Optimizing Asset Transfer Process in ERP Using Business Process Management Technique

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***Abstract*—Enterprise Resource Planning (ERP) systems are critical for managing enterprise-wide business processes, including asset management. Yet, many ERP platforms lack efficient mechanisms for bulk asset transfers, leading to high manual effort, increased costs, and data inconsistencies. This study applies Business Process Reengineering (BPR) techniques as the methodology to optimize ERP asset management, focusing on workflow optimization and automation, contributing both practical and methodological insights. A mixed-method approach was adopted, analyzing a financial organization with 256 branches and over 450 Oracle ERP users. Data from 51 representative branches identified inefficiencies such as manual transfer delays, approval bottlenecks, and synchronization issues. The proposed solution introduces automated bulk asset transfers, optimized approval workflows, and real-time data synchronization, along with new metrics for evaluating efficiency, compliance, risk, and asset utilization. Compared to the As-Is system, the reengineered framework achieved a 100% reduction in operational costs per user ($7,500 annual saving), an 80% reduction in compliance incidents, a 67% reduction in asset transaction errors, and a 20% improvement in asset utilization. These results demonstrate a scalable, adaptable, and effective framework that enhances ERP operational efficiency, strengthens data integrity, and advances both academic understanding and industrial practice of asset management process reengineering.**

Keywords*—Asset management; bulk asset transfer; Business Process Reengineering (BPR); Enterprise Resource Planning (ERP); workflow optimization

TABLE I. ABBREVIATIONS

Abbreviations	Meaning
BPM	Business Process Management
BPR	Business Process Reengineering
ERP	Enterprise Resource Planning
GRN	Good Receive Note
IT	Information Technology
BPO	Business Process Outsourcing
KPI	Key Performance Indicator
UAT	User Acceptance Testing
PL/SQL	Procedural Language/Structured Query Language
BPMN	Business Process Model and Notation
AI	Artificial Intelligence
TQM	Total Quality Management
DMAIC	Define, Measure, Analyze, Improve, and Control
APEX	Oracle Application Express
HTML5	Hypertext Markup Language version 5
BPMM	Business Process Maturity Modeling
Forward Integration	Syncing data from Oracle fusion to the developed system
Reverse Integration	Real-time synchronization of data from developed system to Oracle fusion back

ABBREVIATIONS

Table I shows the abbreviations that are used in this manuscript.

I. INTRODUCTION

The current As-Is asset management process in Enterprise Resource Planning (ERP) systems faces several inefficiencies that hinder operational effectiveness. These inefficiencies arise primarily from the absence of a bulk asset transfer feature, which requires users to process asset transfers individually—making the process time-consuming and prone to human error. Manual interventions and repetitive tasks contribute to operational delays, increased labor costs, and data inconsistencies, necessitating a comprehensive overhaul through Business Process Reengineering (BPR).

Several studies and implementation reports have highlighted enhancements to the asset transferring process in Oracle Cloud ERP, aiming to improve efficiency and accuracy through automation and streamlined workflows. However, these contributions primarily focus on incremental improvements to existing processes rather than a holistic redesign. Moreover, the literature provides limited evidence regarding the effectiveness of these enhancements, with insufficient methodological details or empirical validation to demonstrate measurable performance gains. Consequently, there remains a significant research and practical gap in optimizing the asset transfer process itself—particularly in enabling bulk transfer capabilities. Addressing this gap through a reengineered, BPR-driven approach introduces a clear element of novelty by systematically enhancing efficiency, automation, and integration within the asset management lifecycle [1].

This strategic approach focuses on radically redesigning an organization's core processes to achieve significant improvements in performance, efficiency, and operational outcomes. In the context of asset management, BPR plays a crucial role in workflow optimization, reducing manual intervention, and enhancing data accuracy. By reengineering asset transfer processes, particularly in large organizations utilizing ERP systems, it becomes possible to efficiently manage complex asset movements across multiple locations.

A. Research Gap

Although ERP systems are designed to integrate and automate enterprise-wide processes, most lack built-in capabilities for bulk asset transfers and customizable approval workflows. Existing studies primarily focus on process automation or ERP customization in general, with limited attention to optimizing asset transfer workflows using BPR principles. This research fills that gap by developing and evaluating a reengineered, workflow-optimized bulk asset transfer mechanism integrated with real-time synchronization and enhanced approval processes within Oracle ERP.

B. Statement of the Research Problem

The current ERP asset management modules do not provide efficient mechanisms for bulk asset transfers, resulting in manual, time-intensive processes that cause operational inefficiencies, increased costs, and potential data inconsistencies. The lack of workflow automation and integration between asset movement and approval mechanisms further limits performance. Therefore, there is a need to reengineer the existing asset transfer process to enable automation, workflow optimization, and seamless integration within ERP environments.

C. Research Questions

- How can Business Process Reengineering (BPR) be applied to optimize the asset transfer process within ERP systems?
- What improvements in workflow efficiency, data accuracy, and operational cost can be achieved through the implementation of an automated bulk asset transfer feature?
- How can forward and reverse integration mechanisms enhance synchronization and data consistency in reengineered ERP modules?

D. Research Significance

This research contributes to both theory and practice by bridging a critical gap in ERP asset management. The proposed BPR-driven bulk asset transfer solution introduces a scalable framework for workflow optimization, automation, and integration across ERP systems. It benefits organizations by improving process efficiency, reducing manual workload, enhancing data accuracy, and providing a model that can be adapted by other enterprises facing similar limitations. The outcomes also support ERP vendors and practitioners in extending native ERP capabilities without additional licensing costs, promoting cost-effective digital transformation within enterprise environments.

E. Research Objectives

The primary objective of this research is to identify and reengineer inefficiencies in the existing asset management process within ERP systems in a selected financial institution.

The sub-objectives of this research include:

- To perform a detailed analysis of the As-Is process of asset transfer in the selected financial organization using the Oracle ERP system.
- To develop the proposed system using Oracle APEX and other technologies with forward and reverse integration mechanisms.
- To use Business Process Reengineering tools, we are going to perform a detailed analysis of the developed system for asset transfers in the selected financial organization using the Oracle ERP system.
- To identify the metrics for measuring the success of the developed system.

This study focuses on the reengineering of bulk asset transfers, reverse integration, and workflow automation within ERP systems. Additionally, it examines enhancements in user security and privilege management to ensure that access to sensitive asset-related information is restricted to authorized personnel. However, the scope of this research is confined to implementations within the ERP environment.

II. Literature Review

A. Business Process Reengineering (BPR) in ERP Systems

Enterprise software such as Enterprise Resource Planning (ERP) systems are essential for modern businesses as they integrate core functions such as finance, supply chain, HR, and customer management into a centralized platform. By automating workflows and improving data accuracy, ERP enhances operational efficiency, reduces costs, and supports better decision-making through real-time analytics [2]. ERP systems also provide scalability and adaptability, enabling enterprises to respond to market changes effectively. Their ability to streamline processes and ensure data consistency makes them critical tools for business growth and sustainability [3], [4].

Some studies explore cloud ERP using an integrative model combining the Technological, Organizational, and Environmental (TOE) framework and the Unified Theory of Acceptance and Use of Technology (UTAUT), which identifies key adoption factors such as system reliability, data security, cost efficiency, scalability, and accessibility. These insights are useful for optimizing ERP's asset transfer module, emphasizing security, efficiency, and seamless cloud integration [5].

Business Process Management (BPM) is an approach for improving and optimizing an organization's processes to achieve more efficient workflow and better outcomes. BPM involves analyzing, modeling, implementing, monitoring, and continuously improving business processes. By aligning processes with business objectives, the BPM enhances productivity, reduces costs, and improves agility. It often integrates various tools and methodologies, including automation, analytics, and performance metrics, to drive process improvements across departments and organizational levels. Effective Business Process Management (BPM) ensures a streamlined approach to achieving business goals and adapting to changes [6] Business Process Reengineering (BPR) is a branch of Business Process Management. It was designed to achieve significant improvements in efficiency and performance by fundamentally rethinking and redesigning core business processes. Rather than making incremental changes, BPR focuses on eliminating inefficiencies, optimizing workflows, and enhancing the overall operational effectiveness. This transformation has lead to

improvements in cost reduction, productivity, service quality, process speed, and overall business agility. Since business environments are constantly evolving, BPR is not a one-time initiative but an ongoing effort that requires continuous evaluation and adaptation to maintain competitive advantage [7].

The implementation of BPR begins with a comprehensive analysis of the existing processes to identify inefficiencies, bottlenecks, and areas for improvement. This analysis informs strategic decisions, such as process automation, workflow optimization, business process outsourcing (BPO), or redefining third-party roles. A key aspect of BPR is leveraging information technology (IT) to automate repetitive tasks, restructure workflows, and eliminate non-value-added activities, thereby enabling seamless process execution and improved decision-making [7].

By rethinking and redesigning business processes, organizations can modernize operations, enhance customer service, reduce operational costs, and improve their adaptability to market shifts. When implemented effectively, BPR enables enterprises to remain competitive in dynamic business environments by continuously optimizing their operational frameworks [8]. Evaluating the success of Business Process Reengineering (BPR) initiatives in Enterprise Resource Planning (ERP) systems requires a set of measurable key performance indicators (KPIs). The most commonly used metrics are "cost savings, process cycle time reduction, data accuracy, operational efficiency, and customer satisfaction". Among these metrics, the Business Process Reengineering (BPR) is mainly focuing on "cost reduction" through process efficiency. Organizations measure cost savings by analyzing reductions in labor costs, maintenance expenses, and inventory carrying costs [9]. The other main metric is the "Process Cycle Time Reduction" where it assesses the impact of Business Process Reengineering (BPR) on the speed of business operations. Companies experience faster processing times by automating workflows and eliminating redundant steps. As mentioned above, accurate real-time data are essential for decision-making. BPR initiatives often implement data validation rules, automation, and system integrations to minimize human errors. The effectiveness of these measures is evaluated by tracking data discrepancies, error rates in financial reporting, and compliance adherence within ERP systems [10]. Rather than the above metrics, organizations assess improvements in workforce productivity by analyzing reductions in manual effort and increases in task automation. Productivity gains are often measured using employee performance benchmarks, transaction processing speeds, and system response times after BPR implementation. Based on the assessment of the above KPIs, a successful BPR initiative should enhance customer experience by improving service delivery. Metrics such as response times, and customer feedback scores provide insight into how process reengineering influences end-user satisfaction [11].

The literature on ERP systems, asset management, and Business Process Reengineering (BPR) provides valuable insights into improving enterprise operations through automation and workflow optimization as mentioned above. Previous studies have focused on ERP implementation challenges, process automation, and performance enhancements, but they often address these topics in general terms without targeting the specific inefficiencies in asset transfer processes. Notably, most ERP platforms lack native support for bulk asset transfers, forcing organizations to rely on manual, time-consuming processes prone to errors and delays. While some research has explored workflow redesign or integration strategies, there is limited empirical evidence demonstrating the combined effect of workflow optimization, automation, and real-time data synchronization in reengineering ERP asset management modules [1]. This study addresses that gap by proposing a novel, BPR-driven framework that integrates bulk asset transfer mechanisms, optimized approval workflows, and forward-reverse system integration. The research contributes to both theory and practice by offering a scalable, adaptable solution that improves operational efficiency, strengthens data integrity, and reduces labor costs—demonstrating a significant advancement over existing approaches in ERP process optimization.

B. Asset Management Processes

Enterprise Resource Planning (ERP) is a comprehensive software solution that integrates various business processes such as finance, production, and sales—into a unified system. Within an ERP system, asset management refers to the structured approach of managing an organization's physical assets, including machinery, equipment, and vehicles, throughout its lifecycle. This encompasses key processes such as asset acquisition, operation, maintenance, and disposal to ensure optimal utilization and efficiency. Effective asset management in ERP systems is essential as it centralizes asset-related data and integrates it with other critical business functions, such as finance, procurement, and maintenance. This integration provides real-time visibility into asset performance, cost tracking, and maintenance schedules, enabling organizations to maximize asset utilization, reduce operational costs, and improve decision-making. Businesses that manage and track their assets effectively across multiple departments benefit from enhanced productivity, streamlined operations, and improved financial reporting [12].

Standard ERP applications often require customization to align with an organization's operational needs. Customized integration plays a crucial role in enhancing asset management workflow, approval processes, and data accuracy. While most ERP systems provide basic asset management functionalities, organizations requiring advanced asset tracking, real-time data synchronization, or customized reporting must implement custom modules, modify existing functionalities, or integrate third-party software [13]. Asset management is critical for large enterprises that manage extensive inventories across multiple locations. However, the literature highlights several challenges, including:

- Inefficient manual processes that slow down operations.
- Lack of real-time data synchronization, leading to inconsistencies in financial reporting.
- Complexity in managing large-scale asset transfers across multiple locations.

