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For

Design, Development, Implementation of an Enterprise Resource Planning (ERP) for Essential Drugs Company Limited

Prepared By

Essential Drugs Company Limited (EDCL)

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Lutful Mujeeb



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1. Background

Essential Drugs Company Limited (EDCL) a 100% state-owned pharmaceutical enterprise under the Ministry of Health and Family Welfare, has been entrusted with the critical responsibility of ensuring uninterrupted supply of essential medicines to government hospitals and public health programs across Bangladesh.

Over the years, EDCL has expanded its operations with multiple manufacturing units, distribution centers, warehouses and an extensive nationwide supply chain. While the company plays a pivotal role in safeguarding public health, its business processes have traditionally relied on semi-automated or manual systems. This has created challenges such as:

- Fragmented information flow between manufacturing plants, warehouses, and the central office.
- Limited real-time visibility on production, inventory, and distribution activities.
- Complex manual procedures in procurement, finance, and compliance.
- Duplication of data entry and lack of centralized reporting.
- Difficulty in tracking costs, performance, and timely decision-making.

To address these challenges, the Government of Bangladesh and EDCL have prioritized the adoption of an **integrated Enterprise Resource Planning (ERP) system**. The ERP solution will enable EDCL to:

- Digitize and unify all critical business functions into a single platform.
- Enhance transparency, accountability and compliance with national and international standards (PPR, DGDA, WHO-GMP, etc.).
- Ensure efficient planning, procurement, manufacturing and distribution of medicines.
- Strengthen internal control, monitoring and audit readiness.
- Provide real-time data and analytics to support policy decisions and improve organizational performance.

This ERP initiative is therefore not merely a technology upgrade but a **strategic transformation project** aimed at modernizing EDCL's operations, increasing efficiency and enabling the organization to better serve the healthcare needs of Bangladesh.

Essential Drugs Company Limited is going to introduce delivery of following modules and phases:

Sl. No.	Phase	Module Name
1.	Phase-1	<ol style="list-style-type: none"> 1. Finance and Accounting Management System 2. Human Resource & Payroll Management System 3. Procurement Management System 4. Inventory and Warehouse Management System
2.	Phase-2	<ol style="list-style-type: none"> 1. Planning Management System 2. Sales and Distribution Management System 3. Quality Control and Manufacturing Management System 4. Asset Management System

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3.	Phase-3	1. Project Management System 2. Medical Health Management System 3. Engineering Maintenance Management System 4. Reporting and Analytics
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Please note that phase wise module list will be finalized during the software requirement collection and analysis phase.

2. Proposed Enterprise Resource Planning (ERP)

2.1. Objectives

The overall objectives of this proposed Enterprise Resource Planning (ERP) System are mentioned below

1. All modules of the proposed system will be digitized in a uniformed standard and incorporated in a centralized platform.
2. The internal employee will access every module through a single one stop virtual access point in different platforms like Mobile apps or web. There will be no hassle to search different addresses and multiple apps for Essential Drugs Company Limited.
3. All concerned employees will get access into the same platform and will use the customized application as per their authorization and authentication.
4. The technologies and UI will be similar, consistent and maintain same standard for all the applications and modules under the scope the same integrated ERP system.
5. Operational & technical management and maintenance will be managed centrally which will be easier, less complex.
6. Huge effort & cost will be saved while digitizing modules for Essential Drugs Company Limited.
7. Integration with the external and internal systems will be conducted only once which is easier and will save time and effort as well.

2.2. Scope

The vendor will be required to complete the development and deployment of an Enterprise Resource Planning (ERP) System for Essential Drugs Company Limited as an application following the SDLC (Software Development Life Cycle) methodology and perform the relevant activities accordingly within a proposed stipulated time.

This ERP system's implementation project can be divided into 4 major steps which are described hereunder.

2.2.1. Requirement Analysis & Design

This is the starting phase, in this phase project plan, requirement fixation & high-level design will be completed for the entire project. The entire functional scope that will be finalized in the "System Requirement Analysis & Design" phase may be divided into separate independent multiple parts. Each part may contain a number of sub modules and features based on the implementation priority, dependency, and integration complexity.

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This entire system must be designed and developed following micro service architecture so that inter dependencies and integration functions among the sub modules and features of different modules of multiple parts will be smooth but very organized

2.2.2. Development & Release:

Each part's modules and features will be developed and released in an iterative methodology with predefined steps passed LLD (Low Level Design), Development, Integration and Testing. After successful completion of this part development as per predefined expected standard and result only this iteration cycle will be completed and will release the developed and tested application as Beta version of this part.

2.2.3. UAT and Deployment:

After releasing the developed and tested application as Beta Version, this will enter in the phase i.e. UAT and Deployment. In this phase, the actual user feedback and review will be taken and finally the application will be accepted by the User Authority after passing certain tests. Then the required training as per predefined training plan will be provided and also after taking necessary measures the deployment will be done successfully to make this application LIVE as per the plan that will be prepared in the Project Management plan at the inception phase.

2.2.4. Operation and Maintenance Support Service

After final deployment and going live with the acceptance of implementing organization, the maintenance support service will be started. Apart from this, this system's scope is described hereunder from the high-level perspective of the major user groups.

3. Requirements of this Assignment

3.1. Functions and Features of ERP

The following Modules of Software Development with Customization:

Modules to be Developed and implemented

- 1) Finance and Accounting Management System
- 2) Human Resource & Payroll Management System
- 3) Procurement Management System
- 4) Planning Management System
- 5) Inventory and Warehouse Management System
- 6) Sales and Distribution Management System
- 7) Quality Control and Manufacturing Management System
- 8) Project Management System
- 9) Asset Management System
- 10) Medical Health Management System
- 11) Engineering Maintenance Management System
- 12) Reporting and Analytics

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1. Finance and Accounting Management System

The Finance and Accounting Management System (FAMS) is the backbone of EDCL's ERP solution, designed to ensure financial integrity, compliance, and transparency across all operations. As EDCL operates under strict government and regulatory frameworks, this module provides robust tools for budgeting, accounting, auditing, and reporting, while seamlessly integrating with other ERP modules such as procurement, inventory, payroll, and sales.

Core Functionalities:

1. Budget Management

Master Budget Preparation Requisition System

Purpose:

Provides a structured and transparent process for departments to formally submit their budget requirements, ensuring alignment with organizational goals and financial constraints.

Key Functionalities:

1. Department Budget Requisition Portal

- Each department (Production, QC, QA, HR, Sales, Engineering, R&D, Admin) submits its annual or periodic budget request.
- Forms available for:
 - Sales Budget Requisition
 - Production & Material Requirement Budget
 - Manpower Budget Requisition
 - Maintenance Budget Requisition
 - R&D Project Budget Requisition
 - CAPEX Requisition

2. Standard Templates Integrated with ERP

- Predefined templates for uniformity
- Auto-fetch historical data, last year's budget, and current consumption rates
- Dynamic driver-based fields (e.g., output volume, batch size, yield, consumption ratios)

3. Supporting Document Attachment Module

- Departments can attach:
 - Justifications
 - Vendor quotations
 - Compliance requirements (GMP/FDA)
 - Cost-benefit analysis

4. Automatic Consolidation Engine

- ERP aggregates all requisitions into:
 - Sales Budget Summary
 - Production & Cost Budget
 - Operating Expense Budget
 - CAPEX Budget
 - Cash Budget
 - Budgeted Financial Statements

B. Revised Budget System (Mid-Year, Quarterly, or Ad-Hoc)

Purpose:

Allows modifications to the approved budget due to operational changes, regulatory

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impacts, market fluctuations, or new strategic decisions.

Key Functionalities:

1. Revised Budget Request Form (RBRF)

- Used by any department needing additional budget allocation or reallocation
- Mandatory fields:
 - Reason for revision
 - Impact assessment
 - Updated quantity/cost/volume
 - Revised timeline
 - Supporting documents

2. Budget Version Control

- Each revision creates a new version:
 - Version 1: Approved Budget
 - Version 2: Revised Budget Q1
 - Version 3: Revised Budget Q3
- Full audit trail of changes
- Ability to compare any two versions side by side

3. Scenario Simulations (“What-If”)

- Assess the financial impact before approval
- Examples:
 - Raw material price increase by 10%
 - Sales demand increase by 20%
 - New regulatory compliance cost added

4. Real-Time Variance Monitoring

- Actual vs Budget vs Revised Budget
- Alerts when spending exceeds revised thresholds

C. Budget Approval System (Multi-Level Workflow)

Purpose:

Ensures financial discipline, transparency, and cross-functional alignment through structured approvals.

Approval Workflow – Standard:

1. Initiator (Department Head)

- Submits budget requisition or revised budget request

2. Functional Review (Finance Department)

- Validates:
 - Justification
 - Cost accuracy
 - Compliance
 - Alignment with corporate financial strategy

3. Compliance / QA / QC Review (if applicable)

- Required for:
 - QC equipment purchases
 - Stability study budgets
 - GMP-related expenses

4. Management Approval (Director / CFO / COO)

- Reviews strategic fit
- Approves or sends back with comments

5. Final Approval (Managing Director / CEO)

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- Approves master budget
 - Approves major CAPEX or high-value revisions
6. ERP Auto-Locking System
- After approval, the budget becomes the “Active Version”
 - Transactions (PO, PR, MR, OPEX) follow this budget

D. Budget Enforcement & Integration Controls

1. Budget Control at Transaction Level

- Purchase Requisition (PR)
- Purchase Order (PO)
- Work Orders
- Expense Claims
- Material Requisition (MR)

System warns or blocks if budget exceeds thresholds depending on authorization rules.

2. Auto-Alerts & Notifications

- 80% budget consumption
- Overspending alerts
- Pending approvals
- Revised budget requirement alerts

3. Impact on Financial Statements

Approved or revised budgets automatically update:

- Budgeted P&L
- Budgeted Balance Sheet
- Cash Flow Forecast

E. Reporting & Dashboards

Core Reports:

- Budget Requisition Summary Report
- Revised Budget Comparison Report
- Budget Approval Status Report
- Budget vs Actual vs Revised Dashboard
- CAPEX Budget Utilization Report
- OPEX Consumption Trend Analysis
- Batch Cost Impact Due to Revision

Revised Budgeting:

- Budget Revision Frequency Index
- Budget Accuracy Ratio
- VAR% (Variance %) for each version
- CAPEX Rollover Ratio
- Approval Lead Time

Linkage with others

Financial & Accounting (GL / AP / AR)

Purpose: Central hub for all financial transactions and budget monitoring.

Key Features:

- Budget-linked chart of accounts
- Automated journal entries
- Period-end closing
- Multi-level approval workflow
- Consolidated financial statements



Reports:

- Budget vs Actual (P&L, Balance Sheet)
- Monthly financial variance
- Cash flow projections

Product & Batch Costing

Purpose: Determine precise cost per product and per batch.

Key Features:

- Standard, actual, and activity-based costing
- Batch-wise material, labor, overhead allocation
- Real-time cost updates after production
- Waste, scrap, and QC-rejection costing

Reports:

- Batch Cost Analysis
- Cost Overrun & Variance Report

Budgeting & Forecasting

Purpose: Prepare, revise, and compare annual/rolling budgets.

Key Features:

- Multi-dimensional budgets (Manufacturing, Sales, OPEX, CAPEX)
- Scenario planning ("What-If" modelling)
- Driver-based budgeting
- Rolling forecasts (12–24 months)

Reports:

- Budget Variance Analysis (Monthly/YTD)
- Scenario Comparison Dashboard

Quality Control, Quality Assurance & Compliance

Purpose: Manage QC costs and regulatory expenses.

Key Features:

- QC test cost allocation
- Stability study budgeting
- GMP/FDA/WHO compliance cost tracking

Reports:

- QC Cost per Batch
- Rejection & Waste Cost Analysis

2. General Accounting

- Chart of Accounts setup, journal entries, trial balance, and closing Ledger.
- Real-time financial postings across all integrated modules.

3. Accounts Payable (AP)

- Vendor invoices, payment scheduling, debit/credit notes.
- Integration with procurement and inventory for supplier bills.

4. Accounts Receivable (AR)

- Customer billing, collections, credit management.
- Unlimited individual ledger.
- Integration with sales & distribution for invoice auto-generation.

5. Bank Management

- Bank account setup, transactions, LC management, bank book.

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6. Cash Management

- Petty cash handling, cash book maintenance.
- Daily cash inflow/outflow tracking with approval workflow.
- Daily cash transaction at a glance summary.

7. Accounts Integration

- Seamless data flow from procurement, sales, inventory, HR and project modules.
- Auto-posting of financial impacts across the ERP system.

8. Fund Management

- Tracking of fund allocations, releases, and utilizations across projects, departments, or donors.
- Ensuring proper linkage between budgeted funds and actual expenditures.

9. Financial Reporting and Audit Trail

- Standard reports: trial balance, income statement, balance sheet, cash flow, etc.
- Departmental and project-level financial reports.
- Configurable dashboards for real-time financial KPIs.
- Full audit trails for all financial transactions (who did what, when, and from where).
- Periodic and year-end financial closing process automation.

10. Costing

- Direct Costs: Raw materials (APIs, excipients) and direct labor, packing material.
- Indirect Costs: Manufacturing overhead (utilities, rent) and administrative costs, selling overhead.
- R&D Costs: Investment in drug development and clinical trials.
- Regulatory Costs: Compliance with FDA, GMP, and other regulations.
- Costing Methods: Job order, process costing, and activity-based costing.
- Fixed and Variable Costs: Costs that remain constant vs. those that change with production.
- Cost Allocation: Assigning indirect costs based on cost drivers.
- Break-Even Analysis: Determines the minimum sales volume to cover costs.
- Distribution Costs: Costs for warehousing and regulatory compliance in distribution.
- Inventory Valuation: Accurate tracking of raw materials, work-in-progress, and finished goods.
- Cost sheet – summery (with all O.H) – markup – tax – Net profit.
- Inventory Management
- Reconciliation, variance analysis report
- Calculation of loaded cost.
- Insurance premium calculation
- Short excess report of inventory (value & quantity).
- Consignment costing – assessment of certain duty.

11. Bill Processing:

purpose: to automate and control bill verification, approval, accounting and payment processing.

A. Manual Bill Reports:

- Bill submission register

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- Pending bills report.
- Bill payment report.
- Party ledger report.
- Work order ledger report.
- TA/DA Bill register.
- TA/DA Statement.
- Cash Bill submission register.
- Vehicle expenditure statement.
- Canteen statement.

B. Workflow:

- Supplier completes work as per work order
- Upload bill documents.
- Attach supporting documents.
- Service-level agreement complies report.
- Report generated for review and audit.
- Audit trail report.
- Head-wise Expenditure report.
- Retention and advance adjustment.
- Vendor-wise payment history.
- VDS/TDS deduction report.
- Bill aging report.

C. Output:

- Approved/reject bill list.
- Payment register.
- General ledger posting summary.
- Vendor statement.

Expected Benefits:

- Multilayer Chart of Accounts Supported with Cost Center.
- Fully Integrated, Secured & Scalable System.
- Easy to Prepare Financial Statement.
- Help Management to Take Proper Managerial Decision.
- Financial Budget & Cost Controlling.
- Cheque Print & Cheque Register.
- Fund Management & Distribution.
- Payment Integrated with Supplier Management.

