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# Organization Design and Manpower Strategy for Improving Financial Performance in Marginal Field: A Case Study of Upstream Oil and Gas Company in Indonesia

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**Abstract**

**Background:** Marginal oil and gas fields present significant operational and economic challenges due to declining reserves, low production rates, high operating costs, and negative financial performance.
**Objective:** This study aimed to develop an appropriate organizational model and manpower strategy for managing AX-145 to improve operational efficiency and support the long-term sustainability of marginal field operations.
**Methods:** A qualitative single-case study was conducted using the Galbraith Star Model as the analytical framework. Data were collected through purposive interviews with key stakeholders, analysis of internal company documents, organizational structure evaluation, workload and role-criticality assessment, and Full-Time Equivalent (FTE)-based right-sizing analysis.
**Results:** The study proposed a three-stage organizational transformation consisting of a Lean Internal Operating Model, Cluster Operating Model, and Strategic Partnership Model. The Stage-1 redesign reduced total field-allocated formations from 527 to 375 (28.8%) through supervisory consolidation, organizational delayering, optimized span of control, Operator Driven Reliability (ODR)-based multi-skilling, and Shared Service Organization (SSO) integration. The proposed manpower strategy integrated role-criticality assessment, workforce reallocation, competency-based multi-skilling, and the Manpower Productivity Index (MPI) as a performance measurement instrument, with the projected MPI improving from 0.71 to 1.00 and estimated manpower cost savings of USD 4–6 million annually.
**Conclusion:** The proposed organizational model and manpower strategy provide a structured framework for improving manpower productivity and operational cost efficiency in marginal oil and gas fields while offering a practical reference for managing similar assets within Indonesia's upstream oil and gas industry.

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## INTRODUCTION

The oil and gas industry has historically played a crucial role in supporting Indonesia's economic development, national energy security, and state revenue generation. As a resource-based country, Indonesia has relied heavily on the upstream oil and gas sector, particularly exploration and production activities, to meet domestic energy demand and sustain industrial growth. The contribution of this sector is not only reflected in its direct economic value, but also in its strategic function as a key driver of national development and energy independence. Previous studies have indicated that the oil and gas sector has a positive relationship with national development, especially through its contribution to economic growth, public welfare, and industrial expansion (Indonesia, 2024; Indonesia, 2025; Migas, 2023).

Despite its strategic importance, Indonesia's upstream oil and gas sector has experienced significant structural challenges over the past two decades. The country, which was once recognized as an important oil producer and exporter, has faced a continuous decline in crude oil production. This decline has been driven by several factors, including maturing oil and gas fields, declining reserves, aging infrastructure, increasing operational complexity, and higher production costs. At the same time, domestic energy demand continues to increase, creating a widening gap between national production capacity and consumption needs. These conditions have forced Indonesia to shift its energy strategy from relying on new discoveries toward optimizing existing mature and marginal fields (Agency, 2022; Indonesia, 2024; Reuters, 2024).

One of the most pressing challenges in Indonesia's upstream oil and gas industry is the increasing dominance of marginal fields. Marginal fields are generally characterized by small reserves, low production rates, high lifting costs, aging facilities, complex operational conditions, and limited economic value. In many cases, these fields continue to produce oil and gas but generate only thin profit margins or even negative financial returns. The predominance of marginal fields has therefore created significant pressure on upstream oil and gas companies, particularly in maintaining production while ensuring economic sustainability (Engineering, 2025; Indonesia, 2025; Kaiser et al., 2003).

Marginal field management requires a different strategic approach compared to conventional or high-production fields. While conventional fields may justify larger organizational structures, extensive manpower, and higher capital expenditure due to strong production potential, marginal fields require leaner and more cost-disciplined operating models. The economic limitations of marginal fields demand greater efficiency in asset management, workforce allocation, operational planning, and cost control. Without an appropriate operating model, marginal fields may continue to produce hydrocarbons while simultaneously destroying economic value due to high fixed costs and inefficient resource utilization (Indonesia, 2025; Institute, 2024; Kaiser et al., 2003).

In the context of PT CoreAxis Energy, the issue of marginal field management has become increasingly important. The company manages various upstream oil and gas assets, including offshore and onshore fields with different levels of operational complexity. Several of these assets are mature fields that continue to contribute to production but face declining economic performance. Based on the company's 2026 projection, sixteen production areas are categorized as marginal fields due to negative projected Net Profit After Tax (NPAT). This condition indicates that continued production does not automatically translate into value creation, particularly when operating costs exceed the economic benefits generated from production activities (Energy, 2026).

Among the sixteen marginal fields, AX-145 has been identified as the most critical case and is therefore selected as the focus of this study. AX-145 is projected to record the highest negative estimated NPAT in 2026, approximately -USD 16.41 million, while still producing around 7.50 MBOPD of oil and 21.14 MMSCFD of gas. This situation demonstrates that AX-145 is not primarily facing a production absence problem, but rather a value creation problem. The field remains operationally significant, yet its financial performance is under severe pressure because the revenue generated from production is insufficient to cover the total cost burden (Energy, 2026).

The cost structure of AX-145 shows that Depreciation, Depletion, and Amortization (DDA) and manpower costs are among the largest contributors to operating expenses. DDA reflects the accounting impact of historical investments, asset depletion, and reserve decline, making it relatively difficult to manage in the short term. In contrast, manpower costs represent a managerial cost component that can be influenced through organizational redesign, workforce optimization, role consolidation, improved productivity, capability alignment, and alternative operating models. Therefore, although DDA remains a major financial burden, manpower costs are considered a more controllable factor within the scope of managerial intervention (Brealey et al., 2020; Energy, 2026; Huselid, 1995; Vernimmen et al., 2022).

The existing organizational structure and manpower configuration of AX-145 appear to be misaligned with the economic characteristics of a late-life marginal field. As a marginal asset, AX-145 requires a lean, flexible, and cost-efficient organizational model that focuses on essential operations, asset integrity, safety, production continuity, and financial discipline. However, the current workforce arrangement still reflects a conventional full-scale operating model, which may have been more suitable during the field's earlier growth or peak production stage. This mismatch may lead to high personnel costs, overlapping roles, inefficient manpower allocation, and limited organizational agility in responding to economic constraints (Energy, 2026; Galbraith, 2014; Institute, 2024).