Modern asset management strategies increasingly prioritize sustainability by incorporating lifecycle cost management

and reliability-centered maintenance. Organizations now emphasize long-term cost reduction and environmental impact minimization through efficient asset utilization and responsible disposal strategies. The evolution of topic modeling in asset management research further highlights a shift towards advanced analytics, predictive maintenance, and AI-driven decision-making [14]. ERP automates key asset management processes such as asset transfers, additions, disposals, and reclassifications. These automated workflows minimize manual errors and enhance operational efficiency. The system seamlessly integrates with ERP applications such as payables, project costing, and ledger accounting, ensuring accurate data flow and financial reconciliation. Additionally, assets provide robust reporting tools, offering organizations greater visibility, control, and compliance over their assets throughout their lifecycle [15], [16].

Security is a ERP-based asset management. The literature underscores the importance of integrating security protocols into ERP systems to safeguard sensitive business data and operational integrity. A well-defined security framework ensures access control, compliance with industry regulations, and protection against cyber threats. Research highlights the necessity of embedding IT and corporate security measures into ERP systems to create a holistic, organization-wide security strategy. This approach enhances business process continuity, data governance, and system reliability across multiple operational domains, including technology, communication, and functionality [17].

Cloud-based ERP solutions have changed asset transfer and management by increasing scalability, accessibility, and real-time data analytics. In distributed enterprises, where assets are regularly moved between locations, cloud ERP provides centralized, automated, and intelligent solutions for tracking, validation, and compliance.

1) Scalability for large-volume asset related data: Traditional ERP systems often struggle to handle large-scale asset management related data owing to system limitations and manual processing. Cloud-based solutions, dynamically scale to accommodate high-volume asset related data across multiple locations. This prevents the challenges associated with traditional on-premises ERP setups, ensuring that businesses can quickly reallocate assets without disrupting their operations.

2) Accessibility for real-time asset tracking: One of the biggest challenges in asset management is ensuring that all stakeholders have real-time access to the asset transfer data. Cloud-based ERP solutions provide anytime and, anywhere visibility of asset locations, movement status, and transfer history. This is particularly beneficial for enterprises that, manage assets across multiple regions, warehouses, and business units.

3) Real-time data analysis for decision making: Cloud ERP systems utilize AI-driven analytics and machine learning to optimize asset transfers and management decisions. Organizations can predict asset availability based on past transfer patterns, identify idle assets for reassignment, and automate depreciation and cost adjustments during transfer.

C. BPR Methodologies

In Business Process Reengineering (BPR) and system analysis, the As-Is system refers to the current state of business processes and systems as they exist today. This includes the existing workflows, tools, and technologies utilized within an organization. The primary goal of As-Is analysis is to gain a comprehensive understanding of current operations, identifying inefficiencies, bottlenecks, and manual interventions that hinder performance. By analyzing the As-Is system, businesses can pinpoint areas for improvement, such as outdated processes, redundant tasks, and missing functionalities that lead to operational slowdowns and inconsistencies [18]. In contrast, the developed system represents the optimized future state of the current system after reengineering, and improvements have been implemented. It defines how processes should function once redesigned to eliminate inefficiencies, enhance automation, and optimize workflow. The framework of developed system focuses on integrating advanced technologies, automating repetitive tasks, and improving process accuracy, ultimately leading to cost reductions, enhanced scalability, and improved organizational efficiency. This future-state model serves as a roadmap for transformation, ensuring that the organization operates in a streamlined and sustainable manner [18].

In BPR, the As-Is and To-Be frameworks are essential for diagnosing inefficiencies and designing optimized workflows. The As-Is process documents current business processes, highlighting bottlenecks, redundancies, and areas for enhancement. For asset management, the As-Is state is often characterized by manual, error-prone processes that lack real-time synchronization. The To-Be framework, on the other hand, envisions an optimized asset management process where automation, system integration, and advanced security controls improve efficiency, accuracy, and data consistency. Pereira and Silva (2020) emphasized the importance of analyzing the As-Is state to fully understand data synchronization challenges and inefficiencies in asset transfer processes. Transitioning from As-Is to To-Be requires redesigning workflows, improving system interoperability, and implementing role-based access controls to secure asset data and enhance the operational efficiency. The literature provides Numerous case studies have demonstrated successful BPR-driven transitions from manual to automated asset management systems, resulting in significant improvements in cost savings and workflow efficiency.

Prior research presented a quantitative verification approach for optimizing design models using Business Process Model and Notation (BPMN) and transforming them into improved models [19]. It addresses timed constraints, probabilistic tasks, and dependencies between activities in the processes. This technique helps designers identify operational gaps, time issues, and flaws, thereby ensuring a more effective process design [20].

Several Business Process Reengineering (BPR) methodologies have been applied to asset management within ERP-integrated environments, each offering unique advantages in optimizing asset workflows, reducing inefficiencies, and enhancing data-driven decision-making. Among these methodologies, Business Process Maturity Modeling (BPMM) can be used to evaluate the As-Is asset transfer process and new asset transfer process in the developed system. Previous research has specified that the Business Process Maturity Model (BPMM) is a structured framework used to assess and improve the efficiency, standardization, and automation of business processes. Originating from process maturity models such as the Capa-

bility Maturity Model (CMM), BPMM provides a systematic approach to evaluating the current state of a business process and identifying areas for improvement. Categorizing processes into five distinct maturity levels—initial, Managed, Defined, Quantitatively Managed, and Optimizing—BPMM enables organizations to transition from ad hoc, manual processes to fully automated, data-driven decision-making systems [21].

Among the other methodologies, Lean focuses on eliminating waste and streamlining asset management processes by removing non-value-added activities such as redundant approvals, excessive manual data entry, and delays in asset transfers [22]. In ERP-integrated asset management, Lean principles enable faster asset tracking, optimized maintenance schedules, and reduced downtime by ensuring that resources are efficiently allocated [23].

Six sigma, a data-driven methodology, enhances ERP-integrated asset management by minimizing errors in asset tracking, valuation, and transfer processes [24]. Using the Define, Measure, Analyze, Improve, and Control (DMAIC) framework, Six Sigma ensures that asset data remains accurate, eliminating inconsistencies that could affect financial reporting and compliance. Organizations implementing Six Sigma in ERP-based asset management benefit from predictive maintenance models, optimized asset utilization, and reduced lifecycle costs [25].

More over, Kaizen, which emphasizes continuous improvement, plays a crucial role in ERP-integrated asset management by encouraging incremental process enhancements. Organizations adopting Kaizen-driven asset management continuously refine workflows, such as real-time asset tracking, proactive maintenance alerts, and automated asset reconciliation, ensuring that ERP systems evolve with business needs while reducing operational risks [26].

Rather than the above methodologies, Agile BPR is particularly effective for dynamic asset management environments where assets frequently move across locations or undergo rapid reallocation [27]. By implementing iterative process improvements, Agile BPR ensures that ERP-integrated asset workflows remain flexible, enabling faster asset transfers, improved collaboration among departments, and adaptive compliance frameworks. Agile methodologies also enhance cloud-based ERP integrations, where businesses need real-time analytics and automated decision-making for asset lifecycle management.

However, Total Quality Management (TQM) focuses on a comprehensive process control across asset management operations. When integrated into ERP systems, TQM ensures standardized asset tracking protocols, regulatory compliance, and high-quality data integrity across departments. TQM-driven ERP systems automate asset depreciation calculations, optimize audit trails, and enhance approval workflows, minimizing manual intervention and compliance risks [28].

Rather than the above methodologies, the t-test and Analysis of Variance (ANOVA) will be used to analyze the success metrics of the proposed system, which are statistical methodologies used to compare the means between groups. As in prior research, A T-test is typically used when comparing the means of two groups to determine if there is a significant difference between them [29]. This comes in two main forms: the independent t-test (for comparing two independent groups) and the paired t-test (for comparing two related groups, such as pre-test and post-test data). On the other hand, ANOVA is used when comparing means across three or more groups to assess whether at least one group differs significantly from the others. Unlike multiple t-tests, which increase the risk of Type I errors, ANOVA controls for this error rate and provides a more reliable comparison. The most common form is one-way ANOVA, which examines one independent variable, whereas two-way ANOVA analyzes two independent variables and their interactions. Both methodologies assume normality and homogeneity of variances which will be properly used in the research.

When applied to ERP-based asset management, each BPR methodology contributes to a more efficient, automated, and data-driven approach. While Lean and Agile BPR enhance flexibility and process adaptability, Six Sigma and TQM provide structured, quality-focused improvements. Kaizen ensures continuous refinement, making ERP systems more responsive to business changes. The hybrid approach of Lean Six Sigma is particularly effective in large-scale ERP implementations, ensuring both process efficiency and data accuracy in asset management operations.

D. Asset Management Technologies

The Asset Management Modules of ERP systems lack critical functionalities for efficient bulk asset transfers, creating significant operational inefficiencies. The current system requires manual, one-by-one asset transfers, making the process time-consuming, labor-intensive, and prone to errors, especially for organizations managing large-scale asset inventories. Additionally, the absence of automated approval workflows forces users to rely on email and manual approval, leading to delays and compliance risks. Another major limitation is the lack of real-time data synchronization, resulting in inconsistencies between transferred assets and system records, which affects financial reconciliation and decision-making.

Furthermore, the high licensing costs for user management make it expensive for organizations to assign and control user roles efficiently. ERP systems also lack a dedicated budgeting module for asset transfers, which makes financial planning and expenditure tracking challenging. Finally, the reporting and audit trail features in the current system are insufficient for organizations that require comprehensive tracking of asset movements and compliance monitoring.

This research addresses these critical gaps by developing the Oracle Asset Transfer Suite, an enhanced module designed to introduce bulk asset transfer capabilities, automated approval workflows, real-time data synchronization, cost-effective user management, budget tracking, and advanced reporting functionalities, ensuring efficiency, cost reduction, and improved data accuracy in Oracle ERP's asset management processes according to the use case we selected with the financial institute in Sri Lanka.

Research indicates that leveraging technologies such as Oracle APEX for application development, JavaScript for dynamic user interfaces, and PL/SQL for efficient database operations significantly improves workflow automation, data

accuracy, and operational efficiency [30]. Additionally, advanced analytics tools, such as Power BI, have been integrated into asset management systems to enhance decision-making, provide actionable insights, and optimize process performance.

III. Research Methodology

This study employs a mixed-method approach, integrating both qualitative and quantitative methods, to conduct a comprehensive analysis of asset management processes within Oracle ERP. The qualitative approach focuses on gathering insights from key stakeholders through interviews, observations, and process evaluations to identify inefficiencies, bottlenecks, and user challenges in the current As-Is system. The quantitative approach involves collecting and analyzing system performance data, including process times, error rates, and asset utilization statistics, to assess the effectiveness of both existing and developed system. By combining these two approaches, this study ensures a holistic understanding of the asset management process, capturing both subjective user experiences and objective performance metrics that inform the re-engineering of asset workflows. This methodology enables data-driven evaluation of process improvements, ensuring that the proposed solutions enhance efficiency, accuracy, and automation.

To conduct this study, a representative sampling method was employed. The total population considered in this study consisted of 256 branches distributed across nine provinces of Sri Lanka. A 20% sample was selected from this population to ensure a representative subset for analysis. The sample size was calculated using Eq. (1) below.

$$Samplesize = 20/100 * 256 = 51.2 \quad (1)$$

Because the sample size must be a whole number, it was rounded to 51 branches. Thus, the research findings and analysis were based on a sample of 51 branches drawn from the entire population. The selected 51 branches were distributed among the nine provinces as follows:-

- Western Province – 10 branches (21.28%)
- Eastern Province – 8 branches (17.02%)
- Northwestern Province – 7 branches (14.78%)
- Northern Province – 5 branches (10.64%)
- North Central Province – 5 branches (10.64%)
- Central Province – 4 branches (8.51%)
- Sabaragamuwa Province – 3 branches (6.38%)
- Southern Province – 3 branches (6.38%)
- Uva Province – 2 branches (4.26%)

This distribution ensures that all provinces are represented in the study, while maintaining proportionality relative to the total number of branches in each region. The sampling approach enhanced the validity and generalizability of the research findings by capturing variations across provinces.

A. Data Collection Methods

The researchers will rely on both primary and secondary data sources from a reputed financial institution in Sri Lanka to analyze the current asset management process of Oracle ERP and develop an optimized solution.

