, milling, and packaging, through integrated financial modules. This helps in reducing expenses and improving profitability

## Literature Review/Technologies Overview:

ERPNext is a free and open-source software designed to help businesses manage different tasks, like purchasing, sales, inventory, and finances. For a rice mill, ERPNext can help manage important processes like buying paddy, milling rice, packaging, and keeping track of inventory. While ERPNext has many useful features, some parts may need to be customized to suit the rice mill's specific needs, such as tracking the milling process and managing byproducts like husk and bran.

### Challenges in ERP Implementations:

Implementing ERP in a rice mill comes with some challenges. These include managing the unique steps involved in rice milling, such as checking the quality of paddy, adjusting the milling process, and keeping track of raw and finished products. ERPNext is flexible and can be customized to meet these needs, but careful planning is required to make sure the system works well with the mill’s existing processes.

### Gap Analysis of ERPNext:

ERPNext may need adjustments to work perfectly for the rice mill:

* **Paddy Procurement & Supplier Management:** Custom features will help manage how paddy is purchased, quality checked, and stored. These features will also help handle changes in supply and demand during different seasons.
* **Milling & Processing:** The standard ERPNext system doesn’t fully cover the rice milling process. We will need to customize it to track the stages of milling, calculate rice yield, and manage byproducts like husk and bran.
* **Packaging & Inventory Management**: Custom tools will be added to manage how rice is packaged and track inventory levels. This will ensure the rice mill has the right amount of stock at all times and reduces mistakes in inventory.
* **Financial Management**: The financial part of ERPNext will need adjustments to track the costs related to milling, such as labor, energy, and raw materials. This will help the rice mill manage its finances more efficiently.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Order Management** | Sales Order Processing | Sales orders are processed automatically in ERPNext with customer access to order status and updates. | The **owner** will log into the system, click on the sales orders, and review each order. Upon clicking, the system will show the details. The owner can approve or update orders, which will then be processed automatically. | The standard system allows customer access to order status, which is not required in your case. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Production Planning** | Milling Process & Production | ERPNext supports production planning and tracks manufacturing orders. It calculates required materials based on BOM (Bill of Materials) and production schedules automatically. | The **owner** will click on the production plans and approve them. The system will display the current status, available stock, required materials, and production progress. Once approved, the system will automatically schedule and track the milling process. | ERPNext automatically generates production orders and schedules, which need to be customized for your rice mill's manual intervention. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Inventory Management** | Stock Management & Byproducts | ERPNext automatically updates stock levels based on incoming goods, sales orders, and manufacturing outputs. It also tracks byproducts in the inventory module. | The **owner** will click on inventory records, update stock levels, and manage byproducts. The system will track inventory in real-time, showing material availability, and automatically update stock levels after production and sales. | The standard ERPNext system is fully automated but lacks customization for rice mill byproducts and specific stock management needs. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Financial Management** | Cost & Financial Tracking | ERPNext has a complete financial tracking system that automates cost and financial calculations for inventory, sales, and expenses. | The **owner** will click on the financial reports to review costs, profits, and margins. The system will automatically track expenses related to production, sales, and byproducts. It will also generate financial statements such as P&L reports and balance sheets. | ERPNext offers financial automation but needs customization for the unique financial aspects of rice milling (e.g., specific costs like raw material wastage, milling costs, and byproducts). |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **HRM/Employee Management** | Staff Management & Payroll | ERPNext manages HR tasks, including staff records, attendance, payroll, and employee performance reviews. | The **owner** will click on employee records to review attendance, approve or adjust payroll, and manage staff performance. The system will calculate payroll based on attendance and hours worked and automatically process payments. | ERPNext automates payroll and attendance but needs customization to meet the specific labor force and hourly wage structure of the rice mill. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Notifications** | Alerts for Production & Sales | ERPNext sends basic alerts for sales orders, production orders, and inventory updates. | The **owner** will set up alerts for production delays, sales targets, and inventory thresholds. The system will automatically notify the owner when production milestones are reached, or when inventory needs replenishment. | ERPNext sends notifications but lacks customization for alerts specific to the rice milling process, such as production delays or inventory shortages. |

## Summary

In this chapter, we discussed the core features of ERPNext and the typical challenges encountered during ERP customizations. The gap analysis table highlighted specific areas where modifications were necessary to align ERPNext with the client’s needs, while the activity diagrams offered a clear visual representation of the planned business workflows.

This analysis forms the basis for identifying and justifying the required customizations, providing a roadmap for the design and implementation stages to successfully achieve the client’s goals.

**Chapter 3:**

**Requirements Analysis**

**3.1 Introduction**

The successful implementation of an ERP system tailored for a rice mill depends on a thorough understanding of the mill's specific business processes, operational requirements, and strategic objectives. This section provides a foundation for the requirements gathering and analysis phase, setting the stage for designing a customized ERPNext solution that integrates effectively with the workflows and goals of the rice mill.

