

Analysis Of The Decision-Making Process For Evaluating Changes To The Scope Of Contracts (PLK): A Qualitative Study Of The Project Acceleration Unit (UPP) At SKK Migas

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Abstract

Massive upstream oil and gas projects frequently require Contract Scope Changes (Perubahan Lingkup Kontrak/PLK). This study analyzes the technical evaluation decision-making process of the SKK Migas Project Acceleration Unit (UPP) in navigating bounded rationality under strict deadlines, focusing on the utilization of tacit knowledge. Employing a qualitative case study approach, data were collected through in-depth interviews with UPP and Internal Supervisory (PI) personnel, observations, and thematic analysis of four PLK meeting minutes from the Strategis X National Strategic Project. Findings reveal that UPP personnel avoid sub-optimal "satisficing" by leveraging tacit knowledge, manifested as analytical engineering intuition. Furthermore, effective evaluation relies heavily on cross-functional knowledge sharing and risk-based guidance from the PI division. The study concludes that successful PLK decision-making requires synergizing individual empirical analysis with strict adherence to SKK Migas Working Guidelines (PTK) 007 and 069, thereby ensuring megaproject integrity and state financial efficiency.

Keywords: Contract Scope Change (PLK), Bounded Rationality, Tacit Knowledge, Project Governance, SKK Migas.

INTRODUCTION

The upstream oil and gas industry in Indonesia is governed by the Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas), a state regulatory body mandated to ensure efficient, accountable, and optimal resource management. Operating under a risk-based oversight strategy (SKK Migas, 2023, 2018), SKK Migas supervises Cooperation Contract Contractors (KKKS) through strict phased approval mechanisms.

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Within this structure, the Project Acceleration Unit (UPP) serves as a critical technical gatekeeper for National Strategic Projects. The UPP ensures that massive-scale megaprojects adhere to stringent time, cost, and quality parameters while mitigating operational deviations, acting as the primary verifier before commercial processing by the supply chain function.

In megaproject execution, discrepancies between initial design assumptions and actual field conditions are inevitable, necessitating Contract Scope Changes (PLK) or change orders. Managing scope through change orders is essential for aligning project performance indicators such as time, cost, and quality (Leong et al., 2014; Albar and Johari, 2023), requiring meticulous evaluation to maintain operational harmony and achieve optimal targets (Assbeihat and Sweis, 2015; Mohammad, 2018). While previous studies predominantly evaluate change orders quantitatively by focusing on cost overruns and schedule variations, a critical gap remains regarding the cognitive dimensions and professional interactions behind PLK approval decisions within highly regulated supervisory institutions. Evaluators at the UPP operate under intense operational pressure, facing voluminous justification documents and strict deadlines. This environment aligns with the concept of bounded rationality; however, in state governance, this does not justify sub-optimal compromises but rather demands sharper analytical rigor and absolute compliance.

To navigate complex PLK evaluations under such pressure, decision-makers strategically leverage tacit knowledge rooted in empirical experience (Polanyi, 2009). In technical engineering, this manifests as an "engineering sense," enabling personnel to rapidly detect anomalies in contractor proposals and articulate them into auditable, formal justifications aligned with standard guidelines (Chen and Mohamed, 2010). This dynamic is explicitly observed in the UPP's evaluation of "Strategic Project X," a trillion-rupiah Liquefied Natural Gas (LNG) megaproject. The UPP's technical decisions directly dictate the viability of these changes, making its decision-making mechanism a highly valuable subject for qualitative inquiry to understand how technical gatekeepers overcome operational constraints without compromising governance.

OBJECTIVE

This study qualitatively analyzes the decision-making process of the SKK Migas Project Acceleration Unit (UPP) in evaluating Contract Scope Change (PLK) proposals for Strategic Project X. Specifically, it examines how UPP personnel leverage tacit knowledge and technical intuition to navigate bounded rationality and operational pressures while verifying contractor justifications. Ultimately, the research aims to provide

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strategic recommendations to optimize PLK evaluation mechanisms, ensuring strict regulatory compliance and megaproject execution efficiency.