Organizational redesign is therefore essential to improve the cost-effectiveness of marginal field management. A more suitable organizational model should simplify reporting lines, clarify decision-making authority, reduce unnecessary layers, optimize manpower deployment, and strengthen coordination among operations, human capital, finance, and asset management functions. In addition, the manpower strategy should be aligned with the field's current production profile, remaining economic life, operational risk, and required capabilities. Through this approach, the company can ensure that workforce allocation is not only based on historical organizational patterns, but also on actual business needs and economic realities (Burton et al., 2015; Joseph & Sengul, 2025).

From a human capital perspective, manpower optimization does not merely mean reducing the number of employees. It also involves identifying critical roles, evaluating workload distribution, improving role clarity, aligning capabilities with operational needs, and determining which activities can be consolidated, shared, outsourced, or redesigned. In marginal field operations, manpower strategy must balance cost efficiency with operational reliability, safety, compliance, and asset integrity. Therefore, any proposed manpower model should be carefully designed to avoid excessive cost reduction that could compromise operational performance or regulatory obligations (Becker & Huselid, 2006; Nastase et al., 2025).

Stakeholder involvement is also a critical factor in implementing organizational and manpower changes. The business issue in AX-145 involves multiple stakeholders, including decision-makers, field managers, human capital managers, production teams, asset managers, business development teams, and organizational development specialists. Each stakeholder has different interests, levels of influence, and concerns regarding operational continuity, cost efficiency, workforce stability, and financial performance. A comprehensive stakeholder mapping is necessary to ensure that the proposed organizational model can be implemented effectively and that potential resistance can be managed through appropriate engagement strategies (Freeman, 1984; Kotter, 1996; Mitchell et al., 1997; Ummah et al., 2023).

The urgency of this research lies in the need to bridge the gap between the current operating condition of AX-145 and the desired state of a more efficient marginal field organization. The current condition is characterized by negative economic performance, high operating costs, significant manpower expenses, and organizational misalignment. Meanwhile, the desired condition includes a leaner organizational structure, optimized manpower numbers, clearer roles and responsibilities, improved reporting lines, and better cost-effectiveness. Addressing this gap is important not only for AX-145, but also for other marginal fields within PT CoreAxis Energy's portfolio that may face similar economic and operational challenges (Energy, 2026; Indonesia, 2025; Kaiser et al., 2003). From a practical standpoint, the gap stems from an organizational model designed for peak-production conditions that has not been restructured to reflect the field's marginal economics—resulting in persistent manpower cost inefficiency and value destruction. From a research standpoint, the gap reflects the absence of an integrated framework in the literature that simultaneously applies organizational design theory, role-criticality assessment, and a typology-calibrated productivity index to upstream marginal field management. Maintaining the current operating model without redesign carries concrete consequences: continued value destruction, acceleration toward the economic-limit threshold, increased risk of premature field cessation, and opportunity cost through retaining manpower that could be redeployed to higher-value growth and exploration assets (Energy, 2026; P. Indonesia, 2025; Kaiser et al., 2003).

Based on this background, this study aims to design an appropriate organizational model and determine the optimal manpower requirements for managing AX-145 as a marginal oil and gas field under PT CoreAxis Energy. Furthermore, this studyThe findings of this study are expected to provide practical contributions for PT CoreAxis Energy in managing marginal fields more efficiently and may serve as a reference for broader marginal field management practices in Indonesia's upstream oil and gas industry (Burton et al., 2015; Energy, 2026; Galbraith, 2014; Joseph & Sengul, 2025).

## METHOD

This study employed a qualitative case study approach with a single-case design focusing on AX-145, a marginal oil and gas field operated by PT CoreAxis Energy. The case study approach was selected because the research aimed to obtain an in-depth understanding of organizational structure, manpower configuration, and economic challenges within a specific real-world business context. The study was descriptive-analytical and prescriptive in nature The descriptive-analytical phase involved documenting and diagnosing the current organizational and manpower condition of AX-145 through empirical data collection, comparison against marginal-field benchmarks, and identification of performance gaps. The prescriptive phase translated diagnostic findings into a proposed organizational model and manpower strategy, derived systematically from the Galbraith Star Model and validated through cost-effectiveness criteria. These two phases were deliberately sequenced to ensure that prescriptions were grounded in empirical diagnosis rather than pre-determined design preferences (Creswell & Poth, 2018; Kiely & Hartman, 2023). It first analyzed the existing organizational and manpower conditions of AX-145, then developed a proposed organizational model and manpower strategy to improve operational efficiency and financial performance.

The object of this study was AX-145, which was selected because it represents negative projected Net Profit After Tax (NPAT) and relatively high manpower-related costs. The unit of analysis was the organizational model and manpower configuration of the field, including organizational structure, reporting lines, work processes, manpower size, role distribution, and workforce productivity. Although the study focused on AX-145, relevant contextual information from PT CoreAxis Energy's broader portfolio, corporate strategy, and regional management practices was also considered to ensure that the proposed model was feasible within the company's governance framework.

Data were collected from both primary and secondary sources. Primary data were obtained through semi-structured interviews with selected key stakeholders who had strategic, operational, and human capital responsibilities related to marginal field management. The respondents were selected using purposive sampling based on their relevance to the research objectives, authority in decision-making, experience in the upstream oil and gas industry, and ability to provide reliable information. The key respondents included representatives from business planning and portfolio management, production performance management, and human capital management.

Secondary data were obtained from internal company documents and external references. Internal data included manpower data, personnel cost data, production performance, financial performance, organizational charts, workload analysis, job descriptions, job evaluation data, annual reports, long-term planning documents, and work plan and budget documents. External data consisted of academic literature, industry reports, regulatory references, and previous studies related to organization design, marginal field economics, upstream operating models, workforce planning, and full-time equivalent (FTE) analysis.

The data collection process was conducted through several stages. First, the research problem and business issue were identified based on the economic condition of AX-145. Second, interview guidelines were prepared based on the research questions and the Galbraith Star Model framework. Third, interviews were conducted with selected respondents either in person or through secure online meetings. Fourth, interview results were documented, transcribed, and verified to ensure accuracy. Finally, secondary data were reviewed and compared with interview findings to strengthen the validity of the analysis.

Data analysis was carried out through five main stages. The first stage involved identifying organizational and manpower misalignment by comparing the current condition of AX-145 with the requirements of a marginal field operating model. The second stage classified the field based on production profile, financial performance, field characteristics, and cost structure. The third stage developed the proposed organizational model using the Galbraith Star Model, which consists of strategy, structure, process, rewards, and people dimensions. The fourth stage formulated the manpower strategy by assessing role criticality, conducting right-sizing analysis, and calculating workforce productivity indicators. The fifth stage validated the proposed organizational model and manpower strategy through economic and cost-effectiveness evaluation.