Note: Above mentioned requirements of this module is required but not limited to.

2. Human Resource & Payroll Management System

The HR & Payroll Management System is designed to modernize and automate EDCL's

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human resource functions, ensuring accurate employee records, transparent payroll processing and effective workforce management. The module integrates seamlessly with Finance, Transport, Planning and Medical Health systems offering a holistic view of EDCL's human capital and workforce costs.

Core Functionalities:

1. Personal Information Management System (PIMS)

- Digital employee profile (personal information, education, experience).
- Service records, posting history, medical info, family details.
- Centralized personnel database linked to payroll.
- Report generation with employees different sorts of information.

2. Attendance Management

- Regular Attendance.
- Shifting & Overtime duty calculation.
- Integration with biometric devices, RFID or mobile-based attendance systems.
- Real-time tracking of in-time, out-time, overtime, shift scheduling, late calculation.
- Gate Pass, Short Leave Maintenance.
- Linked with disciplinary management (absenteeism and late)

3. Payroll Management

a. Salary Structure Setup by Grade/Designation

- Define multiple salary structures based on job grade, designation, or employment type.
- Department-wise labor cost allocation
- Overtime and shift-cost analysis
- Configuration of fixed and variable components including:
 - Basic salary
 - House rent allowance
 - Medical allowance
 - Conveyance
 - Festival bonus
 - Special/incentive allowances
 - Shifting allowance
 - Refreshment allowance
 - Overtime
- Automatic assignment of salary structures during employee onboarding or promotion.
- Support for periodic salary revision and arrear calculation (attendance linked).

b. Overtime, Deductions, Advances, and Loans

- Capture overtime hours from attendance module or manual input, and calculate based on pre-defined rates.
- Deductions for:
 - Absences
 - Tax

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- Provident fund (PF)
 - Welfare contributions
 - Loan installments
 - Advance salary
 - Lunch bill
 - Loan and advance management:
 - Loan request and approval workflow
 - Interest calculation (if applicable)
 - EMI generation and tracking
 - Adjustment during resignation or final settlement
- c. Income Tax Computation and Submission**
- Automatic income tax calculation based on latest government tax slabs and exemptions.
 - Monthly and annual tax deduction at source (TDS).
 - Consideration of employee-declared investments and deductions under relevant tax laws.
 - Generation of statutory reports (e.g., Form 16) and digital certificates.
 - Support for online submission of tax returns or export to designated tax authority formats.
- d. Provident Fund and Gratuity Fund, WPPF & Welfare Fund**
- Calculation and tracking of employer and employee contributions to Provident Fund and reports.
 - Gratuity computation rules based on service length, last-drawn salary, and other criteria.
 - Integration with HRM for service records, retirement, and separation tracking.
 - Generation of statements and ledgers for each employee.
 - Interface for statutory submissions to government bodies or PF trusts.
 - Individual ledger and double entry and financial reporting.
- e. Bank Advice Generation and Integration with Finance**
- Automatic generation of bank transfer advice for salary disbursement (in Excel, XML, or bank-specific formats).
 - Generate files for manual upload.
 - Separate disbursement for salary, PF, loan, tax, bonus, etc., as per bank requirements.
 - Real-time or batch-wise integration with financial accounting module to reflect payroll liabilities and disbursements.
 - Posting of payroll expenses and journal vouchers into the general ledger.
- f. Pay-slip Generation, Reports, and Compliance**
- Secure, role-based employee access to digital pay slips, downloadable and printable.
 - Pay slip shows full salary breakdown, deductions, and net salary with email facility.
 - Generation of payroll reports for:
 - Salary register

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- Department-wise payroll summary
- Payroll head-wise reports (e.g., bonus analysis)
- Pay audit trails and approval logs
- Statutory reports for tax, PF, and other compliance.
- Audit log for every payroll processing run with rollback and correction features.
- Final settlement process for separated employees with leave encashment, pending dues, etc.

4. NOC Management

- Automated generation of No Objection Certificates.
- Approval workflow with tracking.
- Compliance with official rules.

5. Transfer Management

- Employee posting and transfer order generation.
- Integration with PIMS for updated service records.
- Linked with payroll.

6. Promotion Management

- Tracks eligibility
- Efficient promotion process aligned with service rules
- Linked with disciplinary management.

7. Disciplinary Management

- Record of disciplinary actions, show cause and others.
- Approval workflow for case processing.
- Process aligned with service rules and labour law.
- Integration with attendance & leave and performance management.

8. Leave Management

- Online leave application & approval.
- Auto leave balance calculation.
- Late calculation.
- Different leave categories (CL,SL, LWP, EL, etc.).
- Configurable leave types (casual, sick, earned, maternity, etc.) with accrual rules.
- Automated leave request, approval, balance checking, and encashment process.
- Leave calendar and substitution workflow during long leave.
- Alerts for late arrivals, absences, or irregular attendance trends.
- Generate leave status after transfer, resign, retirement.
- Integration with attendance & payroll.

9. Loan Management

- Personal loan and other loan processing.
- EMI deduction from payroll.
- Loan balance tracking.

10. Final Settlement Management

- Auto-calculation of payment.
- Clearance process integration with Accounts.

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11. Recruitment and Onboarding

- Offer letter issuance, document verification, and joining formalities.
- Creation of employee records and onboarding checklist management

12. Organizational Structure & Position Management

- Definition of EDCL's organizational hierarchy (company → directorate → department → section → unit).
- Management of job positions, reporting lines, roles, and responsibilities.
- Vacancy management and workflow for new position creation and reclassification.
- Role-based access control derived from organizational hierarchy

13. Performance Appraisal and Training

- Annual and periodic performance appraisal workflow with self-appraisal, supervisor assessment, and rating.
- Customizable KPI-based evaluation system tied to job responsibilities.
- Identification of training needs, training calendar, attendance tracking, and post-training feedback.
- Tracking of internal and external trainings, certifications, and skill development programs.

14. Document & Service Record

Digital repository for:

- Appointment letters, Permanent letter, promotion letters, contracts
- Academic and professional certificates
- ID cards, medical certificates, NOC, etc.
- Employee service book maintenance with all key milestones and events.
- Role-based access to documents with secure storage, versioning, and audit trails.

15. Vehicle Management Module/ Transport pool

This module will be integrated within the ERP system to automate and monitor all vehicle-related operations across EDCL. The goal is to improve transparency, reduce operational cost, ensure safety, and optimize resource utilization.

a. Vehicle Inventory Management

- Registration and master data entry of all company-owned or leased vehicles
- Categorization by type (car, truck, motorcycle, etc.) department, location

b. Fuel Management

- Fuel consumption tracking per vehicle
- Fuel requisition, approval, and refueling records
- Fuel efficiency monitoring and reporting

c. Maintenance & Repair Tracking

- Preventive maintenance schedules and alerts
- Repair work orders, service history logs
- Spare parts usage and inventory link

d. Document & Compliance Tracking

- Fitness, insurance, tax token, and registration expiry alerts
- Emission test logs and regulatory compliance records

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e. Accident & Incident Logging

- Incident reporting system linked to vehicle and driver
- Investigation workflow and cost estimation

f. Linkup with GPS / IoT Devices

- Live tracking, route deviation alerts, usage optimization (Link with GPS Tracking System)

Expected Benefits:

- Manpower Planning integrated with HRM & Forwarding Information.
- Digital Attendance.
- Digital Employee Profile with Image, Signature etc.
- Easy Way to Maintain Manpower According to Budget.
- Digital Employee Profile with Detail.
- Define Leave Categories, Types, Leave Policy & Behavior
- Bonus Policy and Others Types of Bill Policy.
- Accounting systems are integrated with inventory management and store depo systems.
- Integrated link with others plant & EDCL and real time update.
- Unlimited financial year data backup and display.

Note: Above mentioned requirements of this module is required but not limited to.

3. Procurement Management System


The Procurement Management System streamlines and automates EDCL's purchasing activities, ensuring transparency, compliance with Government Procurement Rules (PPR 2008) and cost efficiency. It enables end-to-end procurement from requisition to vendor payment.

Core Functionalities:

- **Purchase Requisition & Approval**
 - Departmental purchase requisition creation.
 - Workflow-based online approval (multi-level authority).
 - Budget check before approval.
 - Integration with inventory (check stock before requesting).
- **Comparative Statement (CS)**
 - Automated quotation collection from vendors.
 - System-generated comparative analysis based on price, quality, lead time.
 - Workflow approval for CS selection.
 - Financial offer.
 - Facility to create Purchase Orders (POs) from CS
- **Purchase Order (PO) Issuance and Tracking**
 - PO will be generated as per EDCL Format)
 - Multi-level PO approval workflows with digital authorization.
 - Real-time tracking of PO status, including delivery schedules, partial deliveries, and amendments.



- Notifications/reminders for delayed or overdue deliveries.
- Supplier database with ratings/history.
- GRN (Goods Receipt Note) generation and stock update.
- Integrated with Accounts Payable for vendor payments.
- Tender schedule with specification
- Tender opening sheet
- Financial minutes with signing committee etc.
- **Tender & Contract Information**
 - Upload & published tender documents
 - Committee Formation.
 - Past Contract Record.
 - Digital Repository of Contracts.
- **L/C (Letter of Credit) Management**
 - L/C request, approval, and bank communication.
 - Tracking of shipping documents, customs clearance, and insurance.
 - Integration with finance for payment scheduling.
 - Status monitoring of imports (open, shipped, received).
- **Supplier/Vendor Master Data Management**
 - Centralized vendor master database including:
 - Basic company information
 - GST, VAT, BIN, trade license, bank account details
 - Contractual terms and payment preferences
 - Document repository (certificates, MoUs, blacklisting records)
 - Categorization of suppliers by goods/services offered.
 - Integration with procurement, finance, and vendor evaluation processes.
 - Duplicate vendor prevention and audit history.
- **Goods Received Note (GRN) and Quality Inspection**
 - Automatic or manual generation of Goods Received Notes (GRNs) against POs.
 - Support for partial, full, and over-receipt logging.
 - Integration with inventory for stock updates upon GRN confirmation.
 - Trigger quality inspection workflows based on material category or supplier.
 - Rejection handling, rework request, and debit note processing.
 - Photos/documents upload for proof of delivery and quality records.
- **Supplier Evaluation and Performance Tracking**
 - Define and configure supplier evaluation metrics such as:
 - On-time delivery rate
 - Product quality score
 - Pricing competitiveness
 - Responsiveness
 - Compliance with contract terms
 - Periodic or transaction-based evaluation scoring system.
 - Generation of supplier performance reports for decision-making in future procurement.
 - Flagging of underperforming or blacklisted vendors with system restrictions

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Expected Benefits:

- Historic Data and Price Comparison of Items Procured.
- Multilayer Approval System of Purchase Requisition and Purchase Order.
- Auto Voucher from Supplier Bill & Supplier Invoice.
- Integration with Account.

Note: Above mentioned requirements of this module is required but not limited to.

4. Planning Management System

The Planning Management System serves as the central intelligence hub of EDCL ERP. It helps EDCL forecast demand, optimize raw material procurement, schedule production, and align warehouse and distribution plans with market and government needs.

Core Functionalities

1. Demand Forecasting

- Forecasting using historical consumption and seasonal trends.
- Integration with Sales & Distribution module for real-time demand inputs.
- Adjustments for emergencies (disasters, government directives).

2. Production Planning & Scheduling

- Long-term production plans aligned with annual targets.
- Monthly, weekly, and daily schedules based on demand and resource availability.
- Machine capacity and labor availability checks.
- Batch production planning for drugs, considering shelf life and regulatory requirements.

3. Material Requirements Planning (MRP)

- Automatic calculation of raw material requirements from production plans.
- Alerts for shortages or surplus stock.
- Integration with Procurement Management to trigger purchase requisitions.
- Optimization of supplier lead times.

4. Sales & Distribution Alignment

- Link sales orders and government distribution requirements to production.
- Prioritization of essential drugs and emergency stock reserves.
- Tracking planned vs actual distribution.

5. Budget & Financial Planning

- Cost estimation for planned production batches.
- Integration with Finance Module for budget validation.

6. Capacity Planning for Production and Procurement

- **Production Capacity Planning:**
 - Define and track available machine hours, labor shifts, and production line capabilities.
 - Match forecasted production with capacity availability to avoid over commitment or underutilization.



- **Procurement Capacity Planning:**
 - Ensure supplier lead time and procurement cycles align with planned needs.
 - Account for supplier reliability, transportation constraints, and seasonal factors.
- Real-time dashboards showing production vs. capacity load.

7. Reorder Level Configuration and Alerts

- Setup of **minimum, maximum, and reorder stock levels** by item and warehouse location.
- Alerts and system triggers when stock reaches reorder levels.
- Auto-generation of PRs (purchase requisitions) or production orders when thresholds are breached.
- Provide reports on historical data, lead times, and usage trends for Reorder level adjustment.
- User-configurable **buffer stock strategies** per item classification (ABC analysis, fast/slow-moving, critical).

Expected Benefits:

- Minimized shortages and stockouts of essential medicines.
- Improved on-time drug availability for hospitals and distribution channels.
- Reduced overproduction, wastage, and expiry losses.
- Cost optimization through better forecasting and supplier coordination.
- Enhanced responsiveness to emergencies and health program needs.

Note: Above mentioned requirements of this module is required but not limited to.

5. Inventory and Warehouse Management System

The Inventory and Warehouse Management System is a core operational module of EDCL ERP, designed to manage raw materials, packaging items, work-in-progress (WIP), and finished drugs across multiple warehouses and factory locations. It ensures real-time stock visibility, regulatory compliance, batch traceability, and cost-efficient warehousing operations to guarantee uninterrupted drug supply to hospitals, healthcare centers, and government programs.

Core Functionalities:

1. Inventory Requisition

- Departments can raise requests for raw materials, spare parts, or finished goods.
- Workflow-based approval (multi-layer authorization).
- Auto-checks availability in stock before processing purchase requisitions.

2. Inventory Control

- Unique batch-ID generation on GRN or manufacturing order, including Mfg. & Exp. dates, potency, and CoA link. Automatic stock update on GRN through Barcode/RFID system.
- Real-time monitoring of stock levels across multiple warehouses/factories.
- Batch-wise and lot-wise tracking.

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- FIFO/FEFO/LIFO/EXPIRE methods supported for issue & consumption.
- Automatic expiry alerts, quarantine of expired stock, and workflow for destruction certificates.
- Serialized items (e.g., high-value instruments) & aggregation hierarchy (case ↔ carton ↔ pack) if serialization is adopted.
- QC hold / quarantine release workflow, potency adjustment for APIs, re-test date management.
- SRM, SR, QC report, Movement order Cardex etc.

3. Inventory Status

- Dashboard view of available stock, reserved stock, and free stock.
- Monitoring of critical drugs/raw materials.
- Integration with Procurement & Planning modules for decision-making.

4. Inventory Tracking

- Barcode/RFID integration for item tracking.
- Location-wise mapping (rack/bin/zone).
- Audit trail for every inward, movement, and outward transaction.

