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REAL-TIME FINANCIAL PERFORMANCE MONITORING AT PT SARANA MULTI INFRASTRUKTUR: ENHANCING DECISION-MAKING THROUGH DATA INTEGRATION

PEMANTAUAN KINERJA KEUANGAN SECARA REAL-TIME DI PT SARANA MULTI INFRASTRUKTUR: MENINGKATKAN PENGAMBILAN KEPUTUSAN MELALUI INTEGRASI DATA

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ABSTRACT

Indonesia's infrastructure development has expanded rapidly, especially with PT Sarana Multi Infrastruktur (PT SMI) mandated by the Ministry of Finance to support various national projects. Despite its crucial role, PT SMI faces persistent challenges in monitoring financial performance in real-time due to fragmented data systems and manual processes. These issues lead to reporting delays, reduce decision-making speed, and create compliance risks. This study aims to identify the root causes of these problems and propose a practical solution. Using qualitative methods, including semi-structured interviews with top executives (CEO, CFO, and CRO), focus group discussions, and process mapping, the research applied the Current Reality Tree (CRT) method to map core issues. The analysis revealed three main problems: scattered data with no single source of truth, excessive manual steps, and unclear data governance. To address these, the study developed three improvement scenarios (conservative, moderate, aggressive) and validated them using the Delphi method with internal experts. The moderate scenario, which emphasizes centralized data management, automation, and real-time dashboards, was most preferred. The study proposes an implementation roadmap using Scrum methodology, ensuring a structured, flexible approach to enhance financial monitoring at PT SMI.

Keywords: *Real-Time Monitoring, Financial Performance, Data Integration, Automation, Centralized Data.*

ABSTRAK

Pembangunan infrastruktur di Indonesia telah berkembang pesat, terutama dengan PT Sarana Multi Infrastruktur (PT SMI) yang ditugaskan oleh Kementerian Keuangan untuk mendukung berbagai proyek nasional. Meskipun memiliki peran yang krusial, PT SMI menghadapi tantangan berkelanjutan dalam memantau kinerja keuangan secara real-time akibat sistem data yang terfragmentasi dan proses manual. Masalah ini menyebabkan keterlambatan pelaporan, mengurangi kecepatan pengambilan keputusan, dan menimbulkan risiko kepatuhan. Studi ini bertujuan untuk mengidentifikasi akar masalah dan mengusulkan solusi praktis. Menggunakan metode kualitatif, termasuk wawancara semi-terstruktur dengan eksekutif tingkat atas (CEO, CFO, dan CRO), diskusi kelompok terfokus, dan pemetaan proses, penelitian ini menerapkan metode Current Reality Tree (CRT) untuk memetakan masalah inti. Analisis menunjukkan tiga masalah utama: data yang tersebar tanpa sumber kebenaran tunggal, langkah manual yang berlebihan, dan tata kelola data yang tidak jelas. Untuk mengatasi hal ini, studi ini mengembangkan tiga skenario perbaikan (konservatif, moderat, agresif) dan memvalidasi skenario tersebut menggunakan metode Delphi dengan ahli internal. Skenario moderat, yang menekankan pengelolaan data terpusat, otomatisasi, dan dashboard real-time, paling disukai. Studi ini mengusulkan peta jalan implementasi menggunakan metodologi Scrum, memastikan pendekatan yang terstruktur dan fleksibel untuk meningkatkan pemantauan keuangan di PT SMI.

Kata kunci: Pemantauan Real-Time, Kinerja Keuangan, Integrasi Data, Otomatisasi, Pengelolaan Data Terpusat.

INTRODUCTION

Indonesia's rapid infrastructure development, led by PT Sarana Multi Infrastruktur (PT SMI), has positioned the organization as a key player in financing national projects. As a state-owned enterprise under the Ministry of Finance, PT SMI is responsible for channeling funds into various sectors, including energy, transportation, and

social infrastructure. Despite its crucial role, PT SMI faces persistent challenges in effectively monitoring its financial performance in real-time.

In the regulation and compliance aspect, as of 2020, PT SMI are regulated under Peraturan Otoritas Jasa Keuangan No. 46/POJK.05/2020 about Perusahaan Pembiayaan Infrastruktur (POJK 46/2020). The regulation are followed by Surat Edaran Otoritas Jasa Keuangan Republik Indonesia No. 26/SEOJK.5/2021 about Laporan Bulanan Perusahaan Pembiayaan Infrastruktur (PPI Monthly Report). The PPI Monthly Report requires PT SMI to submit financial position report, comprehensive income statement, business result calculation report, cash flow statement, asset and liability conformity analysis report, and other reports according to the characteristics of PT SMI. Under the regulation, the report should be delivered no later than the 10th of the following month.

Parallel with the regulatory report mentioned above, PT SMI are also regulated under Peraturan Otoritas Jasa Keuangan No. 64/POJK.03/2020 about Perubahan Atas Peraturan Otoritas Jasa Keuangan no. 18/POJK.03/2017 tentang Pelaporan dan Permintaan Informasi Debitur Melalui Sistem Layanan Informasi Keuangan (SLIK) (POJK 64/2020). The regulation later on is updated as Peraturan Otoritas Jasa Keuangan no. 11 Tahun 2024, which constitutes that PT SMI must deliver a SLIK report that includes information on Debtor, Funding Provision Facilities, insurance/ risk management, guarantees, or LPBBTI, collateral, guarantor, managers and owners, and Debtor's finances. The SLIK report needs to be submitted not later than the 12th of the following month.

Both reports comes from internal corporate data and information based on the end of month financial statements portrait, which can be breakdown to hundreds of data internally collected and kept in the corporate database. The general process of them are described like as in Figure 1:

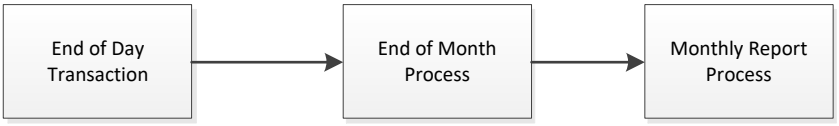

Figure 1. End-of-Month to Monthly Report process

The current financial reporting landscape is often hindered by fragmented data sources, manual processes, and inconsistent data management practices. Such inefficiencies can lead to reporting delays, diminished decision-making speed, and heightened compliance risks, particularly concerning regulatory bodies like the Financial Services Authority (OJK). For instance, a study by (Fawzy et al., 2025) highlights that manual and error-prone data collection methods in agile environments can impede real-time decision-making and compromise data reliability. Additionally, research by (Nisfiarani et al., 2023) indicates that delays in financial reporting adversely affect market reactions, leading to declines in stock prices and investor confidence.