**3.2Problem Scenarios:**

|  |  |
| --- | --- |
| **The problem of** | Difficult to keep track of stock, leading to inaccurate inventory  and delays in production. |
| **Affect** | Owner, Employee |
| **Result of which** | * Spend extra time manually checking stock levels. * Loss in business. * Inefficient decision making. |
| **Benefits of** | * Easier stock management. * Improved business process. * improved decision making. |

|  |  |
| --- | --- |
| **The problem of** | It's hard to keep track of financial records, making it tough to  manage cash flow and profits. |
| **Affect** | Owner |
| **Result of which** | * Mistakes in finances. * Bad decisions due to missing or unclear financial information. |
| **Benefits of** | * Easier to understand financial . * Better decisions with clear financial data. |

|  |  |
| --- | --- |
| **The problem of** | Production planing is unorganized. |
| **Affect** | Owner, Employee |
| **Result of which** | * Hard to meet production goals. * Delays in completing orders. |
| **Benefits of** | * Better production schedules. * Faster order processing. |

The successful implementation of an ERP system tailored for a rice mill relies on a deep understanding of the mill's unique operational processes, business requirements, and strategic goals. This section serves as the foundation for the requirements gathering and analysis phase, providing the basis for designing a customized ERPNext solution that fits seamlessly with the rice mill's workflows and objectives.

**3.3 Requirements:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Order Management** | Sales Order Processing | Sales orders are processed automatically in ERPNext with customer access to order status and updates. | The **owner** will log into the system, click on the sales orders, and review each order. Upon clicking, the system will show the details. The owner can approve or update orders, which will then be processed automatically. | The standard system allows customer access to order status, which is not required in your case. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Production Planning** | Milling Process & Production | ERPNext supports production planning and tracks manufacturing orders. It calculates required materials based on BOM (Bill of Materials) and production schedules automatically. | The **owner** will click on the production plans and approve them. The system will display the current status, available stock, required materials, and production progress. Once approved, the system will automatically schedule and track the milling process. | ERPNext automatically generates production orders and schedules, which need to be customized for your rice mill's manual intervention. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Inventory Management** | Stock Management & Byproducts | ERPNext automatically updates stock levels based on incoming goods, sales orders, and manufacturing outputs. It also tracks byproducts in the inventory module. | The **owner** will click on inventory records, update stock levels, and manage byproducts. The system will track inventory in real-time, showing material availability, and automatically update stock levels after production and sales. | The standard ERPNext system is fully automated but lacks customization for rice mill byproducts and specific stock management needs. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Financial Management** | Cost & Financial Tracking | ERPNext has a complete financial tracking system that automates cost and financial calculations for inventory, sales, and expenses. | The **owner** will click on the financial reports to review costs, profits, and margins. The system will automatically track expenses related to production, sales, and byproducts. It will also generate financial statements such as P&L reports and balance sheets. | ERPNext offers financial automation but needs customization for the unique financial aspects of rice milling (e.g., specific costs like raw material wastage, milling costs, and byproducts). |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **HRM/Employee Management** | Staff Management & Payroll | ERPNext manages HR tasks, including staff records, attendance, payroll, and employee performance reviews. | The **owner** will click on employee records to review attendance, approve or adjust payroll, and manage staff performance. The system will calculate payroll based on attendance and hours worked and automatically process payments. | ERPNext automates payroll and attendance but needs customization to meet the specific labor force and hourly wage structure of the rice mill. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Notifications** | Alerts for Production & Sales | ERPNext sends basic alerts for sales orders, production orders, and inventory updates. | The **owner** will set up alerts for production delays, sales targets, and inventory thresholds. The system will automatically notify the owner when production milestones are reached, or when inventory needs replenishment. | ERPNext sends notifications but lacks customization for alerts specific to the rice milling process, such as production delays or inventory shortages. |

****3.3.1 Purchasing Module****

1. ****Customer Creation Process:****

****Customizations:****

* **Set up customer groups specific to mill buyers (e.g., wholesalers, retailers) and configure item categories to show only relevant rice products for each customer group.**
* **Add conditional logic to the Customer Doctype to display fields like credit limit and payment terms based on the customer type.**

1. ****Raw Material Purchase Process:****

****Configuration Changes:****

* **Create a unique naming series for purchase orders to differentiate between different supplier categories (e.g., raw material suppliers or equipment suppliers).**

****Customizations:****

* **Add a "Rice Type" filter in the purchase order form to limit raw material selection to relevant items such as paddy or packaging materials.**

1. ****Raw Material Availability Check:****

****Customizations:****

* **Add a "Check Stock Availability" button to verify if required materials like paddy or packaging items are available in warehouses, displaying details such as required quantity, actual stock, and availability status.**

****3.3.2 Selling Module****

1. ****Order Management Process:****

****Configuration Changes:****

* **Configure item templates for different rice variants (e.g., basmati, non-basmati) and packaging sizes (e.g., 25kg, 50kg).**

****Customizations:****

* **Restrict item selection in sales orders to only rice and packaging variants relevant to the customer's order.**

1. ****Profit Margin Calculation in Sales Order:****

****Customizations:****

* **Add a profit margin field where users can set the desired profit percentage. Automatically calculate the selling price based on the input margin and cost price.**

