



Policy Reformulation for Inventory and Valuation of Upstream Oil and Gas State-Owned Assets

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ABSTRACT

The reformulation of the inventory and valuation policy for upstream oil and gas state-owned assets through Soft Systems Methodology at the Directorate General of State Assets is vital to resolve recurring audit findings regarding unrepresented balance-sheet assets. Utilizing a Governance, Risk, and Compliance framework, this qualitative study identifies systemic weaknesses: inefficient workflows, absent post-valuation monitoring, ambiguous team roles, and fragmented systems. The study recommends streamlining field bureaucracy through revised technical regulations, improving land data records, and developing an integrated valuation module within the Upstream Oil and Gas Information System to establish transparent and accountable state asset governance.

ABSTRAK

Reformulasi kebijakan inventarisasi dan penilaian Barang Milik Negara (BMN) hulu minyak dan gas bumi melalui pendekatan *Soft Systems Methodology* di Direktorat Jenderal Kekayaan Negara menjadi krusial untuk menuntaskan temuan berulang BPK terkait aset yang belum tersaji di neraca LKPP. Mengintegrasikan kerangka kerja *Governance, Risk, and Compliance*, penelitian kualitatif ini mengidentifikasi kelemahan mendasar pada inefisiensi alur pelaksanaan, minimnya pemantauan pasca-penilaian, ketidakjelasan peran tim, serta ketiadaan sistem terintegrasi. Studi ini merekomendasikan penyederhanaan birokrasi lapangan melalui revisi regulasi teknis, perbaikan penatausahaan data tanah, dan pengembangan modul IP pada Sistem Informasi Hulu Migas guna mewujudkan tata kelola aset yang akuntabel.

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1. Introduction

The credibility and utility of a nation's public financial statements are foundational to fiscal transparency and democratic accountability. In Indonesia, the quality of the Central Government Financial Statements (LKPP) has been persistently challenged by a significant and long-standing issue: the failure to present Upstream Oil and Gas State-Owned Assets on the national balance sheet. These assets, acquired through production sharing contracts between the government and oil and gas operators, represent a substantial portion of national wealth, with unrecognized values estimated to be between IDR 100 trillion and IDR 200 trillion (approximately USD 6.4 billion to USD 12.8 billion). Instead of being formally recognized, these assets are relegated to the notes of the financial statements, obscuring the true financial position of the state and weakening the basis for effective public asset management.

A considerable body of empirical literature has explored the dynamics of public asset administration and revaluation programs. Prior studies have established that systematic asset inventory, legal audits, and valuation exert a significant positive effect on optimizing state asset utilization (Bangun et al., 2024) and substantially improving non-tax state revenue generation from asset management (Citrayantie et al., 2021). Furthermore, researchers have demonstrated that rigorous asset inventory, proper book-keeping, and the adoption of dedicated asset information systems significantly enhance financial reporting quality and balance sheet equity accuracy (Anggraini et al., 2024; Baharsyah et al., 2022; Hermawan & Suyanto, 2023). Other empirical works have also underscored that human resource competence and information technology infrastructure serve as critical determinants in executing successful fixed asset revaluations (Indra, 2020).

Nevertheless, existing research exhibits two critical deficiencies. First, the vast majority of prior studies have focused almost exclusively on general state-owned assets directly procured via the state budget across line ministries and central agencies, while largely ignoring upstream oil and gas assets acquired through Production Sharing Contracts (PSC) (Cahyaningrum & Halim, 2015). Unlike conventional assets, upstream oil and gas assets are governed by distinct cost-recovery mechanisms, PSC accounting rules, and complex multi-institutional stakeholder arrangements. Second, previous works have predominantly focused on measuring quantitative post-execution impacts rather than analyzing upstream structural and institutional bottlenecks.

