

Assessing Digital System Implementation Feasibility: A TELOS-Based Framework For SMES

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Abstract: *The democratization of technology through low-code platforms, Software-as-a-Service (SaaS), and artificial intelligence has enabled small and medium-sized enterprises (SMEs) to develop sophisticated systems with minimal resources. Yet, this accessibility introduces a strategic paradox: while building digital systems is now easier than ever, their necessity, feasibility, and long-term value remain uncertain. Addressing this challenge, this study presents a TELOS (Technical, Economic, Legal, Operational, and Schedule)-based feasibility assessment framework designed for evidence-based decision-making in SME technology adoption. Unlike conventional approaches that employ weighted scoring or subjective prioritization, the proposed model uses TELOS as a structured data integration methodology, consolidating multi-dimensional inputs into a unified feasibility evaluation process. Each TELOS dimension provides distinct data inputs—from software architecture and compliance matrices to organizational structures and project timelines—that are integrated into a comprehensive financial model. A single embedded case study involving the implementation of an integrated dashboard system demonstrates strong viability: Net Present Value (NPV) of Rp 89.6 million, Internal Rate of Return (IRR) of 32.05%, and Payback Period of 3 years. Results validate that structured, multi-perspective feasibility analysis effectively bridges the gap between technological accessibility and strategic investment readiness in SME contexts. The framework offers a replicable, data-driven foundation for evaluating digital adoption initiatives under resource constraints in the evolving era of digital democratization.*

Keywords: TELOS Framework, SME Technology Adoption, Feasibility, Capital Budgeting, Data-Driven Decision Making

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Introduction

The landscape of enterprise technology development has undergone radical transformation over the past decade. The emergence of low-code and no-code platforms, cloud-based Software-as-a-Service (SaaS) solutions, and AI-assisted development tools has substantially lowered technical and financial barriers to system implementation. Contemporary SMEs can deploy sophisticated integrated dashboards, enterprise resource planning systems, and data analytics platforms with development timelines and capital investments significantly reduced compared to traditional custom development approaches. This technological democratization represents a fundamental shift in the relationship between organizational capability and system implementation feasibility.

However, this accessibility creates new strategic challenges for SME decision-makers. While technical capability barriers have diminished, the fundamental questions of strategic fit, financial viability, and organizational readiness remain critical determinants of implementation success. Research by Morgan (2019) indicates that numerous digital transformation initiatives fail to achieve anticipated outcomes. Movahed et al. (2023) found that approximately 70% of digital transformation initiatives undertaken by smaller firms fail to deliver expected results, with SMEs experiencing particularly high failure rates due to resource constraints, inadequate planning, and misalignment between technological capabilities and organizational needs. The Userlane (2023) State of Digital Adoption Report further reinforces this pattern, documenting that 70% of software implementations fail because of poor user adoption. These failure rates remain consistently elevated despite technological advances that ostensibly simplify implementation processes, suggesting that ease of development does not correlate with implementation success.

Small and medium-sized enterprises face distinctive challenges in technology adoption decisions. The World Economic Forum (2021) reports that while 97% of global companies accelerated technology adoption during the pandemic, only 23% of SMEs were able to dedicate resources to new digital tools. Unlike large enterprises with dedicated IT departments, substantial capital reserves, and extensive risk management capabilities, SMEs must make technology investment decisions under conditions of significant resource constraint and heightened operational risk. Consequently, SMEs require systematic, evidence-based frameworks for evaluating technology adoption decisions that account for their specific operational constraints and risk profiles.

The TELOS framework—encompassing Technical, Economic, Legal, Operational, and Schedule feasibility dimensions—provides a structured methodology for comprehensive technology implementation assessment (Hall, 2011). Originally developed by Hall for information systems evaluation, TELOS offers holistic analysis across multiple feasibility dimensions, enabling decision-makers to identify potential implementation barriers before committing substantial resources. Ssegawa & Muzinda (2021) demonstrated that systematic application of TELOS criteria can produce more structured and comprehensive project evaluations compared to ad-hoc feasibility approaches, particularly in resource-constrained environments where implementation failures carry severe consequences.