In a banking common practice, banks practiced their day-to-day transaction posts and end-of-day (EOD) transaction cut-off at the end of the transaction day, this comprehends with the end-of-month cutoff which is done at the end of the month. While non-banks (including PT SMI), are often indirect participants in payment systems,

requiring intermediaries to complete settlements, causing EOD lags. Bank Indonesia Regulation No. 23/6/PBI/2021 stated that non-banks are considered "indirect participants" and require settlement via a commercial bank, causing EOD settlements to shift to T+1 or beyond. This happens also at PT SMI, where the average EOD happened T+1 up to T+3, while EOM processing is finished by the 4th to 7th day on the following month.

Taking example on how SLIK Report are done, the author gained insights from the MIS team under Financing Monitoring Management Division (DPOP), disruption that usually happened during the SLIK Report preparation are likely because of the uncertainty of the EOM process finished, as shown on the historical data given starting from March 2023 reporting period (the first time PT SMI reports to SLIK OJK):

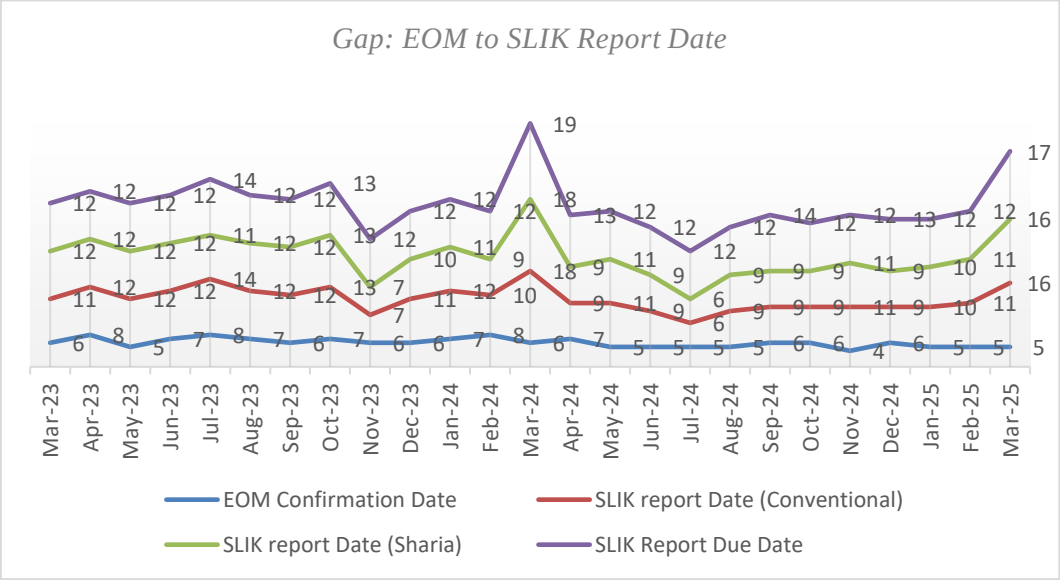

Figure 2 End of Month Date vs SLIK Report Date

Real-time financial performance monitoring is an essential capability for any financial institution aiming to maintain accuracy, transparency, and accountability. In PT SMI, however, the lack of a centralized data platform and the reliance on manual data processing have made it difficult to achieve this goal. Previous studies have emphasized the importance of data integration in improving financial monitoring accuracy (Cao et al., 2015). However, these studies primarily focus on private financial institutions, leaving a gap in understanding how public-sector entities like PT SMI can implement similar improvements. Additionally, while some research highlights the benefits of automation in financial reporting (Granlund, 2011), the challenges of implementing such systems in state-owned enterprises remain underexplored.

This research is designed to address this gap by examining how data integration can enhance real-time financial performance monitoring at PT SMI. It specifically investigates the root causes of monitoring inefficiencies using the Current Reality Tree (CRT) method, supported by thematic analysis and expert validation through the Delphi method. By exploring the unique context of PT SMI, this study aims to provide a practical, scalable solution for improving

financial reporting accuracy, reducing manual processes, and enhancing decision-making speed.

The novelty of this study lies in its application of CRT analysis within a state-owned financial institution, combined with a multi-method approach involving workflow mapping, scenario planning, and Delphi validation. While existing research has explored data integration in private financial institutions, few studies have systematically addressed the unique challenges of state-owned enterprises with complex regulatory requirements. This research aims to fill that gap, providing both theoretical insights and practical recommendations for PT SMI and similar institutions.

RESEARCH METHODS

This study employed a qualitative research approach, designed to explore the challenges and potential solutions for improving financial performance monitoring at PT Sarana Multi Infrastruktur (PT SMI). The research focused on understanding the root causes of financial monitoring inefficiencies and evaluating how data integration can enhance real-time financial performance tracking. The qualitative approach was selected because it allows for an in-depth exploration of complex organizational processes and stakeholder perspectives.

The research was conducted with a primary data coming from a series of semi-structured interviews, focus group discussions (FGDs), process mapping sessions, and expert validation using the Delphi method. According to Freeman (1984), stakeholders is defined as “any group or individual who can affect or is affected by the achievement of the organization’s objective”. The description highly emphasizes on the reciprocal nature of stakeholder relationships, reflecting how stakeholder interests, needs, or actions can shape organizational outcomes and vice versa. In a later framework, Mitchell et al. (1997) classify stakeholders according to attributes like power, legitimacy, and urgency. In other words, the degree to which a stakeholder can influence a project often depends on their ability to exert pressure (power), the recognized legitimacy of their claims, and the time-sensitivity of their demands (urgency).

The participants included Executive Management (C-level executives from PT SMI, specifically the Chief Executive Officer (CEO), Chief Financial Officer (CFO), and Chief Risk Officer (CRO), as well as senior managers from operational divisions such as DAAA (Accounting), DKHI (Treasury), and DTI (Information Technology). This purposive sampling ensured that insights were gathered from individuals with direct knowledge of financial monitoring practices and decision-making processes.