This evident research and institutional gap highlights the urgent necessity of reformulating the inventory and valuation policy for upstream oil and gas state-owned assets. Given the multifaceted environment involving overlapping jurisdictions between the Directorate General of State Assets, the Ministry of Energy and Mineral Resources (EMR), SKK Migas, and Contractors, this challenge constitutes a classic unstructured "soft problem" (Checkland & Poulter, 2006). Therefore, this study adopts Soft Systems Methodology (SSM) integrated with the Governance, Risk, and Compliance (GRC) framework (GRC Forum Indonesia, 2020; Raczy et al., 2010; Vicente & Mira Da Silva, 2011). By structuring problem situations through rich pictures and formulating conceptual models across the dimensions of people, process, and tools, this study aims to deliver a systemically desirable and culturally feasible policy reformulation that accelerates asset recognition, mitigates audit risks, and enforces public sector accountability (Checkland & Poulter, 2006).

2. Literature Review

This research is situated at the intersection of public sector accounting, governance, and systems thinking. It uses established theories to frame the problem, structure the analysis, and guide the intervention, creating a robust intellectual foundation for the proposed policy reformulation.

The study is fundamentally grounded in Usefulness Decision Theory, which posits that the primary purpose of financial reporting is to provide information that is useful for economic decision-making and assessing accountability (Scott, 2015). In the public sector, this translates to providing citizens, legislative bodies, and other stakeholders with a clear and accurate picture of the government's financial position and its stewardship of public resources. The non-recognition of trillions of Rupiah in state assets directly contravenes this principle. It renders the LKPP incomplete and less useful, hindering the ability of stakeholders to hold the government accountable and make

informed decisions about resource allocation and public policy. The failure to complete the inventory and valuation process is, therefore, not just a compliance issue but a fundamental failure to meet the core objective of public financial reporting.

To deconstruct the complex web of failures identified, this study adopts the Governance, Risk, and Compliance (GRC) framework as an analytical lens. GRC provides a structured approach to understanding organizational performance by examining the interplay of three critical domains (Racz et al., 2010). For the purpose of this research, the GRC framework is adapted to categorize systemic failures into three interrelated components, based on the model developed by the GRC Forum Indonesia (GRC Forum Indonesia, 2020):

1. **Process:** This component examines the effectiveness and efficiency of established workflows, procedures, and internal controls that govern the inventory and valuation activities.
2. **People:** This component focuses on the human element, including the clarity of roles and responsibilities, competencies, and the organizational structure supporting the inventory and valuation function.
3. **Tools:** This component assesses the adequacy of supporting technologies, information systems, and the quality and integrity of the data used throughout the inventory and valuation lifecycle.

While GRC provides a powerful diagnostic structure, it does not inherently offer a methodology for intervention in complex social systems. For this, the study turns to Soft Systems Methodology (SSM). Developed by Peter Checkland, SSM is an interpretive and participatory methodology designed to address ill-structured, "soft" problems characterized by multiple, often conflicting, human perspectives (Checkland & Poulter, 2006). Unlike "hard" systems approaches that assume a clear, definable problem and seek an optimal technical solution, SSM assumes that the "problem" itself is a social construct. Its goal is not to engineer a solution but to facilitate a learning process among stakeholders to arrive at a shared understanding and agree upon actions that are both "systemically desirable and culturally feasible". The core of the SSM process involves comparing the real-world problematic situation with conceptual models of "purposeful activity systems" to structure a debate about meaningful improvement (Vicente & Mira Da Silva, 2011).

Numerous previous studies have examined the implementation, determinants, and outcomes of state asset management and revaluation programs within public sector institutions. Empirical research indicates that comprehensive asset inventory, legal audits, and asset valuation exert a positive and significant influence on optimizing the utilization and management of state property (Bangun et al., 2024; Kuntadi et al., 2022; Santosa, 2021). In addition, several scholars have demonstrated that asset revaluation, inventory appraisal, and leasing activities contribute substantially to optimizing non-tax state revenues (Citrayantie et al., 2021; Yanti et al., 2020). From a financial reporting standpoint, rigorous asset bookkeeping, physical inventory, and the effective adoption of asset management information systems (such as SIMAK-BMN) significantly enhance the qualitative characteristics of financial statements and the reliability of central government equity and fixed asset presentation (Anggraini et al., 2024; Baharsyah et al., 2022; Hermawan & Suyanto, 2023). Furthermore, factors such as human resource competence and technological readiness have been identified as essential drivers for successful fixed asset revaluation (Indra, 2020; Suardani & Wijana, 2021; Yuniarto, 2020).

