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Hybrid Project Management-Based Oil Palm Replanting Management Model

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Abstrak

Replanting kelapa sawit merupakan strategi utama dalam menjaga produktivitas perkebunan dan memastikan keberlanjutan industri kelapa sawit. PT Perkebunan Nusantara IV menghadapi berbagai tantangan dalam mengelola proyek *replanting*, seperti perencanaan, keterlambatan proyek, ketidaktepatan biaya, serta kualitas *replanting* yang tidak konsisten. Kompleksitas ini memerlukan pendekatan manajemen proyek yang fleksibel dan adaptif. Oleh karena itu, penelitian ini bertujuan untuk merancang metode manajemen *replanting* berbasis *Hybrid Project Management* (HPM) dengan menggabungkan keunggulan pendekatan *Waterfall* dan *Agile*. Penelitian ini menggunakan metode deskriptif kualitatif dengan teknik pengumpulan data melalui wawancara mendalam, observasi lapangan, dan analisis dokumen. Hasil penelitian menunjukkan bahwa penerapan HPM dalam proyek *replanting* meningkatkan efektivitas manajemen dengan memberikan cakupan proyek yang terstruktur, mengoptimalkan strategi manajemen waktu, meningkatkan akurasi pengendalian biaya, serta memastikan standar kualitas yang konsisten. Model ini memungkinkan manajer proyek untuk lebih responsif terhadap kondisi lapangan, mengidentifikasi risiko lebih awal, dan meningkatkan efisiensi operasional. Dengan demikian, metode yang diusulkan diharapkan menjadi solusi efektif dalam meningkatkan efisiensi dan keberlanjutan proyek *replanting* kelapa sawit di PTPN IV.

Kata Kunci: *Replanting;* Kelapa Sawit*; Hybrid Project Management; Waterfall; Agile*

Abstract

Oil palm replanting is a key strategy for maintaining plantation productivity and ensuring the sustainability of the palm oil industry. PT Perkebunan Nusantara IV faces several challenges in managing replanting projects, planning, project delays, cost underruns, and inconsistent replanting quality. These complexities require a flexible and adaptive project management approach. Therefore, this study aims to design a replanting management method based on Hybrid Project Management (HPM), combining the strengths of Waterfall and Agile approaches. This study employs a qualitative descriptive method, utilizing in-depth interviews, field observations, and document analysis for data collection. The findings indicate that implementing HPM in replanting projects enhances management effectiveness by providing a well-structured project scope, optimizing time management strategies, improving cost control accuracy, and ensuring consistent quality standards. This model enables project managers to be more responsive to field conditions, mitigate risks early, and enhancese. Thus, the proposed method is expected to be an effective solution for improving efficiency and sustainability in oil palm replanting projects at PTPN IV. Simulation results indicate that the proposed hybrid project management model reduced replanting completion time by approximately 12%, improved compliance with quality standards by 20%, and increased documentation completeness by 33% compared to conventional replanting practices.

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Keywords: Replanting; Oil Palm; Hybrid Project Management; Waterfall; Agile.

1. Introduction

The replanting process itself involves stages that require thorough planning, effective execution, and systematic monitoring and control. To ensure replanting proceeds efficiently and sustainably, project management must integrate four main elements: scope, cost, time, and quality. These elements are interrelated and impact the success of the project. The project scope must be clearly defined to ensure all necessary replanting activities are included without redundancy or omission. Costs must be calculated to ensure effective fund utilization and to maintain the financial sustainability of the project. Time is a critical factor to ensure each phase is completed on schedule, preventing delays that could affect quality or cost. Project quality must be clearly defined through measurable parameters to ensure that replanting work is carried out according to specified standards. Laporan penngerjaan proses replanting The March 2025 replanting work report for PTPN IV is shown in Table 1.

Table 1. Weekly Report of PTPN IV Replanting Work for March 2025 Period

Work Stage	Sat	Target	Actual	*Variance*
Write-off Approval	%	100	60,00	(40,00)
Transfer of Assets	%	15,72	-	(15,72)
Procurement Process	%	64,28	10,42	(53,86)
Physical Progress				
- Land clearing	%	15,82	9,27	(6,55)
- Planting	%	12,15	3,47	(8,68)
Progress Biaya		14,61	5,86	8,75)

Source: Data Compilation

Discrepancies in project scope, time, cost, and quality can significantly affect project success. These gaps can lead to issues such as cost overruns due to inaccurate budgeting, project delays that disrupt crop growth cycles, and reduced deliverable quality that compromises final project outcomes. For instance, delays can affect oil palm seedlings prepared for planting, causing them to miss their optimal planting age. Moreover, cost overruns may damage the company's reputation, while dissatisfaction with end quality may affect stakeholder relationships and business continuity.