The data collection process was divided into three stages. First, semi-structured interviews were conducted with the three C-level executives to gain a high-level understanding of the strategic challenges and expectations related to financial monitoring. The interview questions focused on existing monitoring practices, perceived gaps, and potential improvement areas. Each interview lasted between 45 and 60 minutes and was recorded with the participants' consent.

Second, focus group discussions and process mapping sessions were conducted with managers from Accounting, Treasury, and IT Division. These sessions aimed to identify operational challenges in financial data management, including data fragmentation, manual processing, and reporting delays. Participants were

encouraged to discuss their workflows, identify pain points, and suggest possible improvements.

Secondary data sources were reviewed to supplement and triangulate the findings from primary research. These included:

1. Internal SLA compliance documents, capturing deadline expectations and real reporting performance;
2. Compliance reports that documented previous regulatory findings;
3. Relevant Financial Services Authority (OJK) regulations, particularly POJK No.18/POJK.03/2023, governing SLIK data reporting standards.

The secondary data provided critical context and allowed benchmarking of PT SMI's internal practices against external expectations and best practices (Saunders, M., Lewis, P., & Thornhill, A., 2019).

Thematic analysis was applied to the qualitative data obtained from interviews and FGDs. This analysis method involved coding the transcripts to identify recurring themes and patterns related to financial monitoring challenges, data integration, and automation. These themes were then cross-referenced with the CRT analysis to ensure consistency and reliability.

Recognizing the importance of data validation in case study research, this study adopted a triangulation strategy, as advocated by (Yin, 2017). Data gathered through interviews, FGDs, workflow mapping, and document reviews were cross-verified to ensure consistency and to capture multiple perspectives on similar issues. Triangulation not only strengthened the internal validity of the study but also allowed the identification of deeper systemic problems that might not have been apparent from a single source. Member checking was also conducted, allowing participants to review and confirm the accuracy of their statements.

Third, the research utilized the Current Reality Tree (CRT) method to map the root causes of financial monitoring inefficiencies. In understanding complex organizational problems, identifying the root causes is essential. One of the most effective methods for this is Root Cause Analysis (RCA) using the Current Reality Tree (CRT), which is a core tool derived from the Theory of Constraints (TOC) developed by Goldratt (1990). The Current Reality Tree (CRT) is a visual tool within the TOC framework used to systematically identify and map out the root causes of problems within a system (Goldratt, 1990). The CRT provides a systematic approach to map out the cause-and-effect relationships between various issues, helping organizations to identify the fundamental problems that drive multiple undesirable outcomes. CRT is a diagnostic tool derived from the Theory of Constraints, used to visually map cause-and-effect relationships among identified problems.

According to Dettmer (2007), the CRT follows a logical process:

1. Identify Undesirable Effects (UDEs): These are the visible symptoms of deeper issues, such as reporting delays, inaccurate financial data, or compliance breaches.
2. Map Causal Relationships: Each UDE is connected to another through cause-and-effect links, revealing how one problem leads to another.
3. Trace Back to Root Causes: By following the causal chain, the analysis identifies the few core issues that generate most of the UDEs.
4. Validate Root Causes: Ensure that the identified root causes are accurate and consistent with the observed problems.

This research contributes marginal modifications by integrating CRT into scenario modeling pathways, validated through Delphi consensus, an approach rarely applied in prior studies combining real-time financial monitoring and data integration initiatives. Furthermore, the application of a workflow-mapped data triangulation enriched the thematic coding, improving the traceability of root cause identification.

Scenario modeling was conducted using a pathway-based approach (Phelps et al., 2001; van der Heijden, 2005) to structure different levels of organizational investment and change readiness. The Delphi method (Okoli, C. & Pawlowski, S. D., 2004) was added to validate scenario feasibility, providing a consensus-driven enhancement to traditional scenario planning.

The scope of this research was limited to PT SMI as a case study, focusing on financial performance monitoring processes and data management practices within the organization. As a qualitative study, the findings may not be directly generalizable to other organizations, but they provide valuable insights for state-owned enterprises facing similar challenges in financial monitoring.

RESULTS AND DISCUSSIONS

Based on the research design, the study starts from identifying the stakeholders of the business issue. Regarding to the context of the business issue and focusing on implementation plan, internal stakeholders can range from executive leaders who set strategic goals, IT Division that develops and maintains the technology, and other divisions that rely on real-time data for daily basis.

In external stakeholders, Clarkson (1995) describes external stakeholders as primarily risk-bearers or beneficiaries of the firm's actions rather than direct participants in internal processes. These stakeholders often have limited direct control over operational decisions but can exercise power and legitimacy through regulations, market pressures, or public opinion.

To be able to gather information for the root cause identification and also the implementation design for improvement, there are some stakeholders that needed to be focused on. This research divide the stakeholders by internal stakeholders and external stakeholders.

Internal stakeholders are people that provide direct input on system requirements, data integration needs, and KPI definitions. Their engagement ensures that the dashboard is technically feasible and aligned with organizational objectives. The internal stakeholders role are described for each role at Table1 below:

Table 1. Internal Stakeholders

Internal Stakeholders	Role
Executive Management (C-Level)	The CEO, CFO, and Chief of Risk management who rely on accurate and timely financial metrics for strategic decisions. Their interest lies in using integrated data to enhance profitability, risk management, and overall financial health.
Accounting Division	These teams handle financial performance reporting and will use integrated data to track metrics like ROA, NIM, and loan portfolio health. Their work relies on data accuracy, so they are key users of an integrated system.

Internal Stakeholders	Role
Information & Technology Division	The IT team is responsible for implementing and maintaining data integration systems. They ensure that data from various sources flows seamlessly into financial performance monitoring tools and may be involved in choosing or developing the integration technology
Integrated Risk Management Division	This team uses financial data to assess credit risks, manage loan provisions, and mitigate potential financial losses. They require integrated data to make timely and accurate risk assessments.
Relationship Manager (from Financing & Investment Divisions)	They do loan origination and monitor loan and debtor performance, relying on up-to-date financial data for informed client interactions and decisions. Their insights are essential for understanding operational improvements from data integration.
Finance & Treasury Division	They handle interest rate calculation, fund gathering, banking transactions, and investor relation, also monitoring investment portfolio.
Credit Operations Division	They handle credit checking verification, compliance checking, disbursement verification, covenant reminder, document administration, collateral review and monitoring, financial reporting. and must ensure that loan data is accurate and timely for both internal and external reporting.
Corporate Development Initiation Management Division	This team uses financial data to build corporate planning and suited/ tailored to the President Director needs. They require integrated data to make timely and accurate insight/ foresights.