The manpower analysis was conducted using role criticality assessment and FTE-based right-sizing. Each position was evaluated based on its relevance to safety and regulatory compliance, production continuity, and cost efficiency. Positions considered less critical were assessed for potential consolidation, redeployment, outsourcing, or elimination. The FTE analysis was used to estimate optimal manpower requirements by comparing workload volume, activity time, and productive working hours. Productivity was measured using indicators such as manpower cost per barrel of oil equivalent, production per headcount, and revenue per headcount.

To ensure research validity, this study applied triangulation through multiple sources and methods. Source triangulation was conducted by comparing information from different respondents and company documents. Methodological triangulation was applied by cross-checking qualitative interview findings with quantitative data such as production records, manpower costs, financial performance, and headcount data. Theoretical triangulation was also used by interpreting the findings through organization design theory, marginal field economics, operating model literature, and workforce planning concepts. This approach strengthened the reliability of the findings and supported the development of a more practical and evidence-based recommendation.

The final output of the analysis was a proposed organizational model and manpower strategy for AX-145. The proposed model was evaluated based on its ability to improve organizational alignment, reduce manpower-related costs, enhance operational efficiency, and support better financial performance. The results of this study are expected to provide practical recommendations for PT CoreAxis Energy in managing AX-145 and may serve as a reference for other marginal oil and gas fields with similar operational and economic challenges.

## RESULTS AND DISCUSSION

### People and Manpower Strategy

The People dimension of the Galbraith Star Model was translated into a manpower strategy based on role-criticality assessment, competency-based workforce deployment, and workload-driven right-sizing. Rather than applying across-the-board headcount reductions, the proposed strategy differentiates positions according to their contribution to operational safety, production continuity, technical authority, and organizational efficiency. Each role was classified into one of four categories (Critical In-House, Critical In-House (Reshaped), Shared/Clustered, and Protected Critical Roles) to determine the most appropriate organizational treatment during Stage 1.

**Table 1**

*Role-Criticality Assessment and Stage-1 Treatment for AX-145 Principal Positions*

| Skill Group | Category | Design Treatment (Stage 1) | Current Formation | Current Manpower | Stage-1 Formation |
|---|---|---|---|---|---|
| Field Manager | Critical In-House | Retain; single accountable field leadership | 1 | 1 | 1 |
| Superintendents (area/function, | Critical In-House | area/function roles become cluster | 16 | 13 | 10 |

| Skill Group | Category | Design Treatment (Stage 1) | Current Formation | Current Manpower | Stage-1 Formation |
|---|---|---|---|---|---|
| back-to-back) | (consolidated) | superintendents and integrated HSSE superintendent; back-to-back rotation retained to ensure operational stability | | | |
| Section Heads (maintenance & planning) | Critical In-House (reshaped) | Discipline-based heads pooled per cluster; planning & TA consolidated | 15 | 15 | 7 |
| Senior Supervisors (production & maintenance) | Critical In-House (reshaped) | Broaden spans of control; one supervisory cascade per cluster | 66 | 65 | 42 |
| Operators (OI/MechOp) | Critical In-House protected | Retain formation 100%; ODR multi-skilling under competency framework; prioritized backfill of vacancies in safety-critical slots | 68 | 67 | 68 |
| Wellhead & Wireline Officers | Critical In-House protected | Retain; ODR overlay | 4 | 2 | 4 |
| Technicians (I/C, Electrical, Mechanical) | Critical In-House (reshaped) | ODR transition; second-line and specialty focus | 20 | 20 | 12 |
| Analysts / Engineering & Planning | Critical In-House (reshaped) | Right-size post Cost Recovery; consolidate CMMS, planning and per-area analyst roles | 45 | 45 | 27 |
| Senior Engineers (Production Operations) | Critical In-House | Retain; cluster-level technical authority | 2 | 2 | 2 |
| Marine (Mooring Masters) | Shared / Clustered | Retain; cross-cluster scheduling | 2 | 1 | 2 |
| TOTAL dedicated formations | | | 239 | 231 | 175 |

As presented in Table 1, positions directly associated with operational control and production continuity, including the Field Manager, Operators, Wellhead and Wireline Officers, and Senior Production Engineers, are retained because they perform safety-critical and production-critical functions that cannot be transferred or eliminated. In contrast, managerial and supervisory positions undergo significant restructuring through organizational consolidation. The number of Superintendents is reduced from 16 to 10 by integrating functional responsibilities at the cluster level while maintaining back-to-back operational coverage. Similarly, Section Heads are streamlined from 15 to 7 by pooling discipline-based planning and maintenance functions, whereas Senior Supervisors decrease from 66 to 42 through broader spans of control and the elimination of unnecessary reporting layers.

Technical support functions are also redesigned to improve workforce productivity without compromising operational reliability. The number of Technicians is reduced from 20 to

12 following the implementation of the Operator Driven Reliability (ODR) approach, whereby operators assume routine first-line inspection and maintenance activities while technicians concentrate on specialized second-line maintenance. Likewise, Engineering and Planning Analysts are reduced from 45 to 27 after consolidating planning, CMMS, and engineering support activities following the transition to the cost-recovery operating environment. Conversely, Marine Mooring Masters are retained under a shared or clustered operating arrangement because their workload can be efficiently distributed across multiple operating areas.

Overall, the proposed redesign reduces dedicated organizational formations from 239 to 175 positions, representing a reduction of approximately 26.8%, while preserving all safety-critical and production-critical capabilities. The reduction is achieved primarily through organizational delayering, supervisory consolidation, functional integration, wider spans of control, and competency-based role redesign rather than through indiscriminate workforce reduction. This finding demonstrates that manpower optimization in marginal fields should prioritize organizational alignment and operational effectiveness, ensuring that essential technical capabilities are maintained while minimizing structural inefficiencies.