To overcome these challenges, many organizations are adopting more modern and flexible project management methods, such as Hybrid Project Management. This approach combines the strengths of two dominant project management methodologies: Waterfall and Agile. Waterfall is known for its structured and systematic approach, while Agile offers flexibility and adaptability to changing field conditions. In the context of oil palm replanting, using both methods simultaneously helps teams deal with field uncertainties—such as weather changes or logistical issues—while ensuring the main project phases are carried out systematically. With Hybrid Project Management, teams can quickly adapt project steps without sacrificing end goals and quality, while improving efficiency and stakeholder communication.

This study aims to address the challenges faced by PTPN IV in improving the quality of oil palm replanting and supporting effective and sustainable plantation management. It is expected that through the application of comprehensive and adaptive project management, every aspect of the replanting project can be better monitored and controlled, ultimately positively impacting the project's outcomes.

Furthermore, the post-merger and spin-off process has brought operational implications for PTPN IV as the surviving entity, especially in its oil palm replanting operations, including:

a. Fragmentation of Replanting SOPs
   Although a replanting guideline has been issued by the Plantation Holding, each former PTPN entity had different technical standards, work procedures, and replanting methods, resulting in inconsistent replanting quality and outputs.
b. Complex Operational Regions
   Replanting areas span from Aceh to Sulawesi, with diverse agroclimates, accessibility, and infrastructure readiness.
c. Limited Integration of Planning and Monitoring
   The systems for requirement fulfillment, planning, and supervision are not yet fully integrated, hindering the ability to monitor and intervene in replanting problems swiftly and accurately.
d. Challenges in Organizational and HR Harmonization.
   Differences in organizational culture and technical capabilities across regions increase complexity and hinder replanting program consolidation.
e. Productivity Pressures and Transformation Targets
   As oil palm is the main commodity, replanting is a key driver for PalmCo's future productivity. Delays or failures in replanting directly impact the company's business sustainability.

Following the post-merger and spin-off process, PTPN IV faces significant operational challenges in implementing oil palm replanting programs. One of the main issues is the fragmentation of replanting Standard Operating Procedures (SOPs), as each former PTPN entity previously applied different technical standards and work practices. This condition has resulted in inconsistencies in replanting quality and output across regions. In addition, replanting operations are conducted across geographically diverse areas, ranging from Aceh to Sulawesi, each with distinct agroclimatic conditions, infrastructure readiness, and accessibility constraints. These complexities are further exacerbated by the limited integration between planning, implementation, and monitoring systems, which reduces the organization's ability to respond quickly to field-level problems. Moreover, differences in organizational culture and human resource capabilities across operational units add another layer of complexity, making it difficult to harmonize replanting programs and achieve uniform performance standards.

Currently, many replanting projects face challenges in scope, cost, time, and quality, often negatively impacting project outcomes. For example, poorly detailed and unstructured scope planning can lead to additional work beyond the original plan (scope creep), causing increased costs or extended timelines. Cost-wise, price estimates from user functions vary and investment budgets are not fully absorbed, resulting in financial instability. Timewise, delays often occur due to inadequate time management. Lastly, replanting quality often does not meet expected standards in terms of soil processing, LCC establishment, planting techniques, and post-planting crop consolidation.

This research examines these problems to develop a management model that optimally integrates all four elements. A systematic and integrated model is expected to anticipate and manage these challenges more effectively and efficiently. Thus, the study seeks to answer the following key questions:

1. How to structure the project scope to ensure execution aligns with the plan?
2. How to apply time management in each replanting phase to meet schedules while remaining flexible without altering the final completion date?
3. How to apply appropriate quality standards in each replanting phase to ensure plant quality meets expected standards?