5. Inventory Re-Order Level

- System auto-sets minimum, maximum, and safety stock levels.
- Auto-alerts for re-order when threshold is reached.
- Integration with Procurement to auto-generate requisitions.

6. Indent Management

- Stakeholders and internal users can raise indents for finished goods.
- Multi-level approval workflow (configurable by role/value).
- Real-time inventory check before approval.
- Stock allocation and reservation from warehouse/plant.
- Pick list generation and dispatch tracking.
- Goods receipt & inspection with acceptance/rejection.
- Allow requester/stakeholder or internal planner to schedule a delivery date/time per indent or per shipment.
- Allow authorized users (planner, sponsor, warehouse manager) to reschedule with reasons.
- Automatic notifications (email/SMS/in-app) on schedule, reschedule, confirmations, and SLA breaches.
- Track history (who changed what, old vs new dates, reason, timestamp).
- Stakeholder portal for external requests and status tracking.

7. Gate Pass & Challan

- Automated gate pass for stock movement in/out.
- Digital challan generation for inter-warehouse or customer deliveries.
- Security integration to prevent unauthorized stock movement.

8. Stock Valuation & Aging

- Real-time valuation of inventory (FIFO, LIFO, Weighted Avg).
- Stock aging report (by batch, expiry date).
- Visibility of slow-moving and obsolete items.

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9. Physical Stock Reconciliation

- Cycle Counting: ABC classification rules, system-suggested schedules, blind count sheets, variance reporting, auto-generate adjustment vouchers after approval.
- Full Physical Inventory: Freeze transactions by location, count-sheet print/export, upload counted quantities, variance analysis, and audit sign-off.

10. Integration Touch-Points

- Procurement: GRN posts on receipt; quality status drives AP three-way match (PO ↔ Invoice).
- Manufacturing: Issue raw materials via back-flush or manual pick; return excess; receive WIP/FG.
- Sales & Distribution: Reserve stock for sales orders, generate pick/pack/ship tasks, decrement inventory on dispatch.
- Finance: Automatic stock ledger, inventory valuation, and landed-cost allocation (freight, duty, QC charges).
- Planning (MRP): Real-time stock feeds reorder calculations and available-to-promise (ATP).
- Asset & Maintenance: Spare-parts inventory with link to work orders and BOMs of equipment.

11. Regulatory & Audit Controls

- GMP-compliant audit trail recording every quantity/location/batch change with user, time, reason.
- e-signatures where required (e.g., disposition of rejected goods).
- Recall readiness: One-click batch genealogy report (from supplier lot to all customer's/shipping docs).

Expected Benefits:

- Items Track & Item Control
- Define Item Categories and Item Locations
- Real-Time Access to the Inventory System
- Set Re-Order Levels for Inventory Items
- Automatic Calculation of Average Material Cost (per unit)
- Auto Voucher from the Transaction Posting
- Integrated with Account & Finance
- Barcode Enable Gate Pass or Challan Management.
- Demand & Supply Forecast

Note: Above mentioned requirements of this module is required but not limited to.

6. Sales and Distribution Management System

The Sales and Distribution Management System is the frontline execution module of EDCL ERP. It manages sales orders, pricing, dispatch, invoicing, and distribution logistics while ensuring full compliance with government pricing controls, healthcare program requirements, and regulatory standards.

It ensures timely drug delivery to hospitals, healthcare centers, public distribution points, and government programs such as immunization, epidemic response, and emergency reserves.

Core Functionalities

1. Sales Order Management

- Capture sales orders from hospitals, Community Clinic, DGHS, medical stores, and distribution depots.
- Auto-check against stock availability in Inventory Module.
- Order approval workflow based on customer type (Govt. tender, hospital order, etc.).
- Batch/lot assignment during order confirmation.
- Batch-wise invoicing support (e.g., for different delivery batches in one order)
- Auto-Invoice generation
- Integration with Finance for real-time Accounts Receivable (AR) posting.
- Payment gateway & SMS gateway integration for making smooth payment process in sales channel.

2. Pricing Management

- Government-fixed and controlled pricing mechanism.
- Contract-based pricing for public health programs.
- Automatic Tax, VAT calculation.

3. Distribution & Logistics Management

- Delivery order (DO) creation linked with warehouse stock.
- Bulk distribution to depots/hospitals.
- Delivery scheduling

4. Invoicing & Billing

- Automated invoice generation after delivery confirmation.
- Integration with Finance for receivables posting.
- Multiple payment modes (LC, bank transfer, Pay Order).
- Bill collection
- Credit management with debtor aging reports.

5. Returns & Recall Management

- Return order management for damaged/expired products.
- Recall management for defective/unsafe drug batches.
- Reverse logistics and credit note issuance.

6. Depot Management

- Multi-depot management with stock visibility.
- Sales target tracking for depots.

7. Collections

Payment Mode Management

- Configure valid payment modes (cash, cheque, EFT, internal transfer).
- Reconcile cheque payments
- Capture cheque details: number, date, payer name, status (cleared/bounced).
- Customer hierarchies and grouping (by territory, business type, or parent organization).

8. Sales Returns and Credit Notes

- Controlled return processing workflow:
 - Return reason codes (expiry, damage, over-supply, etc.)



- Quarantine or revaluation of returned goods
- Warehouse gate-in and physical inspection records
- Credit Note issuance:
 - Auto-calculated based on original invoice
 - Adjustment with outstanding invoices or refund workflows
- Linkage to Finance for reversal entries and inventory updates.

9. Dispatch and Distribution Tracking

- Delivery challan (DC) generation with details of batch numbers, expiry dates, and weight/volume
- Assign shipments to routes/vehicles; define carrier details and driver info
- Integration with Inventory for real-time stock-out, and with Logistics for load planning
- Vehicle manifest and trip sheet generation

10. Integration with Inventory & Finance

- Inventory:
 - Real-time stock deduction on delivery confirmation
 - Batch management and expiry verification before dispatch
- Finance:
 - Direct posting of invoices to Accounts Receivable
 - Tracking of overdue payments, aging reports, and DSO (Days Sales Outstanding)
 - Reconciliation of sales returns and credit notes

Expected Benefits:

- End-to-end automation of the sales and distribution process.
- Reduced lead time for drug delivery to hospitals and distribution points.
- Improved regulatory compliance with government pricing and reporting.
- Transparency in public drug distribution, ensuring fair allocation.
- Real-time visibility of sales, receivables, and stock positions.
- Better responsiveness to emergencies through priority allocation and recall support.

Note: Above mentioned requirements of this module is required but not limited to.

7. ^{QA} ~~Quality Control~~ and Manufacturing Management System

Ensuring compliance with quality standards and regulatory inspections including batch testing and audit trials.

Core Functionalities:

1. Product Development

- Product Registration and Plant license status of DGDA
- Stability data record & tracking
- Tracking R & D batches (New product, SVS, Reformulation etc.)
- Cost comparison for Alternate formulation
- Current ~~BMR~~ & BPR Status and Application approval copy

2. Pre-Production / R&D

- Research and development of new formulations.
- Stability studies and pilot batch trials.
- Documentation of lab results and formulation adjustments.

3. Production Planning

- Long-term and short-term production plans.
- Resource alignment with demand forecasts.
- Synchronization with procurement and inventory.

4. Batch Scheduling

- Automated scheduling based on demand and resource availability.
- Shift-wise, daily, weekly, and monthly planning.
- Compliance with machine and labor capacity.

5. Recipe / Formula Management

- Centralized database of drug formulations.
- Version control for changes in formulas.
- Integration with regulatory requirements.

6. Weighing & Dispensing

- Controlled weighing of raw materials.
- Barcode/QR code support for tracking.
- Ensures precision in material dispensing as per batch records.

7. Core Production

- Granulation, mixing, coating, and other core processes.
- Real-time monitoring of production stages.
- In-process quality checks.

8. Batch Manufacturing Record (BMR) Generation

- Automated BMR for each batch.
- Recording of all inputs, processes, and inspections.
- Audit-ready documentation for regulators.
- SVS, PLSS, Sample Test, SOP, Revalidation

9. Packaging

- Primary and secondary packaging control.
- Serialization and labeling management.
- Integration with distribution for batch traceability.
- SVS, PLSS, Sample Test, SOP, Revalidation

10. Quality Control *and compliance*

- IPQA monitoring, batch Document releasing.
- In-process and post-production quality checks.
- Lab testing of raw materials, intermediates, and final products.
- Stability and shelf-life analysis.

11. Raw Material Consumption Tracking

- Issue raw materials to production orders with:
 - FIFO or ~~FIFO~~ ^{LIFO} logic
 - Lot/batch traceability
- Monitor planned vs. actual material consumption



- Identify over-usage, under-usage, and waste
- Reconciliation of leftover materials and returns to inventory
- Integration with Inventory for real-time stock updates
- Material dispensing

12. Production Quality Control & Non-Conformance

- Enforce in-process quality checks (IPQC) and post-production QC
 - Sampling plans, quality parameters, acceptance limits
 - Online logging of test results
- Flag and track non-conformance or deviations
 - Automatic quarantining of defective products or batches
 - Workflow for rework, rejection, or disposal
- Maintain QC certificates and COA (Certificate of Analysis)
- Comply with cGMP and DGDA requirements for documentation and traceability
- Material QC, QC report and QC pass.

13. WIP and Finished Goods Costing

- Calculate cost per batch and per unit by capturing:
 - Raw materials, labor hours, machine time, utilities, overheads
- Track Work-in-Process (WIP) costs at each production stage
- Generate standard vs. actual cost variance reports
- Push finished goods cost to Finance and Inventory modules
- Finish Product testing, Batch document compiling.

14. Real-Time Visibility into Plant Floor Operations

- Dashboard to view:
 - Live status of production lines and machines
 - Batch progress, delays, downtime reasons
- Alert system for:
 - Machine breakdown
 - Raw material shortages
 - Quality failure or deviations

15. Integration Requirements

- Inventory: Material issue, return, and finished goods entry
- Quality Management: In-process and final QC results
- Sales & Distribution: Finished goods readiness for dispatch
- Finance: Batch costing, consumption reports
- Asset Management: Equipment availability, preventive maintenance scheduling

16. Reporting & Analytics

- Batch production reports (planned vs. actual)
- Raw material consumption and wastage analysis
- QC pass/fail statistics
- Downtime and OEE reports
- Cost per batch, cost per unit trends

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17. Validation Activities

- Process validation and verification
- Vendor validation for raw and packing
- CRS, working standard maintaining and stock keeping
- Analytical method validation and validation method verification

18. Environment Monitoring

- ETP water testing
- WFI Testing
- Water treatment plant monitoring

19. QA Workflow

- Instrument performance checking, calibration, validation, record and logbook maintaining
- IQ/OQ/PQ of various instrument and machineries
- Various quality document and SOP preparation.

20. Regulatory Compliance & Audit Trail

- Maintain digital audit trails for all production activities
- Support for Good Manufacturing Practice (GMP) and WHO/ISO standards
- Batch recall support through backward and forward traceability.

Expected Benefits

- End-to-end batch traceability from raw materials to distribution.
- Reduced compliance risks through automation and digital audit trails.
- Improved production efficiency with optimized scheduling.
- Enhanced product safety, consistency, and regulatory acceptance.
- Faster response to regulatory inspections and market demands.

Note: Above mentioned requirements of this module is required but not limited to.

8. Project Management System

The Project Management module will provide an integrated platform to plan, initiate, monitor, and evaluate various internal and external projects undertaken by EDCL. These projects may include construction of new facilities, equipment installation, R&D initiatives, IT infrastructure upgrades, regulatory compliance tasks, or other strategic and operational initiatives. The module should enhance visibility, accountability, resource optimization, and financial control over all project activities.

Core Functionalities

1. Project Budgeting & Cost Control

- Define overall project budgets and allocate costs by:
 - Task/phase
 - Department or unit
 - Resource type (materials, labor, external services)



- Maintain planned vs. actual cost tracking
 - Generate cost deviation alerts and logs
- Support budget revisions with appropriate approvals
- Integrate with Finance and Procurement modules for real-time financial visibility
- 2. Work Breakdown Structure (WBS)**
 - Create hierarchical WBS models for complex projects
 - Define sub-projects, phases, work packages, and individual tasks
 - Assign responsibilities at each level (Project Manager, team leads, contractors)
 - Link WBS items to deliverables, deadlines, and cost codes
- 3. Task Scheduling**
 - Define and manage project tasks with:
 - Start and end dates
 - Duration and dependencies (FS, SS, FF, etc.)
- 4. Resource Allocation and Utilization**
 - Assign internal or external resources to tasks:
 - Human resources (employees, consultants)
 - Physical resources (equipment, lab space, materials)
 - View resource availability, workload, and conflicts
 - Track resource time and effort logging for project costing and HR purposes
 - Integration with HRM and Asset Management modules for seamless allocation
- 5. Project-based Procurement and Inventory**
 - Raise project-specific purchase requisitions and purchase orders
 - Link procurement items directly to project tasks
 - Track goods/services received and consumed against project WBS
 - Maintain inventory utilization records for project-linked stock issues
 - Ensure compliance with EDCL's procurement policy and internal audit guidelines
- 6. Milestone and Deadline Monitoring**
 - Define key project milestones with target completion dates
 - Track milestone achievement and automatically update project status
 - Trigger alerts and escalations for overdue activities or delayed deliverables
 - Maintain baseline timelines and compare with actuals
- 7. Project Progress Monitoring and Reporting**
 - Allow progress updates at task or milestone level:
 - % completion
 - Time spent vs. planned
 - Justification for delays or changes
 - Generate progress dashboards for various stakeholders (e.g., Management, PMO)
 - Include financial summaries such as:
 - Budget consumed
 - Cost-to-completion
 - Earned value management (if needed)
- 8. Risk and Issue Tracking**
 - Log and categorize project risks with mitigation plans
 - Record issues, assign ownership, and track resolution status

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- Provide historical logs for audit and lessons learned

9. Document Management and Collaboration

- Attach project-related documents, contracts, drawings, permits, etc.
- Enable controlled document versioning and access rights
- Facilitate collaboration through comments, status updates, and task notifications

Expected Benefits:

- Timely completion of factory expansions, modernization, and R&D initiatives.
- Cost savings through optimized budgeting and resource allocation.
- Increased transparency and accountability across projects.
- Better preparedness for audits, inspections, and compliance reviews.
- Enhanced efficiency in executing donor/government-funded projects.
- Stronger alignment of EDCL's projects with national health objectives.

Note: Above mentioned requirements of this module is required but not limited to.

9. Asset Management System

The Asset Management System (AMS) of EDCL ERP ensures effective lifecycle management of all physical and intangible assets, including machinery, production equipment, vehicles, IT systems, laboratory instruments, and infrastructure. For an organization like EDCL, which operates pharmaceutical factories, distribution centers, and offices across Bangladesh, AMS plays a critical role in ensuring maximum asset utilization, regulatory compliance, preventive maintenance, and cost optimization.

Core Functionalities:

1. Fixed Asset Allocation

- Handles assignment of assets to departments, projects, or individuals.
- Tracks asset usage and ensures proper recording of allocation dates, assigned personnel, and location.