1) Primary data collection:

a) Direct observations: Systematic observations of current asset management workflows are conducted to identify inefficiencies, manual interventions, and synchronization issues in the As-Is process. This will provide real-world insights into operational challenges during asset transfers and system integration.

b) Interviews with key stakeholders: Semi-structured interviews will be conducted with approximately five key stakeholders, including asset managers, IT personnel, and finance teams, to gain qualitative insights into the limitations of the existing Oracle ERP system and expectations of the developed system. These interviews focused on pain points, process delays, security concerns, and system usability.

c) User surveys: A structured survey was distributed to approximately 20 Oracle ERP users within the institution. The survey collects quantitative data on system performance, user satisfaction, error rates, and perceived inefficiencies. The results will help validate the findings from the observations and interviews, while providing a broader perspective on system challenges.

2) Secondary data collection:

a) Historical data and system logs: An analysis of historical asset transfer logs, ERP performance reports, and system audit trails will be conducted to quantify existing inefficiencies. This will serve as a baseline for comparing As-Is and developed systems and help in designing a customized asset transfer module.

b) ERP documentation and regulatory guidelines: A review of system documentation, compliance standards, and financial regulations relevant to asset management will be conducted to ensure that the proposed reengineering aligns with the best practices and industry requirements.

This structured data collection strategy ensures a comprehensive evaluation of existing inefficiencies, providing the foundation for an optimized, automated, and secure asset management solution within Oracle ERP.

B. Process Mapping Techniques to Model the Business Processes

To systematically analyze and optimize the asset management workflow, this study employs flowchart, Business Process Model and Notation (BPMN) Diagrams, and Swimlane Diagrams to map both As-Is and improved processes. These tools provide a structured, visual representation of process flows, enabling the identification of inefficiencies, manual interventions, and areas for automation [31]. Flowcharts are used to visually represent the step-by-step sequence of the current asset management process. Each step illustrates the flow of actions, decision points, and manual interventions, providing a clear, high-level overview of the existing workflow. This will help pinpoint bottlenecks, repetitive tasks,

and redundant approvals that contribute to inefficiencies, such as delays in asset transfers or excessive manual data entry. Additionally, these flowcharts will serve as discussion aids during stakeholder interviews and surveys, facilitating the identification of pain points in the current system. Moreover, Business Process Model and Notation (BPMN) diagrams were employed to provide a detailed, standardized representation of both the As-Is and improved processes. The BPMN enables the modeling of complex workflows, incorporating elements such as: activities (tasks performed at each stage), decision points (approval or rejection conditions), and data flows (information exchange across departments). By leveraging the BPMN, this study documents the current inefficiencies in asset management workflows and identifies opportunities for process reengineering. In particular, BPMN diagrams of developed system highlight automation opportunities, such as automated approval workflows to reduce manual interventions, system-driven asset tracking for improved real-time synchronization, and enhanced Oracle ERP integration to eliminate redundant data entry. This structured mapping ensures that every step in the process is carefully analyzed, allowing for a well-defined transformation strategy. In addition, swimlane diagrams will be utilized to clearly define the roles and responsibilities of the various departments and stakeholders involved in asset management. By mapping the interactions between different entities, swimlane diagrams will help identify gaps in communication and workflow handovers, highlight role-based inefficiencies, such as duplicated approvals or unclear accountability, streamline the improved process by redistributing responsibilities and automating handoffs, and ensure a more structured and, efficient workflow for asset transfers.

By incorporating these process mapping tools, the study will create a comprehensive blueprint for optimizing asset management workflows within Oracle ERP, ensuring a data-driven, well-documented transition from the As-Is to the improved process state.

1) Criteria for analysis: The criteria listed in the Tables II, III, and IV will be used to evaluate the As-Is process and design the optimized To-Be process.

By following this methodology, this study comprehensively evaluates the current asset management process and proposes a reengineered solution that improves efficiency, reduces costs, and mitigates risks, while leveraging technology to achieve an optimized To-Be state.

TABLE II. SUMMARY OF PROBLEMS IN AS-IS PROCESS

Category	Asset Transfer Process is Too Long	High Manual Data Entry	Repeated Processes	Unnecessary Processes	Repetitive Tasks
Quantity				✓	
Eliminate	✓		✓		
Combine			✓		
Separate	✓				
Simplify	✓				
Automate	✓	✓			✓

TABLE III. SUMMARY OF PROBLEM AREAS IN AS-IS ASSET MANAGEMENT

Problem Area	Impact on Efficiency	Potential Solution	Priority Level
Asset transfer process is too long	Significant delays in operations	Automate bulk asset transfers	High
High manual data entry	Increases labor costs and errors	Automate data entry and validation	High
Repeated processes	Redundancies create inefficiencies	Streamline and eliminate redundant steps	Medium
Unnecessary processes	Time wasted on non-essential tasks	Remove unnecessary approval steps	Medium
Repetitive tasks	Employee dissatisfaction	Automate repetitive tasks	Low

TABLE IV. SUMMARY OF PROBLEM SOLUTIONS FOR TO-BE PROCESS

Problem	Proposed Automation	Efficiency Improvements	Priority Level
Asset transfer process is too long	Bulk asset transfer capability	Reduces process time by 50 percent	High
High manual data entry	Automated data input	Reduces data entry errors	High
Repeated processes	Workflow automation	Streamlines redundant processes	Medium

C. Case Study

For this research, a prominent financial organization with 256 branches and over 450+ Oracle ERP users in Sri Lanka was selected, which is recognized as a leading life insurance provider with solid financial standing and market presence. Operating as a subsidiary of a major Sri Lankan bank, the institution benefits from its parent comapny's financial strength and credibility. With continuous growth in revenue and market share, it has maintained a dominant position in the local finance sector. Listed on the Colombo Stock Exchange, the institution prides itself in a dedicated workforce, contributing to its sustained success and industrial leadership. The institution's vision emphasizes becoming Sri Lanka's most admired and trusted insurance partner, while its mission focuses on delivering innovative and, customized solutions with a passion for excellence and teamwork. Its commitment to ethical governance, customer-centricity, continuous improvement, and industry compliance reflects its dedication to exceeding stakeholder expectations.

Discussions with the institution, revealed that the manual and time-consuming process of transferring assets individually, highlighted inefficiencies, and the substantial amount of manual work involved. The core challenge was bulk asset transfer functionality. Consequently, the institution experienced delays in asset requests, assignments, and transfers, leading to considerable gaps in communication and approval processes. This situation presentes an opportunity for research, aimed at enhancing organizational efficiency through the application of Business Process Reengineering (BPR) principles, focusing on streamlining workflows and improving operational performance.

D. Ethic Statement

This study did not involve the use of any personal or sensitive data, as such information was not required for the scope of the research. The data collected were strictly limited to asset transfer records obtained from a relevant financial organization for the purpose of evaluating and enhancing the efficiency of the asset transfer process.

Permission to access and use these data was obtained through direct communication with the organization. Screenshots of the email correspondence granting this permission have been included and can be accessed via the following link.

https://drive.google.com/drive/folders/1T5xPlKda_ZW_GLIUhrgn_qO6HLVHi627

The study did not involve any minors, and therefore, no parental or guardian consent was required. Additionally, as this research is not medical in nature, no medical records or health-related data were used or accessed in any part of the study.

IV. Results and Discussion

A. As-Is System Analysis

1) Explanation on As-Is system: The current asset management process depicted in Fig. 1 in Oracle ERP is predominantly manual and involves several steps to request, transfer, and update asset records across various departments and locations.

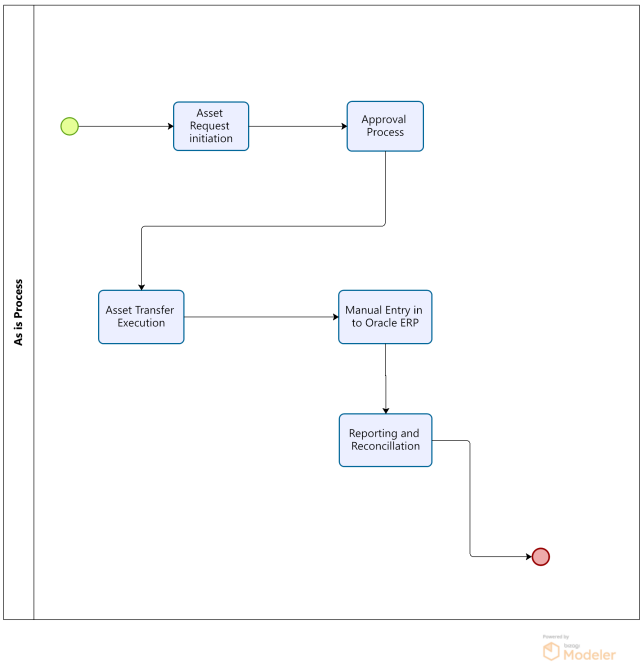

Fig. 1. Process of AS-IS System.

The current asset transfer process in Oracle ERP begins when a department or branch submits an asset request, that is currently handled manually. Each request must include detailed information, such as asset ID, quantity, and location. Following this request, the process moves to an approval workflow, where the asset request passes through multiple stages involving department heads, finance teams, and asset managers. This approval process often experiences delays due to manual handoffs between stakeholders. Once the request is approved, asset transfer is initiated, however, the current system allows only one asset to be transferred at a time, with each transfer requiring manual logging into the system, making it a time-consuming and error-prone task. After the physical transfer of the asset, data entry personnel update the asset's status, location, and transfer details in the Oracle ERP system. This step frequently involves verifying the transfer with physical inventory records and manually entering the data into various system modules. Finally, finance and audit teams must reconcile asset movements with financial records at regular intervals to ensure compliance with company policies and regulations.

The Business Process Maturity Model (BPMM) was utilized to assess the matuariry of the above as is process. The BPMM classifies process maturity into five levels: initial, managed, defined, quantitatively managed, and optimize. Each level represents the degree of process standardization, automation, and data-driven decision-making in an organization.

At Level 1 (Initial), the processes are unstructured, ad hoc, and reliant on individuals rather than defined workflows. The current asset transfer process in Oracle ERP aligns with this level, as it remains largely manual, time-consuming, and inefficient. To address these inefficiencies, automation is recommended, particularly for bulk asset transfers and validation mechanisms. This would reduce human dependency and improve the process reliability.

At Level 2 (Managed), some degree of process discipline is introduced, although inconsistencies persist. The existing asset transfer mechanism in Oracle ERP has seen partial standardization, but manual interventions still leads to delays. To advance to the next level, it is essential to establish standardized workflows and integrate automated approval mechanisms that eliminate the bottlenecks caused by human involvement.

Progressing to Level 3 (Defined) requires processes to be well-documented, standardized, and uniformly followed across the organization. The asset transfer module currently has partially defined workflows, but lacks automation. To enhance operational efficiency, a system-based request-tracking mechanism should be introduced to, ensure streamlined workflows and improved transparency in asset transfers.

At Level 4 (Quantitatively Managed), the processes are controlled using data-driven approaches. The current form of the asset transfer module does not support real-time monitoring or performance measurements using Key Performance Indicators (KPIs). The integration of dashboards and analytics tools enables organizations to track asset transfers effectively, monitor key metrics, and make informed decisions based on data.

Finally, at Level 5 (Optimizing), organizations focus on continuous process improvement through predictive analytics and feedback loops. The absence of such mechanisms in Oracle ERP's asset transfer module results in a lack of proactive decision-making and process enhancements. Implementing predictive analytics for asset lifecycle management would provide valuable insights, allowing organizations to anticipate

issues, optimize resource allocation, and enhance overall asset utilization.

This explained BPMM analysis is shown in the Table V.

TABLE V. BPMM (BUSINESS PROCESS MATURITY MODEL) FOR AS-IS PROCESS ANALYSIS

Maturity Level	Description	Current State	Target Improvements
Level 1 - Initial	Processes are ad-hoc, unstructured, and dependent on individuals	The current asset transfer process is manual, lengthy, and inefficient	Implement automation for bulk transfers and validation mechanisms
Level 2 - Managed	Basic process discipline exists, but inconsistencies remain	Some standardization in Oracle ERP, but manual interventions cause delays	Standardize workflows, introduce approval automation
Level 3 - Defined	Processes are well-documented, standardized, and followed organization-wide	Partially defined processes, but lack automation	Implement system-based request tracking and streamlined workflows
Level 4 - Quantitatively Managed	Processes are measured and controlled using data-driven approaches	No real-time monitoring, lack of KPIs	Introduce dashboards and analytics for asset tracking and performance measurement
Level 5 - Optimizing	Continuous process improvement through predictive analytics and feedback loops	No continuous feedback mechanism or improvements	Implement insights and predictive analytics for asset life cycle management

2) As-Is system process mapping: The As-Is process can be represented by the following Fig. 2 which highlights the steps involved from the asset request to reconciliation.