**Table 2**
*Multi-Skilling Competency Framework for ODR-Enabled Operator at AX-145*

| Activity Domain | ODR Operator (First Line) | Maintenance Tech (Second Line) | Specialist / Contractor |
|---|---|---|---|
| Visual & Sensory Inspection | Routine rounds; smell, sight, sound, vibration check; leak detection | Targeted inspection on deviation | Specialist inspection per integrity plan |
| Lubrication & Greasing | Routine lube; grease points per schedule | Lube-system corrective | Lube-system overhaul |
| Simple Valve Operation | Manual valve operation; bleed; drain; minor adjustment | Valve repair; trim change | Specialty valves; HIPPS |
| Instrumentation | Read; record; basic field calibration check | Calibration; loop check; minor repair | Control-system change; PLC; SIS |
| Electrical | Reset breakers within authorized envelope | Low Voltage electrical maintenance | High Voltage; protection; rotating-machinery electrical |
| Mechanical | Bolt tightening within envelope; cleaning | Routine mechanical; minor seal | Rotating machinery; major overhaul |
| PTW / Safety | Risk-aware execution; permit holder under authorized PTW (Permit-to-Work) | Permit holder under authorized PTW | Per role; PTW preserved |

Table 2 presents the competency framework supporting the implementation of the Operator Driven Reliability (ODR) approach in AX-145. The framework defines clear competency boundaries between first-line operational tasks performed by ODR-enabled operators and higher-risk maintenance activities that remain the responsibility of maintenance technicians or specialized contractors. This competency-based division of work enables operators to assume a broader operational role while ensuring that activities requiring advanced technical expertise, certification, or regulatory authorization continue to be executed by qualified personnel.

The framework shows that ODR-enabled operators are authorized to perform routine visual inspections, lubrication and greasing, manual valve operations, basic instrumentation checks, limited electrical resetting within approved operating limits, simple mechanical activities such as bolt tightening and equipment cleaning, and routine Permit-to-Work (PTW) execution. These activities represent repetitive first-line maintenance tasks that can be integrated into daily production operations after appropriate competency development and certification. By assigning these responsibilities to operators, routine equipment monitoring and early anomaly detection can be conducted more frequently without increasing dedicated maintenance manpower.

Conversely, specialized maintenance activities remain outside the operator's competency envelope. Instrument calibration, loop testing, electrical maintenance, valve repair, rotating machinery overhaul, control system modifications, high-voltage electrical work, and integrity-related inspections continue to be performed by maintenance technicians or specialist contractors. This separation of responsibilities ensures that operational efficiency is improved without compromising asset integrity, process safety, or regulatory compliance. Consequently, the implementation of multi-skilling is positioned as a competency-based workforce optimization strategy rather than a substitution of specialized technical expertise.

The competency framework also provides the operational foundation for the manpower redesign presented in Table 1. By transferring routine first-line maintenance activities to operators, maintenance technicians can focus on corrective, preventive, and specialized maintenance functions, allowing the technician formation to be optimized while maintaining operational reliability. This finding supports the principle that workforce productivity in marginal fields can be enhanced through competency-based job redesign and clearly defined role boundaries, rather than through indiscriminate workforce reduction alone.

**Manpower Productivity Index as the Design Instrument**

The Manpower Productivity Index (MPI) is the calibrated design instrument that translates the qualitative ambition of safe cost-efficient production into a measurable target. The MPI synthesizes the six manpower-productivity components (production per position (PPP), revenue per position (RPP), EBITDA per position (EPP), manpower cost per BOE (MCB), manpower cost as a percentage of revenue (MCS), and the manpower-to-production ratio (MPR)) into a single geometric-mean index calibrated by typology-specific reference values. The typology-specific calibration is the response to the explicit Portfolio interview observation that productivity thresholds must vary by asset type (offshore versus onshore, rotation system, complexity of operation) and cannot be applied uniformly across the portfolio.

Manpower Productivity Index (MPI) is constructed as an applied composite productivity index based on established productivity-measurement theory, partial labor-productivity ratios, human-capital performance metrics, and composite-indicator methodology.

The Manpower Productivity Index developed in this study is constructed as a composite productivity indicator based on partial productivity-ratio logic and composite-indicator methodology. Following Hannula (2002), productivity can be understood as an output-input relationship, and partial productivity ratios are widely used in industry because they provide practical and managerially relevant measures at the business-unit level (Li et al., 2023). The six MPI components therefore capture complementary output-input and cost-efficiency dimensions of manpower productivity: production per position, revenue per position, EBITDA per position, manpower cost per BOE, manpower cost share of revenue, and manpower-to-production ratio.

The construction of the MPI follows the OECD/JRC composite-indicator framework, which requires a theoretical framework, indicator selection, normalization, weighting and aggregation, and robustness assessment. Because the six MPI indicators use different units of measurement, they are normalized against a typology-specific reference field before aggregation. The final aggregation uses the geometric mean, supported by the composite-indicator literature, because geometric aggregation reduces full compensability among indicators compared with a simple arithmetic average.

Refer to the above references, the MPI formula in this research is:

$$\mathrm{MPI} = \left( \frac{PPP}{PPP*} \, x \, \frac{RPP}{RPP*} \, x \, \frac{EPP}{EPP*} \, x \, \frac{MCB}{MCB*} \, x \, \frac{MCS*}{MCS} \, x \, \frac{MPR*}{MPR} \right)^{1/6}$$

In which the starred values (PPP*, RPP*, EPP*, MCB*, MCS*, MPR*) are the typology-specific reference values calibrated from the Tier 4 Large / Profile A / G1 Offshore Scattered class. Because AX-145 is the only field in the portfolio that occupies that class, the reference values are derived in part from the adjacent AX-140 (Tier 3 Medium / Profile A / G1) field its offshore-scattered, EBITDA-positive analogue and in part from a feasible-improvement target rather than a peer median. This is the methodological response to the singularity issue identified, in the absence of a like-for-like internal peer, the reference values are designed to be reachable in three stages.

**Table 3**

*Manpower Productivity Index Components and Staged Targets for AX-145.*

| Component | Current – AX-145 2025 | Reference* (AX-140) | Stage 1 Target | Stage 2 Target | Stage 3 Target |
|---|---|---|---|---|---|
| PPM (boepd / position) | 29.1 | 47.2 | 40.7 | 49.1 | 65.2 |
| RPM (USD k / position) | 694 | 665 | 970 | 1,172 | 1,556 |
| EPM (USD k / position) | 335 | 481 | 468 | 566 | 752 |
| MCB (USD / BOE) | 7.76 | 2.65 | 5.55 | 4.59 | 3.46 |
| MCS (% of revenue) | 11.9% | 6.9% | 8.5% | 7.0% | 5.3% |
| MPR (manpower/ kboepd) | 34.4 | 21.2 | 24.6 | 20.3 | 15.3 |
| MPI (composite) | 0.62 | 1.00 | 0.86 | 1.04 | 1.38 |

Table 3 summarizes the projected improvement in the Manpower Productivity Index (MPI) across the three stages of organizational transformation. The results indicate consistent improvements in all six productivity components, demonstrating that the proposed manpower strategy enhances workforce productivity while reducing labor-related costs.