2. Fixed Asset Requisition

- Manages requests for assets from departments or users.
- Captures details like asset type, quantity, purpose, and required duration.

3. Fixed Asset Requisition Approval

- Provides workflow for approving or rejecting asset requisitions.
- Tracks approval hierarchy, timestamps, and remarks for audit purposes.

4. Fixed Asset Requisition Register

- Maintains a log of all asset requisitions.
- Supports filtering by department, date, status, and asset category.

5. Depreciation Calculation Schedule

- Calculates periodic depreciation for fixed assets based on accounting standards.
- Supports multiple depreciation methods (e.g., straight-line, reducing balance).

6. Fixed Asset Disposal

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- Manages the process of asset disposal or retirement.
- Tracks disposal reason, approval, valuation, and final accounting entries.

7. Fixed Asset Return Requisition

- Allows users to submit requests for returning allocated assets.
- Captures condition of asset, return date, and associated remarks.

8. Fixed Asset Return Requisition Approval

- Workflow for approving or rejecting returned assets.
- Ensures proper verification before updating asset status in the system.

9. Fixed Asset Return Requisition Register

- Records all asset return requisitions and their approval status.
- Provides history for audit and compliance purposes.

10. Fixed Asset Non-Allocation

- Identifies assets that are available but not allocated.
- Helps in better utilization and planning of unused resources.

11. Depreciation Posting Register

- Maintains the ledger of all posted depreciation entries.
- Supports reconciliation with general ledger and financial reports.

Expected Benefits:

- Accurate financial reporting of EDCL's asset base.
- Reduced downtime and increased reliability of critical production machinery.
- Optimized asset utilization across factories, warehouses, and offices.
- Cost savings through preventive and predictive maintenance.
- Stronger audit readiness and compliance with regulatory standards.
- Data-driven decisions for asset replacement, investment, or disposal.

Note: Above mentioned requirements of this module are required but not limited to.

10. Medical Health Management System

The Medical Health Management System is designed to support EDCL in managing employee healthcare, occupational health, on-site clinics, and medicine allocation for both employees and external stakeholders where required. Since EDCL operates in the pharmaceutical and healthcare domain, MHMS ensures health compliance, medical recordkeeping, and efficient delivery of healthcare services to employees and beneficiaries.

Core Functionalities:

1. Employee Health Records

- Centralized health profiles for all employees (personal data, medical history, allergies, vaccinations).
- Regular health check-up records with test results.
- Integration with HR Module for employee identity and department mapping.
- Confidential recordkeeping with access control.

2. Doctor Management

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- On-site doctor management for EDCL factories and offices.

3. Medicine & Stock Management

- Pharmacy management for on-site clinics.
- Tracking of essential drugs and emergency medicines.
- Integration with Inventory & Warehouse Module for stock updates.
- Alerts for shortages or expiry of medicines.

Expected Benefits:

- Better healthcare support and welfare for EDCL employees.
- Reduced absenteeism through preventive healthcare measures.
- Stronger compliance with labor health & safety standards.
- Improved emergency preparedness for epidemics or accidents.
- Enhanced corporate image through CSR-based healthcare initiatives.

Note: Above mentioned requirements of this module is required but not limited to.

11. Engineering Maintenance Management System

The Engineering Maintenance Management System ensures efficient operation, preventive maintenance, and compliance of all engineering assets at EDCL, including production machinery, utilities, laboratory equipment, and building infrastructure. EMMS helps EDCL maintain maximum equipment uptime, reduce breakdowns, and optimize maintenance costs, supporting uninterrupted pharmaceutical production and regulatory compliance.

Core Functionalities:

1. Machine & Equipment Database

- Develop a central database of production machineries & utility services (i.e Sub-station, ETP, Air-compressor, Boiler, WFI plant, HVAC system, Dehumidifier etc) of EDCL.
- Categories assets with unique ID, location and specifications
- Linkage to Asset Management System for lifecycle tracking.

2. Preventive Maintenance (PM) Maintainance Scheduling

- Schedule maintainance at regular intervals (monthly/ half -yearly/ yearly) as required.
- System will automatically send reminder/ alerts before due dates & upcoming maintance schedule.
- After completion of maintance work(s), engineering officer can close the task and update remarks.
- Record completion status, technician assignment, and downtime.

3. Calibration Mangement

- Maintain calibration schedule for all intruments (i.e Temperature controller, pressure Gauge, Magnehelic pressure Gauge, Hygrometer, Slide caliper etc.) that need calibration.

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- Generate automatic reminders before due dates (i.e 15 days prior).
 - Generate calibration certificates and attach to each instrument's record.
- 4. Predictive & Condition-Based Maintenance**
- Sensor-based monitoring (temperature, vibration, pressure) for critical equipment.
 - Predictive analytics to anticipate failures and reduce unplanned downtime.
- 5. Spare Parts & Inventory Management**
- Maintain a complete list of stock position of engineering store (part number, parts number, machine name, quantity supplier etc).
 - Show current stock position and send alerts when stock goes below minimum stock level.
 - Maintain linkage between specific machine and its required spares.
 - Automatic requisition generation for low-stock items.
 - Track parts usage per work order for cost and planning purposes.
- 6. Procurement & Vendor Management system**
- Engineering Department raise(s) a purchase requisition directly through ERP, system automatically forward it to Head of Engineering (through proper channel) for approval and to Store Department for checking availability.
 - After verification, Head of Engineering automatically forward this requisition to Managing Director for final approval then to purchase Department for necessary action.
 - Enables digital tracking of requisition status.
 - Automated alerts for renewal and expiry dates of CPT, work order etc.
- 7. Maintenance Team Assignment and Scheduling**
- Assign maintenance tasks to skilled personnel based on:
 - Availability
 - Expertise and relevant certifications
 - Workload balancing
 - Maintain comprehensive work schedules and calendars for maintenance teams
 - Support mobile access or real-time notifications for field technicians
 - Record time spent on each maintenance activity for accurate payroll and cost accounting
- 8. Equipment Calibration and Life Cycle Records**
- Maintain detailed equipment profiles including:
 - Calibration schedules and historical records
 - Manufacturer manuals, warranties, and service agreements
 - Installation and commissioning dates
 - Expected useful life and replacement planning
 - Track calibration results, deviations, and certification status
 - Schedule and alert users of upcoming calibrations or mandatory equipment certifications
- 9. Downtime Analysis and Maintenance Cost Reports**
- Capture and analyze equipment downtime duration and frequency
 - Differentiate between scheduled maintenance and unscheduled breakdowns
 - Track maintenance costs including labor, materials, and external service charges

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- Generate detailed reports covering:
 - Equipment availability and reliability key performance indicators (KPIs)
 - Cost per maintenance activity and asset
 - Trends in breakdown frequency, resolution times, and maintenance effectiveness
- Support continuous improvement initiatives with actionable, data-driven insights

Expected Benefits:

- Reduced unplanned downtime and increased production reliability.
- Lower maintenance costs through preventive and predictive strategies.
- Enhanced asset life and operational efficiency.
- Better resource allocation for maintenance staff and spare parts.
- Real-time decision support for management via dashboards and reports.

Note: Above mentioned requirements of this module is required but not limited to.

12. Reporting and Analytics

The Reporting and Analytics Module is a central intelligence and decision-support hub of the EDCL ERP. It consolidates data from all operational modules—Finance, HR, Procurement, Planning, Inventory, Sales & Distribution, Quality Control, Project Management, Asset Management, Medical Health, and Engineering Maintenance—to provide real-time insights, performance dashboards, regulatory reports, and predictive analytics. This enables EDCL management to make data-driven decisions, improve efficiency, and comply with government and regulatory requirements.

Core Functionalities:

1. Real-Time Dashboards

- Executive dashboards for top management: alerts, performance summaries.
- Module-specific dashboards: Finance, Procurement, Inventory, Sales, QC, Projects, Assets, HR, etc.
- Drill-down functionality to view detailed transaction-level data.

2. Standard Reports

- Predefined reports per module:
 - **Finance:** Profit & loss, budget vs actual, accounts receivable/payable, asset depreciation.
 - **HR & Payroll:** Attendance, leave, payroll summaries, manpower allocation.
 - **Procurement:** APP status, purchase order summary, supplier performance.
 - **Inventory & Warehouse:** Stock balance, expiry alerts, slow-moving items, batch reports.
 - **Sales & Distribution:** Sales trends, order fulfillment, government program allocation.
 - **Quality Control:** Batch release, deviations, stability testing.
 - **Project Management:** Budget vs actual, milestones, resource utilization.
 - **Asset & Maintenance:** Equipment utilization, downtime, maintenance cost.



- **Medical Health:** Employee health trends, incident/accident reports.
3. **Custom Report Builder:** Users will be able to create department-specific reports using intuitive filters and drag-and-drop options without needing technical expertise. These reports can cover areas such as procurement, HR, project progress, medical services, maintenance costs, and more.
 4. **Real-Time Dashboards:** Dashboards will provide live insights using visual elements (charts, KPIs, maps, graphs) to track performance metrics. These will support different user roles:
 - Executive Management Dashboard
 - Department Head View (HR, Finance, Admin, Engineering)
 - Project-Based Monitoring View
 - Geo-spatial Dashboards (integrated with GIS)
 5. **Export & Sharing Options:** Reports can be exported in multiple formats (PDF, Excel, Word, CSV) and scheduled for auto-emailing to designated recipients on a daily/weekly/monthly basis.
 6. **Mobile Accessibility:** Dashboard snapshots and alert-based reports will be accessible via the EDCL mobile app, ensuring decision-makers stay informed on the go.

Note: Above mentioned requirements of this module is required but not limited to.

3.2. Hardware Requirements

1. Rack Server: Database Server -Qty-02 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand	To be mentioned by Bidder. Must be in the top three OEM for the last quarter release in terms of revenue and shipment.	
Quality	ISO 9001:2015 for manufacturer, FCC Class A for quality assurance	
Model	To be mentioned by the bidder	
Country of origin	To be mentioned by the bidder	
Manufacturing Country	To be mentioned by the bidder	
Form Factor	2U Rack Mountable Server with Rail Kit and Bezel Kit.	
Processors	Should be provided with min. 2 x Intel Xeon Silver Processor (5 th Generation, Emerald Rapids) 2.0GHz 16-core 150W Processor or Higher	
Cache L3	Minimum 30 MB of L3 Cache	
Chipset	Intel C741 Chipset or higher	
Boot drive and	Should be provided with min. 8 x 2.4TB SAS Mission	

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Storage	Critical hot-pluggable HDD. Should be provided with 8SFF drive bay kit supporting NVMe/SAS/SATA drives. Internal HDD expandability supports minimum 32 drives	
Storage array controller	Integrated Hardware RAID controller with 8GB cache supporting RAID 0, 1, 10, 5, 6, 50, 60 supporting SAS/SATA/NVMe devices.	
Memory	Min. 256 GB 5600 MT/s DDR5 with advanced ECC (DRAM ECC detects and corrects data bit errors features capability. Expandability up to 8TB using DDR5 memory.	
	Min. 32 DIMM slots	
Remote management	Integrated remote management capability from day 1 with dedicated network connection supporting GUI. Shall provide enterprise/advanced remote management software license.	
Power supply and Fan kit	Redundant & fully provisioned; min. 2x 800W power supply with min. 6 (Six) nos. high performance fan should be provided.	
Network & FC Card	Shall be provided with 2x dual port 10G Base-T adapter.	
	Will be provided with minimum 8 (Eight) PCIe 5.0 slots.	
Monitoring and analytic engine	1. Cloud enabled monitoring and analytics engine with proactive server management. All required licenses and installation services for same shall be included in the offer. 2. Cloud enabled Analytics engine shall have capability to provide proactive recommendation for arresting the issues / problems noticed at other install bases of vendor after identifying the problematic signature. Data analytics for server security and Predictive data analytics for parts failure.	
Server Management	Must provide cloud-native management architecture that abstracts, manages and controls offered servers regardless of physical location.	
	RESTful API support to manage servers programmatically	
	Group based firmware management that can be scheduled or on-demand	
	Group based firmware management that can be scheduled or on-demand	
	Activity log, troubleshooting recommendation	



	Remote-site management	
	Unified Identity & Access Management	
Security	<ul style="list-style-type: none"> Trusted Platform Module 2.0 must be provided. Commercial National Security Algorithms (CNSA) Trusted Supply Chain support Product cryptographic identity (iDevID) 	
Hypervisor Support	Shall mention all the industry leading supported hypervisors.	
Operating system	Shall mentioned all the supported industry leading operating system.	
Warranty & services	<p>3-yrs collaborative warranty with 24x7 mission critical one-point support from OEM, same day response.</p> <p>15-minute response 24x7 for severity 1 incidents (direct connect to product specialist where available) and 4-hour standard response.</p> <p>OEM must maintain in-country local part depot center and OEM authorized letter must be submitted mentioning the depot location.</p>	

2. Rack Server: Application Server -Qty-02 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand	<p>To be mentioned by Bidder.</p> <p>Must be in the top three OEM for the last quarter release in terms of revenue and shipment.</p>	
Quality	ISO 9001:2015 for manufacturer, FCC Class A for quality assurance	
Model	To be mentioned by the bidder	
Country of origin	To be mentioned by the bidder	
Manufacturing Country	To be mentioned by the bidder	
Form Factor	2U Rack Mountable Server with Rail Kit and Bezel Kit.	
Processors	Should be provided with min. 2 x Intel Xeon Silver Processor (5 th Generation, Emerald Rapids) 2.0GHz 16-core 150W Processor or Higher	
Cache L3	Minimum 30 MB of L3 Cache	
Chipset	Intel C741 Chipset or higher	

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<p>Boot drive and Storage</p>	<p>Shall be provided with min. 4 x 2.4TB SAS Mission Critical hot-pluggable HDD.</p> <p>Should be provided with 8SFF drive bay kit supporting NVMe/SAS/SATA drives. Internal HDD expandability supports minimum 32 drives</p>	
<p>Storage array controller</p>	<p>Integrated Hardware RAID controller with 8GB cache supporting RAID 0, 1, 10, 5, 6, 50, 60 supporting SAS/SATA/NVMe devices.</p>	
<p>Memory</p>	<p>Min. 256 GB 5600 MT/s DDR5 with advanced ECC (DRAM ECC detects and corrects data bit errors features capability.</p> <p>Expandability up to 8TB using DDR5 memory.</p> <p>Min. 32 DIMM slots</p>	
<p>Remote management</p>	<p>Integrated remote management capability from day 1 with dedicated network connection supporting GUI. Shall provide enterprise/advanced remote management software license.</p>	
<p>Power supply and Fan kit</p>	<p>Redundant & fully provisioned; min. 2x 800W power supply with min. 6 (Six) nos. high performance fan should be provided.</p>	
<p>Network & FC Card</p>	<p>Shall be provided with 2x dual port 10G Base-T adapter.</p> <p>Will be provided with minimum 8 (Eight) PCIe 5.0 slots.</p>	
<p>Monitoring and analytic engine</p>	<p>1. Cloud enabled monitoring and analytics engine with proactive server management. All required licenses and installation services for same shall be included in the offer.</p> <p>2. Cloud enabled Analytics engine shall have capability to provide proactive recommendation for arresting the issues / problems noticed at other install bases of vendor after identifying the problematic signature. Data analytics for server security and Predictive data analytics for parts failure.</p>	
<p>Server Management</p>	<p>Must provide cloud-native management architecture that abstracts, manages and controls offered servers regardless of physical location.</p> <p>RESTful API support to manage servers programmatically</p> <p>Group based firmware management that can be scheduled or on-demand</p> <p>Group based firmware management that can be scheduled</p>	