The asset transfer process in the provided diagram begins with branch logging into the company email and submitting an asset request. The procurement department, using the Oracle Fusion Cloud ERP, creates a purchase order based on the request. Once the assets are physically received, the inventory department generates a Good Receive Note (GRN) to confirm receipt and proceeds to create asset transfers in the system. A decision point follows, where it is determined whether the transfer is a bulk or individual asset transfer. If the transfer involves multiple assets, the system utilizes an in-built Oracle Fusion spreadsheet for bulk transfers, whereas individual assets are transferred individually in the case of non-bulk transfer. After the asset transfer is completed, a confirmation email is sent to relevant stakeholders, marking the completion of the process.

3) Current asset transfer process analysis:

a) Data collection: To conduct a comprehensive analysis of the current asset transfer process within the selected financial institution, data were collected using both primary and secondary Data Collection Methods, as outlined in the section "Data Collection Methods." The data collection process encompassed departments and branches across all nine provinces of Sri Lanka according to the sampling technique. This analysis did not involve personally identifiable information. Upon completion of data collection, 47 records were obtained covering all user groups related to the research.

The collected data comprises various aspects such as, "user experience level, frequency of requesting asset transfers, thoughts of the users regarding the communication during asset transfers, inefficiency in current process, need of real-time synchronization, importance of auditing and compliance". The collected data-set consists of categories relevant to the asset transfer process, with a focus on key ideological areas. The primary categories of the data collected were as follows:-

- Demographic Data
  - Demographic data refers to information regarding the length of experience of employees engaged in the asset transfer process, categorized as follows.
    - Less than one year
    - 0 to 5 years
    - 5 to 10 years
    - more than 10 years
- Quantitative Data
  - Experience Distribution - Numerical data representing the number of respondents within each experience category across different departments and branches.
  - Quantitative measures of communication and collaboration metrics - indicate the levels of agreement or disagreement regarding the effectiveness of communication between departments involved in asset management.
  - Asset Request Frequency - Frequency data capturing how often respondents request assets, categorized as daily, weekly, monthly, or rarely.
  - Security and Compliance Perceptions - Data reflecting respondents' views on the efficacy of automated features for asset audits and compliance assurance.
- Qualitative Data
  - Challenges in Asset Requests - Descriptive data highlighting common difficulties encountered in the asset request process, such as longer approval timelines and errors associated with manual data entry.
  - System Feature Feedback - A combination of qualitative and quantitative responses regarding desired enhancements in the asset management system, including automation, real-time synchronization, and compliance report generation capabilities.
  - Stakeholder Expectations - Data capturing overall expectations for improvements in asset management processes and system functionalities.
- Effectiveness Ratings and Collaboration Assessment
  - Communication Effectiveness - Respondents' evaluations of the effectiveness of interdepartmental communication within the existing system.
  - Collaboration Assessment - Responses measuring the extent to which the current system facilitates collaboration among teams involved in asset management.

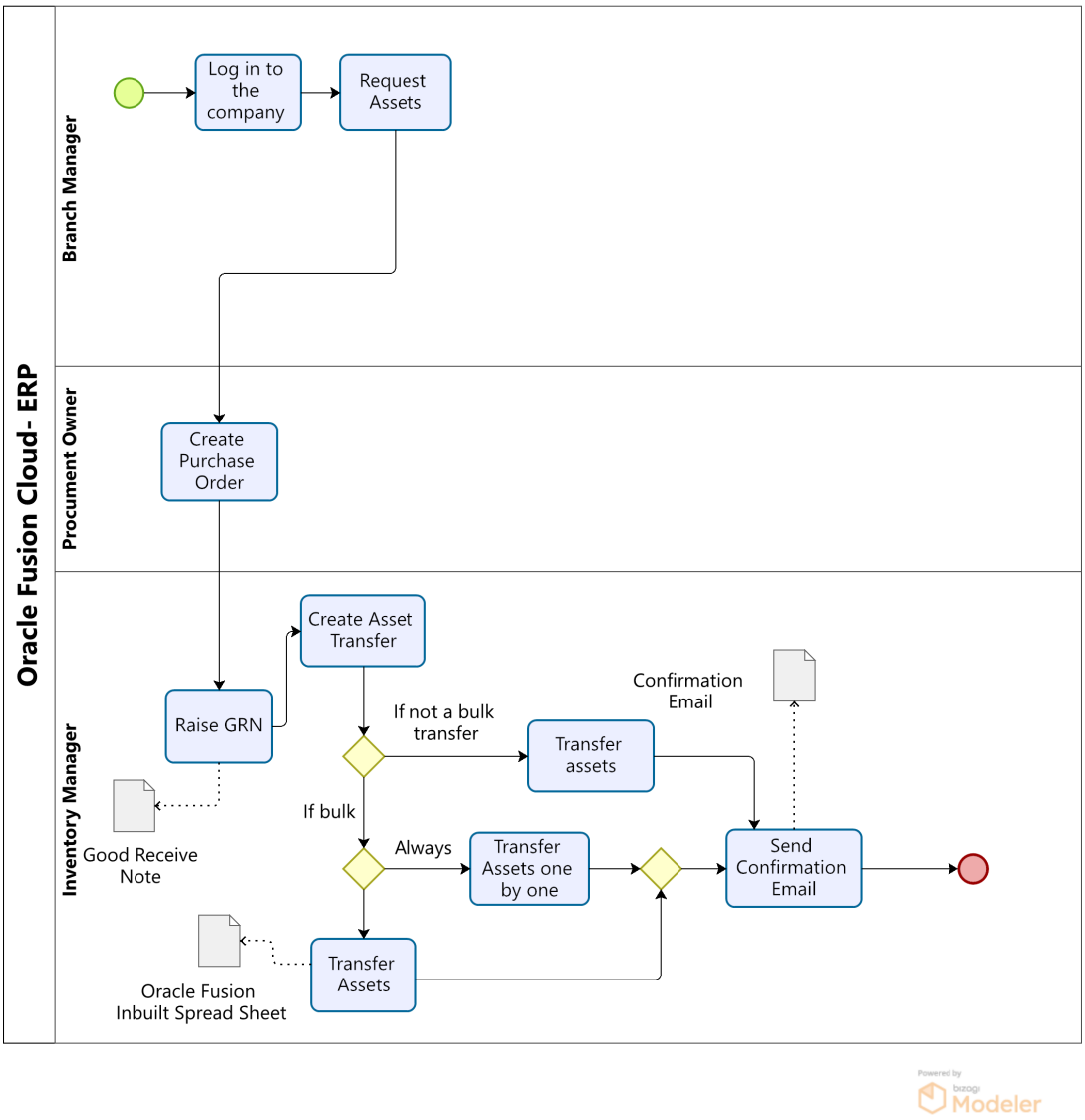

Fig. 2. Process mapping of As-Is system.

This structured approach to data collection enables a thorough understanding of the challenges, perceptions, and expectations surrounding the asset transfer process.

b) Data cleaning process: Before proceeding with the data analysis, a crucial preliminary step involved the data cleaning process to ensure the accuracy and reliability of the dataset. This process was essential for eliminating inconsistencies, errors, and irrelevant data, which could potentially affect the validity of the analysis.

After the data collection, the dataset was thoroughly examined to identify and remove invalid records. During this examination, various errors were detected, including repetitive records and incorrect data entries, which could distort the analytical outcomes. One of the key inconsistencies observed was the misplacement of the responses in different fields. Specifically, some users mistakenly entered the branch name in response to the province-related question, and, conversely, entered the province name in the branch-related question. Such misclassified entries compromised data integrity and required correction before the analysis.

To maintain data integrity, the following steps were undertaken:

- Removal of Duplicate Records – Identified and eliminated redundant records to prevent overrepresentation of certain data points.
- Elimination of invalid responses – Entries where responses were misclassified were removed, such as instances where users provided a branch name instead of a province or vice versa.
- Ensuring Data Consistency – Verified uniformity in categorical data, ensuring that each record was correctly aligned with the intended response category.

By addressing these inconsistencies, the dataset was refined to enhance its accuracy and reliability, ensuring that subsequent analysis would yield meaningful and valid results.

Upon completion of the data-cleaning process, 43 records were retained from the original 47. These refined records were subsequently utilized for the "As-Is system analysis", ensuring that only relevant and accurate data were considered for further evaluation.

c) Data analysis: Data analysis plays a critical role in understanding the efficiency and effectiveness of business processes within Oracle ERP. By analyzing key operational metrics, organizations can identify inefficiencies, smooth workflows, and improve employee satisfaction between branches and departments.

This analysis was conducted using Power BI, a powerful business analytics tool that enables data visualization and interactive reporting. Power BI allows users to connect with various data sources, efficiently process large datasets, and generate insights through dynamic dashboards and visual representations. By leveraging Power BI, the data were analyzed in a structured manner, making it easier to identify trends, patterns, and key areas for improvement in the bulk asset transfer process.

The As-Is system analysis was conducted to provide an in-depth analysis of the current state of the bulk asset transfer process within various departments and branches of the financial institution, highlighting the experience levels, bulk asset request frequencies, and critical importance of real-time synchronization and automation for future improvements. The analysis also highlights the key challenges faced by the existing systems.

According to the Fig. 3, 4, 5, 6, and 7, when considering the bulk asset request frequency by the departments and branches of the financial institution, the breakdown of the results is as follows. In addition, the analysis found that a significant proportion of employees involved in asset transfers fell under the "0 to 5 years" experience category. .

- Daily: 20.83%
- Weekly: 33.33%
- Monthly: 12.5%
- Rarely: 33.33%

The notably higher frequency of responses indicating "Rarely" can be attributed to the geographical distribution of the selected financial institutions. Most of their departments and branches are located in rural areas, where asset transfers occur infrequently. However, this trend shifts in urban regions, where demand for asset transfers is significantly higher, often occurring on a daily or weekly basis.

The high prevalence of daily and weekly requests highlights the ongoing operational need for an efficient bulk asset transfer process, particularly in high-activity departments where asset allocation is frequent. Notably, 33.33% of respondents rated real-time synchronization between Oracle ERP and other systems as extremely important. The responses varied regarding the effectiveness of communication between departments, with 39.53% indicating a positive experience. A strong 95.65% on the necessity for automated features in bulk asset transfers indicates a clear demand for reduced manual errors and increased operational efficiency. The key pain points indicated by branch/departmental users were, "Lengthy approval processes, manual data entry errors, and difficulty in tracking assets".

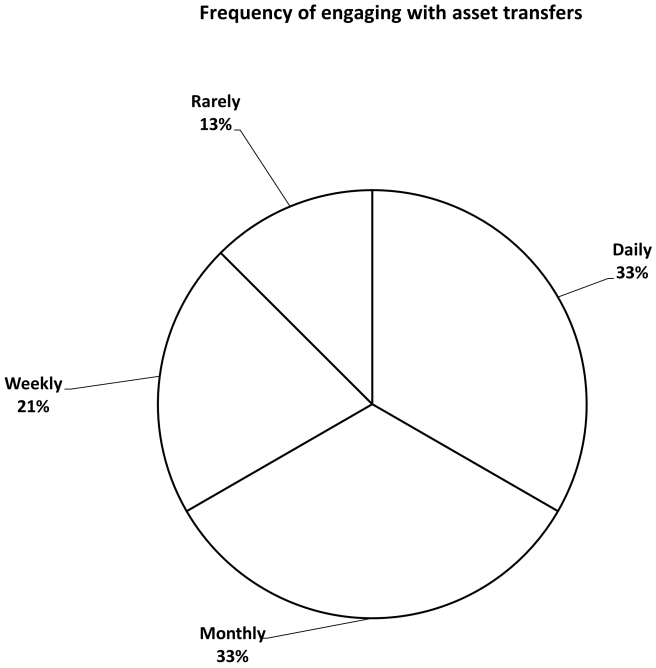

Fig. 3. Frequency of engaging with asset transfers from each branch/ department.