External stakeholders (e.g., regulators, investors, or large public clients) may exert compliance requirements (for real-time reporting, audit trails) or demand regular updates on performance and risk metrics, influencing the scope and design of the dashboard's reporting capabilities. The roles of each external stakeholders are mentioned in Table 2.

Table 2. External Stakeholders

Stakeholder	Roles
Debtor/ Clients	PT SMI's clients are the infrastructure project developers or companies applying for loans. They are impacted by the efficiency and accuracy of the loan processing and approvals. Clients who apply for loans are indirectly affected by PT SMI's data integration, as it impacts the efficiency of loan approvals, monitoring, and communication regarding their financial status.

Stakeholder	Roles
Regulatory Bodies (OJK)	Financial and governmental regulatory bodies monitor compliance, risk management, and data governance at PT SMI. Financial regulators (e.g., Indonesia's Financial Services Authority) monitor PT SMI's compliance with financial regulations. They expect accurate, timely reports and may audit PT SMI to ensure adherence to standards
Partners and Investors (WB, ADB, MoF)	External partners and stakeholders who may have a vested interest in how well PT SMI manages and reports on loans.

Each of the internal and external stakeholders are then categorized and identified using stakeholder mapping table. The Influence-Interest Matrix, as outlined by Reed et al. (2009), is a central method in stakeholder analysis that categorizes stakeholders according to their level of influence over a project and their degree of interest in its outcomes.

Stakeholders are identified and then scored, often using structured interviews and quantitative measures, on both influence and interest. These scores are plotted on a matrix, allowing for clear visualization of stakeholder positions and enabling their classification into four groups: key players (high influence, high interest), context setters (high influence, low interest), subjects (low influence, high interest), and the crowd (low influence, low interest). This approach not only helps prioritize stakeholders for engagement but also supports more inclusive decision-making by recognizing the roles and potential contributions of all parties involved, including those who may otherwise be marginalized in the process (Reed et al., 2009). The scoring process area given by the researcher based on internal observations.

Table 3. Stakeholders Mapping Table

Stakeholder	Influence	Interest	Category	Role
Executive Management	High	High	Manage Closely	Decision maker, strategic overview
Accounting Division	High	High	Manage Closely	Financial Reporting & corporate performance monitoring
Information & Technology Division	High	Medium	Manage Closely	Implement & maintain systems and data
Integrated Risk Management Division	High	High	Manage Closely	Risk assessment & credit rating
Relationship Manager (from Financing & Investment Divisions)	High	Medium	Keep Informed	Loan origination & client management
Finance & Treasury Division	High	Medium	Manage Closely	Fund management
Credit Operations Division	High	Medium	Manage Closely	Loan monitoring & Reporting

Stakeholder	Influence	Interest	Category	Role
Corporate Development Initiation Management Division	High	High	Manage Closely	Corporate Planning & Reporting
Debtors/Clients	Low	Low	Monitor	Beneficiaries
Regulatory Bodies (OJK)	High	Low	Keep Satisfied	Compliance & Auditor
Partners and Investors (WB, ADB, MoF)	High	Low	Keep Satisfied	Investment decision-making

Semi-structured interviews were conducted with three key executives at PT SMI: the President Director (CEO), the Finance and Operations Director (CFO), and the Risk Management Director (CRO). Their perspectives offer valuable insights into the challenges and expectations surrounding financial performance monitoring and real-time data integration.

Interestingly, the CEO emphasized the urgent need for centralized data access to support faster and more accurate decision-making. As he put it, "Sometimes it is difficult just to know the number of debtors we currently have, let alone make strategic decisions based on project performance." This fragmentation, he suggested, causes delays in strategic responses and undermines PT SMI's ability to benchmark itself against the broader industry. In addition, the CEO stressed that real-time insights must go beyond data presentation to include actionable recommendations: "I want every report to show what action needs to be taken, not just numbers." He further highlighted that success in financial monitoring depends not only on technological deployment but also on cultivating discipline and accountability across teams.

The CFO shared similar concerns, particularly pointing to technological limitations and manual workarounds. He observed that while systems like Arium exist, they often rely on delayed data updates, which diminishes their strategic value. "The dashboard is there," he noted, "but it is still not truly real-time; updates are sometimes done manually." In his view, fragmented master data leads to inconsistencies, especially in financial indicators such as CKPN (Loan Loss Provision) and collectibility rates. The CFO remarked, "Even with a dashboard, if the upstream processes are not integrated, the final output will still be questionable." Furthermore, he stressed that beyond achieving operational KPIs like ROA, ROE, and DER, the organization must measure success by its strategic agility and profitability improvements.

Apparently, the CRO approached the issue from a risk management perspective, highlighting operational burdens stemming from fragmented data ownership. He commented, "When you have to ask three different people and get three different answers for one figure, that's a red flag." While some degree of fragmentation is inevitable, the CRO stressed that the lack of centralized reference standards exacerbates inconsistencies. Real-time monitoring of risk indicators, including overdue payments, covenant breaches, and CKPN (Loan Loss Provision) fluctuations, was deemed critical. Moreover, he acknowledged a cultural resistance to automation, explaining, "Whenever we talk about automation, the fear is always about job security. It's natural, but we need to focus on how

technology enhances work rather than replaces people."

Overall, the interviews revealed a strong consensus among the executives: PT SMI's financial monitoring efforts are hindered by data fragmentation, manual processing dependencies, delayed reporting cycles, and resistance to organizational change. It seems clear that addressing these challenges will require not only technical upgrades but also a comprehensive transformation focusing on better governance, data centralization, and a shift toward a more data-driven culture.

In summary, three major thematic clusters emerged from the interviews:

1. Data Fragmentation and Lack of Centralization: The current reporting process relies heavily on siloed systems without integrated validation layers.
2. Delayed and Non-Actionable Financial Insights: Reports are often backward-looking and lack predictive or strategic interpretation.
3. Risk of Compliance Breaches and Operational Strain: The manual reconciliation of financial and risk data not only consumes resources but also increases organizational exposure to regulatory penalties.

In addition to the executive interviews, operational-level insights were gathered through a series of semi-structured interviews and focus group discussions (FGDs) involving representatives from DKHI, DAAA, and DWH divisions. These engagements were aimed at capturing practical bottlenecks, workflow inefficiencies, and systemic gaps that affect PT SMI’s financial performance monitoring processes.