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	or on-demand	
	Activity log, troubleshooting recommendation	
	Remote-site management	
	Unified Identity & Access Management	
Security	<ul style="list-style-type: none"> Trusted Platform Module 2.0 must be provided. Commercial National Security Algorithms (CNSA) Trusted Supply Chain support Product cryptographic identity (iDevID) 	
Hypervisor Support	Shall mention all the industry leading supported hypervisors.	
Operating system	Shall mentioned all the supported industry leading operating system.	
Warranty & services	<p>3-yrs collaborative warranty with 24x7 mission critical one-point support from OEM, same day response.</p> <p>15-minute response 24x7 for severity 1 incidents (direct connect to product specialist where available) and 4-hour standard response.</p> <p>OEM must maintain in-country local part depot center and OEM authorized letter must be submitted mentioning the depot location.</p>	

3. Firewall: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand:	To be mentioned by the bidder	
Model:	To be mentioned by the bidder	
Country of Manufacture/Assembly:	To be mentioned by the bidder	
Qty	One	
Form Factor	IU rack mountable	
Environmental	Maintain International Quality Environmental Safety standard	
Platform Requirement	The Next Generation Firewall should be enterprise grade capacity for securing multisite network connectivity and provide user/server network protection against malware, exploits, and malicious websites in both encrypted and non-encrypted traffic. Solution/hardware must be compatible with SDN, SD-WAN & SD-Branch.	
Form factor	Please mention RU with 19-inch rack mounting kits included	

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Part No	Bidder will mention detail's part number	
3rd Party Certifications & Validation	The system must inherit the following Compliance Certification: FCC, CE, RCM, VCCI, BSMI, UL, CB	
	The OEM must be recognized as a Leader in 2022 Gartner Magic Quadrant for Enterprise Firewalls.	
	The OEM must be recognized as a Leader in 2022 Gartner Magic Quadrant for WAN Edge Infrastructure.	
	The equipment of the proposed brand must be recommended by NSS Labs for Enterprise Network Firewall with Exploit block rate: 98% or higher.	
Hardware and System Requirements (Day one)	The device should be based on a dedicated ASIC-based standalone appliance.	
	The device must have 18 x GE RJ45 (including 1 x MGMT port, 1 X HA port, 16 x switch ports), 8 x GE SFP slots, 4 x 10GE SFP+ slots, NP6X Lite and CP9 hardware accelerated.	
	The firewall must have dual hot-swappable power supplies	
	The firewall should have minimum 6 Virtual firewall/Virtual Domains/Context	
	Firewall should support configurable virtual systems resource limiting and management such as maximum/guaranteed active sessions and log disk quota	
	Firewall should support creating access-rules with IPv4 & IPv6 objects	
	Firewall should support operating in routed & transparent mode.	
	Firewall should support Active-Active, Active-Passive & Clustering high availability from day one	
Firewall Performance (Day one)	Firewall should support Static, RIP, OSPF, IS-IS and BGP routing protocol.	
	Firewall should support static NAT, dynamic NAT, PAT, NAT64 and NAT46.	
	The system must support at least 5 Gbps of IPS/IDP throughput	
	The system must support at least 3 Gbps of Threat Protection (Firewall, IPS, Application Control, URL filtering, and Malware Protection) throughput	
	The system must support at least 3 Gbps of SSL Inspection (DPI) throughput	
	The system must support at least 2 million concurrent sessions	
	The system must support at least 250,000 new sessions per second	

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	The system must support at least 10 Gbps IPsec VPN throughput	
	The system must support at least 2,000 IPsec VPN tunnel	
	The system must support at least 1 Gbps SSL-VPN throughput	
	The system must support at least 500 SSL VPN user	
	The system must support at least 10 Gbps Layer-2 Application Control Throughput	
SD-WAN Features Requirement	The SD-WAN solution should have Application Identification and Control along with 5000+ application signatures, first packet Identification, deep packet inspection, custom application signatures, SSL decryption, and TLS1.3 with mandated ciphers	
	The SD-WAN solution should have Application aware traffic control along with granular application policies, application SLA based path selection, dynamic bandwidth measurement of SD-WAN paths, active/active and active/standby forwarding, overlay support for encrypted transport, Application session-based steering and probe-based SLA measurements	
	The SD-WAN solution should have WAN remediation along with Forward Error Correction (FEC) for packet loss compensation, packet duplication for best real-time application performance, Active Directory integration for user-based SD-WAN steering policies and per packet link aggregation with packet distribution across aggregate interface members	
	The SD-WAN solution should support WAN load balancing (weighted) algorithms based on traffic volume, sessions, source-destination IP, Source IP, and spillover	
	The SD-WAN solution should support Ping/HTTP probes and monitoring criteria including latency, jitter, & packet loss with configurable check interval, failure and fail-back thresholds for WAN link checking in SLA.	
	The SD-WAN solution should have Traffic shaping based on bandwidth limits per application and WAN link, rate limits per application and WAN link, prioritize application traffic per WAN link, mark/remark DSCP bits for influencing traffic QoS on egress devices, application steering based on ToS marking	

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	The system shall also be able to block graywares and mobile malwares	
	The system shall offer the ability to treat Windows Executable files in Email Attachments as viruses	
	The antivirus scanning should be supported on various protocols not limited to HTTP/HTTPS, SMTP/SMTPS, POP3/POP3S, IMAP/IMAPS, MAPI, FTP/SFTP and CIFS	
	The system shall able to quarantine file and ban infected host	
Web Filtering Features	The system shall allow organizations to implement flow-based, proxy-based and DNS-based web filtering concurrently, depending on the network and security needs	
	The system shall support dynamic web filtering by querying real-time cloud-based categorization database over 250 million URLs rated into 78 categories and in 70 languages	
	Web filtering engine should support Allow, Block, Monitor (logged), Warning (with message at configurable time interval), (request for) user authentication actions when matched to a category	
	Web filtering engine should support customizable replacement page for warning and blocking	
	The system shall provide ability to use local categories (that override the cloud-based database rating) and remote categories (external URL list) as part of the URL rating function.	
	The system shall able to Filter Java Applet, ActiveX, and/or cookie	
	The system shall able to exempt scanning encrypted connections on certain categories for the organization requirements.	
	The system shall have the ability to limit users' access to YouTube channels, such as in an education environment where users are only able to access YouTube education videos but not other YouTube videos.	
DNS Filtering Features	The system shall support DNS category filtering to control user access to web resources	
	The system shall able to categories filters of the DNS request based on the domain rating send by OEM threat intelligence center.	
	The system shall able to blocks the DNS request for the known botnet C&C domains	
	The system shall able to allows administrator to define an IP block list to block resolved IPs that match this list	
	The system shall able to allows administrator to	

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	override DNS translation which can maps the resolved result to another IP	
SSL Inspection Features	The system must support DPI (Deep packet Inspection) for all types of traffic.	
	The system shall provide Secure sockets layer (SSL) content scanning and inspection abilities that allow organizations to apply antivirus scanning, application control, web filtering, and email filtering to encrypted traffic	
	The system shall support certificate inspection on port 443, all ports or a specific non-standard port.	
	The system shall provide the ability to exempt web sites from SSL inspection by site reputation, address, category, or using a white list.	
IPS	The system's IPS database shall have over 11,000 up-to-date signatures	
	The system shall provide configurable IPS filters to selectively implement signatures based on severity, target (client/server), protocol, OS and Application types.	
	The system shall support Allow session, Monitor and log session, Block session, Reset session, quarantine attacker actions when an IPS attack is detected	
	The IPS system shall able to scan botnet-connections to block Botnet C&C communication	
Application Control	The system shall able to detect and take action against network traffic depending on the application generating the traffic.	
	The system shall able to analyses network traffic to detect application traffic even if the traffic uses non-standard ports or protocols	
	The system shall support detection for traffic using HTTP/2 protocol and able to block QUIC traffic so that browser automatically falls back to HTTP/2 + TLS 1.2	
	The system shall support dynamic application filtering by querying real-time cloud-based categorization database over 2500+ application rated by 18 categories.	
	Application Control filtering engine should support Allow, block, reset session, monitor only and attacker quarantine actions when matched to a category	
File Control	The system shall able to detect and take file filtering action (Monitor/Block) against CIFS, FTP, HTTP, IMAP, MAPI, POP3, SMTP protocol	
	The system shall able to detect password protected file	

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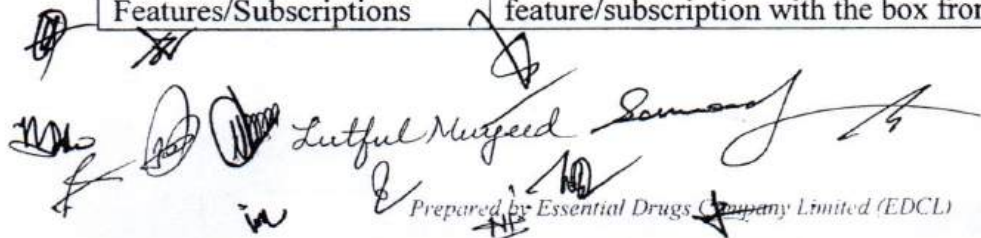


	The system shall able to detect and filter both upload and download file	
	The system shall able to detect and filter files based on file type & file's meta data only, and not on file size or file content	
	The system shall able to detect well know file type including net, 7z, avi, bat, bnp, aspack, bzip, cab, chm, cod, dmg, exe, fsg, gif, gzip, hlp, hta, html, iso, jad, javascript, jpeg, mine, mov, mpeg, msi, msoffice, msofficex, pdf, png, rar, rm, torent, wma, xar, and zip.	
DOS Protection	The system shall support IPv4 and IPv6 rate-based DOS protection	
	The system shall able to setting threshold value against TCP Syn flood, TCP/UDP/SCTP port scan, ICMP sweep, TCP/UDP/SCTP/ICMP session flooding (source/destination)	
VPN Features	The system shall support industry standards of IPSEC, PPTP, L2TP and SSL without additional external solution, hardware or modules.	
	The system support Route-based, policy-based IPSEC VPN and GRE over IPSEC	
	The system shall support Local, Radius, LDAP and 2FA authentication for the VPN user	
	The system shall support customizable SSL VPN portal for color themes, layout, bookmarks, connection tools, client download options	
	The system shall able to prevents concurrent logins using same username in SSL VPN	
	The system shall support IPsec VPN encryption: DES, 3DES, AES128, AES192, AES256	
	The system shall support IPsec VPN authentication: MD5, SHA1, SHA256, SHA384, SHA512	
Authentication	The system should support minimum 1,000 LOCAL authentication user database	
	The system should support RADIUS, TACACS, and LDAP remote authentication server	
	The system should support Security Assertion Markup Language (SAML) authentication	
	The system should support multi factor authentication (MFA)	
	The system should support single-sign-on authentication	
Firewall Policy	The system shall support minimum 5000 firewall policy	
	The system shall support predefined, custom and object grouping policy objects	

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	The system shall support subnet, IP, IP range, GeoIP (Geography), FQDN, Dynamic (based on received tags from external systems) and MAC address policy objects	
	The system shall support Seven-day rolling counter for each policy hit & byte count	
	The system shall support policy lookup tool to find out which policy matches specific traffic from a number of policies	
Log and Report	Must have built-in log and reporting module or vendor may offer additional hardware for log and reporting solution.	
	Must be capable of providing rich reports based on application, users and threats or in any combination.	
	Must support report generation on a manual or schedule (Daily, Weekly, etc.) basis	
	Must allow the report to be exported in PDF format	
Management Feature	Should support integration with SIEM tools like: Q-Radar, Arcsight, Splunk etc.	
	The system should support complete GUI and CLI, HTTPS, SSH, Console, SNMP, API, Central Management etc.	
	The firewall should have in-built CLI option in Graphical Interface for easy access in troubleshooting & configuration	
	The firewall should have diagnostic CLI commands, session tracer, and packet capture for troubleshooting hardware, system, and network issues.	
	The firewall should able to manages network devices compliance via dynamic access control with tags provided by external security systems	
	The firewall should have integration & automation technology with other security product to provide broader visibility, integrated end-to-end detection, threat intelligence sharing, and automated remediation	
	The system should support Security Fabric Rating for the audit components within the fabric against best practices, provide results and recommendations, then allow users to easily apply remediations for some items	
The management platform must be capable of role-based administration, enabling different sets of views and configuration capabilities for different administrators subsequent to their authentication.		
Security Features/Subscriptions	Must have at least following active security feature/subscription with the box from day one:	



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	-Firewall	
	-Application Control	
	-URL/Web Filtering	
	-DNS Filtering	
	-Video Filtering	
	- File Filtering	
	-Antivirus	
	- IPS	
	- APT and Zeroday Protection	
	-Bandwidth Management	
	- VPN Gateway (IPSec & SSL)	
	-SD-WAN	
	- ZTNA	
Manufacturer's part number, Warranty/RMA and TAC support	Bidder must be submitted Manufacturer Authorization form (MAF)	
	Bidder should submit BOQ of device including the detail's part numbers, necessary TAC support 24x7 and manufacturer warranty for 3 years	
	Bidder should quote necessary security subscription & license for 3 years	
	Bidder should submit BOQ of proposed device including the detail's part numbers and Manufacturer's Warranty part number also have to add services " 24x7 Comprehensive Support, Firmware and General Upgrades, (Unified Threat Protection (UTP) (IPS, Advanced Malware Protection, Application Control, URL, DNS & Video Filtering, Antispam Service &Support) for Three Year's.	

4. Switch: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand:	To be mentioned by the bidder	
Model:	To be mentioned by the bidder	
Country of Manufacture/Assembly:	To be mentioned by the bidder	
Qty	One	
Form Factor	1U rack mountable	
Environmental	Maintain International Quality Environmental Safety standard	
Interface	Enterprise-grade switch for secure network segmentation. 24 x 1GbE RJ45 ports (including 1 dedicated management port).4 x 10GbE SFP+ uplink ports.4 x 10GbE SFP+ uplink ports.4 x	

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	10GbE SFP+ uplink ports. Dual hot-swappable power supplies (redundant)	
Performance & Scalability:	High-performance switching with ASIC acceleration.	
	Up to 128 Gbps switching capacity. Supports Forti Link for seamless integration with FortiGate security fabric	
Security Features:	advanced threat protection. Supports dynamic segmentation, VLANs, and secure access controls.	
Management & Monitoring:	Centralized management via FortiGate or standalone. Supports CLI, GUI (web-based), SNMP, and REST API. Real-time monitoring and analytics via Forti Switch Manager	
High Availability:	Redundant power and network resilience. Dual power supplies, STP/RSTP/MSTP support	
Certifications:	FCC, CE, RoHS, UL, and other industry standards. Fully certified and compliant	
Warranty & Support:	3-year manufacturer warranty. Includes 24x7 Fortinet TAC (Technical Assistance Center) support	
	Optional extended support and subscriptions. Available Premium support.	