The objectives of this research are:

1. To identify and define the specific scope of the replanting project
   Analyze in detail the scope components, including required activities and necessary constraints. Clearly defined scope minimizes scope creep risk. The identification and definition process uses tools such as:
   a. SOPs to ensure consistent procedures from land preparation to plant maintenance
   b. DSR to identify potential scope deviations and design preventive solutions.
2. To develop time management strategies to ensure schedule compliance
   Including scheduling, critical path identification, and project phase management to ensure each stage is completed on time.
3. To ensure replanting quality through consistent application of standards
   Define quality standards for each replanting stage, from surveying to plant maintenance. Consistent quality approaches ensure replanting outcomes meet productivity and quality expectations.
4. To formulate an integrated replanting project management model
   Design a replanting management model that integrates the four key elements: scope, cost, time, and quality—serving as a comprehensive reference framework for more structured and effective replanting project planning and execution.

2. Literature Review

1. *Oil Palm Replanting*

Oil palm replanting refers to the systematic replacement of old and unproductive oil palm stands to restore land productivity and ensure long-term plantation sustainability. According to Corley and Tinker (2016), oil palm productivity generally declines after 25–30 years due to reduced fresh fruit bunch yield and increased vulnerability to pests and diseases. In the Indonesian context, replanting is also driven by the need to improve land-use efficiency and maintain national palm oil competitiveness (BPS, 2021). Pahan (2006) emphasizes that successful replanting is not only determined by seed quality but also by proper land preparation, drainage systems, and post-planting maintenance. Furthermore, Obidzinski et al. (2012) highlight that replanting programs play a strategic role in balancing productivity improvement with environmental and social sustainability. Therefore, oil palm replanting requires not only agronomic precision but also structured project management to ensure consistent quality, cost efficiency, and timely execution.

2. *Hybrid Project Management*

Hybrid Project Management is a project management approach that combines principles from the two dominant methodologies: the sequential Waterfall and the iterative Agile. This approach seeks to optimize project efficiency while maintaining structured discipline and flexibility to respond to changes. In today's uncertain and complex project environment, hybrid serves as a bridge between organizational control needs and team adaptability (Wening, 2020). Hybrid Project Management (HPM) is an integrated project management approach that combines the structured planning characteristics of the Waterfall method with the flexibility and adaptability of Agile practices. According to Wening (2020), hybrid approaches are particularly suitable for projects characterized by high complexity and environmental uncertainty. The Project Management Institute (PMI, 2021) also recognizes hybrid methodologies as an effective response to projects that require both governance discipline and adaptive execution. Kerzner (2022) argues that hybrid project management enables organizations to maintain control over scope, cost, and quality while

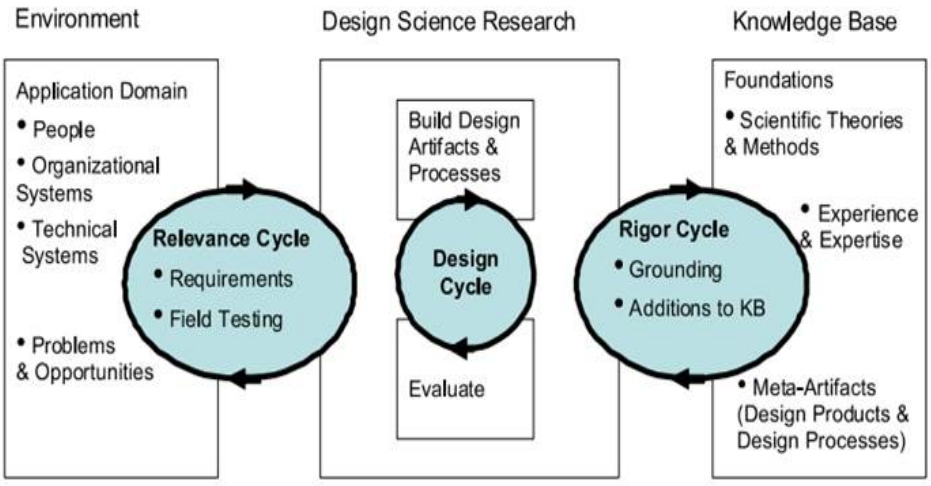
allowing iterative adjustments during implementation. Compared to pure Waterfall or Agile methods, hybrid project management provides a balanced framework that is highly relevant for large-scale agricultural projects such as oil palm replanting, where initial planning must be detailed, yet field execution often requires flexibility due to weather, logistics, and site-specific conditions.

3. *Standard Operating Procedure* (SOP)

Standard Operating Procedures (SOPs) are formalized documents that define standardized methods, sequences, and responsibilities for executing organizational activities. According to Kerzner (2017), SOPs play a critical role in ensuring consistency, quality assurance, and risk mitigation in project execution. PMI (2021) emphasizes that well-documented SOPs help align operational activities with project objectives and performance standards. In oil palm replanting projects, SOPs function as technical and managerial references that guide land preparation, planting techniques, fertilization, and post-planting maintenance, thereby reducing variability in execution and improving overall project quality.