Despite TELOS framework advantages, several limitations constrain its application to SME technology adoption decisions. First, conventional TELOS applications typically employ equal or subjectively determined dimension weightings that may not reflect SME-specific

priorities and constraints (McLeod, 2021). Second, economic feasibility analysis often relies on simplified cost-benefit calculations rather than comprehensive capital budgeting methodologies that account for time value of money and risk-adjusted returns. Third, validation approaches frequently lack systematic triangulation across multiple stakeholder perspectives, potentially introducing bias into feasibility assessments. These limitations motivate development of enhanced TELOS methodologies specifically adapted for SME technology adoption contexts.

This research addresses these gaps through several contributions. First, we employ the TELOS framework not as a validation model, but as a guiding structure for feasibility assessment—collecting and organizing data across its five dimensions. Each aspect serves as a data foundation: for instance, the technical dimension includes the software bill of materials, the Operational dimension encompasses organizational structure and RACI mapping, while other dimensions are similarly represented by relevant datasets. Second, these multi-dimensional data inputs are systematically integrated and analysed, forming the basis for a comprehensive cash flow and financial feasibility evaluation. Third, the financial analysis incorporates seven distinct metrics (Net Present Value, Internal Rate of Return, Payback Period, Return on Investment, Benefit-Cost Ratio, Profitability Index, and Average Annual Return) to provide a multi-faceted perspective on economic viability. Fourth, the resulting financial insights are decomposed into tangible operational benefits such as labour efficiency improvement, defect reduction, process optimization, and resource utilization enhancement.

We demonstrate the framework's application as a data integration and feasibility assessment methodology through an in-depth case study of integrated dashboard system implementation at an Indonesian SME operating in the manufacturing sector with 25–30 employees and annual revenue of approximately Rp3 billion. The proposed system encompasses seven integrated modules (Customer Relationship Management, Manufacturing Execution System, Product Information Management, Project Management Information System, Human Resource Information System, Financial Dashboard, and Inventory Management System) requiring initial capital investment of Rp141.4 million and annual operational expenditure of Rp20.4 million.

The remainder of this paper proceeds as follows. Section II reviews related literature on TELOS framework applications, SME technology adoption challenges, and capital budgeting methodologies. Section III details our research methodology including TELOS aspect, data collection procedures, and comprehensive analysis techniques. Section IV presents result across all TELOS dimensions with particular emphasis on implementation effect and financial feasibility analysis. Section V concludes with practical implications, study limitations, and directions for future research.

Related Work

Technology feasibility assessment and adoption decision-making have been widely studied at the intersection of information systems, management, and investment analysis. The TELOS (Technical, Economic, Legal, Operational, and Schedule) framework provides a comprehensive structure for evaluating multidimensional project feasibility (Hall, 2011). Bause et al., (2014) and McLeod (2021) emphasize that feasibility studies must extend beyond technical considerations to encompass financial, organizational, regulatory, and scheduling

constraints. Ssegawa & Muzinda (2021) further highlight that structured TELOS-based assessments enable more consistent project evaluations compared to ad-hoc approaches, particularly in resource-constrained contexts such as SMEs. However, prior applications often rely on fixed or subjective weightings that may not reflect SME-specific priorities, underscoring the need for context-adapted methodologies. Bause et al. (2014) note that many feasibility studies maintain a narrow technical focus while overlooking operational and legal complexities that frequently emerge as post-implementation challenges.

SMEs face distinct barriers in adopting new technologies, including limited financial resources, workforce capability gaps, and inadequate strategic alignment. Global analyses by the World Economic Forum (2021), Morgan (2019), and Movahed et al. (2023) report that more than two-thirds of SME digital transformation efforts fail to deliver expected outcomes, with poor operational readiness and insufficient planning as dominant factors. These constraints reinforce the need for structured feasibility approaches that integrate organizational, financial, and technical perspectives rather than relying solely on perceived technological advantages.