The constructed workflow is categorized into 3 (three) parts:

1. Day-to-day Transactions
2. End-of-Month (EOM) Processing
3. Monthly Report Processing

From these sessions, several systemic bottlenecks and inefficiencies were identified. First, many reporting processes remain highly manual and repetitive, particularly in the reconciliation of internal data with regulatory reporting requirements such as SLIK and PPI. Staff are often required to cross-validate similar datasets across different departments, leading to redundant efforts and extended processing times. For instance, data consolidation before submission to the Financial Services Authority (OJK) frequently involves manually adjusting and verifying numbers between different divisions, which introduces risks of delay and human error.

Second, inconsistent data definitions further complicate operational workflows. Different units apply varying interpretations of sector classifications, debtor statuses, and other key data attributes, resulting in discrepancies that require late-stage adjustments before external reporting. As highlighted in the DWH interviews, even subtle mismatches, such as differing economic sector codes between the SLIK and PPI reports, creating manual interventions that burdened reporting timelines.

Third, lack of workflow standardization exacerbates these issues. While some divisions have adopted Service Level Agreements (SLAs) internally, there is no overarching SLA framework that binds the end-to-end financial reporting process. Consequently, coordination between divisions often relies on informal communication rather than predefined handover protocols, leading to delays and accountability gaps.These themes collectively confirm the urgent necessity of establishing an integrated, real-time financial monitoring system at PT SMI,

as will be elaborated through subsequent analysis.The research findings reveal significant challenges in financial performance monitoring at PT Sarana Multi Infrastruktur (PT SMI), primarily due to data fragmentation, manual processes, and lack of data governance. These issues were consistently highlighted during interviews with C-level executives and focus group discussions with operational teams. The Current Reality Tree (CRT) analysis, as shown in Figure 1, systematically maps the root causes of these challenges, providing a clear visualization of how these issues are interconnected. The CRT revealed three critical root causes affecting financial monitoring at PT SMI.

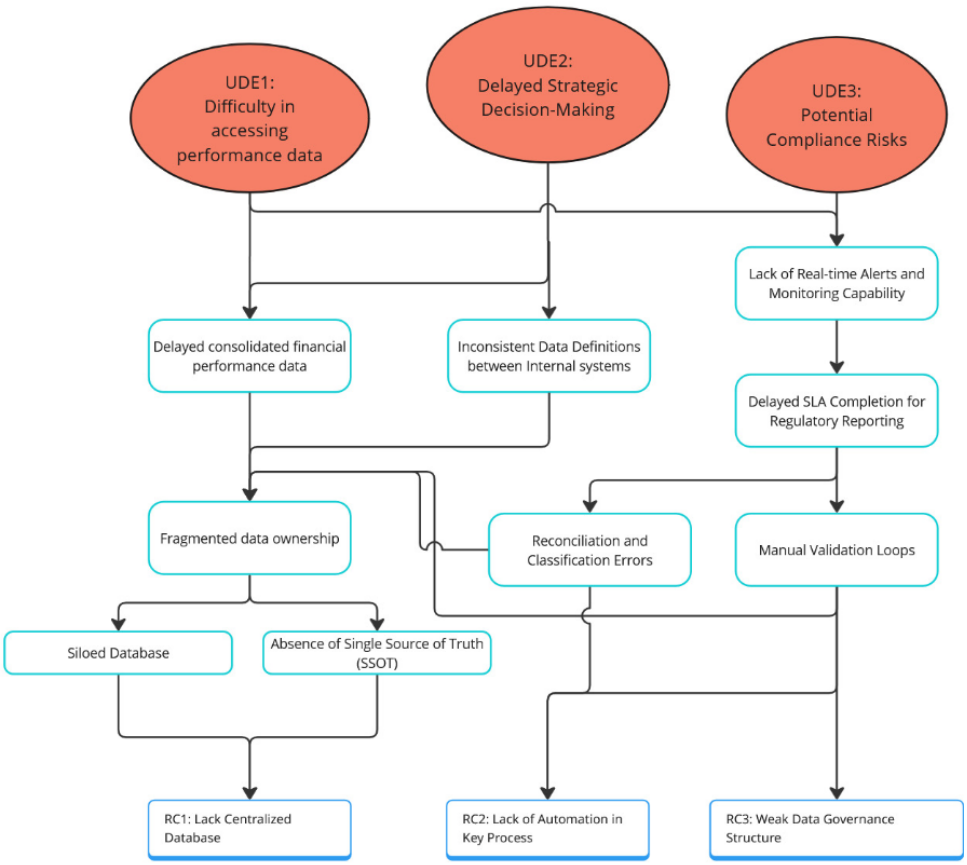

Figure 3. CRT Analysis

First, decentralized data management was identified as a major problem. Financial data is stored in multiple systems managed by different divisions (DAAA, DKHI, and DTI), leading to data fragmentation. This lack of a unified database causes inconsistencies in data definitions and delays in consolidating reports. Second, manual data handling was found to be a significant contributor to inefficiency. Many reporting tasks, including data entry, reconciliation, and report generation, are performed manually, increasing the risk of human error and slowing down the reporting process. Finally, the analysis highlighted ambiguous data ownership. There is no clear accountability for data management, resulting in inconsistent data quality and a lack of standardized reporting protocols.

These CRT findings were further supported by thematic analysis of the

interview and focus group data (Table 1), where participants consistently mentioned difficulties in consolidating financial data due to multiple data sources, reliance on spreadsheets for manual processing, and the absence of standardized data governance. Such conditions not only slow down reporting but also increase compliance risks.

Table 4. Thematic analysis result

No.	Category	Description	Number of Quotations
1	Data Fragmentation	Issues caused by scattered and fragmented data systems	40
2	Data Centralization Need	Demand for a centralized, unified data repository (SSOT)	2
3	Manual Processes	Delays and errors resulting from manual workflows	4
4	Real-time Monitoring	Challenges due to lack of real-time visibility and decision support	14
5	Governance, Compliance, and Accountability	Weak data governance, unclear data ownership, and compliance gaps	5
6	Implementation Priorities	Expectations on dashboard success metrics, KPI tracking, project execution	4

Table 5. Operational Coding Insights

Operational Challenge	Description	Impact
Manual, redundant data processing	Repeated validation across units	Prolonged reporting cycles, higher resource cost
Inconsistent data definitions	Divergent use of economic sector and debtor codes	Increased adjustment needs, error risks
Absence of end-to-end SLA	Fragmented process ownership	Delayed handovers, lack of accountability

The study's validation using the Delphi method (Table 2) confirmed that the moderate improvement scenario was most preferred by internal experts. This scenario emphasizes the need for a centralized data warehouse, automated reporting, and clear data governance policies. This balanced approach aligns with PT SMI's resource capacity while providing significant improvements in financial performance monitoring.