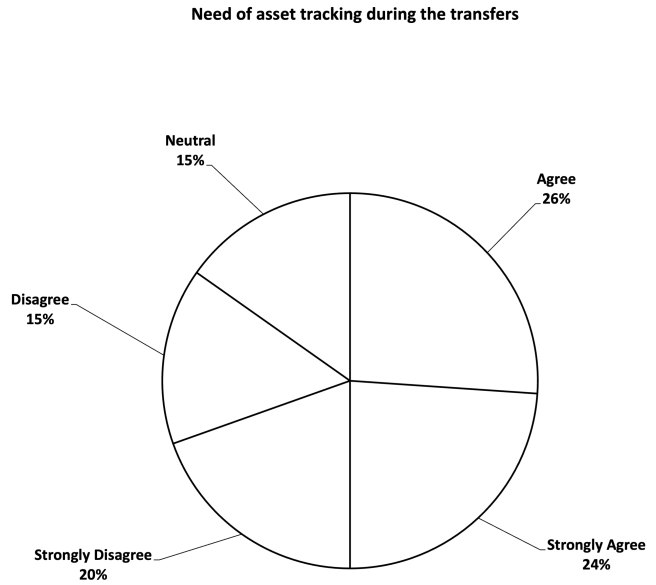

Fig. 4. Need of asset tracking during the asset transfers.

4) Identification of issues: The current asset management process suffers from several inefficiencies and bottlenecks.

- Lack of Bulk Asset Transfer The system does not support bulk transfers, forcing users to handle each asset individually. This leads to an increased time consumption and a higher chance of human error.

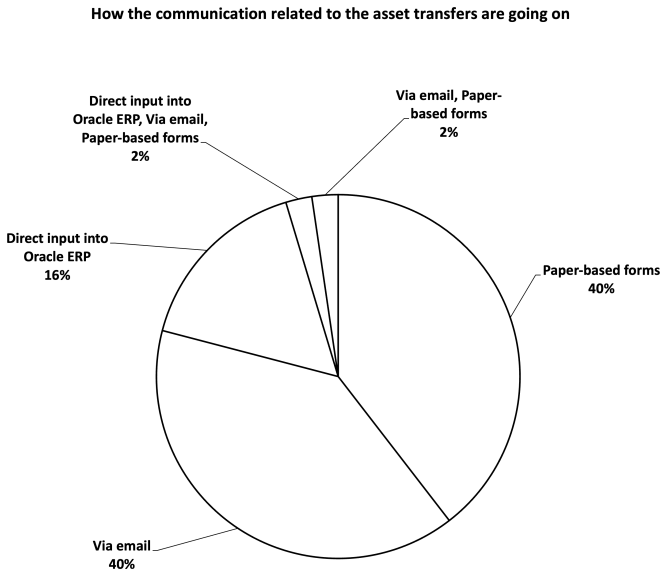

Fig. 5. How the communication related to the asset transfers are going on.

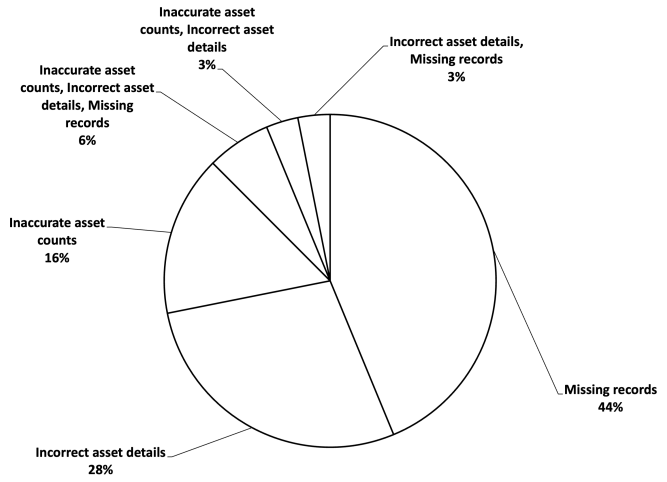

Fig. 6. Types of errors happen during the manual entries.

- The approval process requires multiple handoffs and manual interventions, which often lead to delays, particularly when approval is dependent on busy department heads or finance teams.
- Because asset data are manually entered into the system after physical transfers, there is a significant risk of errors in asset IDs, locations, and quantities. These errors can create discrepancies in financial reporting and asset tracking.
- Owing to delays in manual data entry and the lack of real-time updates, asset records across different departments and locations can become outdated, leading to inaccurate inventory counts.
- The manual nature of data entry and approval increases the risk of non-compliance with internal and external policies, particularly in terms of timely and accurate record-keeping.

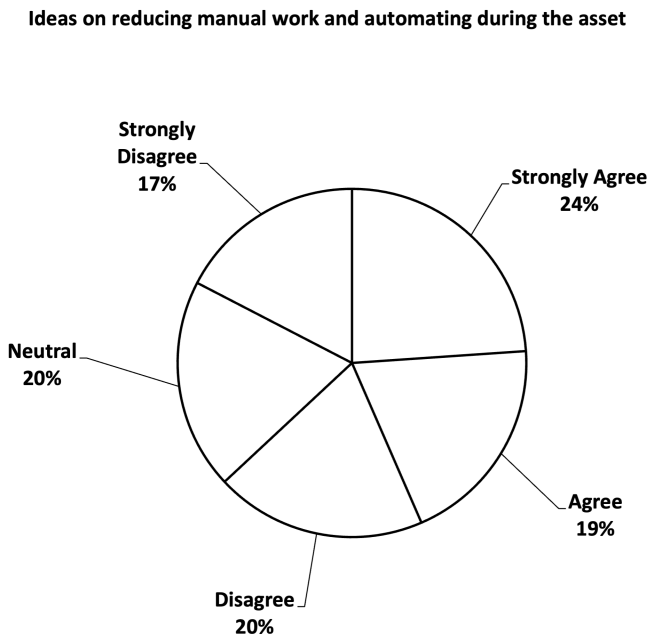

Fig. 7. Ideas on reducing manual work and automating during the asset transfer.

B. Design of the Developed System

1) Reengineering objectives: The objectives of reengineering the asset management process within the Oracle ERP system were,

Streamlining the asset transfer process by introducing bulk asset transfer capabilities can significantly improve operational efficiency. By reducing the time and effort required to move assets across departments or locations, businesses can enhance productivity. This approach also minimizes bottlenecks and allows staff to focus on more strategic tasks, rather than repetitive manual processes [32].

Automating key steps in the asset management process, such as- data entry, approval workflows, and error correction, can significantly reduce labor costs. Manual processes are time-consuming and prone to human error, both of which can lead to costly inefficiencies. By automating these tasks, businesses can not only save labor expenses but also increase the overall accuracy and speed of their asset management operations [33].

Strengthening compliance by improving data accuracy and real-time synchronization across departments is another crucial benefit. Discrepancies in asset data can lead to regulatory non compliance or internal auditing issues, which may result in fines or reputational damage. By ensuring real-time updates and synchronization, businesses can minimize these risks and, maintain accurate records for both regulatory and internal purposes [34].

Access controls are essential for ensuring the security, integrity, and compliance by regulating who can view, modify, or

execute specific actions within a system. These controls define the user roles, permissions, and authentication mechanisms to prevent unauthorized access, safeguard sensitive data, and enforce accountability. In enterprise systems such as Oracle ERP, access controls play a critical role in the above mentioned key steps in automation [35].

However, automation also plays a significant role in increasing data accuracy. Manual data entry is often riddled with errors,which can cause discrepancies in asset tracking and management. By automating data entry and synchronization processes, businesses can ensure that all asset movements are accurately reflected in the system, eliminating the potential for human error, and ensuring data integrity [36].

Finally, improving user experience through user friendly interfaces and minimizing manual interventions is essential for enhancing productivity and satisfaction. When users can interact with systems more intuitively, they are more likely to adopt technology and perform tasks more efficiently, leading to overall improvements in asset management [37].

2) Development of reengineered system: The Asset Transfer Suite is an application developed using Oracle APEX. It was created to offer a friendly scalable security platform for handling very large asset movements integrated directly with Oracle Fusion. They opted for Oracle APEX because it offered low-code architecture, rapid development, and Oracle database integration, thus providing quick deployment without performance or scalability being compromised. Architecture-wise, the application is designed to offer modularity and flexibility, with the business logic implemented in PL/SQL-encompassing critical activities like asset data validation, transformation, exception handling, and transaction rollback. Custom database objects such as tables, views, and packages were created to manage assets, transfer logs, audit trails, and user access controls.

Integration with Oracle Fusion ERP existed through both the web services using SOAP and REST. Web service callouts in Oracle APEX can be made through the use of a web source module or through PL/SQL's UTL_HTTP package. For authentication, if the particular Fusion API allowed OAuth 2.0 tokens, then such tokens were used; otherwise, basic authentication was used. Likewise, the integrations executed a series of activities like fetching the asset records, sending transfer requests, verifying transfer requests, and finally updating statuses of such requests, including updates regarding errors or validation messages issued by Fusion. The front-end interface of the application was built in APEX using its low-code UI builder, which allows the creation of interactive forms, reports, and dashboards in a snap. The users would filter assets by location, department, or cost center and perform those bulk transfers all at once, keeping track of their transaction history alongside real-time statuses synced with Oracle Fusion ERP.

Security integration was short and sweet-from Oracle Identity Cloud to Role-Based Access as defined within Fusion. Audit logs for transfer records, including user actions and system events, were created automatically for later traceability. Error handling and rollback mechanisms were designed and implemented to protect the data from accidental corruption in unplanned failure conditions. The entire suite was deployed and tested on staging Oracle Fusion test tenants. Functional testing, integration testing, and UAT provided a robust system that comprised the business requirements. After all validations were complete, the app was pushed into production. Later on, monitoring dashboards were added to keep track of API call success and failure rates so that issues could be addressed before anyone even noticed. This development approach gave the full capability of delivering a comprehensive, reliable, enterprise-grade solution that extended Oracle Fusion ERP for bulk asset transfers in an efficient and secure manner.

3) Developed system for reengineered process: The reengineering of the asset management process with adherence to the Oracle technology use guidelines, involves several transformative improvements, aimed at increasing efficiency, data accuracy, and process scalability. The key changes introduced include bulk asset transfer capability, automated approval workflows, real-time data synchronization, role realignment, and technology integration. These enhancements address the inefficiencies in the current system and offer a robust framework for future growth.

One of the most significant improvements is the introduction of bulk asset transfer capabilities. In the current system, assets must be transferred one at a time, which is time consuming and prone to delays. This new feature allows multiple assets to be simultaneously transferred, thereby accelerating the entire process. Bulk transfers significantly reduce the administrative burden, freeing up time for employees to focus on other critical tasks. This change is especially beneficial for organizations managing a large volume of assets, as it minimizes the number of individual transactions required and reduces repetitive tasks. By automating and simplifying asset transfers, organizations can expect faster processing times, reduced errors, and increased operational efficiency.

Another key feature of the reengineering effort is the introduction of automated approval workflow. In the current system, asset-related approvals often involve manual handoffs, that can result in bottlenecks and delays. The new automated workflow route asset requests to the appropriate stakeholders based on predefined business rules, ensuring that approvals are processed in a timely manner. This change reduces the need for manual intervention and eliminates the risk of requests becoming stuck or lost in the system. Automated workflows can also be customized to accommodate different approval levels based on the value or sensitivity of the asset, ensuring that all approvals are aligned with the organization's policies and procedures. By automating this process, companies can reduce turnaround times for asset requests, improve accountability, and enhance the overall transparency in asset management.

Real-time data synchronization is another crucial component of the asset management reengineering process. In many organizations, asset data are stored in disparate systems, leading to inconsistencies and outdated information. With the implementation of real-time synchronization, asset data are updated across all departments and locations instantly using web services. This ensures that all stakeholders have access to the most current and accurate data,thereby reducing the risk of errors caused by outdated information. Real-time synchronization is especially important for organizations that operate in multiple locations or have decentralized teams because it ensures that everyone is working with the same data. This capability also improves reporting accuracy and

enables better decision-making based on reliable, up-to-date asset information.

The reengineering effort also involves role realignment within the asset-management process. This change clarifies and automates the roles related to data entry, approval, and reporting. By separating these responsibilities, the organization can improve compliance and security and, ensure that tasks are handled by appropriate personnel. Access control is a key focus of this realignment, As it ensures that users have access to the information and functions necessary for their roles. This change enhances the overall security of the asset management process by reducing the risk of unauthorized access and improving accountability. Clear role definitions and automated workflows also help reduce human errors, as employees can focus on their specific tasks without having to navigate unnecessary complexity.

Finally, technological integration plays a vital role in the reengineered asset management process. The integration of advanced tools, such as Oracle APEX, for rapid application development allows the organization to build custom solutions tailored to its specific needs [38]. PL/SQL manages database operations, ensuring efficient and reliable handling of asset data, whereas JavaScript and HTML5 will be used to develop user-friendly interfaces that improve the usability of the asset management module [39]. These technologies provide a scalable platform that can grow with the organization, offering flexibility and adaptability for future needs. By leveraging these modern tools, the asset management system becomes more powerful and easier to use, thereby enhancing both user satisfaction and system performance. Moreover, the following results can be expected from the developed system, which can be identified using the BPMM methodology.