While technology adoption models such as the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology–Organization–Environment (TOE) framework provide valuable insights into behavioural and organizational adoption determinants, they primarily explain why adoption occurs rather than assess whether proposed implementations are feasible (Dai & Li, 2022); (Shahadat et al., 2023); (Venkatesh, Thong & Xu, 2016). In contrast, the TELOS framework offers a pre-implementation assessment perspective that evaluates project viability across technical, operational, economic, and regulatory dimensions. Integrating TELOS with capital budgeting analysis strengthens economic evaluation through multi-metric assessment using Net Present Value, Internal Rate of Return, Payback Period, Return on Investment, Benefit-Cost Ratio, Profitability Index, and Average Annual Return (McLeod, 2021). This combined approach enables a more evidence-based and holistic feasibility analysis tailored for SMEs operating under resource constraints.

Method

This study employs a qualitative case study approach to examine the feasibility of technology adoption within resource-constrained SME contexts. Following Yin's case study methodology, a single embedded case design was implemented, focusing on a manufacturing-based SME in Indonesia (25–30 employees, annual revenue approximately Rp3 billion) considering the implementation of an integrated dashboard system (Yin, 2018). The case study approach is particularly suitable for investigating contemporary phenomena within real-world contexts where boundaries between the phenomenon and its environment are indistinct (Patton, 2015).

TELOS Framework as Data Integration Model

This research utilizes the TELOS (Technical, Economic, Legal, Operational, and Schedule) framework not as a scoring or weighting model, but as a structured data integration methodology. Each dimension serves as a lens for systematic data collection to ensure

comprehensive feasibility coverage. Data collected from all dimensions are subsequently consolidated into an integrated financial and operational analysis model.

The Technical dimension captures system specifications and software bill of materials (SBOM) to evaluate system readiness and integration complexity. The Economic dimension compiles capital and operational expenditures, projected benefits, and cost structures for capital budgeting analysis. The Legal dimension is represented through a compliance matrix assessing data protection, licensing, and regulatory obligations. The Operational dimension employs organizational structure (SOTK), RACI mapping, and workflow documentation to evaluate functional efficiency and role clarity. The Schedule dimension includes Gantt charts and project timelines outlining implementation feasibility within planned durations.

Table 1 presents the key data types collected under each TELOS dimension and their corresponding analytical focus areas.

Table 1 TELOS Dimensions and Key Data Collected

TELOS Dimension	Key Data Collected	Analytical Focus
Technical	Software Bill of Materials (SBOM), architecture documentation	System readiness and scalability
Economic	CAPEX/OPEX data, projected benefits, cash flow assumptions	Financial viability and investment return
Legal	Compliance matrix, data protection, licensing requirements	Regulatory and contractual compliance
Operational	Organizational chart (SOTK), RACI matrix, SOP mapping	Workflow efficiency and responsibility structure
Schedule	Gantt chart, project timeline, milestone plan	Implementation feasibility and sequencing

Data Collection Procedures

Data collection adopted a triangulated design to enhance construct validity (Papavasileiou, Emmanouil & Irini Dimou, 2025). Structured interviews were conducted with three stakeholder groups: (1) system developers (n=2), providing insight into technical architecture and timeline constraints; (2) domain experts (n=2), contributing operational and industry-specific knowledge; and (3) prospective end-users (n=3), representing workflow integration and readiness perspectives. The interview process followed Brinkmann and Kvale’s structured interviewing principles, using standardized question sets with targeted probes for clarification.

Secondary data sources included system documentation, financial statements, industry benchmark reports, and regulatory references. Triangulation between interview data and secondary sources mitigated single-source bias, increasing methodological robustness and reliability.

Economic Feasibility Analysis

Economic analysis derived from the TELOS framework’s economic dimension employed comprehensive capital budgeting to evaluate project viability through multiple financial indicators (Putri *et al.*, 2025). Seven complementary metrics were calculated: Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, Return on Investment (ROI), Benefit–Cost Ratio (BCR), Profitability Index (PI), and Average Annual Return (AAR).