5. UPS: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand	To be mentioned by bidder	
Brand of Origin	USA/UK/Japan	
Country of Manufacture	To be mentioned by bidder	
MODEL	To be mentioned by bidder	
INPUT PARAMETERS		
Rectifier type	IGBT rectifier	
Rated voltage	220VAC single-phase three-wire	
Input voltage range	single-phase 120Vac-288Vac	
Input frequency range	45Hz-65Hz	
Input power factor	>=0.99 for single phase	
BATTERY		
Charging capability	>6h for 90% re-charging of standard model	
Battery type	Lead-acid maintenance-free battery	
Battery backup time	1 Hour @ full IT load	

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Battery qty	20pcs	
Battery brand	Leoch	
Battery Capacity	12V-42Ah	
Battery Cabinet	External	
OUTPUT PARAMETERS		
Rated power	10kVA/8KW	
Rated Voltage	Single-phase 220Vac	
Voltage precision	3%	
Frequency precision	0.25%	
Output mode	Terminal strip	
Load crest factor	3:1 (comply with IEC62040-3)	
Step load performance	100%	
Overload performance	105% - 125% 5mins, 125% - 150% 1 mints, 500ms for over 150%	
(% of the rated load)		
System parameters and standard		
Conversion type	Online double conversion	
Installation mode	tower	
System efficiency	>92.5%	
Switching time (power failure)	0	
Noise	<55dB	
Language	Chinese/English	
Whether LCD display is available	Yes	
Safety	IEC/EN62040-1-1	
Electromagnetic capability	IEC/EN 62040-2, IEC/EN61000-3-11, IEC/EN61000-3-12, YD/T1095-2008	
Surge protection	IEC/EN 62040-2, meeting IEC/EN61000-4.5	
Protection level	IP20	
Dimensions, UPS,(DXWXH)mm	To be mentioned by bidder	
Communication and management		
Management software	Site Monitor	
Interface type	USB/intelligent slot (SNMP card) (optional)	
Environmental parameters		
	0 - 40°C	
Relative humidity	5-95% without condensation	
Altitude	<1500m (when the altitude exceeds 1500m, de-rating is required according to GB/T3859.2)	
Warranty	Online UPS (1 year) Battery (12 months). Vendor is responsible to solve for any kind of problem in the product within warranty period.	

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6. Server Rack: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Item Name	42U Server Cabinet	
Brand	Mention By the Bidder	
Part No.	Mention By the Bidder	
Country of Origin	UK, USA, Switzerland or Japan	
Country of Assemble	Mention By the Bidder	
Specification:		
Dimension	42U (H)x 600mm(W)x 1000mm(D)	
Front Door	Single glass front door with vented holes & MS818 handle lock	
Rear Door	Single vented rear door with small round lock	
Side Panels	Steel Sheet side panels with universal key	
Mounting profile	2.0mm, others are 1.2mm to 1.5mm	
Castors	4 Pcs 2.0 inch castor with 2 lock and adjustable feet	
Cooling Fans	Min 4 Pcs with 3pin Power Cord	
Color	Black	
Cable Entry	Top & Bottom	
Philip screws and Nuts	Min 30 Sets	
Tray	Fixed & Sliding (Min 1 Nos each)	
PDU	Min 13 AMP 10 way PDU with 3 Pin UK Type Plug	
Dust & Insect Protection	Must Have Brush Panel on Top & Bottom Cable Entry	

7. PDU: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Item Name	10 Port Back-to-Back PDU	
Brand	Mention By the Bidder	
Part No.	Mention By the Bidder	
Country of Origin	UK, USA, Switzerland or Japan	
Country of Assemble	Mention By the Bidder	
Specification:		
Socket Type	10 x IEC320 C13	
Nominal Voltage	230V	
Rated Current	10A	
Impute Plug	UK 13A (BS1363) Plug	



Maximum Current	10A	
Frequency	50/60 Hz	
Nominal Voltage	230V	
Impute Cable	3 M	
Maximum Power	2500W	
	LED Indicator	
Control Function	Master Switch	
	Overload Protector	
Protection Function	Leakage Protection	
	Surge Protection	
Orientation	Vertica	
Formfactor	1U, Standard Rack Mountable	
Product Dimension	44.4mm x 44.4mm x 1U	
Operating Relative Humidity	85%	
Safety Authentication	CE	
Colour	Black	

8. KVM Switch with Console: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Item Name	8 Port KVM CONSOLE	
Brand	Mention By the Bidder	
Part No.	Mention By the Bidder	
Country of Origin	UK, USA, Switzerland or Japan	
Country of Assemble	Mention By the Bidder	
Specification:		
Dimension	148.4*445*45mm (KVM Module) and 407*445*45mm (Console)	
Type	8 Ports Detachable KVM Module	
Computer Connection	Direct Connects 8 Maximum Connects 256	
CPU Port Selection	CPU Port Selection OSD Menu, Front panel buttons, Hot Key, IP Remote Control (Optional)	
Console Connector	DB 37PIN	
PC Connector	VGA DB15, Female Type (Monitor, Keyboard/Mouse, Switch Module)	
Power	1 x DC Jac	

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Network Port extension Slots	1 (Optional, RJ-45)	
Connection Port Selection	KVM Operation Panel Digital keys	
KVM Reset	KVM Operation Panel Function Keys	
IP Module Reset	1 x semi-embedded key (if available IP Module)	
IP Module Default	1 x semi-embedded key (if available IP Module)	
Selected LED	Nixie Tube Display	
Online LED	8 x Red (depending on KVM Module)	
IP Network	1 x Green, 1 x Orange (if available IP Module)	
Analog Mode	Keyboard/Mouse over USB	
Maximum Resolution for KVM Module	1920 x 1200 @ 60HZ Local & Remote	
Scan time interval	3, 5, 10, 15, 20, 30, 40, 60s (3s by default)	
Total length	611mm, fit for 800-1200mm cabinet	
Weight	11.00 Kg (± 00.5)	

9. Laptop: Qty-01 Pcs

Features	Technical Specifications and Standards	Bidder Response
Brand	To be mentioned by Bidder. Must be in the top three OEM for the last quarter release in terms of revenue and shipment.	
Model	To be mentioned by the bidder	
Country of origin	To be mentioned by the bidder	
Manufacturing Country	To be mentioned by the bidder	
Processors	Intel Core Ultra 7 155H	
Cache	24MB	
Chipset	Intel SoC Platform	
Display Size	14.0-inch	
Display Type	OLED	
Display Resolution	WUXGA (1920x1200) OLED	
Touch Screen	Yes	
Display Type	OLED	
Display Features	Touch Display Glossy / Anti-fingerprint Dolby Vision	

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	Display HDR True Black 500 TÜV Low Blue Light Glass OGM, 10-point multi-touch	
Brightness	400nits	
Refresh Rate	60Hz	
Color Gamut	100% DCI-P3	
RAM	16GB (Soldered)	
RAM Type	LPDDR5x-7467	
Max Memory	16GB soldered memory	
Storage Capacity	1TB	
Storage Type	M.2 2242 PCIe 4.0x4 NVMe SSD	
Graphics Model	Integrated Intel Arc Graphics	
TouchPad	Buttonless glass-like Mylar surface multi-touch touchpad, supports Precision TouchPad (PTP), 75 x 120 mm (2.95 x 4.72 inches)	
Speaker	Speakers: Stereo speakers, 2W x2, optimized with Dolby Atmos, Smart Amplifier (AMP) Audio Chip: High Definition (HD) Audio, Realtek ALC3306 codec	
Microphone	2x, Array	
Card Reader	1x microSD card reader	
HDMI Port	1x HDMI 2.1, up to 4K/60Hz	
USB 3 Port	1x USB-A (USB 5Gbps / USB 3.2 Gen 1), Always On	
Body Material	Surface Treatment: Aluminum Stamping (Anodized with Sandblasting) Case Material: Aluminum (Top), Aluminum (Bottom)	
Warranty & services	3 Years (OEM support).	










4. SDLC Approaches & Methodology

Considering the current context of smart government implementation of Bangladesh, we've proposed hereunder a tailored SDLC methodology for the development of this ERP solution. Under the scope of this SDLC methodology, for effective, efficient, timely and fruitful development of this system and achieving early release as a tangible result, the scope of this project can be divided into 02 parts (modules & sub modules) based on priority and dependency of the modules and features to be developed and released. At the project inception phase, the two parts modules will be defined by the concerned authority (implementing agency) discussing with the vendor.

The methodology covers the following phases:

4.1. System Analysis & Design

4.1.1. Project Inception:

The SDLC process will be started from this phase. Project will be initiated with a kick off meeting between vendor, implementing agency & relevant stakeholders. At this phase, the entire project scope mentioned in TOR will be briefed and discussed extensively, the part boundaries will be defined, preliminary project implementation timeline, project management plan format & content structure will be discussed. At the end of this phase, vendor will submit a comprehensive and detailed project management plan for client's approval with a power point presentation and submit hardcopy of documents. On receipt of approval of the project management plan, only the phase will move to **Next Phase**.

Deliverables: Approved Project Management Plan

4.1.2. System Requirement Analysis:

The vendor will initiate the project with this phase which includes requirement finalization for the entire project scope from functional aspect.

Proposed ERP requirement study, analysis and finalization is a very important phase in the entire SDLC. It is expected that, the selected vendor will carry out detailed requirement study and analysis on each and every scope of ERP that mentioned in the TOR. Under this scope of work, the selected vendor has to analyze the detailed functions, processes, documents, actors, service delivery sites and infrastructure of the relevant services precisely of the concerned organization. At this phase, vendor's ultimate objective will be finalization of the ERP requirements in details under the scope of TOR and receiving approval of the concerned organizational authority. Here vendor is requested to propose and submit a software requirement analysis plan which should cover the relevant activities to be performed, required timeline, specific deliverables to be produced, determine dependencies and resources to be used.

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Deliverables: Software Requirement Specification (SRS) and UI based non-functional prototype/ Mock.

4.1.3. High-level System Design (HLD):

The scope of the high-level design phase will be based on the entire project’s approved SRS. However, the HLD document (if required) can be updated based on the changes of SRS i.e. version changed of SRS on received CR.

Here, high-level design will ensure the architecture that would be used for developing this ERP solution. The architecture diagram will provide an overview of an entire system, identifying the main components that would be developed for the ERP and their interfaces.

The ultimate deliverables of this design will be high-level design document or HLD which adds the necessary details to the current project description to represent a standard model for coding. This document includes a high-level architecture diagram depicting the structure of the system, such as the database architecture, application architecture (layers), application flow (navigation), security architecture, technology architecture and integration blueprint.

4.2. Development & Release:

Based on the priority, importance and dependency, the project scope will be defined as per organizational consideration and decision. This will be completed through an iteration. The iteration process may follow the scrum process with several sprints of Agile Methodology. The iteration includes several steps such as LLD (Low Level Design), Development, Integration, Testing, Review and Release. For detail clarification the “Iteration” steps are described below:

4.2.1. Design Document:

Low-level design (LLD) is a component-level design process in which the actual software components, modules and functional requirements are designed. This process can be used for designing data structures, required software architecture, source code and ultimately performance algorithms. Vendor will have to submit a report on LLD based on which development will be started.

4.2.2. Development:

At the development stage based on the LLD, a development team will be mobilized who will start the coding process following the standard code convention, code level documentations, header of each file, algorithms, interfaces, code compression and APIs should be supplied with proper description within the given schedule as per the plan. The team will strictly follow the standard procedure of version control of codebase, database and related files using stable version control tools. The vendor will use standard project management tools to manage and track issues as well as monitor development progress. The client (Govt.) or client nominated representative/product owners need to have access and control to the version control system and in project management tools to manage and monitor the development process.

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Deliverables: Developed features/modules/components/applications, code documentation, algorithm & interface related documents, development & versioning report, Test driven development (TDD) approach should be included at this stage to ensure smooth development etc.

4.2.3. Integration

Considering the Integration requirements and scopes defined in the SRS, HLDD & LLDD for this ERP application, the vendor must perform the planned integration activities. At this stage, the vendor will perform all necessary above-mentioned tasks & follow guidelines regarding integration to make the ERP application interoperable.

4.2.4. Testing

Software testing process is one of the most vital phases through which it will be expected to evaluate each and every functionality of the proposed software application with an intent to find whether the developed application's functional features meet the specified requirements or not.

The vendor should prepare an extensive testing plan so that any functional failure can be detected and corrected timely and properly. The scope of the software testing should include the examination of code as well as the execution of the code in various environments and conditions as well as examining the aspects of the code; does it do what is required.

The vendor must propose a comprehensive testing plan in their technical proposal for this ERP application starting from development to deployment that is covered in the full test life cycle. This testing plan should cover all the standard testing approaches applicable for this ERP solution which may include phase wise testing activities like test scripting, test cases, testing tools, testing process, test log, result and report formats i.e. expected test deliverables. The vendor should submit testing plan which may include standard test approaches. Some are mentioned below as examples for reference.

1. Unit Test
2. Smoke and sanity testing
3. Load testing
4. System testing
5. Integration testing
6. Performance testing.

Note: Based on the Test reports and received feedback (Change Request) the LLD, version, developed application may be changed accordingly.

4.2.5. Release:

After successful completion of "iteration" that is predefined, successive steps will be executed properly with expected quality, the developed application will be released as a Beta version

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considered to be deliverable of this iteration. **In case of unsatisfactory testing reports, the iteration will be continued accordingly without any release.**

4.3. UAT & System Deployment

As soon as one iteration releases any developed application after completing the predefined steps and processes, this released version will be entered into this immediate phase i.e. UAT and system Deployment. The basic objective of this phase is to receive user feedback, adjust them, take final consent or acceptance of user, and ensure system testing for deployment, training and taking final deployment actions to GO LIVE. There may be basically 3 major steps are involved in this phased which are described hereunder:

4.3.1. User Acceptance Test (UAT):

Just after the release from an iteration as BETA version, developed application will enter into this UAT Process. At this step, the system will be tested by the users of different levels extensively to receive their precise feedback and review. Based on the received feedback and review, the process may lead to the previous state i.e. may enter into the previous iteration again with defined CR to adjust. Finally, when user's valuable feedback and review will be addressed, this application will be ready for User Acceptance. This step will end with the user acceptance for the BETA version to move forward.

4.3.2. User Training:

After completion of the UAT, at this step, User training will be required to be provided as per predefined project management plan and timeline. User training has to be very extensive and detailed so that users of each level will receive this training and will be capable to operate and run this system without any major technical dependencies.

4.3.3. Deployment

Deployment is a very important step in the SDLC before going LIVE where different types of necessary and standardized activities should to be performed as per predefined plan. The deployment plan should be prepared in a comprehensive manner choosing the appropriate deployment method and right deployment checklist. Automating deployment process as much as possible is a wise decision at this step. Obviously adopting continuous delivery and using integration server is necessary. Deployment preparation also may include another code deploying entering version release notes, checking that the required server is running smoothly and configuring staging environment properly. At this step, there are various testing processes that should be performed as a part of the obvious process. The deployment test plan and method should be chosen well ahead. This may include deploying the update to test environment, running each and every test code/scripts and reviewing results. Finally, this deployment process may continue with copying the updates to the production environment, running any necessary scripts, setting changes for live and testing on the live server before going LIVE.