LITERATURE REVIEW

Decision Making (Bounded Rationality)

Traditional decision-making models assume perfect rationality, yet the reality of complex megaprojects necessitates the theory of bounded rationality, which acknowledges the inherent cognitive and informational constraints in processing real-world data (Puranam et al., 2015). Driven by time pressure and voluminous technical documentation, these limitations often push decision-makers toward satisfying, or accepting "good enough" solutions (Hernandez & Ortega, 2019). However, within highly regulated upstream oil and gas environments, bounded rationality does not justify sub-optimal compromises; rather, it operates as an operational challenge that demands stricter cross-functional collaboration, precise document verification, and rigid adherence to standard procedures to mitigate informational risks. In this study, bounded rationality serves as an analytical lens to examine the contextual environment of the Project Acceleration Unit (UPP). It facilitates the categorization and analysis of how UPP evaluators navigate schedule constraints, enforce data completeness from contractors, and manage the complexity of Contract Scope Changes (PLK) in Strategic Project X. The analysis focuses on UPP's managerial strategies such as multi-departmental coordination and strict enforcement of *Pedoman Tata Kerja* (PTK) to overcome cognitive constraints and ensure that all PLK approval decisions remain exact, measurable, and fully compliant.

Project Management

Project management is defined as the systematic application of knowledge, skills, tools, and techniques to fulfill specific project requirements (PMI, 2021). It functions as a structured governance discipline encompassing planning, organizing, actuating, and controlling to ensure strategic objectives are delivered within allocated time, budget, and quality standards (Albar and Johari, 2023). Contemporary theory frames projects as temporary organizations designed for non-routine tasks under specific spatial and temporal constraints (Moura and Skibniewski, 2011). As project scale increases, management complexity grows exponentially due to technical variations, diverse stakeholder involvement, and high field uncertainty (Ajmal et al., 2022). Project performance is universally measured against the "iron triangle" of time, cost, and quality,

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with scope positioned at its core (Leong et al., 2014). Effective scope management is critical to prevent scope creep, a destructive expansion of work beyond initial boundaries that disrupts schedules and inflates costs. This theoretical framework directly informs the evaluation of PLK in the upstream oil and gas sector. For National Strategic Projects like Strategic Project X, technical adjustments are inevitable due to field uncertainties. Within this context, the UPP performs a crucial controlling function by analyzing specification anomalies and mitigating potential cost deviations (Albar and Johari, 2023). Precise, data-driven information management is essential for UPP personnel to objectively evaluate PLK proposals, clearly distinguishing legitimate technical adaptations from detrimental scope creep that could burden state finances.

Change Order

In large-scale construction and operational projects, structural adaptations from initial plans are formally executed through change orders, or Contract Scope Changes (PLK). A change order is an officially authorized written instruction issued by the project owner during contract execution to modify scope, compensation, or schedules. Its initiation often stems from design refinements, owner-driven adjustments, or the need for improved field coordination (Khalifa & Mahamid, 2019), with contractors actively contributing to contract interpretation to achieve mutually beneficial economic outcomes (Alnuaimi et al., 2010, in Assbeihat & Sweis, 2015). This process can be systematically analyzed using Drewin's Open Conversion System, which illustrates how projects are influenced by internal resources and organizational structures, alongside external environmental and regulatory factors (Assbeihat and Sweis, 2015). Change orders typically manifest as additional, omitted, or substituted works, each necessitating project re-planning, strategic adjustments, and careful management of ongoing activities to prevent inefficiencies (Mohammad, 2018). These modifications significantly impact the iron triangle of cost, time, quality, and safety, often requiring extended durations for optimal execution and proportional budget reallocations (Geraldo & Ariesto, 2023). Consequently, change order theory is highly relevant for examining the UPP's strategic role in evaluating PLK proposals for Strategic Project X. Guided by Mohammad (2018), this framework explores the origins of change proposals and their managerial implications. The UPP functions as a strategic controller of the internal project environment, rigorously screening modification initiatives to ensure they meet technical specifications and actual project needs. This theoretical approach positions UPP evaluations as essential governance instruments that accommodate legitimate technical

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adaptations while safeguarding the megaproject's optimal time, cost, and quality performance.

Regulatory Framework and Project Governance

1. *Pedoman Tata Kerja* (PTK) 007 and PTK 069 SKK Migas

Within Indonesia's upstream oil and gas ecosystem, procurement, contract management, and scope change evaluations are strictly governed by two primary SKK Migas internal regulations. *Pedoman Tata Kerja* No. 007 (PTK 007) regulates the entire Supply Chain Management system for Cooperation Contract Contractors (KKKS), defining procurement procedures, administrative contract requirements, financial approval limits, and field execution oversight. For PLK processes, PTK 007 establishes the minimum administrative prerequisites for change proposals. Complementarily, *Pedoman Tata Kerja* No. 069 (PTK 069) specifically details PLK mechanisms, including the classification of eligible and ineligible changes, submission protocols, and technical evaluation parameters. PTK 069 serves as the direct operational manual for the UPP in determining technical acceptance or rejection criteria. Collectively, these guidelines form a rigid, non-negotiable compliance framework: every PLK evaluation decision must be fully verifiable against their specific clauses during external audits.