The challenges facing PT SMI must be addressed through a strategic framework that weighs up the organization's ambition, risk and level of investment, and readiness. Therefore, the researcher are able to devise three possible pathways for solutions each offering varying degrees of improvement: Conservative, Moderate and Aggressive pathways.

The design of the above pathways are derived from the scenario modelling methodology prescribed by van der Heijden (2005) and Schoemaker (1995) which stresses using structured scenario planning to create alignment and navigate uncertainty within organisational transformational programs and to achieve strategic objectives.

Furthermore, the prioritisation and feasibility of each pathway were tested via a Delphi method with internal experts across PT SMI's operational and strategic divisions. The Delphi

validation process confirmed that each scenario pathway provided a degree of trade-off between feasibility of implementation, operational risk, and organizational benefit. When considering the scenarios, the respondents rated three intended impact dimensions: SLA performance, data governance, and automation. These three dimensions are well documented in the literature and acknowledged as critical success factors for digital transformation (Westerman et al. (2014) and (Brynjolfsson, E. & McAfee, A., 2014)).

The Conservative Pathway was rated low to medium in most dimensions. While it was recognized in the prototype evaluation sustainably - meaning it geographically took a risk averse orientation to the level of internal improvement on improvements to responsiveness and manual processing error eradication. This is consistent with findings by (Kane et al., 2015) who argued that risk averse digital strategies reap limited result in either competitive advantage or efficiency gains.

The Moderate Pathway was rated the most balanced and the most widely accepted. It rated medium rating across SLA, governance, automation. This option aligns with a notion of "strategic ambidexterity" in balancing the potential for operational capability with short term feasibility to resource future applicability (Tushman, M. L. & O'Reilly, C. A., 1996). We know incremental transformation is preferable in an organization with complex legacy systems like PT SMI (Sebastian et al., 2020) ideally using multiple, short-lived cycles.

The Aggressive Pathway has generally received high ratings across all dimensions; respondents acknowledged that it has high policy and procedure requirements for internal alignment, a high change manage utility, and a high resource expense. However, when done well, the strategy shows significantly positive returns in saving cycle-time, audit reliability, and end-to-end visibility and response. (Bresciani, Ferraris, & Del Giudice, 2018) and (Chanias, S., Myers, M. D., & Hess, T. , 2019) research supports this with their findings that aggressive digital strategies, governed properly, drive higher ROI and digital maturity.

The feedback garnered via the Delphi respondents provided many high-quality indicators towards each of the perceived risk, perceived benefit and alignment to the company's operational realities relative to each of the proposed pathways:

Table 6. validation by Delphi method

Pathway	Average Impact to SLA	Average Impact to Data Governance	Average Impact to Automation	Strategic Alignment with Delphi Ranking
Moderate	Medium	Medium	Medium	Most preferred by respondents; enables progress without overwhelming the system
Aggressive	High	High	High	High potential impact, but readiness and resources remain limiting factors

Pathway	Average Impact to SLA	Average Impact to Data Governance	Average Impact to Automation	Strategic Alignment with Delphi Ranking
Conservative	Low – Medium	Low – Medium	Low	Least preferred; seen as too limited to drive real change

The thematic impact evaluation across all Delphi participants reveals a strong alignment between perceived feasibility and actual preference. As discussed in the previous section, the Moderate Pathway was selected by most respondents as the most appropriate scenario. This preference is supported by the impact scores across key operational dimensions such as SLA performance, data governance, and process automation.

The Moderate Pathway consistently received medium scores across all three dimensions. Participants viewed it as balanced and strategically paced. It was seen as sufficient to reduce manual processes, improve reporting timeliness, and strengthen basic data governance without overburdening internal teams. Its alignment with phased implementation and manageable change resonates with findings in digital transformation research, which emphasize the importance of sequencing and organizational learning (Sebastian et al., 2020). Respondents appreciated that this pathway allows enough structure for experimentation and gradual adoption, making it a natural fit for PT SMI's current maturity level.

The Aggressive Pathway, while rated highest in terms of potential impact, was frequently placed second in ranking. Participants acknowledged its ability to deliver end-to-end automation, reduce SLA delays, and enable strong compliance with standards such as POJK and PDP Law. However, many raised concerns about its organizational readiness. Despite high technical appeal, aggressive transformation requires major restructuring, intensive training, and unified leadership. These conditions, although desirable, were not seen as fully achievable in the short term. This reflects the idea that readiness, not just potential, plays a central role in successful transformation (Chanias et al., 2019).

The Conservative Pathway received the lowest impact scores and was also ranked least by all respondents. Although low in risk, its limited automation and minimal changes to governance and SLA monitoring were seen as major drawbacks. It offers little improvement over the current state and risks entrenching inefficiencies that the transformation seeks to eliminate. This view is consistent with critiques in transformation literature warning that overly cautious strategies may lead to stagnation and missed opportunities (Kane et al., 2015).

These findings are consistent with prior research by (Freitas et al., 2025), who emphasized that effective data management is crucial for improving monitoring accuracy, especially in complex organizational settings. Additionally, the study aligns with the insights of (Fedyk et al., 2022), who demonstrated that automation significantly enhances reporting efficiency by reducing human error in audit processes. Furthermore, this research extends existing knowledge by highlighting the critical, yet often underestimated, role of data governance in ensuring accurate and reliable financial monitoring, particularly in state-owned institutions (Mikael & Mabhungu, 2024) like PT SMI.

The proposed implementation plan based on the selected Moderate Pathway,

which balances feasibility and value creation while preparing PT SMI for more advanced digital transformation in the future. The plan is structured into several phases to ensure gradual adoption, risk mitigation, and measurable progress, as shown in the Table 4 below.