1. ****Customer Invoice and Payment Tracking:****

****Customizations:****

**Include a feature to auto-generate invoices based on sales orders and track payment status (e.g., paid, partially paid, unpaid).**

****3.3.3 Production Planning Module****

1. ****Rice Milling Process Management:****

****Customizations:****

* **Add a button to automatically generate production orders based on incoming sales orders, specifying details like rice type, quantity, and milling schedule.**

1. ****Production Workflow Optimization:****

****Customizations:****

* **Implement a simple production tracking feature with status updates like "Not Started," "In Progress," and "Completed."**

1. ****Material Availability Check for Milling:****

****Customizations:****

* **Add a button in the production order form to check the availability of paddy stock and packaging materials in the assigned warehouse.**

****3.3.4 Inventory and Stock Management Module****

1. ****Warehouse Management:****

****Customizations:****

* **Set up warehouses for different purposes, such as raw material storage, finished goods storage, and rejected stock storage, ensuring clear separation.**

****Stock Monitoring:****

****Configuration Changes:****

* **Enable stock alerts for critical items like paddy, rice bags, or packaging materials, notifying the user when stock falls below a minimum threshold.**

1. ****Stock Ledger Automation:****

****Customizations:****

* **Automate ledger entries for stock movements, such as paddy milling, rice bagging, or sales dispatch, to minimize manual errors.**

****3.3.5 Reporting and Analytics Module****

1. ****Sales and Production Reports:****

****Customizations:****

* **Generate detailed reports on sales performance and production efficiency (e.g., milling output, wastage analysis).**

1. ****Inventory Analysis:****

****Customizations:****

* **Create inventory reports that highlight stock levels, turnover rates, and storage durations for rice and packaging materials.**

****3.4 Non-Functional Requirements:****

**The system should be flexible to accommodate future customizations as per the mill's evolving operational needs.**

**3.5 Testing**

**3.5.1 Client Review**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Order Management** | Sales Order Processing | Sales orders are processed automatically in ERPNext with customer access to order status and updates. | The **owner** will log into the system, click on the sales orders, and review each order. Upon clicking, the system will show the details. The owner can approve or update orders, which will then be processed automatically. | pass |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Production Planning** | Milling Process & Production | ERPNext supports production planning and tracks manufacturing orders. It calculates required materials based on BOM (Bill of Materials) and production schedules automatically. | The **owner** will click on the production plans and approve them. The system will display the current status, available stock, required materials, and production progress. Once approved, the system will automatically schedule and track the milling process. | **pass** |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Inventory Management** | Stock Management & Byproducts | ERPNext automatically updates stock levels based on incoming goods, sales orders, and manufacturing outputs. It also tracks byproducts in the inventory module. | The **owner** will click on inventory records, update stock levels, and manage byproducts. The system will track inventory in real-time, showing material availability, and automatically update stock levels after production and sales. | **pass** |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Financial Management** | Cost & Financial Tracking | ERPNext has a complete financial tracking system that automates cost and financial calculations for inventory, sales, and expenses. | The **owner** will click on the financial reports to review costs, profits, and margins. The system will automatically track expenses related to production, sales, and byproducts. It will also generate financial statements such as P&L reports and balance sheets. | pass. |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **HRM/Employee Management** | Staff Management & Payroll | ERPNext manages HR tasks, including staff records, attendance, payroll, and employee performance reviews. | The **owner** will click on employee records to review attendance, approve or adjust payroll, and manage staff performance. The system will calculate payroll based on attendance and hours worked and automatically process payments. | **pass** |
| **Module** | **Process** | **System As-Is (Standard ERPNext Process)** | **System To-Be (Customized Process)** | **Gap Identified** |
| **Notifications** | Alerts for Production & Sales | ERPNext sends basic alerts for sales orders, production orders, and inventory updates. | The **owner** will set up alerts for production delays, sales targets, and inventory thresholds. The system will automatically notify the owner when production milestones are reached, or when inventory needs replenishment. | pass |

**3.5.2 Summary of Client Approval**  
The rice mill owner participated in multiple review sessions where the gap analysis table was presented. Each identified gap related to mill operations was discussed thoroughly, and the owner provided feedback. After addressing all the necessary changes, the owner verified and approved each of the proposed recommendations.

**Owner Review:**

* The owner reviewed each customization listed in the gap analysis specific to the rice mill's workflows, such as purchasing, inventory management, and production planning.
* In each session, the owner confirmed verbally that they approved the recommended changes.
* For each gap in the analysis, the owner marked it as "Passed," indicating their approval of the proposed solution.

**Final Confirmation:**

* The owner gave verbal confirmation that the proposed recommendations were acceptable and aligned with the mill's operational needs. This verbal approval was documented in meeting notes and project status updates. Although no formal email or document was provided, the owner verbally confirmed their acceptance in each review meeting.

**Action Taken:**

* Following the final approval, the team proceeded with implementing the recommended customizations and designing the system to meet the rice mill's specific requirements, ensuring all processes were aligned with the owner's expectations.