The Minimum Attractive Rate of Return (MARR) of 10.7% was determined based on weighted average cost of capital (WACC) principles and benchmarked against Indonesian government bond yields plus a risk premium for SME technology investments. Conservative assumptions were applied for benefit realization and cost escalation, ensuring realism in financial projections.

Analysis Framework

Analysis proceeded through four sequential stages. First, data were collected and categorized under the five TELOS dimensions. Second, all dimension data were integrated within a consolidated cash flow model linking operational inputs to financial outcomes. Third, capital budgeting metrics were computed and interpreted within the TELOS analytical context. Finally, qualitative insights from interviews and operational documentation were triangulated with quantitative financial outcomes to formulate comprehensive feasibility conclusions.

Inter-rater reliability checks were performed during qualitative interpretation to mitigate subjectivity, with discrepancies resolved through collaborative discussion until consensus was reached (Lindgren *et al.*, 2020). This process enhanced analytical objectivity and ensured the consistency of feasibility judgments across evaluators.

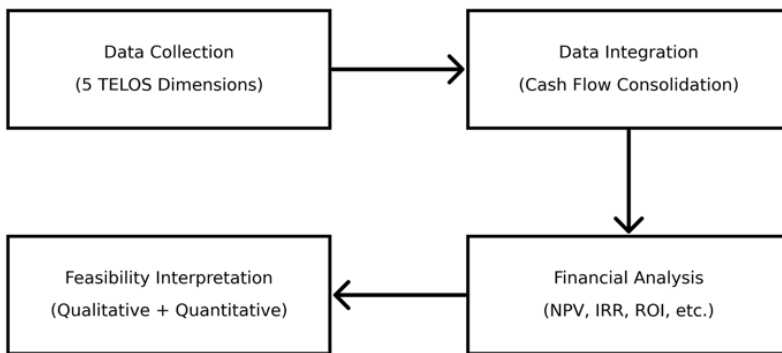


Figure 1: Data Integration and Feasibility Flow under the TELOS

Implementation & Evaluation

This section presents a systematic feasibility assessment following the TELOS framework dimensions. Our evaluation systematically documents technical requirements, economic projections, legal compliance, operational readiness, and implementation scheduling—integrating these findings into comprehensive cash flow projections and multi-

metric financial analysis. This approach grounds feasibility determination in concrete financial viability indicators while maintaining rigorous evaluation across all TELOS dimensions, addressing the critical gap between ease of system development and strategic investment necessity.

Technical Feasibility

The technical assessment evaluated infrastructure readiness and system architecture supporting the integrated dashboard implementation (Koo, Ji-In & Suk-Jae Jeong, 2024). Core infrastructure includes seven hardware components—a centralized NAS server, uninterruptible power supply, networking switches, six desktop/laptop terminals, four tablets, and wireless access points—ensuring reliable data storage and connectivity. Software infrastructure comprises the Laravel framework, MySQL database management system, Docker for containerized deployment, and Visual Studio Code as the primary development environment.

To systematically document all components, a Software Bill of Materials (SBOM) was constructed, detailing hardware and software elements along with their hierarchical relationships (De Bonis & Gianluca, 2025). The SBOM ensures complete technical traceability, dependency mapping, and validation that each component is commercially available and technically compatible with SME-scale operations.

Table 2: Software Bill of Materials (SBOM) Summary

Component Category	Key Elements	Function
Hardware	Synology NAS Server, Uninterruptible Power Supply (UPS), Network Switch, Laptop/Desktop, Tablet, Wireless Access Point	Data storage, connectivity, and user access
Software	Ubuntu Server LTS, Cloudflare Server, Laravel, PHP, HTML/CSS/JavaScript, Bootstrap, MySQL	Backend development, database management, deployment
Development Tools	Visual Studio Code, Docker	Source management and development environment

This documentation confirms that the proposed infrastructure meets performance, scalability, and reliability requirements appropriate for SME operational contexts, validating the technical feasibility dimension within the TELOS framework.