Despite these extensive contributions, several critical research gaps remain unaddressed in the existing literature. First, prior investigations have predominantly focused on general state-owned assets procured directly through the State Budget across line ministries and state agencies, while frequently identifying recurring operational constraints such as outdated inventory reports, manual spreadsheet tracking, and insufficient personnel (Karunia & Malik Ibrahim, 2021; Setiawati & Ramdany, 2021; Widyatama & Suhartono, 2020). Consequently, there is an evident lack of in-depth empirical studies addressing upstream oil and gas state-owned assets, which possess unique operational and legal characteristics governed by production sharing contracts and multi-stakeholder arrangements (Cahyaningrum & Halim, 2015). Second, existing studies largely evaluate the quantitative impacts or outputs of asset inventory rather than systematically evaluating the underlying technical regulations, procedural workflows, and inter-institutional governance

mechanisms. This study fills this gap by utilizing Soft Systems Methodology to formulate a holistic policy reform that addresses regulatory, procedural, and technological bottlenecks in managing upstream oil and gas assets (Checkland & Poulter, 2006).

3. Research Methods

This study employed a qualitative research design rooted in an interpretive paradigm, seeking to understand the complexities of the asset valuation problem from the perspectives of the key actors involved in the system. The research was structured around the modified four-stage cycle of Soft Systems Methodology (SSM), which provides a framework for moving from understanding a problematic situation to defining and taking action to improve it (Checkland & Poulter, 2006).

Specifically, this study adopted the four-stage SSM cycle originally streamlined and modified by Checkland and Poulter (2006) from the classical seven-stage methodology, rather than inventing a new approach. This adopted framework integrates finding out, modelling, using models to structure discussion, and defining action to systematically examine multi-stakeholder interactions, socio-political dynamics, and institutional governance.

Stage 1: Finding Out (Problem Expression)

The initial stage focused on developing a rich and holistic understanding of the "problematic situation" surrounding the inventory and valuation of upstream oil and gas state-owned assets. This was not about defining the problem in narrow terms, but about appreciating its full complexity, including the structures, processes, and human factors at play (Checkland & Poulter, 2006). Data was gathered using two primary methods:

1. **Extensive Document Analysis:** A thorough review of official documents was conducted to understand the formal system and its documented failures. This included government regulations (e.g., PMK No. 140/PMK.06/2020, PMK No. 207/PMK.05/2022), BPK audit reports from 2010 onwards, Central Government Financial Statements and internal reports related to past inventory and valuation activities.
2. **In-depth, Semi-structured Interviews:** To capture the perspectives, experiences, and "worldviews" of the actors within the system, in-depth interviews were conducted with a purposive sample of key stakeholders. This included officials from the Directorate General of State Assets (DJKN) as policy formulators, the Ministry of Energy and Mineral Resources as asset users, SKK Migas as asset custodians, a major PSC Contractor (PT Pertamina Hulu Rokan) as an asset operator, and the DJKN's internal compliance unit responsible for monitoring BPK recommendations.

The culmination of this stage was the development of a "Rich Picture," a diagrammatic representation used in SSM to capture the intricate web of relationships, conflicts, processes, and concerns within the problematic situation without imposing a premature structure (Checkland & Poulter, 2006).

Stage 2: Modelling (System Definition)

The second stage shifted from the real world to a conceptual level of systems thinking, with the goal of building models of "purposeful activity systems" that could be seen as relevant to improving the situation (Checkland & Poulter, 2006). This involved three key steps:

1. **Formulating Root Definitions (RDs):** Based on the insights from the Finding Out stage, three relevant systems for improvement were identified, structured around the GRC components of People, Process, and Tools. For each system, a concise statement of purpose, known as a Root Definition, was formulated. Each RD describes a transformation process, articulating what the system does, how it does it, and why.
2. **CATWOE Analysis:** To ensure each Root Definition was robust and well-formed, it was tested against the CATWOE mnemonic: identifying the Customers (beneficiaries/victims), Actors (who perform the activities), Transformation process (input to output), Worldview (the perspective that makes the system meaningful), Owners (who could stop the system), and Environmental constraints.