4. *Design Science Research* (DSR)

Design Science Research (DSR) is a research methodology that focuses on the development and evaluation of artifacts designed to solve identified organizational problems. Peffers et al. (2007) describe DSR as a structured process consisting of problem identification, objective definition, design and development, demonstration, evaluation, and communication. In the context of management and operational research, DSR enables researchers to produce practical models that are both theoretically grounded and empirically validated. This study adopts the DSR approach to design and evaluate a hybrid project management model that addresses the specific challenges of oil palm replanting at PTPN IV.The Design Science Research (DSR) methodology helps researchers in conducting scientific research by providing research guidelines, starting from the development stage to how the evaluation of the resulting information system artifacts should be carried out. The stages in the DSR methodology can be seen in Figure 1.



Source: Data Compilation

Figure 1. DSR Methodology Cycle

3. Methods

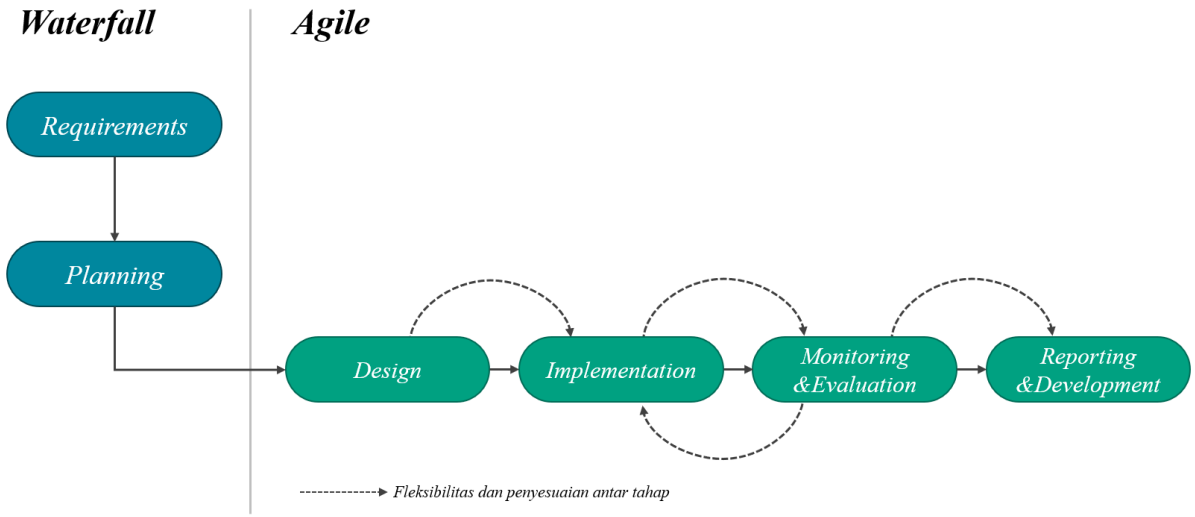
This study employs a descriptive qualitative approach using a case study method. Data were obtained through interviews, direct observation, and documentation of replanting activities within the PTPN IV operational area. The analytical technique used includes thematic analysis to explore managerial patterns and evaluate the implementation of the Hybrid Project Management method. This approach is combined with the Design Science Research (DSR) method to develop an applicable and measurable replanting management model based on ABC/ABM. Data collection was carried out through:

a. **In-depth interviews**: Conducted with the Head of Plantation Division, Estate Managers, Agronomists, and Field Staff.
b. **Participant observation**: Conducted at plantation sites executing the replanting project.
c. **Documentation and company archives**: Including management reports, SOPs, and project schedules.

4. Results and Discussions

These findings are consistent with Kerzner (2022), who emphasizes that hybrid project management is particularly effective in projects characterized by environmental uncertainty and operational complexity. However, unlike previous studies that predominantly focus on information technology and construction sectors, this study demonstrates that hybrid project management can also be effectively applied in large-scale agricultural projects, particularly oil palm replanting, which involves both structured planning requirements and dynamic field execution.

The framework that integrates the Hybrid Project Management approach (Waterfall + Agile) with the ABC/ABM system is shown in Figure 2.