2. Project Governance

Beyond internal regulations, project governance provides the broader conceptual foundation for megaproject oversight mechanisms. Too and Weaver (2014) define project governance as the system of values, responsibilities, processes, and policies that enable projects to achieve objectives within a framework of clear organizational accountability. Distinct from project management, which focuses on execution, project governance dictates decision-making authority and accountability structures. In state supervisory institutions like SKK Migas, effective governance mandates independent oversight layers to ensure operational technical decisions align with public interest and state financial standards. The involvement of Internal Supervision (PI) in PLK evaluations exemplifies risk-based governance. As Miller and Hobbs (2005) emphasize, multi-tier oversight is essential in high-value megaprojects to mitigate governance breaches that could cause significant state financial losses. PI's independent, case-by-case, risk-based consultative approach represents adaptive governance that preserves UPP's operational flexibility while guaranteeing that the approval process remains robust, transparent, and fully auditable.

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Tacit Knowledge

Human knowledge extends beyond formal documentation, a concept grounded in Polanyi's (2009) principle that "we can know more than we can tell," which establishes the foundation of tacit knowledge. This form of knowledge is deeply rooted in direct experience, professional tenure, and long-term industry involvement. Within large-scale engineering and project management, tacit knowledge does not manifest as intuition or emotional guessing, but rather as a high-level "engineering sense." Unlike easily codified explicit knowledge, tacit knowledge operates as a reactive analytical capability, enabling professionals to rapidly detect anomalies, discrepancies, or inefficiencies in contractor proposals before engaging in complex mathematical calculations (Chen and Mohamed, 2010). To maximize this insight, organizations facilitate externalization: transforming implicit technical sensitivity into explicit, objective, and auditable arguments through rigorous technical debate and formal rule validation. In this research, tacit knowledge serves as the analytical framework to examine the cognitive and professional mechanisms employed by UPP personnel during PLK evaluations. It guides the interpretation of interview data on how evaluators leverage professional tenure and technical expertise rather than mere instinct to deconstruct and critique contractor arguments. This theoretical lens structures the analysis of transcripts and meeting minutes, tracing the knowledge transformation process: from initial tacit technical sensitivity, through intensive social and professional interactions, to the crystallization of explicit knowledge in the form of technical justifications that strictly comply with PTK 007 and 069 guidelines (SKK Migas, 2023, 2018).

METHODOLOGY

Research Approach

This study employs an exploratory qualitative case study approach to examine the technical decision-making process for Contract Scope Changes (PLK) by the Project Acceleration Unit (UPP) at SKK Migas. This design is optimal for capturing the nuanced group dynamics, operational pressures (bounded rationality), and the application of tacit knowledge (engineering sense) within a highly regulated megaproject environment.

Unit of Analysis and Participants

The bounded system is the UPP division, analyzed through four purposively selected, contrasting PLK cases from "Strategic Project X" (two technically approved, two rejected). To ensure robust triangulation, in-depth, semi-structured interviews were conducted with three distinct informant groups: Internal Supervision (PI) personnel

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(providing objective governance validation), UPP non-PIC staff (outlining macro-organizational norms), and the UPP Person-in-Charge (PIC) (providing empirical insights into operational pressures and contractor claim deconstruction). All entities were anonymized to maintain confidentiality.

Data Sources and Collection Techniques

Primary data is collected through in-depth interviews and observations of key personnel representing various levels of involvement in the PLK governance and technical evaluation of Strategic Project X. In-depth, semi-structured interviews are conducted with PI personnel (macro governance validators), UPP non-PIC personnel (divisional norm representatives), and the UPP PIC (primary evaluator). This approach allows for the exploration of empirical experiences and analytical strategies used to leverage engineering sense (tacit knowledge) in responding to operational pressures (bounded rationality), ensuring precise and compliant decisions (Creswell and Creswell, 2023). Direct observation is conducted to understand the managerial context, compliance-based work culture, and the transparent, argumentative technical debates occurring during PLK evaluation.

Secondary data is derived from official internal documents, specifically the Minutes of Meeting (MoM) for the four purposely selected PLK cases (two technically accepted, two rejected). This contrasting case selection is a strategic methodological design that enables the comparison of analytical strategies and decision-making dynamics between fundamentally different outcomes (Yin, 2018). These MoM documents serve as a solid written audit trail, providing contextual proof and supporting data triangulation to ensure the accuracy, objectivity, and reliability of the research findings (Aspers and Corte, 2019; Yin K. Robert and Campbell T. Donald, 2018).