During Stage 1, productivity improvements are achieved primarily through organizational right-sizing and workforce optimization. Production per manpower position (PPM) increases from 29.1 to 40.7 boepd per position, while revenue per manpower position (RPM) rises from USD 694 thousand to USD 970 thousand. Likewise, EBITDA per manpower position (EPM) improves from USD 335 thousand to USD 468 thousand, reflecting higher economic value generated by each workforce position following organizational redesign.

At the same time, labor-cost efficiency also improves substantially. Manpower cost per barrel of oil equivalent (MCB) decreases from USD 7.76 to USD 5.55 per BOE, manpower cost as a percentage of revenue (MCS) declines from 11.9% to 8.5%, and the manpower-to-production ratio (MPR) decreases from 34.4 to 24.6 manpower per kboepd. These improvements indicate that the proposed workforce configuration enables greater production output with fewer manpower resources while maintaining operational capability.

The combined effect of these improvements increases the composite MPI from 0.62 under the current operating condition to 0.86 after Stage 1, indicating a substantial improvement in overall manpower productivity despite remaining below the typology-specific benchmark value of 1.00. Further organizational transformation through the Cluster Operating Model in Stage 2 is projected to increase the MPI to 1.04, exceeding the reference benchmark, while the implementation of strategic operating alternatives in Stage 3 is expected to raise the MPI further to 1.38. These results demonstrate that organizational redesign, competency-based workforce deployment, and progressive operating model transformation collectively contribute to sustained improvements in manpower productivity across the AX-145 marginal field.

**Stage-1 Manpower Planning**

Six derivation drivers, each grounded in a specific design move and each independently traceable to one of the three interviews or to the data set, generate the move from the current 239 dedicated formations to the Stage-1 target of 175 dedicated formations, and the parallel move from the current 288 SSO-allocated formations to 200 SSO-allocated formations. The combined Stage-1 total of 375 formations represents a reduction of 152 formations from the current 527, or approximately 28.8 percent.

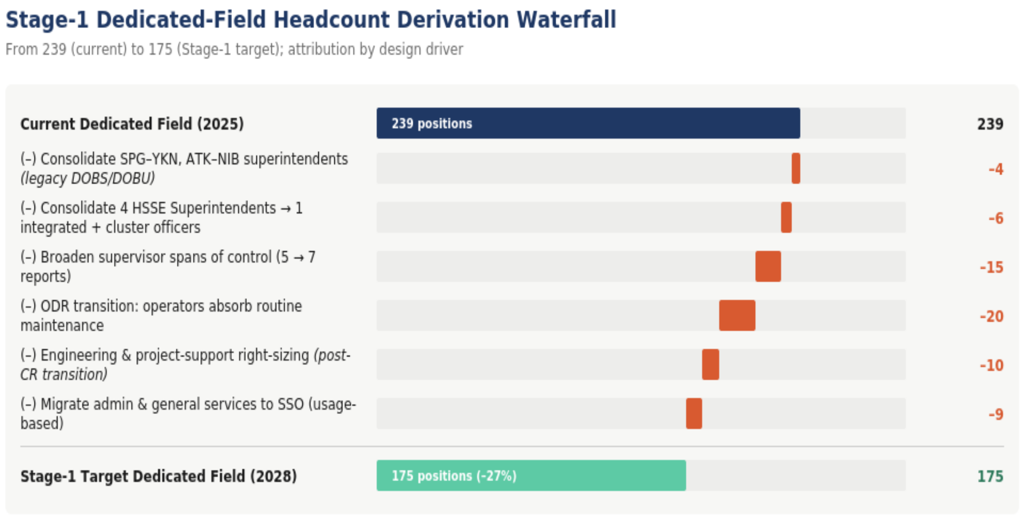


**Figure 1.** *Stage-1 Headcount Derivation Waterfall for AX-145 Dedicated Formations*

The six drivers, in the order they operate on the headcount baseline refer to the Interview result, are: (a) supervisory consolidation of the SPG-YKN and ATT-NIC Senior Superintendent positions and the supporting cluster supervisor positions, generating a reduction of 4 formations, traceable to the interview with Production Function on combined field management and Human Capital function interview on layer simplification; (b) HSSE consolidation from four parallel Superintendent positions plus their supporting structures into a single HSSE Superintendent with three Lead positions, generating a reduction of 6 formations; (c) span-of-control broadening across the supervisory layer, generating a reduction of 15 formations through the elimination of intermediate supervisory positions whose role was principally a function of narrow spans; (d) ODR transition that moves first-line maintenance activities from dedicated maintenance technicians into the operator role, generating a reduction of 20 formations from the maintenance-technician population; (e) engineering right-sizing post the gross-split to cost-recovery transition, generating a reduction of 10 formations from the engineering function as the post-transition workload settles; and (f) administrative migration to SSO, moving 9 administrative positions from the dedicated field organization to the SSO with usage-based SLA. The six drivers sum to 64 formations, exactly bridging the 239-to-175 gap.

The parallel SSO reduction from 288 to 200, a reduction of 88 formations or 30.6 percent, is generated by the usage-based SLA renegotiation rather than by the addition of work absorbed from the field (which only adds 9 formations through driver (f)). The reduction reflects the rebalancing of allocated overhead across the portfolio: under the current per-capita allocation, AX-145 absorbs a share of SSO capacity disproportionate to the actual services it consumes; under usage-based allocation, the absorbed share falls to the level of actual service consumption. The 88-formation reduction is the difference between the two allocation methodologies and is implementable without service-level degradation provided that the receiving SSO functions are themselves right-sized to match the rebalanced demand profile across the portfolio.