3. Developing Conceptual Models: For each validated Root Definition, a Conceptual Model was developed. This is a model of the minimum, necessary set of activities that would have to be performed to realize the transformation described in the RD. These models represent an ideal, logical system of purposeful action.

Stages 3 & 4: Comparison and Action

The final stages of the inquiry involved bringing the conceptual models back into the real world to structure a debate about change (Checkland & Poulter, 2006). The activities in the Conceptual Models were systematically compared with the actual processes observed in the Finding Out stage to identify key differences and potential areas for improvement. This comparison was facilitated through a validation interview with the primary problem owner, the Head of the Sub-directorate for State Asset Policy at DJKN, who has the authority to influence policy change. This discussion aimed to assess whether the changes suggested by the models were both systemically desirable (*i.e.*, they would logically lead to improvement) and culturally feasible (*i.e.*, they were acceptable within the organization's culture and power structures). The outcome of this structured debate was the formulation of a set of concrete, actionable recommendations for policy reform, which were validated and refined by the problem owner.

4. Results and Discussion

Findings: Deconstructing a Systemic Failure in Asset Management

The "Finding Out" stage of the inquiry revealed a deeply entrenched system of failure, where issues across processes, human resources, and technology interlock to perpetuate the non-recognition of upstream oil and gas state-owned assets. The GRC framework provides a structured way to deconstruct this complexity.

The Problematic Situation: A Rich Picture of Interlocking Failures

The Rich Picture developed from stakeholder interviews and document analysis articulates a system caught in a loop of inefficiency and non-performance (Checkland & Poulter, 2006). It depicts a fragmented landscape where multiple government bodies and private contractors interact through a rigid, bureaucratic process. Key elements visualized include the central role of BPK audit findings, which act as a recurring trigger for action that ultimately fails to resolve the root causes. Communication breakdowns are evident, with data flowing through siloed channels. A fundamental conflict is shown between the objectives of PSC Contractors (focused on cost recovery under their contracts) and the requirements of government accounting standards, leading to misaligned data and priorities. The overall impression is one of a system characterized by high effort and low output, where procedural compliance is prioritized over achieving the substantive goal of accurate financial reporting.

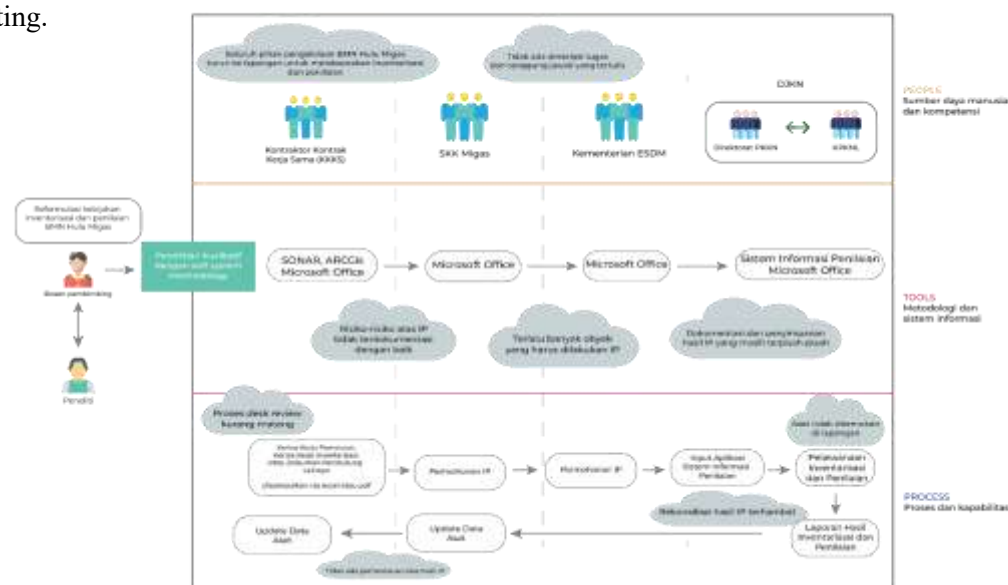


Figure 1. Rich Picture

Process Deficiencies

The investigation revealed that the business process for inventory and valuation is fundamentally flawed, creating bottlenecks and accountability gaps that make timely completion almost impossible.