Data Analysis Technique

Primary data were gathered through interviews and direct observation of technical evaluation debates. Secondary data comprised the official Minutes of Meeting (MoM) for the four selected PLK cases, serving as a verifiable audit trail. Data were analyzed using thematic analysis (Patton, 2015). The process involved systematic coding to identify patterns of how UPP personnel navigate bounded rationality, followed by theme synthesis to construct a narrative-descriptive framework. Methodological rigor and credibility were ensured through rigorous source and technique triangulation (Baxter & Jack, 2015).



RESULTS AND DISCUSSION

Results

Based on thematic analysis of in-depth interviews with three key informants (Internal Supervision, UPP Non-PIC, and UPP PIC) and Minutes of Meeting (MoM) documents from four contrasting PLK cases (two approved, two rejected), this study identifies four central themes that interconnect in the technical PLK evaluation process.

Operational Dynamics and Bounded Rationality

The first theme reveals extreme time pressure and initial information constraints when PLK documents are submitted. This condition represents the empirical reality of bounded rationality within the megaproject ecosystem. Informant N1 (Internal Supervision) stated: *"Masa evaluasi itu selalu berkejaran dengan project itu sendiri. Semakin gede project-nya, semakin rumit, maka semakin lama evaluasinya. Challenge dari sisi time itu amat sangat banyak"*. This pressure is exacerbated by incomplete justification documents from KKKS. N3 (UPP PIC) described the intensity of evaluation: *"Sekali meeting itu empat jam duduk. Keras-kerasan leher, keras-kerasan kepala menunggu data. Mental dan fisik itu diuji. PLK ini nggak main-main."*

Tacit Knowledge as Engineering Sense

To navigate this pressure, evaluators leverage tacit knowledge converted into engineering sense not emotional instinct, but data-driven analytical sensitivity. N2 (UPP Non-PIC) emphasized: *"Kalau PLK itu kan kita based on data, based on audit, harus auditable, ada datanya, bisa dijelaskan. Memang engineering practice. Judgement-nya tuh harus eksak."* Professional experience enables rapid detection of design anomalies. N3 explained the validation process: *"Ada ketidaksesuaian dari engineering sense saya. Saya tanyakan sampai semua terpenuhi: dokumentasi, comply aturan, jenis kontrak, ketentuan kontrak, comply sama PTK. Sampai benar-benar PLK ini bulat untuk diterima atau ditolak."*

Cross-Functional Collaboration and Knowledge Sharing

When PLK complexity exceeds internal UPP capacity, knowledge externalization occurs through cross-functional collaboration. In the case of rejecting the LNG vessel dynamic mooring study PLK, N3 explained: *"Pengetahuan kapal kita waktu itu tidak komprehensif. Jadi kita undang fungsi kapal untuk menjelaskan studi apa saja yang harus dilakukan, ketentuan yang berlaku, dan engineering practice. Mereka punya benchmark-*

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nya". This process confirms knowledge externalization principles by Nonaka (2009) where implicit knowledge transforms into collective wisdom through structured social interaction.

Absolute Governance Compliance

All technical analysis is ultimately locked by absolute compliance with PTK 007 and 069. N3 emphasized: *"Kita dekatkan ke engineering practice, PTK, aturan pekerjaan. Once tidak justified secara aturan, secara teknis, compliance di PTK 069, itu firm tidak akan diterima. Tapi kalau justifikasi sesuai PTK 069 dan PTK 007, itu hak kontraktor, harus dilakukan"*. The involvement of Internal Supervision (PI) on a case by case basis provides a risk-based oversight layer to mitigate potential future audit findings.

DISCUSSION

Implementation of Technical Decision-Making Under Operational Pressure

PLK document evaluation at SKK Migas occurs amidst ongoing construction dynamics, directly testing the resilience of UPP evaluators. In megaproject ecosystems, time for document review is highly constrained, and bounded rationality is often defined by organizational information processing and attention limitations (Puranam et al., 2015). UPP evaluators face exceptionally thick PLK justification documents, frequently accompanied by incomplete initial raw data from Cooperation Contract Contractors (KKKS). Field findings confirm this forces personnel to dissect issues under severe bounded rationality, with discussions often lasting hours. However, aligning with Love et al. (2024), in highly regulated supervisory institutions, this bounded rationality does not trigger analysis paralysis; the UPP firmly rejects satisficing (choosing merely adequate solutions to save time) as described by Hernandez & Ortega (2019) in conventional managerial contexts. To overcome this time pressure and data asymmetry, UPP personnel leverage an inherent analytical instrument: tacit knowledge. Polanyi (2009) asserts that human insight is deeply rooted in direct experience and years of professional engagement. In SKK Migas operations, research findings prove this tacit knowledge is not manifested as emotional guessing, but as highly analytical engineering sense. This technical sensitivity enables personnel to rapidly identify discrepancies or detect anomalies in contractor design proposals, reinforcing Chen & Mohamed (2010), who state that technical experience acts as a crucial initial "scalpel" before detailed mathematical validation is performed.