Economic Feasibility

The economic assessment analysed investment requirements and projected operational benefits derived from the integrated TELOS data dimensions. Capital expenditure (CAPEX) and operational expenditure (OPEX) were identified as primary cost components, while benefit projections were obtained from operational efficiency improvements validated through the operational dimension analysis (Wardhana et al., 2026).

Initial capital investment totals Rp 141,461,300, comprising hardware infrastructure (Rp 71,941,400), software development and licensing (Rp 32,319,900), legal and data-security compliance (Rp 35,700,000), and implementation training (Rp 1,500,000). Average annual operational expenditure equals Rp 32 million, covering internet connectivity, electricity, IP addressing, and maintenance support.

Quantified benefits include labour efficiency gains, administrative workload reduction, defect minimization, and document digitalization savings. These inputs were consolidated into a five-year cash-flow projection forming the foundation of financial analysis in later sections.

Table 3: Investment Structure and Annual Operational Expenditure Summary

Cost Category	Description	Amount (Rp)	Frequency
Hardware Infrastructure	Server, Network Devices, Client Terminals	71,941,400	One-time (CAPEX)
Software Development & Licensing	Framework, Database, Deployment Tools	32,319,900	One-time (CAPEX)
Legal & Security Compliance	Data Protection, Licensing, Certifications	35,700,000	One-time (CAPEX)
Training & Implementation Support	User Training and Technical Setup	1,500,000	One-time (CAPEX)
Operational Costs	Internet, Electricity, Maintenance, Hosting	32,000,000	Annual (OPEX)

This economic assessment confirms that total investment and recurrent costs are within feasible SME investment capacity, supporting further evaluation through multi-metric capital-budgeting analysis presented in Section G.

Legal Feasibility

The legal assessment evaluated the regulatory and compliance requirements for implementing an integrated digital system within the Indonesian SME context. This dimension of TELOS ensures that the proposed system aligns with national information security, data protection, and business operation regulations.

Six key compliance areas were identified: domain registration, intellectual property rights, personal data protection, information security certification, public service provider registration, and ISO 27001 compliance. All requirements were cross-referenced with applicable Indonesian laws and verified for feasibility of implementation.

The total compliance investment of Rp 38,019,900 was incorporated into the overall capital expenditure calculation under the Economic dimension. Each compliance item was classified by risk level, cost implication, and implementation readiness to confirm the absence of regulatory barriers to deployment.

This assessment confirms that all legal and regulatory obligations are identifiable, manageable, and fully integrated into the project's financial and operational planning, ensuring the legal feasibility of the proposed system implementation.

Operational Feasibility

The operational assessment examined the organization’s capacity to adopt, manage, and sustain the integrated dashboard system. This dimension of TELOS focuses on human resource readiness, workflow alignment, and responsibility distribution to ensure operational integration.

The system architecture consists of seven functional modules—Customer Relationship Management (CRM), Manufacturing Execution System (MES), Product Information Management (PIM), Project Management Information System (PMIS), Human Resource Information System (HRIS), Financial Dashboard, and Inventory Management System—each mapped to existing business processes to prevent functional overlap and ensure smooth workflow integration (Kowsar, Md Masud, & Md Arifur Rahman, 2022).

Stakeholder responsibilities were formalized using a RACI (Responsible, Accountable, Consulted, Informed) Matrix to clarify roles across ten key activities, including requirements analysis, system development, testing, deployment, training, maintenance, and performance monitoring.