Source: Data Compilation

Figure 2. Hybrid PM Integration Model

Explanation of the Model Workflow:

1. ***Waterfall at the Beginning:*** *The process begins with gathering requirements and prerequisites for the replanting area, followed by sequential and complete planning.*
2. ***Agile (Sprint) in the Field:*** *Once planning is complete, the team transitions into iterative sprint cycles*:
   a. **Design:** Formulating an initial solution design based on the planning phase.
   b. **Implementation:** Executing the design into technical fieldwork.
   c. **Monitoring & Evaluation:** Regular evaluation of each sprint to monitor results, assess performance, and identify improvements.
   d. **Reporting & Development:** Consolidating sprint results into progress reports and evaluations to continually refine work processes based on field learnings.

This model enables PTPN IV to gain cost transparency in every replanting phase, operational flexibility through rapid iterations, KPI-based cost and time performance control, and continuous improvement.

The hybrid project management framework is structured to accommodate the complexity of plantation activities, operational flexibility, and the need for more accurate cost and quality performance evaluations through the ABC and ABM approaches.

Key Model Elements:

a. Products
   1) A hybrid project management model applicable to oil palm replanting
   2) Standard Operating Procedures (SOPs) for replanting based on the hybrid method.
b. Processes
   1) Project management using Waterfall for planning and Agile for implementation
   2) Continuous evaluation to refine replanting strategies
c. Strategies
   1) Use of Key Performance Indicators (KPIs) to measure project success

In its implementation, hybrid project management is divided into two main phases, as follows:

1. Requirements Fulfillment, Planning, and Control Phase (Waterfall)

This phase uses the waterfall method for activities that require detailed and sequential planning, including:

a. Initial Analysis and Feasibility Study
1. Assessing the condition of land and crops to be replanted.
2. Determining the requirements for seedlings, fertilizers, and equipment according to company standards.
3. Developing the project budget and timeline.

b. Scheduling and Resource Allocation
1. Using a Gantt chart to visualize the project schedule.
2. Defining the project's critical path using CPM (Critical Path Method).

c. SOP and Quality Standards Development
1. Developing Standard Operating Procedures (SOPs) to ensure the process runs according to standards.
2. Establishing quality parameters to be met at each stage.

d. Procurement Process
1. Defining the terms of reference.
2. Executing the procurement process.

2. Implementation and Adaptation Phase (Agile)

This phase uses the agile method, which allows greater flexibility in project execution. The stages in this phase

include:

a. Design

1. Defining sprint/weekly targets for each replanting stage.
2. Designing micro-zoning of the planting area (block layout, stacking paths, planting rows, planting patterns, etc.).
3. Designing basic infrastructure and drainage system.
4. Preparing resource requirements and implementation methods.

b. Implementation

1. Block-by-block land clearing.
2. Block-by-block land preparation.
3. Initial fertilization application per block.
4. Seedling planting per block.
5. Adapting work methods and sprint execution based on field conditions.

c. Periodic Monitoring and Evaluation

1. Conducting daily stand-up meetings to discuss daily progress and challenges.
2. Monitoring physical replanting implementation in the field using both direct and indirect methods.
3. Evaluating each sprint using the scrum retrospective method.
4. Adjusting strategies in response to field issues.
5. Quality Assurance and Feedback Loop: Ensuring seedling growth meets established standards.
6. Using evaluation data for continuous process improvement.

d. Reporting and Development

1. Preparing weekly and monthly performance reports.
2. Reporting replanting success indicators.
3. Mapping replanted blocks.
4. Reviewing sprint outcomes to identify bottlenecks.
5. Updating guidelines or regulations based on lessons learned.
6. Identifying new technologies to be integrated

Standard Operating Procedure (SOP) for Managing Oil Palm Replanting Projects Based on Hybrid Project Management (Waterfall + Agile) can be seen in Table 2.