At Level 1 (Initial), the focus is on basic data retrieval and asset onboarding. By leveraging the Oracle SQL Cloud Developer and Oracle Autonomous Database, real-time asset data extraction can be ensured for timely updates. Additionally, the automation of asset onboarding and budgeting through Oracle APEX and Oracle Cloud Infrastructure eliminates manual asset entry while maintaining financial tracking accuracy.

Moving to Level 2 (Managed), the system setup and configuration phase ensures adaptability to business rules and policies using Oracle APEX. Furthermore, asset request and assignment processes are optimized using Oracle APEX and Oracle SQL Cloud Developer, leading to streamlined workflows, improved transparency, and reduced processing delays.

At Level 3 (Defined), bulk asset transfers are automated using Oracle APEX and Oracle Cloud Infrastructure, ensuring error-free and efficient transactions. Additionally, approval workflows are enhanced through APEX Workflows and APEX Email API, reducing manual interventions and expediting the approval processes.

In Level 4 (Quantitatively Managed), reverse integration with Oracle ERP enables seamless synchronization of asset updates, financial reconciliations, and status changes using Oracle SQL Cloud Developer and Oracle Autonomous Database. Performance tracking and analytics are further enhanced with dashboards that provide real-time monitoring and KPI tracking via the Oracle APEX and Oracle Cloud Infrastructure.

Finally, Level 5 (Optimizing focuses on strengthening security and compliance), Access control management is implemented using Oracle APEX and Oracle Identity Cloud Service (IDCS) to restrict unauthorized access and ensure compliance with security policies. Additionally, audit logging and compliance tracking, enabled by Oracle APEX Logging and Oracle Audit Vault, provide enhanced security, regulatory adherence, and visibility for asset transfers and approvals.

A summarized expected analysis from the improved process is shown in Table VI.

4) Modeling the developed system: The developed system for asset management can be visualized as shown in Fig. 8 and Fig. 9.

5) Key improvements in the developed system: The developed system introduces several key improvements that enhance the efficiency and streamline operations within the asset management system. First, the automated routing of asset requests and approvals based on predefined rules ensures that requests are directed to appropriate stakeholders without delay. This accelerates the approval process and minimizes the potential for errors, ensuring that all requests are handled consistently according to organizational policies. Additionally, the bulk asset transfer feature allows users to move multiple assets in a single operation, thereby significantly reducing the time and effort required for asset management tasks. This capability is particularly especially beneficial during audits, relocations, or system migrations, where managing large quantities of assets can be cumbersome.

Moreover, real-time automatic updating of asset records across the ERP system eliminates the need for manual data entry, greatly reducing the risk of inaccuracies. As changes are made, all related records are updated instantly, providing users with the most current information available. This integration enhances visibility into asset status and availability, allowing for better decision-making and resource allocation. Collectively, these improvements create a more responsive and reliable asset management process, empowering organizations to operate more efficiently and effectively.

6) Implementation strategy: To ensure successful implementation of the reengineered asset transfer process, a robust change management strategy was employed. This begins with stakeholder engagement, where key figures, such as asset managers, finance teams, and IT personnel are involved early in the process. Their insights were invaluable in addressing concerns and fostering a sense of ownership over changes. In addition, a clear communication plan was established to articulate the objectives, benefits, and specific changes associated with the new process, ensuring that all users understand the rationale behind the transition and are motivated to adopt it. Comprehensive training sessions were organized to equip users with the skills necessary to navigate new functionalities by user manuals and online resources to provide ongoing assistance.

Before full-scale implementation, user acceptance testing (UAT) was conducted in collaboration with the selected financial institution. This critical phase allowed end users to interact with the re-engineered system in a controlled environment, validating its functionality, usability, and alignment with operational requirements. UAT provided an opportunity to identify potential discrepancies, gather user feedback, and

TABLE VI. BPMM (BUSINESS PROCESS MATURITY MODEL) FOR DEVELOPED SYSTEM ANALYSIS - WITH ORACLE APEX ENHANCEMENTS

Maturity Level	Component	Description	Technology Used	Expected Outcome
Level 1 - Initial	Data Retrieval from Oracle ERP	Extract asset data from Oracle ERP for real-time updates	Oracle SQL Cloud Developer, Oracle Autonomous Database	Accurate and timely asset data retrieval with automated fetch mechanisms
	Asset Onboarding and Budgeting	Automate asset addition and integrate with budgeting controls	Oracle APEX, Oracle Cloud Infrastructure	Eliminate manual asset entry, ensure financial tracking with automated validations
Level 2 - Managed	System Setup and Configuration	Define configurable parameters for asset management	Oracle APEX	Flexible system that adapts to changing business rules and policies
	Asset Request and Assignment	Enable request submission and automated asset allocation	Oracle APEX, Oracle SQL Cloud Developer	Streamlined request processing, increased transparency, reduced delays
Level 3 - Defined	Bulk Asset Transfers	Automate and validate mass asset transfers within Oracle ERP	Oracle APEX, Oracle Cloud Infrastructure	Efficient, error-free bulk transfers with built-in approval workflows
	Approval Workflow and Notifications	Implement system-driven approval tracking and email notifications	Oracle APEX Workflows, APEX Email API	Faster approvals, role-based notifications, and reduced manual interventions
Level 4 - Quantitatively Managed	Reverse Integration to Oracle ERP	Sync asset updates, status changes, and financial reconciliations	Oracle SQL Cloud Developer, Oracle Autonomous Database	Real-time data updates in Oracle ERP with minimal manual intervention
	Performance Tracking and Analytics	Implement dashboards with KPIs and real-time monitoring	Oracle APEX, Oracle Cloud Infrastructure	Real-time asset tracking, performance measurement, and compliance reporting
Level 5 - Optimizing	Security and Access Control Management	Implement Access Control Lists (ACL), IP-based restrictions, and role-based permissions	Oracle APEX, Oracle Identity Cloud Service (IDCS)	Restricted system access, preventing unauthorized entry and ensuring compliance with security policies

refine the system to enhance its effectiveness. By involving end users in this testing phase, the organization could ensure that the final implementation meets practical expectations and minimizes disruptions during deployment.

Following a successful UAT, the technology deployment phase was commenced with a pilot testing stage, allowing the reengineered process to be trialed in a limited capacity across select departments or locations. This approach enabled the organization to gather further feedback and address any residual issues before a full-scale rollout. By adjusting based on both UAT and pilot outcomes, the organization could mitigate risks and ensure a smoother transition. Once the pilot proves successful, the full system was deployed organization-wide, maximizing the benefits of the new processes across all areas of operation.

Post-implementation, continuous monitoring and support were critical to the long-term success of the re-engineering process. A dedicated support team was established to address any challenges that may arise during the transition, ensuring that users had the assistance necessary to adapt effectively. Regular performance evaluations were conducted to assess system effectiveness and user satisfaction, allowing for ongoing improvements. By integrating user acceptance testing, structured deployment, and continuous monitoring, this comprehensive approach to change management enhanced operational efficiency while fostering a culture of collaboration and adaptability within the organization.

C. Comparison of As-Is and Developed Systems

1) Evaluation criteria: A comparison of the As-Is and developed asset management systems highlights significant improvements across various criteria. In terms of process efficiency based on time, below Table VII shows the how the process has optimized from the reengineered system.

When evaluating cost-effectiveness, the annual operational cost for the As-Is system is stand approximately $7,500 per user, which includes labor and error correction. With the implementation of the new system, these costs were not included, leading to a savings of $7,500 from users or a 100% reduction [40].

The compliance aspect reveals that the As-Is system experiences approximately 10 compliance incidents per year. The improved system reduced these incidents to only two, representing an impressive 80% improvement in compliance.

In terms of risk mitigation, the As-Is system has an error rate of 15% in asset transactions. The developed system has a significant lower error rate of 5%, resulting in a risk reduction of 67%.

Finally, in terms of asset utilization, the As-Is system achieves an asset utilization rate of 75%. The developed system has affected to enhance this rate to 90%, indicating a 20% improvement in how effectively the organization tracks, transfers, and allocates assets.

2) Analysis of changes: Tables VIII, IX, X, XI, and XII, depict the changes that performed in the developed system compared to As-Is System.

3) Impact on stakeholders: Tables XIII, XIV, and XV depict the impact of the developed System on stakeholders.

D. Quantitative and Qualitative Benefits

1) Quantitative benefits: Implementing automation in asset management can lead to significant cost savings, with an estimated 100% reduction in operational expenses by lowering labor costs and minimizing errors and reconciliation expenses. Additionally, the introduction of bulk asset transfers and automated workflows is projected to reduce the time required

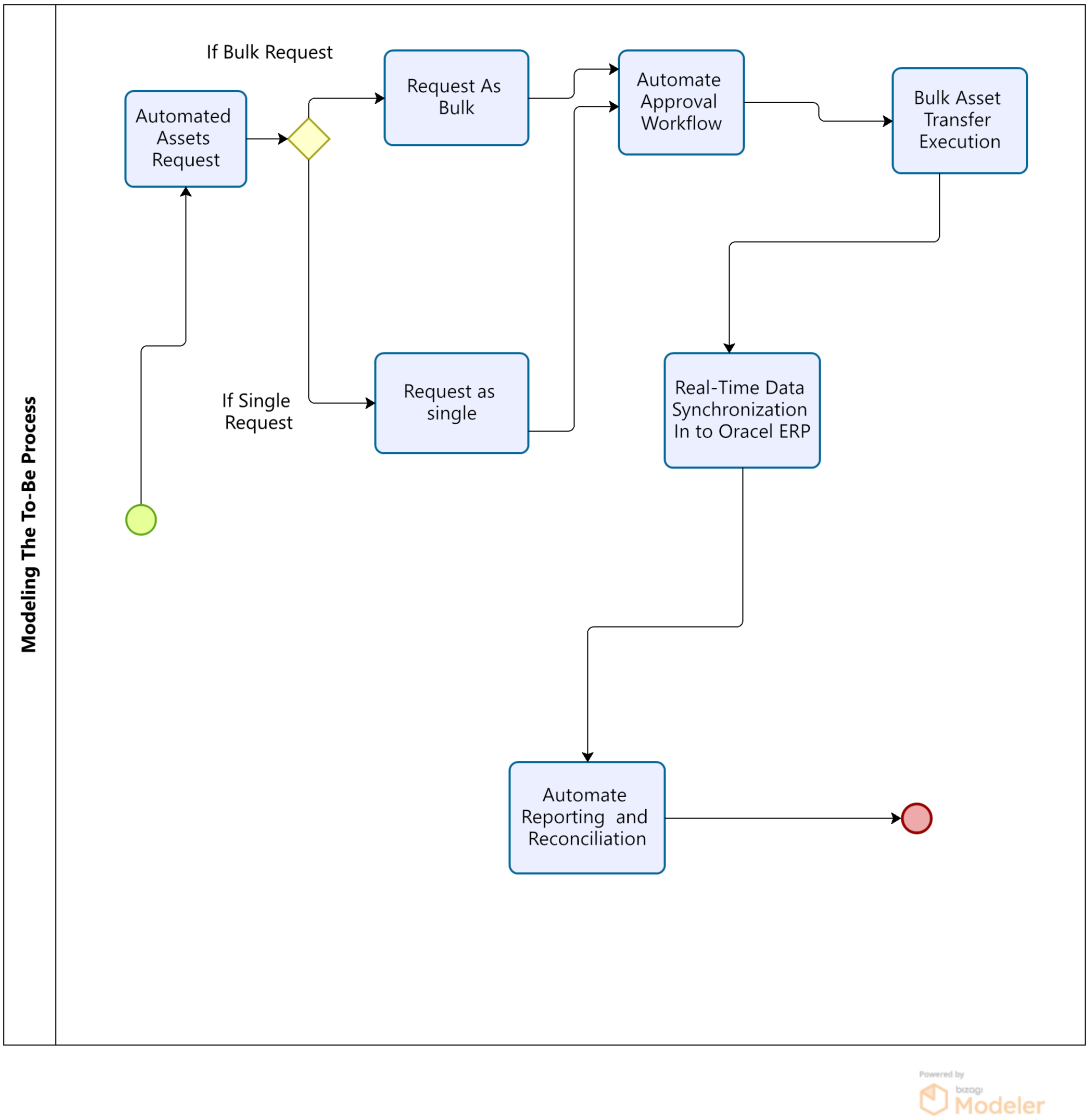

Fig. 8. Modeling developed system.