1. **Inefficient and Bureaucratic Workflow:** A core inefficiency is the procedural requirement for the physical presence of all four key stakeholders (DJKN, Ministry of EMR, SKK Migas, and the relevant PSC Contractor) during fieldwork. This rule, a legacy from a time when roles were less defined, creates significant logistical hurdles in scheduling, leading to frequent delays and cancellations. Stakeholders confirmed that this requirement is a primary source of inefficiency, transforming a technical task into a complex bureaucratic exercise.
2. **Inadequate Preparation:** The critical *desk review* phase, intended to prepare all necessary data and documents before fieldwork, is consistently reported as being rushed and incomplete. This lack of preparedness manifests during fieldwork in predictable ways: teams arrive on-site only to find that the asset's location is unknown, supporting documents are missing, or the data in the records do not match the physical reality. This turns expensive and time-consuming fieldwork into a data-gathering exercise that should have been completed beforehand.
3. **An Accountability Gap in Follow-up:** The most critical process failure occurs *after* the fieldwork is completed. The research found a systemic lack of a formalized, time-bound process for reconciliation, reporting, and follow-up. Once teams leave the field, momentum is lost. The reconciliation between the inventory team's findings and the valuation team's report is often indefinitely delayed. This creates an "accountability gap" where the inventory and valuation process is considered finished after fieldwork, yet no actionable report is produced. This gap is the direct cause of many BPK findings, as assets that have been physically verified and valued remain unrecorded for years simply because the final administrative steps were never completed or monitored.

Ambiguity in Roles and Responsibilities (People)

While high-level institutional roles are defined in regulations, there is a significant lack of clarity regarding the specific tasks and responsibilities of the individuals who form the inventory and valuation teams in the field. The research found no clear, documented description of duties for the members of the inventory team. This ambiguity leads to confusion on-site about who is responsible for specific tasks, such as verifying documents, documenting findings, or leading the reconciliation process. This lack of defined roles contributes to the process inefficiencies and the post-fieldwork accountability gap, as no single party feels a clear sense of ownership for driving the process to its final conclusion.

Data and Technology Gaps (Tools)

The process is critically undermined by deficiencies in the foundational tools required for effective asset management: reliable data and an integrated information system.

1. **Pervasive Poor Data Quality:** The foundational asset data provided by the PSC Contractors, is often structured for their own operational and cost-recovery purposes and is incompatible with government accounting requirements. The most striking example is the land data for PT Pertamina Hulu Rokan (PHR), a major operator. PHR's legacy system recorded land assets based on acquisition invoices, where a single invoice could cover numerous non-contiguous land parcels spread across a wide area. This makes it practically impossible to match a single record to a specific physical plot of land for valuation. An internal estimate cited in the research suggests that resolving PHR's outstanding land inventory using the current parcel-by-parcel inventory and valuation method would take an astonishing 32 years. This single data issue represents a near-insurmountable barrier to progress.
2. **Absence of an Integrated Information System:** The entire inventory and valuation lifecycle is managed without a central, integrated information system. Data, working papers, and final reports are stored in disparate, siloed formats, typically spreadsheets and documents on local servers or individual computers. This has several severe consequences: it prevents transparent,

real-time monitoring of the inventory and valuation process; it makes document retrieval and historical analysis extremely difficult; and it leads to a significant loss of institutional knowledge whenever key personnel are transferred or leave, as their records are often not centrally archived or accessible. The lack of a monitoring system is a key reason why the post-execution accountability gap persists.

These findings converge to reveal a central point of failure: the accountability gap in the post-execution phase. Even when fieldwork is completed despite process inefficiencies and ambiguous roles, the entire effort is rendered moot if there is no systematic, technology-enabled mechanism to ensure the results are formally reconciled, reported, and acted upon. The evidence of inventory and valuation results from as far back as 2017 for major operators like PHR and PT Pertamina Hulu Sanga-sanga, worth a combined total of over IDR 11.8 trillion, still not being recorded in the 2024 unaudited financial statements is a stark testament to this governance failure. This demonstrates that the most critical leverage point for reform is the creation of a robust system for monitoring and enforcing follow-up actions.