Table 2 Standard Operating Procedures

No.	Phase	Step	Brief Description	Person in Charge	Related Documents
1.	Preparation, Requirements & Planning	Project Initiation	Assess replanting needs, block maps, plant age; establish Hybrid PM team	Project Sponsor & Manager	Project TOR, Decree of Team Formation
2.		Feasibility Study & DSR Analysis	Identify scope gaps and risks using the DSR framework	Project Manager & DSR Lead	DSR Analysis Document, Risk Register
3.		Scope Definition (WBS)	Detail activities; develop Work Breakdown Structure (WBS)	Project Manager	WBS, Scope Statement
4.		Time Management & CPM	Create Gantt Chart; identify critical path; set milestones	Scheduler / PMO	Gantt Chart, CPM Diagram
5.		Cost Planning (ABC)	Identify cost pools & cost drivers; estimate cost per activity using ABC	Finance & Control	ABC Template, Budget Estimate

6.		SOP & Quality Standard Documentation	Finalize replanting SOP; define quality KPIs	QA/QC & Agronomist	Replanting SOP, KPI Matrix
7.	Sprint Execution (Agile)	Sprint Planning	Select sprint backlog; allocate resources and duration	Scrum Master & Product Owner	Sprint Backlog, Sprint Charter
8.		Design & Field Preparation	Prepare land; validate materials and elite seedlings	Estate Manager & Agronomist	Field Preparation Checklist
9.		Implementation	Execute planting according to SOP; input time and cost data into ABC system	Field Team & Vendors	Daily Report, ABC Input Form
10.	Sprint Execution (Agile)	Daily Monitoring & Evaluation	Daily stand-up; monitor time/cost deviations; check field quality	Scrum Master & QA/QC	Daily Report, KPI Dashboard
11.		Sprint Reporting & Development	Prepare sprint report	Product Owner	Sprint Report, Action Log
12.	Post-Planting Maintenance	Seedling Growth Monitoring	Monitor seedling retention and growth; record data in KPI dashboard	Agronomist & Field Team	Post-Plant Monitoring Form, KPI Dashboard
13.	Project Closure & Final Review	Final Review & Lessons Learned	Validate final milestone achievement; final cost report; document lessons learned; update SOP	Project Manager & QA/QC	Final Report, Lessons Learned Document

Source: Data Compilation

The results of the model implementation were tested with a simple simulation based on the current year's replanting project data in the PTPN IV work area, detailed in Table 3.

Table 3 Simulation test results

Sprint	Target Area (Ha)	Realized Area (Ha)	Completion Time (Days)	Technical Deliverable (%)	Field Documentation (%)	Status
1	40	30	12	99	67	☒
2	40	56	12	114	80	☒
3	40	61	10	106	100	☒

Sumber: Pengolahan Data

Based on the analysis and evaluation of the table above, the following conclusions can be drawn:

a. The replanting implementation time in the simulated project can be reduced by an average of 12% compared to conventional methods.
b. Technical deliverables can be accelerated by an average of 6%.
c. Compliance with quality standards increased by 20% due to consistent evaluation cycles in each Agile sprint.
d. Awareness of documentation improved by 33%.
e. A positive trend was observed, with improvements from sprint 1 to sprint 4.

Key Benefits of Implementation:

a. Daily and weekly execution is more controlled.
b. Minor issues are resolved more quickly due to faster problem-solving response.
c. Documentation and transparency are improved.

d. The team becomes more disciplined, as short sprints create positive pressure to achieve targets faster.

Validation was conducted through source triangulation (interviews, observations, and documentation) and method triangulation (thematic and evaluative approaches). The model was also tested in practice through Focus Group Discussions (FGDs) with internal stakeholders, including estate managers and project teams. The consensus reached was that the model effectively enhances project management transparency and provides a strong foundation for data-driven decision-making. Furthermore, the validation test indicated that the model can be replicated for replanting projects in other units with minimal adaptation.

Furthermore, the business process is strengthened through the development of a Risk Control Matrix (RCM) designed for each stage of the project. The RCM developed in this project includes five main elements: phase, process, sub-process, business process risks, control activities, and control objectives, as detailed in Table 6.3 below. With this structure, key risks such as scope creep, quality deviations, and cost mismanagement can be anticipated from the outset. Controls are carried out through practical measures such as validation of technical data, supervision of implementation methods, and continuous quality control. All of these activities aim to ensure that no material information is misrepresented or undocumented in the financial system.