TABLE VII. COMPARISON OF THE PROCESS EFFICIENCY IN AS-IS SYSTEM AND REENGINEERED SYSTEM

Process Step	As-Is System (Oracle Fusion ERP Only)	Reengineered System	Time Saved
Time to Request Assets	16 hours	1 hour	15 hours
Time to Transfer Assets	48 hours	8 hours	40 hours
Time to Confirm notification of Assets	24 hours	2 hours	22 hours
Total Time for Full Process	88 hours (approx. 5.5 days)	11 hours (less than 2 days)	77 hours

for these transfers by 50%, thereby enhancing asset utilization and overall operational efficiency. Furthermore, automating data entry and ensuring real-time synchronization will decrease the error rate in asset transfers and record keeping, thereby reducing the need for expensive reconciliations.

2) Qualitative benefits: Transitioning from manual processes to automation is expected to significantly enhance employee satisfaction, as team members spend less time on repetitive tasks and more meaningful work, fostering a more positive work environment. Additionally, access to accurate, real-time data will empower management to make well-informed decisions regarding asset utilization, procurement, and financial planning, leading to more strategic asset management and improved resource allocation. Furthermore, with

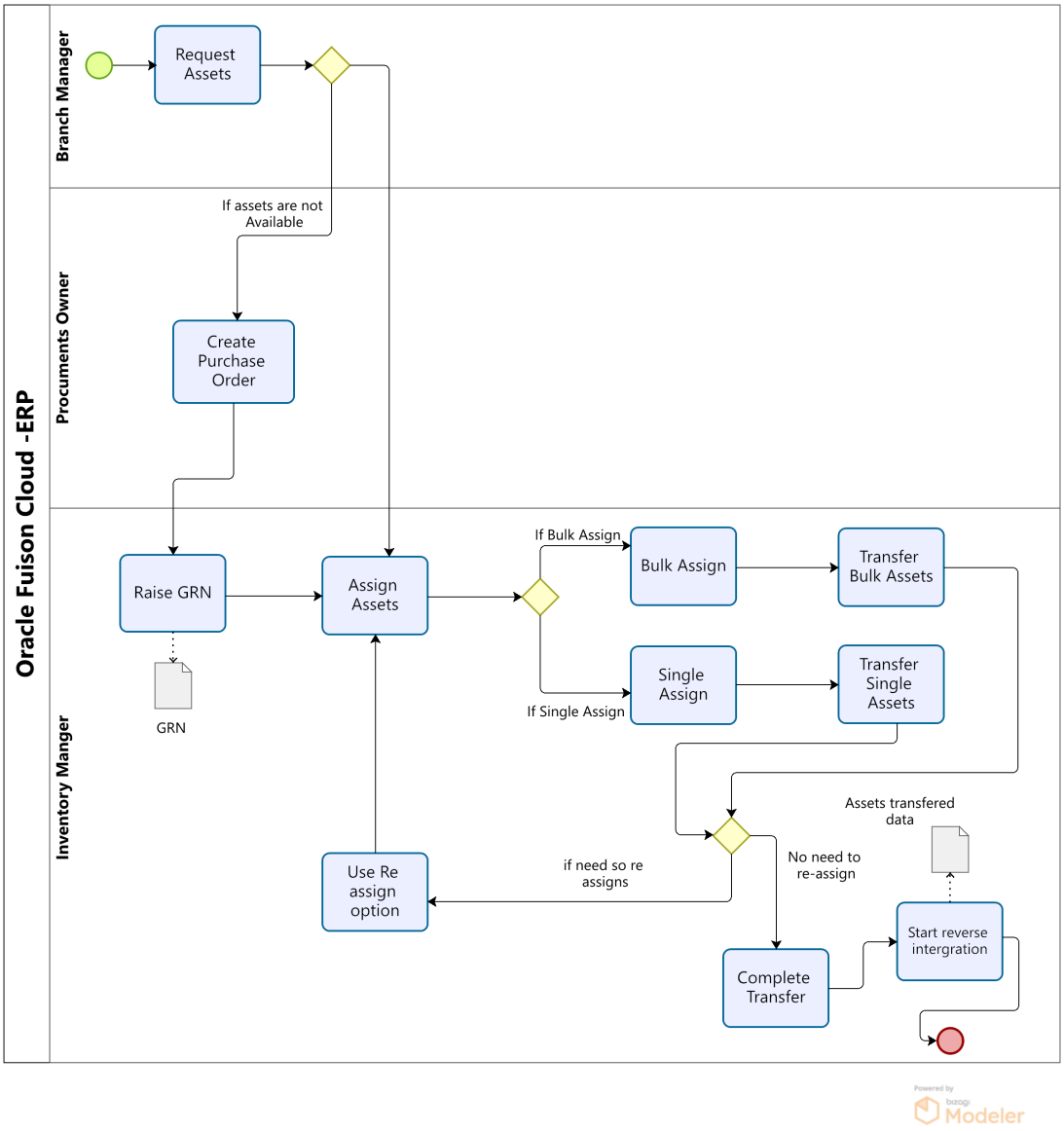

Fig. 9. Detailed developed system model.

TABLE VIII. PROCESS EFFICIENCY

As-Is System	Developed System
The current system requires manual input for each asset transfer, leading to significant delays, especially for large-scale transfers. The approval process is manual, involving multiple handoffs, which further slows down operations.	The bulk asset transfer feature in the developed system allows for transferring multiple assets at once, reducing the time required by up to 50%. Automated approval workflows eliminate manual handoffs, significantly improving the speed of asset requests and approvals.

TABLE IX. COST-EFFECTIVENESS

As-Is System	Developed System
High labor costs due to the manual nature of asset transfers, approvals, and data entry. Errors in manual data entry led to further costs in reconciliation and error correction.	Automation reduces labor costs by 30%, as fewer hours are needed for manual tasks such as data entry and error correction. The system also minimizes costs related to errors and operational delays.

improved compliance features and a lower risk of errors, the organization will be better positioned to meet both internal and external audit requirements, enhance its reputation, and minimize the risk of penalties.

In conclusion, the developed system offers significant improvements over the As-Is system in terms of process efficiency, cost-effectiveness, compliance, risk mitigation, and asset utilization. These changes are expected to have a positive impact on all stakeholders, delivering both tangible cost savings and intangible benefits such as improved satisfaction and decision-making capabilities.

TABLE X. COMPLIANCE

As-Is System	Developed System
The lack of real-time data synchronization leads to inaccurate records, making it difficult to comply with internal and external audit requirements. Delayed updates can result in financial reporting discrepancies.	Real-time synchronization of asset data ensures that records are always accurate and up to date, improving compliance with audit requirements. Automated workflows reduce the risk of non-compliance by ensuring that all approvals and asset transfers are properly documented.

TABLE XI. RISK MITIGATION

As-Is System	Developed System
The manual nature of the system introduces a high risk of errors in data entry, asset tracking, and approvals. Delays in asset transfers can cause operational risks, such as inventory shortages or unaccounted assets.	Automated data entry and real-time updates significantly reduce the risk of errors. The system's built-in validation checks during asset transfers further mitigate the risk of discrepancies. Timely and accurate record-keeping lowers operational and financial risks.

TABLE XII. ASSET UTILIZATION

As-Is System	Developed System
Poor visibility into asset locations and transfer statuses due to delayed and inaccurate data updates. This leads to under-utilization of assets and inefficiencies in resource allocation.	With real-time tracking and updates, asset visibility improves dramatically. The organization can better allocate resources and respond quickly to asset transfer requests, leading to improved asset utilization.

TABLE XIII. EMPLOYEES

As-Is System	Developed System
Employees, especially asset managers and data entry personnel, are burdened by repetitive manual tasks, leading to lower job satisfaction and higher error rates.	Employees, especially asset managers and data entry personnel, are burdened by repetitive manual tasks, leading to lower job satisfaction and higher error rates.

TABLE XIV. MANAGEMENT

As-Is System	Developed System
Management struggles with delayed reporting and inaccurate data, which hampers decision-making and makes it difficult to track asset utilization and costs.	With real-time data and automated reporting, management can make more informed decisions based on accurate and timely information. The improved visibility into asset movements and costs also enhances strategic planning and operational efficiency.

TABLE XV. EXTERNAL PARTIES (AUDITORS, REGULATORS)

As-Is System	Developed System
External parties often face difficulties auditing asset records due to discrepancies and outdated information, which can lead to compliance issues.	The Developed system ensures that external auditors and regulators have access to accurate and up-to-date records, improving compliance and reducing the risk of regulatory penalties.

V. CHALLENGES AND LIMITATIONS

A. Challenges in Reengineering

Resistance to change is a significant challenge in Business Process Reengineering (BPR). Employees often hesitate to adopt new technologies or processes because fear of job displacement and unfamiliarity with automated workflows. To effectively address this issue, organizations must implement clear communication strategies and comprehensive training programs.

Data limitations can complicate the BPR process. The accuracy and completeness of existing data in the As-Is system can be inconsistent or outdated, making it difficult to map current processes and identify inefficiencies. Resolving these data issues is crucial before transitioning to a improved system, where real-time data accuracy is essential.

Technological constraints also present another challenge. The integration of newly developed processes, such as bulk asset transfers and real-time data synchronization, requires an advanced technological infrastructure. Existing ERP systems may not support these changes without significant customization or upgrades, which can lead to compatibility issues and increased technical debt.

Finally, the implementation cost is a major concern. While the developed system is expected to reduce operational costs in the long run, the initial investment required for technology upgrades, training, and system deployment can create a financial burden for many organizations.

B. Limitations of the Research

The scope of this study is specifically centered on the reengineering of the asset management process within the Oracle ERP system. This focus inherently limits the generalizability of the findings, meaning that the insights and recommendations derived from this research may not be applicable to other ERP Systems or Asset Management platform. By concentrating on a single system, this study aimed to provide a detailed and nuanced understanding of the challenges and opportunities present within the Oracle ERP framework. However, this focus also means that organizations using different systems may not find the same relevance in the conclusions drawn.

Furthermore, the research relies heavily on existing data extracted from the current As-Is system. While these data serve as the foundation for process analysis, it is crucial to acknowledge that such information may be prone to inaccuracies or reflect incomplete records. These data limitations could significantly undermine the integrity of the process analysis, because the insights generated are only as reliable as the data on which they are based. If the existing data fail to capture the true state of asset management practices, the recommendations formulated in response may not effectively address the underlying issues or may overlook critical areas for improvement.

In addition to these internal limitations, this study must contend with various external factors that could impact the feasibility and effectiveness of the improved process. Factors such as changing regulations, shifts in organizational culture, and broader economic conditions can play a crucial role in the implementation and sustainability of asset management processes. For example, new regulatory requirements might necessitate alterations in how assets are tracked or reported, whereas organizational culture could influence employee buy-in for new processes. Economic conditions, can also affect

available resourcesand. alter the landscape for potential improvement. Although these external elements were not explored in depth in this study, their potential influence could be underestimated.

VI. Conclusion

A. Summary of Findings

This study identified critical inefficiencies in the As-Is asset management process within ERP systems, particularly in manual asset transfers, delayed approvals, and inconsistent data synchronization in a leading Sri Lankan financial institution. A mixed-method approach integrating qualitative and quantitative analyses was employed, with data collected from 51 branches and analyzed using statistical tools such as Power BI to assess process inefficiencies, error rates, and stakeholder feedback.

The reengineered system introduces bulk asset transfers, automated approval workflows, and real-time data synchronization, delivering measurable improvements over the As-Is process. Specifically, the system achieved a 100% reduction in operational costs per user ($7,500 annual savings), an 80% reduction in compliance incidents, a 67% reduction in asset transaction errors, and a 20% improvement in asset utilization. These quantitative results demonstrate a significant enhancement in process efficiency, reduced manual effort, improved compliance, and optimized resource management.

Furthermore, the reengineering process ensures greater data accuracy, minimizes human intervention, and enhances system transparency. This transformation results in a more efficient, scalable, and user-friendly ERP asset management system, providing both academic and practical contributions by offering a validated framework for workflow optimization, process automation, and effective decision-making across large-scale enterprise environments.

B. Implications for Practice

This study highlights the crucial role of Business Process Reengineering (BPR) in optimizing enterprise resource planning (ERP) systems. The findings demonstrated that automation, real-time data synchronization, and structured workflows can significantly improve operational efficiency, regulatory compliance, and risk management. Furthermore, implementing role-based access controls enhances data security and governance,thereby reducing the likelihood of data breaches or unauthorized asset transactions.

Organizations can leverage these insights to reengineer similar processes across various business functions, including procurement, inventory control, and financial operations. This study underscores the necessity for organizations to transition from manual, labor-intensive processes to automated, data-driven systems to enhance productivity and decision-making capabilities in rapidly evolving digital environments.