Table 7. Implementation Plan

Phase	Focus Area	Duration (Months)	Key Deliverables
Phase 1	Centralized Data Warehouse (SSOT) and Governance Framework	1–6	• Centralized DWH established (SSOT) • Governance Policies • Initial Training
Phase 2	Pilot Project for Workflow Automation and SLA Monitoring	7–12	• Automated pilot workflows developed • Scrum sprints for iterative process refinement • Real-time SLA dashboards established
Phase 3	Scale-Up Automation and Capability Building	13–18	• Expanded automation across multiple workflows. • Predictive analytics implemented. • Advanced analytics training for staff.
Phase 4	Post-Implementation Review (PIR) and Continuous Improvement (CI)	19–24	• PIR conducted. • Stakeholder feedback collected and analyzed. • CI initiatives launched.

The first phase focuses on establishing the critical infrastructure required to support financial monitoring transformation. (Freitas et al., 2025) emphasize that effective data management is critical for maintaining data quality, security, and accessibility, particularly in complex organizational settings. This approach ensures that PT SMI can achieve a consistent and accurate data environment, serving as a foundation for subsequent phases.

PT SMI will set up a centralized Data Warehouse (DWH) to serve as a Single Source of Truth (SSOT) across departments. Key activities will include mapping all existing data sources, standardizing data formats, eliminating duplicates, and creating master reference tables. Parallel to technical work, a cross-functional Data Governance Committee will be formed, comprising representatives from Finance, Risk, IT, and Operations. This committee will define clear policies regarding data ownership, access rights, update frequency, and quality standards. Training programs will be conducted for frontline data handlers and mid-level managers to reinforce governance practices across the organization. Otto (2011) stresses that robust governance structures are essential for sustaining high data quality over time.

Building upon the data foundation, Phase 2 aims to initiate automation through pilot projects. (Fedyk et al., 2022) demonstrate that automation can significantly enhance efficiency by reducing manual processing and human error, making it a suitable approach for PT SMI. By adopting an Agile/Scrum approach, PT SMI can refine automated processes incrementally, ensuring that they align with operational requirements.

Specific workflows, particularly monthly reporting reconciliation and SLA performance tracking, will be selected for end-to-end automation. A Scrum-based agile project management approach will be adopted, breaking down the automation project into smaller, manageable sprints. Real-time dashboards will be developed to monitor SLA compliance rates and reporting cycle times. Business units involved will undergo additional hands-on workshops to ensure smooth adoption. Early feedback loops will enable adjustments before scaling the automation further. (Schwaber & Sutherland, 2020) advocate that Scrum provides high adaptability in complex, changing environments like digital transformation.

Upon successful pilot implementation, PT SMI will scale up workflow automation to additional processes, including risk reporting and management control activities.

According to (Fedyk et al., 2022), scaling automation can drive significant improvements in efficiency and accuracy, but it requires employee capability building to ensure sustainability. This phase also introduces predictive analytics to enhance decision-making.

Predictive analytics tools will also be introduced to enable early detection of operational risks, financial anomalies, and potential SLA breaches. This phase will also emphasize human capital development: tailored workshops on advanced data analytics, risk prediction, and data visualization will be rolled out. The goal is to embed a culture of evidence-based decision-making across departments, reducing reliance on intuition and manual interpretation. Wixom et al. (2010) explain that embedding analytics into everyday workflows drives improved decision quality and organizational agility.

In the final phase, a Post-Implementation Review (PIR) will be conducted to evaluate whether intended benefits have materialized. (Mikael & Mabhungu, 2024) emphasize that state-owned enterprises (SOEs) like PT SMI must ensure accountability and transparency in performance reporting. This review phase will include stakeholder feedback collection and the launch of continuous improvement initiatives.

This review will involve quantitative analysis (against KPIs and SLAs) as well as qualitative feedback through surveys and structured interviews with users. Identified gaps or bottlenecks will be addressed through iterative adjustments. Governance documentation will be updated to reflect lessons learned. Continuous improvement cycles will be formally institutionalized, ensuring that innovation becomes an ongoing part of PT SMI's operational DNA rather than a one-off project. Kotter (1996) emphasizes that real organizational transformation requires mechanisms for continuous reinforcement and enhancement.

To measure the success of the Moderate Pathway implementation, a comprehensive set of qualitative and quantitative success metrics will be utilized. These metrics are grounded in prior research on digital transformation outcomes, data governance success factors, and performance management in financial institutions. The success metrics include:

1) **SLA Compliance Improvement**: Refers to the increase in the percentage of reports submitted on time after automation. SLA (Service Level Agreement) compliance is a critical measure of operational efficiency, ensuring that services meet predefined performance

standards. Automation can significantly enhance SLA compliance by reducing manual errors, accelerating data processing, and improving workflow efficiency (de Boer et al., 2019). Improvement will be benchmarked against pre-implementation SLA performance, providing a clear measure of the impact of automation on report submission timeliness.

2) **Reduction in Reporting Cycle Time**: Measures the decrease in processing time for financial reports (Kiron et al., 2014). A faster cycle indicates process efficiency gains.
3) **Accuracy and Consistency of Financial Data**: Evaluated based on audit findings and the reduction of discrepancies (Wixom, B. H. & Watson, H. J., The BI-based Organization, 2010). Improved data integrity supports better decision-making.
4) **User Satisfaction Rates**: Gathered through structured surveys post-implementation, reflecting system usability, performance, and perceived value (DeLone, W. H., & McLean, E. R., 2003).
5) **Cultural Readiness Index**: Assesses the organization's readiness to embrace data-driven decision-making and automation (Westerman, G., Bonnet, D., & McAfee, A., 2014).
6) **Return on Investment (ROI)**: Measures the financial benefits realized from operational efficiencies compared to the implementation costs. In modern contexts, ROI has been expanded beyond mere financial gains to include value derived from enhanced operational performance (Brynjolfsson, E. & McAfee, A., 2014).
7) **Social Return on Investment (SROI)**: Evaluates the broader social and environmental value generated by corporate actions, integrating both direct and indirect impacts on stakeholders ((Gargani, 2017) and (Bocken, Short, Rana, & Evans, 2014)). SROI provides a more holistic view of value creation, incorporating environmental sustainability, social welfare, and stakeholder engagement.

Each metric is selected to capture a different aspect of success, from operational efficiency to financial returns and organizational culture shifts.