Table 4 Risk Control Matrix

Phase	Process	Sub-Process	Business Process Risks	Control Activities	Control Objectives
Waterfall	Initial Analysis	Survey of planned replanting area	• Outdated land condition data	• Validation by technical team	Ensure that the planning basis reflects actual field conditions
	Feasibility Study	Develop replanting feasibility study (FS)	• Area not recommended • Late FS issuance	• FS proposal checklist based on initial analysis • FS conducted at least 6 months prior to implementation	Ensure the replanting area meets business feasibility
	Schedule Preparation	Develop indicative project timeline	• Unrealistic schedule • Schedule misaligned with seasons	• Use of approved-level project scheduling tools • Cross-functional critical path (CPM) validation	Ensure the schedule is feasible for implementation
	Resource Allocation	Allocate resources for all project activities	• Insufficient or mismatched resources	• Adjust allocations based on workload and equipment needs • Routine monitoring of CPM	Ensure resources support project execution targets
	Evaluation / Standard Setting	Align guidelines and performance standards	• Outdated procedures • Inadequate performance standards	• Cross-functional update evaluations • Verification of technical specifications	Ensure replanting is conducted according to technical and quality standards

	Procurement Process	Prepare technical specs and execute procurement	• Inadequate technical specs • Incomplete documents • Delayed procurement	• Cross-functional verification of technical specs • Task force for document preparation • Ad hoc team for procurement	Ensure procurement aligns with technical needs and schedule
Agile	Design	Set sprint targets and technical implementation	• Too many or too few sprints • Unrealistic design	• Site visits prior to design • Sprint planning with implementers	Align technical designs with actual field conditions
	Implementation	Field execution of replanting activities	• Inconsistent implementation • Lack of documentation	• Daily supervision • Checklist and notes on adaptation and changes	Ensure implementation consistency and learning documentation
	Monitoring & Evaluation	Monitor and evaluate findings	• Subjective evaluations • No continuous improvement	• Daily stand-ups • Retrospective sessions • Feedback loops • Use of indicator-based dashboards	Provide real-time information and promote continuous improvement
	Reporting & Development	Reporting and improvement development	• Reports not timely • Incomplete reports • Reports not aligned with actual conditions • Lessons learned undocumented	• Fixed reporting schedule with automatic reminders and assigned PICs • Standard templates with regular reviews • Cross-functional validation and sampling • Mandatory retrospective sessions • Use of digital knowledge management	Provide valid data and support sustainable improvement development
	Project Closing	Final measurement and preparation of BAST	• Inaccurate physical measurement data • Undocumented measurements • Incomplete/incorrect documents • BAST does not reflect actual conditions	• Cross-functional supervised measurement and direct supervisor verification • Official format and geotagged documentation • Checklist for BAST documents • Cross-review by independent party (SPI or other institution)	Ensure the project closing documents accurately reflect final project outcomes

Therefore, this study explicitly integrates Waterfall and Agile methodologies within a Hybrid Project Management framework to address the unique challenges of oil palm replanting projects.

5. Conclusions

Based on the findings of this study, it can be concluded that the implementation of a hybrid Waterfall–Agile framework in oil palm replanting projects effectively addresses the identified challenges and achieves the formulated objectives as follows:

1. **Unifying Planning Standardization**
   Utilizing the Waterfall method to organize the requirements gathering and project planning phases in a structured, systematic, and consistent manner across regions and work units.
2. **Structured Scope Definition**
   By applying Standard Operating Procedures (SOPs) and the Design Science Research (DSR) approach, the project scope is clearly defined in detail—from land preparation to post-planting maintenance—thereby minimizing the risk of scope creep and ensuring the project remains aligned with the original plan.
3. **Flexible and Accurate Time Management**
   Scheduling based on the Critical Path Method (CPM) combined with Agile sprint cycles allows for detailed adjustments in each phase without compromising the overall replanting completion date. This ensures timely operational execution while providing flexibility to handle field-level obstacles.
4. **Accelerating Organizational Adaptation**
   Managing operational and human resource changes through Agile sprints enables rapid iterations and process improvements driven by real-time feedback.
5. **Enhancing Monitoring and Control Effectiveness**
   Establishing a sprint review-based monitoring system linked to quality standards defined for each stage—from initial survey, seedling planting, to post-planting maintenance—enables early detection of deviations, allowing corrective actions before they escalate into major issues. This approach ensures that planting outcomes meet expected productivity and quality benchmarks.
6. **Promoting Sustainable Productivity and Efficiency**
   Optimizing replanting results through a structured approach that combines planning precision with rapid adaptation supports PalmCo's medium- and long-term productivity enhancement targets.
7. **An Integrated Project Management Model**
   The final result of this research is a replanting project management model that integrates the key elements of scope, time, cost, and quality. This model provides a comprehensive framework for requirements fulfillment, planning, execution, and control—ensuring that replanting projects are implemented in a more structured, systematic, effective, and sustainable manner.

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