A Conceptual Model for Reform: Designing a Purposeful Activity System

Following the diagnosis of the problematic situation, the SSM "Modelling" stage was used to design an ideal system of purposeful activity for the inventory and valuation of upstream oil and gas state-owned assets (Checkland & Poulter, 2006). This involved formulating clear statements of purpose (Root Definitions) and then building conceptual models of the activities required to achieve them. This section outlines this proposed ideal system.

The Foundation for Change: Root Definitions

Three Root Definitions (RDs) were formulated to serve as the foundation for reform, with each targeting one of the core problem areas identified through the GRC lens:

1. RD 1 (People/Process): A system to improve the roles and effectiveness of inventory and valuation implementers by simplifying workflows and reducing bureaucratic impediments, with the purpose of creating a more efficient and effective inventory and valuation business process.
2. RD 2 (Process): A system to mature the inventory and valuation business process by formalizing procedures for reconciliation and introducing a robust monitoring mechanism, with the purpose of ensuring that all inventory and valuation results are actionable and followed through to completion.
3. RD 3 (Tools): A system to enhance the inventory and valuation process by improving foundational data quality and developing an integrated information system module, with the purpose of creating a process that is computerized, measurable, reliable, and auditable.

The Ideal System: Conceptual Models

For each Root Definition, a corresponding Conceptual Model was developed, outlining the specific activities required to bring that purposeful system to life. Together, these models constitute a blueprint for a reformed inventory and valuation process.

1. Conceptual Model for RD 1 (Simplifying the Process and Clarifying Roles): This model fundamentally redesigns the workflow to eliminate bureaucratic bottlenecks. The core activity of on-site inventory and valuation fieldwork is streamlined to involve only the essential parties: the asset custodian (SKK Migas) and the asset operator (the PSC Contractor), supported by the government appraiser from DJKN for valuation tasks. Other stakeholders, such as the Ministry of EMR (as asset user) and DJKN's policy unit (as asset manager), are repositioned as recipients of the final, verified reports rather than mandatory participants in the fieldwork. This single change drastically reduces logistical complexity. Furthermore, the model includes an activity to "define and document field team roles" within revised technical guidelines, ensuring that every member of the streamlined team has clear, unambiguous responsibilities.
2. Conceptual Model for RD 2 (Ensuring Actionable Follow-up): This model directly addresses the critical "accountability gap." It introduces two key control activities. First, it establishes a mandatory, time-bound activity for "post-fieldwork reconciliation," requiring the final, signed LHIP report to be completed within a strict timeframe (e.g., five working days) after the conclusion of fieldwork. Second, it embeds a new activity called "monitor and report inventory

and valuation status" into the existing, routine reconciliation process for preparing quarterly and annual financial statements. During these meetings, stakeholders would be required to review the status of all outstanding inventory and valuation results and formally document the follow-up action for each (e.g., "reclassified to balance sheet," "submitted for write-off," or "pending further legal review"), ensuring no result is left behind.

3. Conceptual Model for RD 3 (Building the Data and Technology Foundation): This model proposes a two-pronged approach to fix the underlying tool deficiencies. The first activity is a strategic "data quality improvement initiative," exemplified by the proposal for PT Pertamina Hulu Rokan to re-register its vast land asset portfolio based on official land certificates instead of its legacy invoice-based system. This would consolidate thousands of fragmented records into manageable units, making valuation feasible. The second, and most crucial, activity is the "development of an integrated inventory and valuation module" within the existing government platform, the Upstream Oil and Gas Information System (SIHM). This module would digitize and manage the entire inventory and valuation lifecycle, including:
 - a. A function for selecting and proposing inventory and valuation targets.
 - b. A centralized repository for uploading and archiving all related documents (maps, legal documents, field reports, valuation reports).
 - c. A workflow engine to track the status of each inventory and valuation process from initiation to completion.
 - d. A dashboard for real-time monitoring of progress, outstanding tasks, and overall performance against targets.