Constraints and Challenges in Evaluating Contract Scope Changes (PLK)

Technical evaluation faces varying hurdles depending on the nature of the contractor's proposed changes, as not all PLK documents fall within the core expertise of UPP personnel. Evaluation challenges peak when PLK proposals touch upon highly specific disciplines. Empirically, in evaluating LNG ship hydrodynamic (mooring analysis) studies, UPP personnel faced maritime knowledge limitations. To overcome this, the UPP employed cross-functional collaboration by inviting experts from the marine division, representing organizational knowledge sharing. This aligns with Kan et al. (2025), who highlight that implicit knowledge shared and externalized through social interaction forums is crucial for mitigating managerial risks. Tyrou (2026), aligning with Nonaka's (2009) SECI model, explains that through such structured interpersonal communication, implicit understanding is transformed into collective wisdom that can be formally codified and communicated within the organization. Another challenge stems from contractor initiatives often seeking to secure project economics through deemed necessary additional work. Kaming et al. (1997, in Khalifa & Mahamid, 2019) identify design refinement needs as a primary driver of modifications. While viewed as a reasonable adjustment in project management literature (Assbeihat and Sweis, 2015), the UPP must ensure such proposals are purely based on technical feasibility (legitimate change order), not unwarranted scope creep. This layered evaluation is essential to maintain the alignment of the project's central "iron triangle" indicators outlined by Leong et al. (2014) and Albar & Johari (2023), encompassing construction quality, time, and cost stability.

The Role of Governance in Securing Project Parameters

The entire sequence of cognitive analysis and field technical debates lacks legitimacy without the enforcement of compliance with state governance corridors. The outcome of UPP evaluations must culminate in valid, exact, and auditable Minutes of Meeting (MoM). Research findings prove that justifications for PLK approval or rejection are strictly based on the institution's internal legal framework: Work Procedure Guidelines (PTK) 007 and 069 (SKK Migas, 2023, 2018). At this juncture, the tacit knowledge of evaluators must be cross-validated against the explicit knowledge of engineering parameters and formal regulations. Furthermore, to ensure that bounded rationality pressures in the UPP do not yield decisions compromising good corporate governance, SKK Migas provides an additional defense layer through the Internal Supervision (PI) Division. Referring to Haiyirete et al. (2024), supervisory entities play a primary analytical role in filtering proposals to mitigate megaproject governance risks. Although the PI is not

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routinely involved in the daily technical approval chain, their case-by-case consultative assistance proves vital. This supervisory synergy guarantees that the flexibility and adaptive agility exercised by the UPP do not devolve into managerial integrity violations, ensuring that all cost efficiencies purely serve to protect state interests and finances.

CONCLUSION

This study concludes that PLK technical decision-making at SKK Migas is driven by four dynamics which are operational bounded rationality, engineering sense deployment, cross-functional collaboration, and absolute governance compliance. Despite time pressure and data asymmetry, UPP personnel reject satisfaction by tightening verification through objective engineering practice calibrated by professional experience. The findings reveal that UPP evaluation follows rigid verification against the iron triangle and PTK 007/069 regulations, with PI oversight ensuring legal and auditable decisions. Evaluators leverage tacit knowledge as logical engineering sense initiating cross-functional collaboration when technical complexity exceeds internal capacity to externalize individual knowledge into collective organizational wisdom. Theoretically this study refines bounded rationality models by demonstrating that in regulated state institutions, information pressure catalyzes high-level engineering heuristics rather than sub-optimal compromises. Practically, UPP should implement standardized document checklists and early engagement systems with PI and PRS functions. Management must institutionalize knowledge-sharing culture and reorient KPIs to recognize extended evaluation durations as engineering prudence safeguarding state finances. Future research should expand case numbers across diverse change types, compare governance across multiple megaprojects, explore contractor perspectives, and employ quantitative methods to measure knowledge-sharing impact on cost overrun reduction.

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