The following table summarizes the success metrics framework:

Table 8. Success Metrics Framework

Metric	Definition	Reference
SLA Compliance Improvement	% of reports submitted on time after automation	de Boer et al. (2010)
Reduction in Reporting Cycle Time	Shortened days/hours to complete reporting	Kiron et al. (2014)
Accuracy and Consistency of Financial Data	Reduction in data discrepancies (audit results)	Wixom et al. (2010)
User Satisfaction Rates	Post-implementation survey scores	DeLone et al. (2003)
Cultural Readiness Index	Organizational readiness for digital practices	Westerman et al. (2014)
Return on Investment (ROI)	Financial gain vs. implementation cost	Brynjolfsson et al. (1998)
Social Return on Investment (SROI)	Social impact from operational gains	Gargani (2017); Bocken et al. (2014)

This success measurement framework provides PT SMI with a clear, multidimensional approach to evaluate the impact of the transformation initiative. It ensures that not only operational targets but also strategic and social goals are monitored and optimized.

The selection of the Moderate Pathway as the preferred implementation strategy was driven by a balanced consideration of feasibility, impact, and organizational readiness. While the Aggressive Pathway proposed transformative changes, including comprehensive data governance restructuring and predictive analytics integration, it was deemed less practical due to existing resource and skill constraints identified through Delphi validation.

The Moderate Pathway strikes an optimal balance between improvement and manageability. It prioritizes the establishment of a centralized data warehouse and partial automation of key reporting processes, aligning with PT SMI's current technological capacity and human resources. By focusing on gradual improvements rather than radical transformation, this pathway minimizes operational disruption while still advancing towards real-time financial monitoring.

Moreover, the Delphi validation process revealed that stakeholders, including executives and technical staff, viewed the Moderate Pathway as more aligned with the company's current capability level. The Delphi method, characterized by iterative rounds of expert consultation and consensus-building, is particularly effective in contexts where empirical data is limited or decisions are complex (Skulmoski, G. J., Hartman, F. T., & Krahn, J., 2007). This approach allowed for a structured assessment of organizational readiness and informed the selection of a feasible implementation strategy.

Implementing the changes in phased sprints using the Scrum framework further supports this strategic approach. Scrum, an agile project management methodology, facilitates iterative development and continuous stakeholder engagement, which are critical for managing change in complex organizational environments (Jiménez, V., Afonso, P., & Fernandes, G., 2020). By adopting Scrum, PT SMI can mitigate risks associated with rapid change while progressively enhancing data integration and performance tracking.

This strategic approach supports both short-term wins and long-term sustainability, making it the most practical and efficient option given the current organizational context.

This study has several implications. For PT SMI, it provides a practical roadmap for transitioning to real-time financial monitoring through data integration and automation. For other state-owned institutions, the study offers a model for identifying and addressing financial monitoring challenges. It also highlights the importance of data governance as an essential component of financial monitoring, which is often overlooked.

This research is limited by its focus on PT SMI as a single case study, which may affect the generalizability of the findings. The study also relies on qualitative methods, which provide in-depth insights but are subject to participant perspectives. Future research could explore quantitative validation through statistical analysis of financial performance metrics before and after implementing the recommended improvements.

CONCLUSION AND SUGGESTION

This research has conducted a series of analysis and proposed solutions which can be concluded as follows:

1) Fragmented systems and manual reporting flows at PT SMI have created bottlenecks that delay access to financial insights and increase the likelihood of errors. These inefficiencies affect decision-making, reduce responsiveness to external stakeholders like OJK, and contribute to operational risks. Evidence from interviews and workflow mapping shows that even executive-level users often struggle to obtain consolidated data without extensive manual intervention.
2) Several technical and organizational enablers emerged as critical to addressing these challenges. These include the establishment of a centralized data warehouse (Single Source of Truth), clear data governance roles, automated workflows with integrated SLA tracking, and a shift in culture to embrace ownership and collaboration across divisions. Without these structural elements in place, efforts to automate or monitor performance in real time would likely stall or revert to manual workarounds.
3) Through executive insights and operational validation, a core set of financial and risk indicators was identified, SLA compliance, CKPN (Loan Loss Provision) accuracy, overdue exposures, ROA/ROE, and report cycle time among them. These metrics reflect the core of PT SMI's strategic monitoring needs and were structured to fit into a dynamic dashboard format that enables quicker interpretation and response. Visual prototypes and success criteria were developed to ensure these KPIs are not only measurable but also meaningful to end users.
4) Building a dashboard solution at PT SMI requires more than just choosing the right software. It demands alignment between business units, data engineers, and compliance teams. The study revealed that stakeholder buy-in, clarity around project roles, and the use of phased Scrum-based implementation are essential. Each scenario pathway was validated using Delphi to ensure the selected strategy matched the organization's real capacity for change.
5) If implemented as proposed, the solution offers clear, measurable benefits. These include reduced reporting time, improved data accuracy, cost savings from process streamlining, and higher compliance reliability. In addition, long-term value can be captured through return on investment (ROI) and social return on investment (SROI) indicators. These outcomes not only support internal decision-making but also enhance PT SMI's reputation as a responsive and transparent financial institution.

Based on the research analysis and proposed implementation plan, the following key recommendations are made:

1) Adopt the Moderate Pathway Implementation: Begin with foundational steps such as SSOT establishment and data governance before scaling automation and predictive analytics.
2) Institutionalize Data Governance Early: Form a governance committee from cross-functional units and deploy clear SOPs and ownership models for all data flows.
3) Conduct End-to-End Pilot Projects: Apply Scrum methodology in automating key workflows such as reporting reconciliation, SLA tracking, and loan impairment

monitoring. This helps validate assumptions and increase adoption readiness.

4) Deploy Real-Time Dashboards for SLA and KPI Monitoring: These dashboards should be accessible to both executive and operational units for transparency and accountability.
6) Track Success Metrics Regularly: Include operational, financial, and cultural indicators such as SLA compliance rates, reporting cycle time, ROI, user satisfaction, and Cultural Readiness Index.
7) Use ROI and SROI to Measure Value Creation: Quantify both financial gains and societal benefits generated by improved monitoring efficiency to support future investment justifications.
8) Prepare for Post-Implementation Review: Define an institutional process for PIRs to ensure continuous improvement and knowledge retention beyond the project lifecycle.
9) Expand Delphi Validation for Long-Term Strategy Alignment: Use Delphi or similar foresight methods periodically to ensure stakeholder perspectives evolve with the organization's transformation.

Future research may focus on direct measurement of the dashboard's long-term impact post-implementation, assess deeper cultural change indicators, or investigate AI-driven forecasting in financial control.

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