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4.3.4. Go Live:

Successful deployment of any developed and tested application will lead finally to the "GO LIVE" state. The inauguration of the application may take place immediately when it enters into this stage. As inauguration is the formal session to expose or open the application to the end users/citizen, therefore proper consent of the concerned implementation Organization/Agency is required before going LIVE.

4.4. Operation and Maintenance Support Service

4.4.1. Maintenance & Support:

Maintenance phase will be started in this SDLC methodology. This phase is very important because the actual maintenance support service will be started by the vendor and the implementing organization will also take measure for scale up implementation of this software based on the result of the pilot. Those two important issues of this methodology are described hereunder:

In case of software implementation, especially for the ERP, maintenance support service plays a very vital role. Vendor needs to provide this maintenance support service as per the predefined plan and action which will be approved by the implementing organization at the inception phase under the project management plan. At this maintenance phase, the main objective will be ensuring this e-government or digital service application operation is running smoothly, uninterruptedly and without any hassle or complexity. Some factors mentioned below are very important at the time of maintenance support service by the vendor.

1. The developed and deployed ERP application should run smoothly and bug free.
2. **In case of any technical problem or support requirement, vendor's response for solution has to be very prompt.**
3. Based on the type of technical complexity and support requirement, the response and problem solution plan has to be predefined and precise through a signed SLA.
4. Vendor must consider contingency plan to manage and solve sudden complexity; technical problems arose and support request.
5. The help desk remote support should be comprehensive, strong, standard and adequate.
6. Improving user engagement, user training and receiving user review & feedback should be considered in the maintenance support plan.
7. Communication, software performance evaluation, continuous improvement for user satisfaction and right time reporting to the concern authority should be planned well ahead and execute the same timely as standard service.

Note: Understanding the scope of the project and other important context and factors, vendor may follow this proposed methodology, or may customize it as per necessity or may propose any other different SDLC/Agile/Hybrid methodology with proper justifications in their technical proposal. The project implementation time plan /schedule should be proposed in the technical proposal completely based on the chosen methodology by the vendor.

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But vendor is requested to describe the **“SDLC Methodology”** for this project in details in their technical proposal covering the following

1. Diagrammatic representation of the proposed SDLC showing the phases, methods, processes, flow, steps, deliverables etc.
2. Proper justification/rationality for choosing the SDLC and context/factors considered in choosing the same. The advantages of this SDLC should be stated very clearly and precisely with respect to this project scope/context.
3. Detailed activities/tasks and description of each and every phase /step which will be performed under the scope of this SDLC for this project like Inception, Requirement analysis, Design, Testing, Development, Deployment etc. This description of each phase/step should also include the purpose, deliverables/documentation, dependencies of this SDLC.
4. The probable risk, challenges and threats of the proposed SDLC methodology considering the scope and timeline of the assignment.

5. Non-Functional Requirements

5.1. Application Compliance Requirements

5.1.1. Web Application

1. The application which is a web-based solution, should be hosted in a centralized Web-server
2. The application should be developed following Service Oriented Architecture (SOA)
3. Application should develop Microservice Architecture with support MVC framework.
4. Considering the operating/client environment at different levels of this application, it should be developed in such a way so that it requires low bandwidth to run.
5. The web-based application should support cross browser platforms (popular web-browsers such Mozilla Firefox, Opera, Chrome, Internet Explorer, Safari etc.)
6. The application should have the ability to seamless integration with future module / components / applications
7. Application should be lightweight and rich client-side scripting
8. UI should be developed based on the analysis of UX.
9. Any web interface of this application should be fully responsive

5.1.2. Mobile Application Requirements

1. The mobile application version of the system should be developed for both Android and iOS.
2. The mobile app should have the capability of displaying system notifications
3. Functionality for registration options for service recipients
4. App should enable compact view of services for service recipients.

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5. There should be an option for auto synchronization with the central database with apps local database on the availability of the Internet connectivity.

5.1.3. Coding Conventions

The vendor must follow the standard coding styles to produce high-quality code for further usage of the code in terms of reusability, refactoring, task automation, language factors etc. The vendor should submit a standard coding convention approach, which may include different conventions like commenting, indent style, naming etc. following the best coding practices.

Note: A comprehensive "List of Standards" based on the latest technology to be complied for web and mobile platform regarding this eService solution development and operation will be preferred in the vendor's technical proposal.

5.2. Integration Requirements

As a government system or ERP application, integration with the required and other prescribed national systems is very important and essential. Only by proper integration and interoperability, ERP application can derive the ultimate benefits with the optimum use of technology from manual to digital transformation. Here, vendor should come up with an integration plan in their technical proposal considering and understanding the scope of the ERP application as per this TOR. The vendor will require to integrate successfully with all existing software and mobile apps of the organization based on the assessment which will be conducted in requirement analysis phase. The possible integration scopes of this ERP application are mentioned below as a reference for the vendor

To establish an ERP system and ensuring the interoperability among the e-government/e-Services of Bangladesh, integration is one of the key factors which should be considered as a topmost priority. The proposed ERP solution must comply with all national e-Government standards which are prescribed by the BNDA (Bangladesh National Digital Architecture) or any relevant and authorized government authority. Only an integrated and interoperable ERP solution can fulfill the ultimate objectives of digitalization with the optimum use of latest and standards ICT.

The vendor can follow standard integration mechanism such as exposing standard Restful APIs for the service process in different modules so that any modules or features can exchange data and related resources whenever it is required by satisfying the Govt. Agency's business purposes. The ERP should be able to exchange data with other digital systems within the particular Govt. agency as well as with inter-agency solutions. So, the vendor will develop a standard API manager following international standard so that the data sharing can happen efficiently and standard securities will be maintained smoothly. The digital solution must address the stated interoperability and integration issues of the agency for systems' sustainability and end-to-end digitalization issues which is the ultimate goal of digital transformation.

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Based on the consent and approval of implementing organization (concerned authority) at system requirement analysis phase of software development, vendor may follow customized integration framework complying BNDA guidelines, published e-government policies & acts and international standards/conventions for minimizing system's operational dependencies and strengthening sustainability.

The vendor is requested to submit an **"Integration Plan"** in their technical proposal for this eService solution covering the functional, technological, business, strategic, implementation, dependencies and activity related aspects.

5.3. Hosting Requirements

Bangladesh Government is providing an extensive and standard hosting facility for all types of government organization applications and software that is named as National Data Center under Bangladesh Computer Council (BCC). It may be mentioned here that the vendor developed application will be hosted in government provided data center i.e. National data center (NDC) or EDCL data center. Therefore, at this stage, vendor is requested to submit a **"Hosting Architecture & Requirements"** in their technical proposal for this ERP Solution.

Note: If any implementing organization decides to host this ERP solution in their own or any nominated data center, understanding the strength and capacity of this data center and hosting requirements, vendor must guide implementing organization well ahead of the time of system design phase. So, implementing organization can take necessary measures to ensure hosting facilities which will be required at the time of hosting the developed system.

5.4. Security and Privacy Requirements

The vendor should submit an extensive **"Security and Privacy Plan"** including comprehensive security architectures in their technical proposal for this proposed ERP application considering the following issues:

1. Project technical scopes
2. Functional and nonfunctional requirements and ultimate objectives
3. Concerned service provider organization's operational environments and capacity
4. User roles - Accessibility, Authentication, Authorization and Accountability
5. Importance of data management & data privacy
6. Strength of technologies to be used for development, operate & maintenance
7. Deployment & hosting
8. Service recipients and providers security, confidentiality and privacy
9. A checklist of security measures to be taken for this solution
10. Overall security standards which should be applicable for an e-government system.

Apart from these, the vendor should keep in account the following considerations as well as vendor should provide a checklist based on system and hosting security plan (i.e. fraud, hacking, money laundering etc.) & the test report of that checklist.

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5.4.1. System Security Requirements (But not limited to)

1. The vendor should follow any of the industry standard secured development methodology such as (but not limited to) Comprehensive Lightweight Application Security Process (CLASP) by Open worldwide Application Security Project (OWASP) etc.
2. The vendor should consider (but not limited to) common vulnerabilities such as SQL Injection, Cross Site Scripting (XSS) etc.
3. Vendor will undertake responsibility for Input Validation Controls, Authorization/Authentication Control and other security controls in place in both testing and production environment of application.
4. The following vulnerabilities must be checked and ensured security from the beginning:
 - a. Cross Site Request Forgery (CRSF)
 - b. Cross Site Scripting (XSS)
 - c. Session hi-jacking
 - d. Session Fixation
 - e. SQL Injection and Code Injection
 - f. Input Validation/Filtering
 - g. Output Escaping
 - h. Secure File Access
5. The vendor shall minimally provide Access control, Authentication and accountability security mechanisms for backend operations of the System.
6. The proposed security solution shall be scalable and should not affect the performance by creating a bottleneck or single point of failure to the overall system.
7. The system should provide tamper-proof audit trails and logs for administrator or auditor to check for the actions committed by users. The audit trails shall consist of following details but not limited to:
 - a. Login and logout
 - b. Attempts to access unauthorized resources
 - c. User profile changes
 - d. Past audit events.
 - e. Track all actions performed on documents attached/uploaded.
 - f. The system should have provision to assign the access rights of other resources on need basis to authorized users.
 - g. Information in the System that is deemed to be sensitive shall be encrypted and protected from accidental and/or unauthorized modification.
 - h. The System shall provide automatic session disconnection for inactive user after session time [Proposed best practice session time] is over.
 - i. The system shall protect the audit trails from being modified by unauthorized personnel or privileged users.



5.5. Sizing, Performance and Scalability Requirements

1. The system processing shall be scalable to support the volume estimates for a period of 10 years at a 20% annual growth rate.
2. The system shall be designed to handle estimated 1000 simultaneous connection (online users) when it is ultimately rolled out.
3. The vendor must conduct an extensive load testing task taking above factors into consideration and submit a load testing result.
4. The database architecture should be such that the system is available to user 24x7x365 days a year without any unapproved downtime.
5. Page load time, login response-time, on-click load time for the web application should be less than 3 seconds while this is accessed over the internet.
6. Average transaction response time, on-submit response-time, or any other database access/search time should be less than 5 seconds when the system solution is accessed over the internet.
7. Considering the network infrastructure challenges in Bangladesh, the solution must support low bandwidth conditions for the services defined in the functional requirements.
8. In case of mobile application also, this should support very low bandwidth even in 2G network provided internet bandwidth.
9. The proposed solution should be highly scalable to accommodate current and future requirements within the scope of the scope mentioned in the TOR.
10. Analyze the requirements whether both horizontal scaling (scale-up) and vertical scaling (scale-up) will be required for this e-Service application or not?
11. The ERP should be provided with appropriate caching mechanism to handle very high-traffic scalability.
12. The vendor may propose here other relevant measures for the ERP application scalability.

Note: The vendor should submit a **“Strategic & Action Plan for System Optimization & Upgradation”** including the method of sizing, mechanism and measures that will be taken for ensuring the standard of performance mentioning proposed system’s functional process and completion of standard time and scalability of this ERP solution

5.6. Interoperability and Data Exchange

The selected vendor must develop this ERP system following all the standards and protocols of interoperability, integration and data exchange with other systems. It is expected that the system will be based on open architecture and will be fully interoperable with current and future systems.

The following are the key expectations on interoperability requirements:

1. The system should be designed for interoperability using industry standard protocols.
2. System must expose data by Advanced Message Queuing Protocol and REST via TLS
3. All imported data must undergo data validation to ensure full integrity.
4. Data exchange within the system at different levels via the internet shall be encrypted.

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5. The system should have functionality to exchange data with other own systems or external institute systems.
6. The system shall have functionality to export/import files based on the standard template defined through web services and/or API
7. The vendor must ensure standard interoperability facility for the system so that necessary data can be shared with the other concerned public & private sector software or mobile apps based on the approval of the ministry authority simply exposing API for data sharing/ exchanging.

Full API documentation must be provided so that third party integrators can integrate their system with this system.

5.7. UI/UX.

The vendor must propose a "UI/ UX Plan" containing UI designing method and tools, UI design Activity plan, prototype or Mock Up design for both web & mobile, expected result & their finalizing process of that UI/UX design. Apart from this, the vendor should consider the following issues as requirement at the time of UI/UX plan.

1. The system interfaces should be highly user friendly, easy to navigate and ensure fast loading.
2. The UI shall be designed by using well-established, supported and lightweight UI framework so that it follows widely used industry flow patterns.
3. UI shall be easily configurable if any changes are needed.
4. Menu, content and navigation shall be based on the user entitlements, roles and permissions.
5. Vendor is requested to propose sample UIs for each platform i.e. mobile, web considering important features. The UIs should be designed professionally maintaining quality standard.

5.8. Digital Service Toolkit and Guide

A 360-degree guide of service using updated technologies will create a significant impact in case of using the implemented digital service by the system user (service providers & recipient). This toolkit & guide service may be implemented in different modalities as mentioned below:

5.8.1. Digital service receiving guide:

Digital service receiving guide: In both of the platform of web & mobile applications, the service recipient who are not even tech literate should be able to find an easy way to make them easily oriented for the digital service they would like to receive from application. Both the platform (Web & mobile) with few clicks should have easy content read & multimedia/ animated/video which is easy to view & understand receiving process, guideline & examples. The content can be focused on service receiving eligibility, requirements & step by step service receiving process for each & every service.

5.8.2. Smart guide for Digital features:

Smart guide for Digital features. In both the platform mobile apps & web in case of receiving any digital service in each interface of digital feature, the service recipient will find a default "guide/help link" by clicking on this meaning. Instance guide service can be availed like step-by-step pictorial action flow or video/multimedia content to use this feature & other relevant smart or interactive contents to receive instant support.

5.8.3. Digital user manual:

Vendor is requested to provide a comprehensive "Digital Service Toolkit & Guide plan" for all the service to be digitalize.

1. User (service recipient/ provider) will use this system in a very simple, fast and interactive way.
2. Vendor should plan properly during content designing & development so that it will be easier for non-technical & non tech savvy users.
3. This digital guide has to be implemented for each & every service of this system for each platform i.e. web, mobile.
4. All the digital content guidelines must be interactive so user can navigate the system by hearing, listening & reading.
5. Content creation methodology, activity & standard should be included in the plan.
6. Vendor's innovative & future context plan of this digital toolkit & guideline considering all the users will be appreciated

5.9. Language Support

System's default language will be Bangla. The ERP system should support multilingual option i.e. Bangla and English for both the Web version and Mobile Apps. All the user interfaces will be able to display and input controls can take input both in Bangla and English. System/App users can choose and set his/her preferred language in profile setting for the system interfaces. The system should support Unicode for the Bangla Language.

5.10. Tools and Technologies to be used

The following tools and technology are to be used for the development and implementation of the ERP application. Database will be Oracle 21c (License Version). The selected vendor has to provide Database licensing cost.