Aktivitas / Role	Owner	Project Manager (Internal)	Agency Development Team (External)	System Administrator (Internal)	Manager (General)	End Users
1. System Requirements Analysis	C	A	R	C	C	I
2. System Development & Configuration	I	A	R	C	I	-
3. System Testing & Quality Assurance	I	A	R	R	C	C
4. Deployment & Go-Live	I	A	R	R	I	I
5. User Training & Onboarding	I	A	R	R	C	R
6. System Maintenance & Updates	I	A	R	R	I	-
7. Technical Support & Troubleshooting	I	A	R	R	C	C
8. Data Management & Backup	I	A	R	R	-	-
9. System Monitoring & Performance	I	A	C	R	I	-
10. Budget Approval & Cost Control	A	R	I	I	C	-

R Responsible Melaksanakan aktivitas	A Accountable Bertanggung jawab akhir	C Consulted Memberikan input/konsultasi	I Informed Perlu diberi informasi
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Figure 2: RACI Matrix Summary

This analysis confirms that the organizational structure and resource allocation provide sufficient capacity for system operation and maintenance. Clear responsibility mapping and role definition minimize implementation risk and support sustainable technology utilization within the SME’s operational framework.

Schedule Feasibility

The schedule assessment evaluated project timeline feasibility within the SME’s operational constraints. This TELOS dimension ensures that implementation can be executed within realistic timeframes considering available resources, coordination complexity, and development dependencies.

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The total implementation duration was estimated at 225 calendar days, divided into six sequential phases: discovery and planning (30 days), design (45 days), development (60 days), testing (40 days), deployment (30 days), and support and stabilization (20 days). Each phase includes specific deliverables and milestone validations to ensure timely progress and alignment with project objectives.

Industry benchmarks indicate that SME-scale dashboard and ERP implementations typically require 4–12 months depending on customization level. The proposed schedule falls within this benchmark, confirming temporal feasibility.



Figure 3: Implementation Timeline

This assessment confirms that the project schedule is realistic and executable under SME operational conditions, with clear milestone sequencing that supports controlled implementation and post-deployment stabilization.

Integrated Cash Flow Analysis

The integrated cash flow analysis represents the synthesis of all TELOS dimensions into a unified financial model. Data from the Technical, Economic, Legal, Operational, and Schedule assessments were consolidated to form a five-year projection capturing investment, operational costs, and benefit realization timelines (Gundapaneni, 2025).

Initial capital expenditure (CAPEX) of Rp 141,461,300 was allocated at Year 0, with operational cash inflows rising from Rp 79,677,788 in Year 1 to Rp 106,669,555 in Year 5, reflecting an average annual growth of 7.6% driven by efficiency improvements and system adoption. Operational outflows increase modestly from Rp 29,399,280 in Year 1 to Rp 35,982,639 in Year 5, reflecting average annual escalation of 5.2% due to inflation and maintenance cost growth.

Applying a 10.7% discount rate (MARR), derived from ORI028 government bond yields plus SME risk premium, the cumulative discounted cash flow achieves break-even in Year 3 and positive growth thereafter.

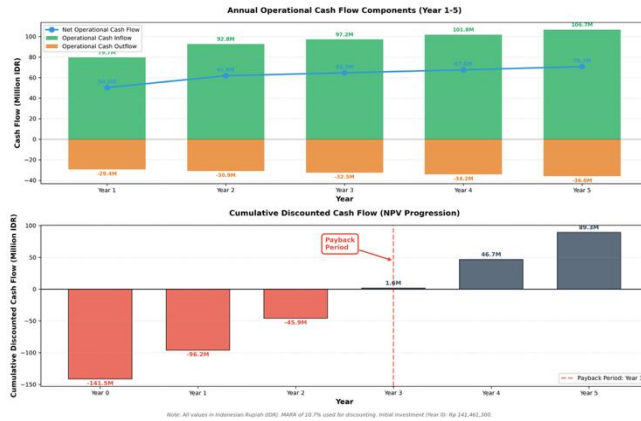


Figure 4: Cumulative Cash Flow Progression

The positive progression demonstrates strong financial recovery momentum and confirms economic viability under realistic SME operational conditions, validating feasibility through integrated TELOS-based analysis.

Comprehensive Financial Analysis

To evaluate overall investment viability, seven capital budgeting metrics were calculated based on the five-year integrated cash flow projection: Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PBP), Return on Investment (ROI), Benefit-Cost Ratio (BCR), Profitability Index (PI), and Average Annual Return (AAR).