Three boundary conditions of the headcount derivation should be noted explicitly. First, the derivation is at the formation (position) level rather than the headcount (person) level; differences between filled and vacant positions are not assumed away. The current 527 formations are filled by an estimated 397 manpower (including the embedded vacancy of 12 and the supplementary 130 Temporary/Permanent/Contract positions), and the Stage-1 target of 375 formations is correspondingly expected to be filled by approximately 285 manpower. Second, the derivation does not assume any involuntary separation. Refer to the Portfolio interview, workforce reallocation to other working areas and to exploration assets is the preferred mechanism for Permanent staff; contract non-renewal at end of natural contract term is the preferred mechanism for fixed-term contract staff. Third, the derivation does not include changes to the contractor and service-personnel population. The on-call versus standby reclassification of service contracts is expected to reduce standby contractor cost by an additional 20–30 percent, but this saving is over and above the formation reduction and is captured separately in the impact assessment.

**Implementation Plan & Justification**

***Implementation Plan (5W+1H)***

The implementation plan translates the proposed organizational redesign into a structured execution roadmap that specifies the key activities, responsible stakeholders, implementation timeline, and execution mechanisms for each stage of the transformation. As summarized in Table 4, the implementation begins with strategy alignment and change management in the third quarter of 2026, followed by supervisory consolidation, deployment of the Operator Driven Reliability (ODR) competency framework, expansion of supervisory spans of control, and workforce redeployment. These initiatives constitute the core activities of the Stage-1 Lean Internal Operating Model aimed at improving organizational efficiency while maintaining operational reliability.

Beyond the field-level redesign, the implementation plan also includes portfolio-level initiatives such as the renegotiation of Shared Service Organization (SSO) service-level agreements and the reclassification of service contracts to optimize indirect manpower utilization. The subsequent stages focus on establishing the Cluster Operating Model during 2027–2028 and evaluating long-term strategic operating alternatives after 2029. This phased implementation demonstrates that the proposed organizational transformation is designed to achieve sustainable improvements in manpower productivity and operational efficiency while minimizing implementation risks and organizational disruption.

**Table 4**

*Implementation Plan (5W + 1H) for Stage 1-3*

| What | Why | Who (Accountable) | Where | When | How |
|---|---|---|---|---|---|
| Strategy alignment & change-management charter | All three interviews: redesign without strategic alignment will not survive | Sr Manager Production & Projects (Zone X) sponsor; Field Manager AX-145 accountable | AX-145 leadership team | Q3 2026 | Leadership workshop; strategic-posture statement; change-management charter signed by Management and related accountable positions |
| Supervisory consolidation (SPG-YKN + ATT-NIC; HSSE 4→1) | Interviewee from Production on combined field management; HC Interviewee on layer simplification | Field Manager AX-145; VP HC for formation changes | Field operations & HSSE | Q4 2026 | Organizational decision; formation chart update; Permanent employee redeployment plan |
| ODR program design & | Both operations interviews on | Sr Supt Maintenance & | Field operatio | Q3–Q4 | Competency framework (Table |

| What | Why | Who (Accountable) | Where | When | How |
|---|---|---|---|---|---|
| deployment | multi-skilling within competency boundary | Operations; HC for competency framework | ns | 2026 | 6); operator training program; pilot at SPG-YKN then ATT-NIC |
| Span-of-control broadening; layer 4→3 | Sr Manager Human Capital on simplified layering and wider spans | Field Manager AX-145; Sr Manager Production & Projects | Whole field structure | Q3 2026 | Position-by-position review; redeployment plan; supervisor coaching |
| SSO usage-based SLA renegotiation | Portfolio interview on SSO allocation; HC Interviewee on shared service | VP Operations Region 3; SVP HC; SSO function heads | SSO functions allocated to AX-145 | Q3 2026 – Q1 2027 | SLA negotiation; usage metering; allocation reform |
| Service-contract reclassification on-call vs standby | Production Interviewee on standby vs on-call basis; hidden manpower cost | Sr Supt Logistics & Procurement (in SSO); Field Manager | All service contracts | Q3 2026 – Q1 2027 | Contract-by-contract review; renegotiation at renewal; activity-based call-out fees |
| Stage-2 cluster transition design | Production Interviewee on cluster model; HC Interviewee on clustering archetype | Field Manager AX-145; Sr Manager Portfolio & LTP | Whole field AX-145 | Q3 2027 – Q1 2028 | Cluster boundary design; cluster-manager job design; transition plan |
| Stage-3 strategic option study | Portfolio interview on partnership / KSOT / disposal options | VP Strategy; VP Operations; VP Portfolio Mgmt. | Corporate-strategic | 2029 – 2030 | Market sounding; partner identification; valuation; SKK Migas engagement |

**Three-Stage Transformation Roadmap**

Figure IV.5 presents the three-stage transformation roadmap. Stage 1 (2026–2028) is the Lean Internal Operating Model, completing the formation reduction from 527 to 375. Stage 2 (2028–2030) is the Cluster Model, restructuring the field into SPG-YKN, ATT-NIC, and LLW Terminal clusters with cross-functional cluster accountability. Stage 3 (post-2030) opens the strategic alternatives Form 3 Asset-Light Hybrid, Form 4 Dedicated Low-Cost Company, or Form 5 KSO/KSOT to be selected based on the Stage-1 and Stage-2 outcomes and the prevailing market and regulatory conditions.

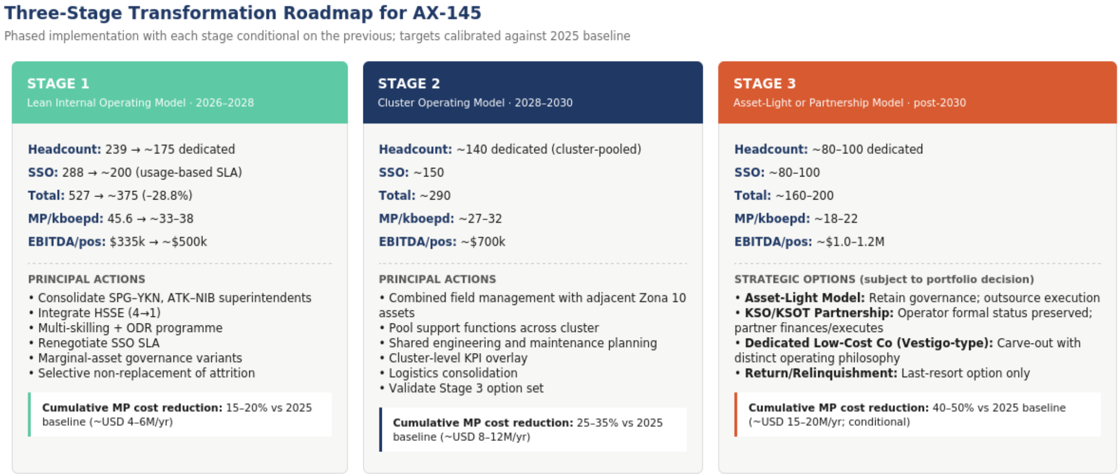


**Figure 2.** *Three-Stage Transformation Roadmap for AX-145. Stage 1 (2026–2028) is the Lean Internal Operating Model corresponding to Form 1; Stage 2 (2028–2030) is the Cluster Model corresponding to Form 2; Stage 3 (post-2030) opens the strategic alternatives Form 3 Asset-Light Hybrid, Form 4 Dedicated Low-Cost Company, or Form 5 KSO/KSOT.*