The main components of the software will be web based applications. It should be run in Windows/Linux operating system at user's end and should be compatible with all major browsers such as – Internet Explorer, Firefox, Google Chrome, Opera, Safari etc.

The System UI should be compatible with Tab & Smart Phone browsers and in case of Mobile Apps should be support both Android and IOS.

Understanding the details scope of this project, vendor is requested to submit a detail "Tools & Technology plan" in their technical proposal following the table format mentioned

below

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Purpose	Used Technology/Tools	Justification for use
Software Development Tools	HTML, CSS, AJAX, Java, JavaScript, Angular 15, Bootstrap, Oracle Apex, Oracle Fusion Middleware	Standard technology which is fit for this project
Database	Oracle 21c (License Version)	Relational database management system
Mobile Apps Framework	Flutter	Cross Platform support
Application Server OS	Spring Boot	Spring Boot is an open-source Java-based framework used to create a micro-Service.
Database Server OS	Red Hat Enterprise Linux 10 (License Version)	License operating system
Version Control	Oracle Linux	Open-Source operating system (Latest Version)
UI Design	Github	Git is widely used for version controlling
System Requirement Specification	Figma, Draw io	Up to date UI modern design tool
System Design	MS Visio, UML, MS Office	To draw Use case, business flow and UI prototype diagrams
Browser	MS Visio, UML	To draw different UML, workflow and Architectural diagrams
API/Web Services	Safari, Mozilla, Chrome etc.	Based on system preference for better uses experience
Documentation	Rest API, JSON	To communicate between Presentation and Service layer and with external APIs/Application
Helpdesk/Support	MS Word, PowerPoint	Widely used
Reporting	Microsoft Teams, Email, Phone	Widely used
Communication	HTML and Charts, Jasper Reports & Oracle Report	Free and Open Source
	Email, Microsoft Teams, WhatsApp	Widely used

6. Project Management

6.1. Implementation Timeline

Vendor must complete the project within a stipulated timeline based on the proposed SDLC methodology. The project timeline can be divided in three below phases that is – Requirement Analysis, Development, UAT, Deployment & Training. Total duration will be 24 Months.

6.2. Implementation Requirements

The selected vendor has to conduct part wise (as per priority and readiness) implementation of the ERP software solution. Vendor will submit the detailed "**Implementation Plan**" in the technical proposal in which the following may be considered to incorporate:

1. Vendor will be required to provide on-site support in phase to ensure smooth operation.
2. Vendor must provide extensive, premium and time-bound support at the implementation phase. The detailed support modality, methods, standard and relevant activities should be mentioned in the proposed plan.
3. Vendor will submit a performance assessment report at the end of the UAT phase covering UAT result/output, impact/outcome, scalability, stability and sustainability for full-scale implementation.
4. The criteria/key factors based on which the evaluation will be conducted should be mentioned in the proposed plan.

6.3. Documentation

Detailed and proper documentation of such ICT based project like ERP application development and implementation for any organization is very vital and essential. Documentation is required for any such project as reference, knowledge transfer, analysis of development and implementation history, baseline information for any modification or change, guidance etc. In this issue, Vendor should show highest-level of professionalism for delivering the standardized documentation approach at each phase of ERP development and implementation project. Vendor should include an extensive "**Documentation Plan**" of this project in their technical proposal.

6.4. Work Distribution and Team Composition

The vendor is expected to provide work distribution and team composition plan based on the project scope, their proposed SDLC methodology and work and project implementation plan. The interested applicant (Vendor) should provide a "**Work Distribution & Team Composition Plan**" in their technical proposal describing the different teams with required HR positions that will be allocated at various phases or steps of proposed SDLC and project implementation. In the case of running multiple phases or steps or activities, the team allocation plan mentioning the number of HR positions should be planned and described precisely. In the team allocation plan, each HR position should also be described with the roles, amount of involvement (man-day/man-month), expected deliverables and required skill and expertise. However, for proper execution of the project i.e. ERP application development, the vendor shall include at least the following HR positions as minimum project team requirements:


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SL	Position	No. of Person
1.	Project Manager	1
2.	Deputy Project Manager	1
3.	Business Analyst	5
4.	Software Architect	1
5.	System Analyst	2
6.	Senior programmer	8
7.	Programmer	12
8.	Programmer (Mobile App)	4
9.	Database Administrator (DBA)	1
10.	Cyber Security Expert	1
11.	Quality Assurance Engineer	4
12.	Implementation Engineer	4
13.	System Administrator	1
14.	Technical Document Writer	2
15.	UX / UI Expert	2
16.	GIS Expert	1
17.	Interoperability Expert	1
18.	Deployment Expert	1
19.	Software Trainer	4
	Totals	56

Note: Please consider, the above-mentioned project team composition has been proposed here mentioning minimum size of team with required HR positions for evaluation only. Vendor may propose any additional HR positions as per their SDLC methodology and work plan in the technical proposal as their plan.

6.5. Quality Attributes and Assurance

The Quality attributes and Assurance plan will describe the standards, processes and procedures in this ERP application development life cycle which will be used to support the consistent delivery of high-quality, professional standard ERP application in the support of



an automated environment. The quality assurance process will be concerned with establishing the authority of the QA function, quality assurance standards, procedures, policies, and monitoring, and evaluation processes to determine quality in relation to established standards. Quality assurance activities will concentrate on the prevention of problems through the continuous improvement of processes.

In order to provide high quality products and services, each support team will adhere to processes, procedures and standards. Quality Assurance (QA) is a process used to monitor and evaluate the adherence to processes, procedures, and standards to determine potential product and service quality. It will involve reviewing and auditing the products and activities to verify that they comply with the applicable procedures and standards, and will assure the appropriate visibility for the results of the reviews and audits. Please note that this application will be tested in Software Quality Testing and Certification (SQTC) center of ICT Division.

The vendor is requested to provide an extensive **“Quality Assurance Plan”** with measurable attributes of this ERP development life cycle in their technical proposal.

6.6. Data Management and Migration of Legacy Data

Under the process of service to e-Service transformation, during ERP activation or deployment, it might be necessary to move the legacy data of prevailing services. In that case, the vendor may require to perform different relevant activities that may include softcopy conversion, data filter, data cleansing, data verification, data processing, data entry (master data only), data migration and overall data management. Here, it is expected that, the vendor will propose their detailed **“Data Management and Data Migration Plan”** for this ERP application considering the estimation of legacy data mentioned below which will be required to migrate into the developed application.

Data About	Description	No of Pages	of Current Status	Amount of Data	of Dependency

The plan may cover amount of data to be migrated, activities to be performed, the amount of resources to be used, required time for different data migration phases for different activities (hardcopy to softcopy conversion, data entry (master data only), data transformation from soft copy, data filtration, data cleaning, data verification) etc.

6.7. System Audit

This ERP system will maintain an audit trail of any changes or updates made in any information that are considered as vital and should maintain the audit log with information such

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1. Log the users who are accessing the system
2. Log the parts of the application that are being accessed
3. Log the fields that are being modified
4. Log the results of these modifications
5. Log the attempted breaches of access
6. Log the attempted breaches of modification rights
7. Timestamp.

It should be ensured that an audit trail is kept for all transactions and all audit transactions logged are kept on the trail file or trail database from where system can generate different audit reports as and when required.

Vendor is requested to submit their proposed "**Audit Plan**" including strategy & standard measures in their technical proposal.

6.8. Training Plan

In case of ERP successful implementation, user training plays one of the most vital roles in the entire implementation cycle. Vendor must consider government culture, ICT literacy & expertise at the time of designing user training plan for the ERP implementation. Based on the requirements, target prospective participants and implementation scope, vendor may plan for user training in 3 different modalities i.e. 1) User Training for 200 persons, 2) System Admin Training for 5 persons, 3) Management Training for 25 persons. The vendor is requested here to submit a detailed "**Training Plan**" in their technical proposal considering the following:

Please note that, the training infrastructure like venue will be provided by the implementation organization (EDCL). Vendor will provide training Manuals & Materials (Folder, Pen, Pad), Lunch & Refreshment Cost & Honorarium.

Training on the Use and Operation

To ensure successful adoption and efficient utilization of the ERP system by EDCL personnel, comprehensive training programs must be delivered covering all aspects of system use, administration, and maintenance. The training will be designed to accommodate users with varying levels of technical proficiency and job responsibilities.

Training Needs Assessment

- Conduct an initial assessment to identify training needs for different user groups, including end-users, supervisors, department heads, and IT support staff.
- Tailor training content to align with users' roles, focusing on relevant modules and functionalities.

Training Program Structure

- **User Training:**
Detailed hands-on sessions for all ERP modules relevant to users' job functions, such as finance staff, HR personnel, procurement officers, production supervisors, and maintenance teams. Training will cover routine operations, data entry, report generation,



and troubleshooting basic issues.

- **Administrator Training:**
Specialized sessions for system administrators and IT staff on configuration, user access control, system maintenance, backups, and troubleshooting.
- **Supervisory and Management Training:**
Focus on decision-making tools such as dashboards, reporting, approvals, and workflow management.

Training Materials and Documentation

- Develop user manuals, quick reference guides, FAQs, and video tutorials in both English and Bangla.
- Provide access to an online knowledge base or helpdesk portal for ongoing support and refresher training.

Training Delivery Methods

- **Classroom Training:**
In-person sessions at EDCL premises or designated training centers.
- **Virtual Training:**
Online webinars and interactive remote sessions for dispersed teams or to support follow-up training.
- **On-the-Job Training:**
Practical guidance and coaching during initial live use of the system.

Training Evaluation and Feedback

- Conduct assessments, quizzes, or practical exercises to evaluate understanding and competency.
- Gather user feedback to identify gaps and improve future training sessions.

6.9. End User Engagement

End user engagement is very important for ERP implementation. Vendor should measure involvement of end users during development and the constant incorporation of feedback to provide high-quality end-user experience satisfying usability test. Based on different types end-user group, vendor may require to consider the following at the time of preparing "End-User Engagement Plan" which is required to be submitted with the technical proposal,

1. Purpose of end-user engagement.
2. For ensuring end-user behavior, proposed method & activity.
3. Define indicators & factors of the outcome for end-user engagement.
4. Determining area & boundary of end-user's Engagement & the degree of involvement.

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5. Mentioning vendors & implementing organization's roles in engaging end-users for large scale implementation.

6.10. Risk Management

Software development is an activity that uses a variety of technological advancements and requires high levels of knowledge because every software development project contains elements of uncertainty. This is known as project risk. The success of a software development project depends quite heavily on the amount of risk that corresponds to each project activity. As a project manager, it's not enough to merely be aware of the risks. To achieve a successful outcome, they must identify, assess, prioritize, and manage all of the major risks. A standard risk management process includes the following steps:

1. **Identify** risks and their triggers
2. **Classify** and prioritize all risks
3. Craft a **plan** that links each risk to a mitigation
4. **Monitor** for risk triggered during the project
5. Implement the **mitigating action** if any risk materializes
6. **Communicate** risk status throughout project

The vendor should submit a "Risk Management Plan" addressing all types of risks including above mentioned steps following standard risk management principles and their mitigation plan

6.11. Expected Deliverables

Considering the scope of services and work of this project and based on the proposed project development & implementation methodology (SDLC), the vendor is requested to submit a comprehensive "Project Deliverables Plan" in their technical proposal describing the SDLC phase/steps/action wise timeline-based deliverables mentioning different formats and types.

For better clarification, some of the deliverable's examples are mentioned below:

1. Project Inception Report
2. Project Management Plan
3. System Requirement Specification (SRS)
4. System Design Document (HLD and LLD as SDD)
5. Complete Source Code
6. Test Plan with Testing Reports
7. Integration Plan and Reports
8. Mobile Application (Android and iOS)
9. Web Application
10. SLA

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6.12. Copyright

Essential Drugs Company Limited shall be entitled to all proprietary rights including but not limited to patents, copyrights and trademarks, with regard to many Vendors.

All kinds of source codes and other approved documents (all kinds of deliverables) which bear a direct relation to or are made in consequence of the services provided by the vendor under this scope of this TOR will be owned by Essential Drugs Company Limited.

At the request of the Essential Drugs Company Limited, the vendor shall assist in securing such property rights and transferring them in compliance with the requirement of the applicable law. After the completion of the project, such rights will be handed over to the Essential Drugs Company Limited that will be produced at the time of entire system development and implementation life cycle under the scope of this TOR and will be owned by Essential Drugs Company Limited.

The vendor should properly deliver the entire approved source codes and other deliverables to the Essential Drugs Company Limited. The vendor cannot claim any royalty or authority of any sort in case of replicating the source code or database or any other deliverables under this TOR for any future use that Essential Drugs Company Limited and the Government of Bangladesh may see fit.

Any studies, documents, reports, graphics or other materials prepared by the vendor for this project under this TOR shall belong to and remain the property of Essential Drugs Company Limited.

6.13. Maintenance and Support Service

The selected vendor will require to provide maintenance and support service for this developed, deployed ERP application. After the development and deployment phase as soon as the application goes Live, having consent and acceptance from the implementing organization, immediately the implementation phase will be started including the maintenance and support service. Vendor will require to provide maintenance and support services plan for next **5 (Five) years**. If this project is divided into multiple parts (as planned), then maintenance phase will be started from the implementation independently for each part. Here it is expected that, the vendor must provide a detailed **"Maintenance and Support Service Plan"** including proposed SLA in the technical proposal.

Support & maintenance plan should be comprehensive and well elaborated to ensure proper support to the end users. Apart from above mentioned issues, if vendor thinks any other issue/method should be included in their plan which assures proper standard support & maintenance of this ERP application which is suitable for implementing organization, it would be considered as added value addition.

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Note: Please note that submitting the “SLA” plan by the vendor will be one of the major deliverables of the maintenance plan before the expiration to the organization including extensive feasibility study. Here vendor is requested to add this as a deliverable in the **“Project Deliverables Plan”** Plan that is going to be submitted by the vendor with the technical proposal.

6.14. Performance Review

As per the predefined performance review plan of different stages of SDLC, the vendor will take necessary actions so that it will be possible to evaluate the performance at different levels of their activities and the deliverables based on indicators/factors precisely. Those indicators, standards and factors for performance evaluation have to be defined earlier at the time of project management plan. Here vendor is requested to submit a proposed **“Performance Review Plan”** for the entire design, development, and implementation cycle mentioning the indicators, measuring strategy and expected review scopes.

6.15. Knowledge Transfer

The Knowledge Transfer Plan should provide a comprehensive approach to transfer the responsibility for maintenance and operations from the vendor to implementing organization or their nominated agency. While designing a smooth, efficient and effective **“Knowledge Transfer Plan”** vendor should consider the following:

- Strategies, methods, milestones, schedules & their duration of accomplishing target.
- Vendor will propose required technical capacity, number of resources mentioning their roles & responsibilities from implementing agency to carry forward this plan.
- Vendor will need to identify the risks, craft a mitigation & contingency plan.
- Vendor needs to propose a method of evaluating & verification of the standard of knowledge transfer plan.

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 Lutful Musyadd
 Samir J. A.