Results indicate strong financial feasibility across all indicators. The project achieves an NPV of Rp 89,611,187, reflecting positive value creation after discounting. The IRR of 32.05% exceeds the benchmark MARR (10.7%) by 21.35 percentage points, while the Payback Period of 3.0 years demonstrates timely capital recovery. ROI reaches 122.71%, with BCR and PI both at 1.63, indicating high resource efficiency. The Average Annual Return of Rp 63,010,824 represents consistent annualized benefit generation throughout system operation.

Table 4: Capital Budgeting Metrics

Metric	Value	Benchmark
Net Present Value (NPV)	Rp 89,611,187	> 0
Internal Rate of Return (IRR)	32.05%	> 10.7% (MARR)
Payback Period (PBP)	3.0 years	< 5 years
Return on Investment (ROI)	122.71%	> 0%
Benefit-Cost Ratio (BCR)	1.63	> 1.0
Profitability Index (PI)	1.63	> 1.0
Average Annual Return	Rp 63,010,824	> MARR

The convergence of all seven metrics confirms robust financial performance, validating that the integrated dashboard implementation is both economically and strategically feasible under SME operational constraints.

Cost-Benefit Decomposition

To further interpret financial performance, a cost–benefit decomposition identified the main sources of economic value creation. Annual efficiency savings were grouped into four categories from the operational and economic dimensions of TELOS: labor productivity, administrative cost reduction, defect minimization, and document digitalization.

Labor productivity improvements contribute Rp 44.08 million annually (49.8%), representing the dominant benefit driver through automation and reduced manual data entry. Administrative cost reduction yields Rp 21.60 million (24.4%), reflecting optimized workflow and task reallocation. Defect and rework reduction adds Rp 16.80 million (19.0%), while document digitalization provides Rp 6.05 million (6.8%) in savings.

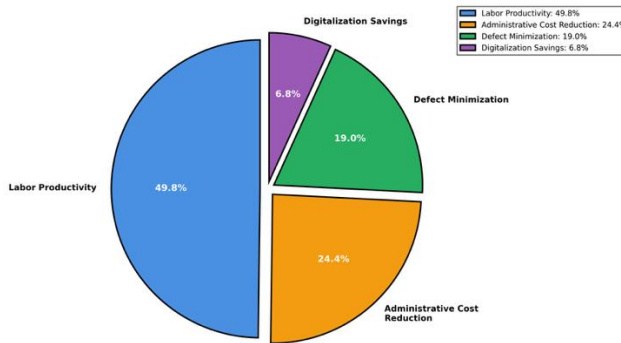


Figure 5: Cost–Benefit Composition

This benefit structure shows that system-driven efficiency improvements constitute the primary source of financial return, emphasizing indirect value realization through process optimization rather than direct revenue generation—consistent with SME technology adoption patterns.

Conclusion

This study developed and applied a TELOS-based feasibility assessment framework that integrates technical, economic, legal, operational, and schedule data to evaluate technology adoption decisions in small and medium-sized enterprises (SMEs). Unlike traditional approaches employing weighted scoring or subjective prioritization, this research employed TELOS as a structured data integration methodology, consolidating multidimensional inputs into a comprehensive financial and operational feasibility model.

Through a single embedded case study, the integrated dashboard system implementation demonstrated strong economic viability, achieving a Net Present Value (NPV) of Rp 89.6 million, Internal Rate of Return (IRR) of 32.05%, and Payback Period of three years, alongside operational readiness, regulatory compliance, and technically feasible infrastructure. The results confirm that systematic, evidence-based evaluation using TELOS can effectively bridge the gap between technological accessibility and strategic necessity in SME contexts.

This research contributes a practical, replicable framework for data-driven technology adoption assessment in resource-constrained environments. Future studies could extend this model across sectors or compare adoption scenarios involving artificial intelligence, automation, or other emerging technologies to further refine context-specific feasibility benchmarks.

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