Discussion: From Ideal Models to Actionable Policy

The development of conceptual models is a critical step in SSM, but their true value is realized when they are compared with the real world to structure a debate about change. This section discusses the gap between the current problematic situation and the proposed ideal system, and analyzes the feasibility of implementing the proposed reforms, drawing on the validation process with the primary stakeholder.

Comparing Models with Reality: Bridging the Gap

The comparison between the conceptual models and the current reality reveals significant gaps across all three GRC dimensions, as summarized in [Table 1](#). The current process is ad-hoc, manual, and fragmented, whereas the proposed model is structured, technology-enabled, and integrated. The validation interview with the Head of the Sub-directorate at DJKN confirmed that these gaps are recognized within the organization and that the proposed solutions align with their internal perception of the problem. For instance, the proposal to simplify the workflow by reducing the number of required participants (Model 1) was strongly endorsed, with the official acknowledging that DJKN's policy unit does not need to be directly involved in the fieldwork and should instead focus on its role as the ultimate asset manager receiving the final reports. Similarly, the need for a mandatory reconciliation timeline and a systematic monitoring mechanism (Model 2) was accepted as a necessary control to close the accountability gap that perpetuates BPK findings. The proposal for an integrated SIHM module (Model 3) was seen as a critical long-term solution to the persistent problems of monitoring and documentation.

Table 1. Comparison of the Problematic Situation and the Proposed Conceptual Model

GRC Component	Current Problematic Situation	Proposed Conceptual Model
Process	Inefficient, bureaucratic workflow requiring all parties' presence. Inadequate preparation (<i>desk review</i>). No formal timeline or mechanism for post-inventory and valuation reconciliation and monitoring, creating a critical accountability gap.	Simplified workflow with only essential parties (SKK Migas, KKKS, DJKN Valuer) attending fieldwork. Formalized, time-bound reconciliation process (e.g., 5 days). Routine monitoring of inventory and valuation follow-up integrated into financial reporting cycle.
People	Ambiguous, undocumented roles and responsibilities for field team members, leading to confusion and lack of ownership.	Clearly defined and documented roles and responsibilities for all inventory and valuation team members within revised technical guidelines.
Tools	Pervasive poor data quality (e.g., invoice-based land records). Siloed, manual data management using spreadsheets and local files. No integrated system for managing or monitoring the inventory and valuation lifecycle.	Strategic data quality improvement initiatives (e.g., re-registering land based on legal parcels). Development of an integrated inventory and valuation module within the SIHM to manage the entire lifecycle, from planning to monitoring and archiving.

Systemic Desirability and Cultural Feasibility

The structured debate with the problem owner confirmed that the proposed changes are not only systemically desirable but also culturally feasible. The desirability is clear: the models logically address the root causes of inefficiency, lack of accountability, and data unreliability. The feasibility, however, is a more nuanced judgment about whether the changes can be implemented within the existing organizational culture and power structures. The endorsement from a key DJKN official indicates a high degree of feasibility. The willingness to revise regulations and invest in a technology solution signals that there is institutional readiness for change. The SSM process itself contributes to this feasibility; by engaging the problem owner in the validation of the models, the proposed solutions are not perceived as an external imposition but as a co-created path forward. This participatory element is crucial in a public sector context, as it builds the ownership and buy-in necessary to overcome institutional inertia and drive meaningful reform. The discussion also highlighted a key dependency for the technology solution: the successful implementation of the SIHM module requires that underlying data from PSC Contractors is first standardized and fed into SKK Migas's systems, a critical prerequisite that must be managed as part of the implementation roadmap.

Theoretical and Empirical Dialogue with Previous Studies

The findings of this study reinforce and extend the broader discourse in public sector accounting, governance, and systems thinking. From a public sector accounting perspective, the persistent non-recognition of BMN Hulu Migas directly impairs the useful decision of government financial reports, corroborating Usefulness Decision Theory (Kuntadi et al., 2022; Scott, 2015). While prior studies emphasize that asset inventory, valuation, and SIMAK-BMN adoption positively enhance financial report quality and balance sheet equity (Anggraini et al., 2024; Baharsyah et al., 2022; Hermawan & Suyanto, 2023), our findings extend this understanding by revealing that quantitative revaluation alone is insufficient without closing the post-fieldwork accountability gap through structured reconciliation and monitoring.