Three sequencing principles govern the roadmap. First, internal-first sequencing. Per all three interviews, internal streamlining should be exhausted before more radical operating-model alternatives are considered. Stage 1 and Stage 2 are therefore completed before Stage 3 is opened. Second, evidence-led sequencing. Stage 3 is a decision rather than a default. The decision is informed by the Stage-1 and Stage-2 outcomes, by the MPI trajectory, by the cost-trajectory data, by the market response to the field's improved economics, and by the regulatory posture on partnership and KSO/KSOT arrangements. If Stage 1 and Stage 2 are sufficient to deliver positive NPAT on a sustained basis, Stage 3 may be deferred or omitted. Third, governance-preserving sequencing. Across all stages, the operator-of-record status with SKK Migas is preserved; the safety-critical envelope is preserved; and the field-level governance accountability remains with the Field Manager and through the existing Zone 10 / Region 3 reporting line.

### Impact Assessment

The impact assessment evaluates the projected outcomes of the proposed organizational transformation across the three implementation stages. The assessment focuses on changes in total manpower, manpower cost savings, workforce productivity as measured by the Manpower Productivity Index (MPI), and the projected impact on financial performance. As summarized in Table 5, the results indicate that progressive organizational redesign and manpower optimization are expected to generate measurable improvements in operational efficiency and economic performance throughout the transformation roadmap.

**Table 5**

*Staged Impact Assessment for the AX-145 Transformation*

| Dimension | Current | Stage 1 (2026–2028) | Stage 2 (2028–2030) | Stage 3 (post-2030) |
|---|---|---|---|---|
| Manpower – dedicated (AX-145 field) | 231 | 169 | 135 | 97 |
| Manpower – SSO (Zona & Regional) | 166 | 115 | 100 | 80 |
| Total manpower | 397 | 284 (-28.5%) | 235 (-40.8%) | 177 (-55.4%) |
| Manpower cost saving (USD M /year) | — | 9.31 | 13.35 | 18.13 |
| MPI (composite) | 0.62 | 0.86 | 1.04 | 1.38 |
| NPAT impact (USD M / yr) | –16.41 | -7.1 | -3.06 | +1.72 |

The projected results show a continuous improvement across all performance indicators as the transformation progresses. Total manpower is expected to decrease from 397 to 284 in Stage 1, 235 in Stage 2, and 177 in Stage 3, accompanied by increasing annual manpower cost savings from USD 9.31 million to USD 18.13 million. The composite MPI is projected to improve from 0.62 under the current condition to 0.86, 1.04, and 1.38, while the projected NPAT gradually improves from –USD 16.41 million to a positive USD 1.72 million in Stage 3. These findings indicate that the phased organizational redesign has the potential to substantially improve manpower productivity, reduce operating costs, and strengthen the financial sustainability of the AX-145 marginal field.

**Risk Assessment and Change Management**

The proposed organizational transformation was accompanied by a risk assessment to identify potential implementation challenges and appropriate mitigation strategies. The assessment evaluates operational, workforce, and organizational risks that may arise during the implementation of the three-stage transformation, together with the responsible stakeholders and expected residual risk after mitigation. The results are summarized in Table 6.

**Table 6**

*Risk Register and Mitigation Plan for the AX-145 Transformation*

| Risk | Likelihood × Impact (no mitigation) | Mitigation | Owner | After Mitigation |
|---|---|---|---|---|
| Safety regression through reduced supervisory coverage | Low × Very High | PTW preserved; separation of duty preserved; HSSE consolidation does not reduce HSSE leads; ODR competency framework explicit; pilot before full rollout | HSSE Supt; Field Manager | Low × High |
| Industrial-relations friction from formation reduction | Med × High | Workforce reallocation as primary mechanism; contract non-renewal at natural term; change-management charter; communications plan; union engagement | SVP HC; Field Manager | Low × Med |
| Recurrence of formation growth post-redesign | High × Med | Zero-formation-growth KPI; usage-based SSO SLA; mindset change embedded in change-management charter (per Sr Manager Human Capital) | Field Manager; Sr Manager Production & Projects | Med × Low |
| Service-level degradation in response time | Med × Med | Tiered SLA explicit; on-call mobilization commitments; service-level expectations recalibrated and signed off by Sr Manager Production & Projects | Field Manager | Low × Low |
| Stage-3 strategic option failure (no partner / no buyer) | Med × Med | Stage 1 and Stage 2 deliver sufficient improvement to defer Stage 3 if necessary; Stage 3 is a decision, not a default | VP Strategy & Portfolio Mgmt. | Low × Low |
| SSO reallocation friction across portfolio | High × Med | Cross-asset usage-based SLA implemented at portfolio level; receiving SSO functions right-sized in parallel | VP Operations Reg. C; VP HC | Med × Low |

The risk assessment indicates that the proposed organizational transformation can be implemented with manageable levels of risk when supported by appropriate mitigation strategies. Safety-related risks are reduced by preserving Permit-to-Work (PTW) procedures, maintaining competency-based Operator Driven Reliability (ODR) implementation, and conducting phased deployment before full-scale implementation. Workforce-related risks, including industrial relations issues arising from organizational restructuring, are addressed primarily through workforce reallocation, natural contract completion, and structured communication with employees and relevant stakeholders. In addition, portfolio-level risks associated with Shared Service Organization (SSO) reallocation and service-level performance are mitigated through usage-based service agreements and parallel right-sizing of support functions.

The findings also highlight that successful implementation depends not only on structural redesign but also on effective change management. Continuous monitoring of manpower formation, implementation progress, and the Manpower Productivity Index (MPI) is required to prevent the recurrence of organizational inefficiencies following the transformation. Leadership commitment, stakeholder engagement, and competency development therefore become essential supporting factors to ensure that the proposed organizational redesign delivers sustainable improvements in operational efficiency, workforce productivity, and financial performance throughout the three-stage transformation.