C. Recommendations

In today's fast-paced business environment, effective training and change management are critical for overcoming resistance when organizations implement new systems. Comprehensive training programs designed for all users and stakeholders create a supportive learning in environment which individuals feel empowered to adopt new technology. By emphasizing the importance of training, organizations can build a culture of acceptance towards change.In Addition, a clear communication strategy that outlines the benefits of the new system is essential. When stakeholders understand how a new system can enhance their workflows, increase efficiency, and contribute to thier overall business goals, they are more likely to embrace these changes. This dual approach—robust training coupled with transparent communication—ensures that users not only comprehend the operational aspects of the new system but also feel motivated to utilize it effectively, thereby reducing disruptions during the transition period.

Instead of pursuing a full-scale rollout of new systems, organizations may find it advantageous to adopt incremental implementation strategies. This approach allows for the initial deployment of the system in the pilot phase, enabling the organization to identify potential issues in a controlled environment. By starting small, organizations can gather feedback from users, observe the system's performance, and make the necessary adjustments before expanding the implementation. This pilot phase serves as a testing ground that helps organizations fine-tune functionalities and address any unforeseen challenges, thus minimizing the risks associated with a larger rollout. Furthermore, incremental implementation fosters a sense of ownership among users, because their input during the pilot phase can lead to enhancements that cater specifically to their needs. This strategy not only facilitates smoother transitions but also enhances overall user confidence in the new system, setting the stage for a more successful organization-wide deployment.

Once the new system was implemented, continuous monitoring and evaluation were crucial to ensure that it meets the established efficiency and compliance targets. Organizations might set up regular check-ins and performance assessments to track a system's effectiveness over time. These evaluations could provide insights into how well the system functions and identify areas that require further improvement. As organizations evolve and grow, their needs may shift, necessitating ongoing adjustments to the system to align with new operational goals. By establishing a culture of continuous improvement, organizations can proactively address any shortcomings in the system and capitalize on opportunities for optimization. Furthermore, future research could explore broader applications of Business Process Reengineering (BPR) principles beyond asset management, extending into areas such as procurement and inventory control. Such studies could provide valuable insights into the transformative potential of BPR in various business functions, thereby enhancing overall organizational agility. Additionally, investigating the role of emerging technologies, such as artificial intelligence and machine learning, can open new avenues for enhancing asset management and ERP systems, driving efficiency, and improving decision-making capabilities. In conclusion, embracing a holistic approach to training, incremental implementation, and continuous evaluation can significantly mitigate resistance to change and foster a culture of adaptability in organizations.

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In the preparation of this research manuscript, the only AI tool used was ChatGPT (developed by OpenAI). The

tool was employed exclusively for enhancing language clarity, improving grammar, and refining sentence structure throughout the manuscript.

To evaluate the validity and accuracy of the language outputs generated by ChatGPT, all content revised using the tool was thoroughly cross-verified by the university's English Language Unit. Additionally, the paid version of Paperpal Preflight tool was used as a supplementary resource to assess the grammatical correctness and coherence of the language improvements.

We explicitly confirm that no part of the research design, data collection, analysis, results, or interpretation was generated or influenced by ChatGPT or any other AI tools. The sole purpose of using ChatGPT was to enhance the manuscript's linguistic quality, and it was not used to create or manipulate any scientific content, findings, or supporting materials.

Furthermore, we affirm that,

- The content presented is accurate and valid, reflecting the genuine findings of the study.
- There are no concerns regarding plagiarism, and all writing is original unless explicitly cited.
- All relevant sources have been cited appropriately.
- Every statement regarding hypotheses, results, interpretations, conclusions, limitations, and implications represents the authors' own intellectual contributions and perspectives.

REFERENCES

[1] T. Prasad, "Enhancing the asset posting process in cloud enterprise resource planning application," *Journal of Economics & Management Research*, 2024. [Online]. Available: https://api.semanticscholar.org/CorpusID:272798355

[2] I. Lukyanova, A. Haddud, and A. Khare, "Types of erp systems and their impacts on the supply chains in the humanitarian and private sectors," *Sustainability*, vol. 14, no. 20, 2022. [Online]. Available: https://www.mdpi.com/2071-1050/14/20/13054

[3] R. Bochnia, D. Richter, and J. Anke, "Self-sovereign identity for organizations: Requirements for enterprise software," *IEEE Access*, vol. 12, pp. 7637–7660, 2024.

[4] S. AlMuhayfith and H. Shaiti, "The impact of enterprise resource planning on business performance: With the discussion on its relationship with open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 6, no. 3, 2020. [Online]. Available: https://www.mdpi.com/2199-8531/6/3/87

[5] S. Tongsuksai, S. Mathrani, and K. Weerasinghe, "Influential characteristics and benefits of cloud erp adoption in new zealand smes: A vendors' perspective," *IEEE Access*, vol. 11, pp. 23 956–23 979, 2023.

[6] L. Bartlett, M. A. Kabir, and J. Han, "A review on business process management system design: The role of virtualization and work design," *IEEE Access*, vol. 11, pp. 116 786–116 819, 2023.

[7] I. Corporation, "Business process reengineering," 2025, accessed: 2025-03-14. [Online]. Available: https://www.ibm.com/think/topics/business-process-reengineering

[8] G. H. Watson, *Business systems engineering: managing breakthrough changes for productivity and profit*. John Wiley & Sons, 1995.

[9] M. Al-Mashari and M. Zairi, "Revisiting bpr: a holistic review of practice and development," *Business process management journal*, vol. 6, no. 1, pp. 10–42, 2000.

[10] T. H. Davenport, "Putting the enterprise into the enterprise system," *Harvard Business Review*, vol. 76, no. 4, pp. 121–131, 1998, accessed: 2025-03-14. [Online]. Available: https://hbr.org/1998/07/putting-the-enterprise-into-the-enterprise-system

[11] A. Fetais, G. M. Abdella, K. N. Al-Khalifa, and A. M. Hamouda, "Business process re-engineering: A literature review-based analysis of implementation measures," *Information*, vol. 13, no. 4, 2022. [Online]. Available: https://www.mdpi.com/2078-2489/13/4/185

[12] A. Usman, "Erp systems and their impact on supply chain management," *Uncertain Supply Chain Management*, pp. 1–2, 2024.

[13] AntMyERP, "Customized eam software: Benefits of implementation," 2025, accessed: 2025-03-14. [Online]. Available: https://antmyerp.com/en/blogs/customized-eam-software-benefits-of-implementation/

[14] H. Jung and B. Kim, "Identifying research topics and trends in asset management for sustainable use: A topic modeling approach," *Sustainability*, vol. 13, no. 9, p. 4792, 2021.

[15] O. Corporation, *Oracle Financials Cloud Documentation*, 2025, accessed: 2025-03-14. [Online]. Available: https://docs.oracle.com/en/cloud/saas/financials/25a/faalm/index.html

[16] L.-E.-L. Barna, B.-S. Ionescu, and L. Ionescu-Feleaga, "The relationship between the implementation of erp systems and the financial and non-financial reporting of organizations," *Sustainability*, vol. 13, no. 21, 2021. [Online]. Available: https://www.mdpi.com/2071-1050/13/21/11566

[17] R. Kashyap, "Security framework for enterprise resource planning," in *Metrics and Models for Evaluating the Quality and Effectiveness of ERP Software*. IGI Global, 2020, pp. 84–118.

[18] Netcall, "As-is vs. to-be: Where do you start?" 2025, accessed: 2025-03-14. [Online]. Available: https://www.netcall.com/blog/as-is-vs-to-be-where-do-you-start/

[19] C. Dechsupa, W. Vatanawood, and A. Thongtak, "Stepwise verification for the bpmn with timed and stochastic process using a colored generalized stochastic petri net," *IEEE Access*, vol. 10, pp. 42 983–43 002, 2022.

[20] F. Huang, F. Ni, J. Liu, F. Yang, and J. Zhu, "A colored petri net executable modeling approach for a data flow well-structured bpmn process model," *IEEE Access*, vol. 10, pp. 86 696–86 709, 2022.

[21] A. Tarhan, O. Turetken, and H. A. Reijers, "Business process maturity models: A systematic literature review," *Information and Software Technology*, vol. 75, pp. 122–134, 2016. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0950584916300015

[22] R. Shah and P. T. Ward, "Defining and developing measures of lean production," *Journal of operations management*, vol. 25, no. 4, pp. 785–805, 2007.

[23] D. Kolberg and D. Zühlke, "Lean automation enabled by industry 4.0 technologies," *IFAC-PapersOnLine*, vol. 48, no. 3, pp. 1870–1875, 2015.

[24] M. L. Duc, L. Hlavaty, P. Bilik, and R. Martinek, "Design and implement low-cost industry 4.0 system using hybrid six sigma methodology for cnc manufacturing process," *IEEE Access*, vol. 11, pp. 127 176–127 201, 2023.

[25] Simplilearn, "What is six sigma? a complete overview," 2025, accessed: 2025-03-14. [Online]. Available: https://www.simplilearn.com/what-is-six-sigma-a-complete-overview-article

[26] U. Author, "Kaizen," 2025, accessed: 2025-03-14. [Online]. Available: https://www.academia.edu/16740573/Kaizen

[27] N. Koussani, A. Leshob, P. Hadaya, I. Benzarti, and H. Mili, "Towards an agile approach for business process reengineering," in *2022 IEEE International Conference on e-Business Engineering (ICEBE)*, 2022, pp. 130–135.

[28] J. S. Oakland, *Total quality management and operational excellence: text with cases*. Routledge, 2014.

[29] M. R. Spiegel and L. J. Stephens, *Schaum's Outline of Statistics*, 6th ed. New York: McGraw-Hill Education, 2018. [Online]. Available: https://www.accessengineeringlibrary.com/content/book/9781260011463

[30] O. Corporation, "Autonomous transaction processing," 2025, accessed: 2025-03-14. [Online]. Available: https://www.oracle.com/autonomous-database/autonomous-transaction-processing/

[31] I. Zafar, F. Azam, M. W. Anwar, B. Maqbool, W. H. Butt, and A. Nazir, "A novel framework to automatically generate executable web services from bpmn models," *IEEE Access*, vol. 7, pp. 93 653–93 677, 2019.

[32] Y. I. Rahmawati and A. Herawati, "The influence of good corporate governance and asset management on financial performance with erp (enterprise resource planning) as a mediating variable in the construction subsector in indonesia in 2023," *Journal of Accounting and Finance Management*, vol. 6, no. 1, pp. 201–212, 2025.

[33] C. Zeng, "Enterprise financial management in modern environment," in *2022 International Conference on Economics, Smart Finance and Contemporary Trade (ESFCT 2022)*. Atlantis Press, 2022, pp. 1116–1122.

[34] B. E. Abikoye, S. C. Umeorah, A. O. Adelaja, O. Ayodele, and Y. M. Ogunsuji, "Regulatory compliance and efficiency in financial technologies: Challenges and innovations," *World Journal of Advanced Research and Reviews*, vol. 23, no. 1, pp. 1830–1844, 2024.

[35] N. Farhadighalati, L. A. Estrada-Jimenez, S. Nikghadam-Hojjati, and J. Barata, "A systematic review of access control models: Background, existing research, and challenges," *IEEE Access*, vol. 13, pp. 17 777–17 806, 2025.

[36] J. C. Bauer, E. John, C. L. Wood, D. Plass, and D. Richardson, "Data entry automation improves cost, quality, performance, and job satisfaction in a hospital nursing unit," *JONA: The Journal of Nursing Administration*, vol. 50, no. 1, pp. 34–39, 2020.

[37] R. Pushpakumar, K. Sanjaya, S. Rathika, A. H. Alawadi, K. Makhzuna, S. Venkatesh, and B. Rajalakshmi, "Human-computer interaction: Enhancing user experience in interactive systems," in *E3S Web of Conferences*, vol. 399. EDP Sciences, 2023, p. 04037.

[38] I. Pastierik, "Deploying oracle machine learning automl models for oracle apex analytics," in *2024 IEEE 17th International Scientific Conference on Informatics (Informatics)*, 2024, pp. 499–506.

[39] O. Corporation, *Oracle E-Business Suite Documentation*, 2025, accessed: 2025-03-14. [Online]. Available: https://docs.oracle.com/cd/E26401_01/doc.122/f21671/T673609T683724.htm

[40] O. L. Experts, "Oracle erp cloud licensing costs," 2025, accessed: 2025-03-14. [Online]. Available: https://oraclelicensingexperts.com/oracle-erp-cloud-licensing-costs/