Furthermore, regarding governance and technological readiness, our results align with Indra (2020) and Suardani & Wijana (2021), who identified human resource competence and information technology as vital determinants of asset revaluation success. However, unlike prior research which focused primarily on conventional line-ministry assets with standard state budget funding (Karunia & Ibrahim, 2021; Setiawati & Ramdany, 2021; Widyatama & Suhartono, 2020), this study highlights the unique complexities of PSC-based upstream oil and gas assets. Applying Soft Systems Methodology (Checkland & Poulter, 2006) and the GRC framework (GRC Forum Indonesia, 2020; Racz et al., 2010; Vicente & Mira Da Silva, 2011) demonstrates that resolving multi-stakeholder conflicts and institutional inertia requires an integrated approach: synchronizing technical regulations

(process), defining field-level team ownership (people), and developing an end-to-end module within SIHM (tools).

5. Conclusion

This study set out to address a chronic and systemic failure in Indonesia's public financial management: the inability to properly account for valuable upstream oil and gas state-owned assets. The research has demonstrated that this is not a simple technical problem but a complex governance challenge rooted in flawed processes, ambiguous roles, and inadequate technological infrastructure. The primary contribution of this paper is the application and validation of an integrated Soft Systems Methodology (SSM) and Governance, Risk, and Compliance (GRC) framework to diagnose this multifaceted problem and co-develop a holistic and actionable reform agenda. The findings confirm that a piecemeal approach is insufficient; a fundamental, systemic reformulation of the inventory and valuation policy is imperative.

Based on the validated conceptual models, this study puts forth two overarching policy recommendations for the Directorate General of State Assets (DJKN) and its partner institutions. These recommendations are designed to be implemented in a coordinated manner to address the identified failures comprehensively.

1. Immediate Regulatory and Process Reform:

The first priority is to revise the primary technical regulation governing the inventory and valuation process (Keputusan Direktur Jenderal Kekayaan Negara No. 370/KN/2020). This revision should codify the key process improvements identified in the conceptual models. Specifically, the new regulation must:

- a. **Simplify the Business Process:** Formally change the requirement for fieldwork participation to only the essential parties: the asset custodian (SKK Migas), the operator (PSC Contractor), and the DJKN appraiser. This will immediately remove the primary bureaucratic bottleneck.
- b. **Clarify Roles and Responsibilities:** Include a specific section or appendix that clearly defines the tasks and responsibilities for each member of the streamlined field team to eliminate ambiguity and establish clear ownership.
- c. **Mandate and Enforce Follow-up:** Introduce a mandatory, non-negotiable timeline for the completion and signing of the final reconciled report (LHIP) after fieldwork. Crucially, it must also institutionalize a monitoring mechanism, requiring the status of all inventory and valuation results to be a standing agenda item in periodic financial reconciliation meetings.

2. Strategic Technology and Data Infrastructure Investment:

Parallel to the regulatory reform, a strategic commitment must be made to build the necessary technological infrastructure to support a modern, accountable inventory and valuation process. This involves two key initiatives:

- a. **Initiate a Data Quality Improvement Program:** DJKN, in coordination with SKK Migas, should mandate and oversee a data cleansing and standardization program for PSC Contractors, prioritizing those with the largest and most problematic asset portfolios, such as PT Pertamina Hulu Rokan. This program should focus on aligning asset records with legal and physical realities (e.g., registering land based on legal parcels).
- b. **Develop an Integrated Inventory and Valuation Module within SIHM:** A formal project must be launched to develop the proposed inventory and valuation module within the Upstream Oil and Gas Information System (SIHM). This module is not merely a database but a comprehensive management tool that will provide the transparency, control, and institutional memory that is currently absent. Its development should be treated as a critical infrastructure project for enhancing the integrity of Indonesia's public financial management.

By implementing these integrated reforms, the Indonesian government can finally break the decade-long cycle of audit findings, bring trillions of Rupiah of state assets onto its balance sheet, and significantly enhance the transparency, accountability, and quality of its national financial statements. Future research could extend this SSM-GRC framework to other complex public asset management challenges or conduct a longitudinal evaluation of the impacts of these reforms once implemented.

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