## Discussion

### *Organizational Redesign in the Context of Marginal Field Management*

The findings indicate that organizational effectiveness in marginal oil and gas fields depends not only on cost reduction but also on the alignment between organizational design and the economic characteristics of the asset. According to the Galbraith Star Model, organizational performance is achieved when strategy, structure, processes, rewards, and people are mutually aligned. As production declines and operational complexity changes during the late-life stage of an oil field, organizational structures that were originally designed for high-production assets tend to become inefficient because they retain excessive managerial layers and functional duplication. Consequently, organizational redesign becomes a strategic adaptation rather than merely an administrative restructuring process.

This interpretation is consistent with Galbraith (2014), who emphasized that organizational structure should evolve in response to changes in business strategy and environmental conditions (Gutterman, 2023). Similarly, Burton et al. (2015) argued that organizations operating in dynamic environments require continuous structural adjustment to maintain organizational fit (Joseph & Sengul, 2025). Unlike previous studies that discuss organizational redesign from a general management perspective, this study extends the application of these concepts to marginal upstream oil and gas operations, where economic sustainability is strongly influenced by the interaction between organizational efficiency and asset productivity.

### *Workforce Optimization through Strategic Human Resource Management*

The proposed manpower strategy reflects the principles of strategic human resource management, in which workforce planning is driven by organizational objectives rather than by historical staffing patterns. In mature assets, maintaining workforce capability while improving labor productivity requires a systematic evaluation of role criticality, competency requirements, and workload distribution. Therefore, workforce optimization should be understood as improving organizational capability rather than simply reducing the number of employees.

This perspective aligns with Becker and Huselid (2006), who argued that human capital contributes to organizational performance when employees are deployed according to strategic priorities and value-creating activities (Nastase et al., 2025). Likewise, Armstrong and Taylor (2023) highlighted that competency-based workforce planning enhances organizational flexibility and resource utilization. The incorporation of multi-skilling within defined competency boundaries also reflects current developments in upstream oil and gas operations, where broader operational capabilities improve responsiveness without compromising safety or regulatory compliance.

***Manpower Productivity Index as a Managerial Performance Framework***

One of the principal methodological contributions of this study is the development of the Manpower Productivity Index (MPI) as an integrated performance measurement framework. Existing productivity assessments in the oil and gas industry commonly rely on individual indicators, such as production per employee or labor cost ratios, which provide only a partial representation of workforce performance. By integrating multiple productivity dimensions into a typology-calibrated composite indicator, the proposed MPI offers a more comprehensive assessment of manpower efficiency across different categories of marginal assets.

This approach is consistent with Hannula (2002), who emphasized that productivity evaluation should consider multiple complementary indicators rather than relying on a single productivity rasio (Li et al., 2023). Furthermore, the aggregation of normalized indicators follows the composite indicator framework recommended by the OECD/JRC, allowing managerial decisions to be supported by a balanced assessment of operational productivity, financial performance, and workforce utilization. Consequently, the MPI has the potential to become a practical decision-support tool for workforce benchmarking and organizational evaluation in upstream oil and gas companies.

***Practical Implications for Marginal Oil and Gas Operations***

The implications of this study extend beyond the organizational redesign of AX-145. As many upstream operators increasingly manage mature and economically constrained assets, organizational adaptation becomes an essential component of long-term asset sustainability. Rather than focusing exclusively on production enhancement or capital investment, companies should integrate organizational design, workforce planning, and productivity management into their asset management strategies. Such integration enables operators to improve cost efficiency while maintaining operational reliability, safety performance, and regulatory compliance.

The proposed framework may also provide a useful reference for other marginal-field operators in Indonesia facing similar operational challenges. Although organizational configurations will vary depending on asset characteristics and corporate governance structures, the principles of organizational alignment, competency-based manpower planning, and productivity measurement are broadly applicable. Future implementation across multiple fields would enable further validation of the framework and facilitate the development of standardized manpower productivity benchmarks for Indonesia's upstream oil and gas industry.

## CONCLUSION

This study developed an organizational model and manpower strategy for AX-145, a marginal upstream oil and gas field operated by PT CoreAxis Energy, applying a qualitative case study approach grounded in the Galbraith Star Model. For Research Question 1 (organizational design), the most appropriate model is a three-stage lean-cluster configuration: Stage 1 (2026–2028) reduces total field-allocated formations from 527 to 375 (–28.8 percent) through five structural moves (supervisory consolidation, HSSE delayering, span-of-control broadening, ODR multi-skilling transition, and SSO administrative migration) evolving into a full cluster model at Stage 2 (2028–2030) and opening strategic alternatives (Asset-Light Hybrid, Dedicated Low-Cost Company, or KSO/KSOT) at Stage 3. For Research Question 2 (manpower strategy), the optimal approach comprises five instruments: role-criticality assessment, multi-skilled operator development through the ODR competency framework, total-workforce visibility across all contract types, workforce reallocation as the primary right-sizing mechanism, and change management as a precondition for sustainable implementation. The Stage-1 headcount target is 175 dedicated formations and 200 SSO-allocated formations. For Research Question 3 (operational efficiency and cost-effectiveness), the projected outcomes include manpower-cost savings of USD 4–6 million per year at Stage 1 and an improvement of the composite Manpower Productivity Index from 0.71 to 1.00, scaling to approximately USD 15–20 million per year and MPI ≈ 1.50 at Stage 3. The three research questions are mutually dependent under the Star Model framework: structural redesign, manpower strategy, and efficiency outcomes cannot be implemented sustainably in isolation.

The study makes two primary contributions. Methodologically, it introduces the Manpower Productivity Index (MPI) as a typology-calibrated composite productivity indicator for marginal-field workforce benchmarking, built on partial productivity-ratio logic and composite-indicator methodology. Managerially, it provides a replicable three-stage transformation roadmap applicable to analogous marginal assets across Indonesia's upstream oil and gas portfolio. The principal limitation is the single-case, qualitative design focused on one field within one company, which constrains the generalizability of specific headcount targets and cost estimates to other operational contexts. Future research should validate the MPI framework across a broader portfolio of marginal fields with different typology classifications, test Stage-1 and Stage-2 outcomes following implementation, and examine the regulatory and industrial-relations dimensions of workforce reallocation within Indonesia's current employment law framework.

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## AUTHOR CONTRIBUTION STATEMENT

SM Deasyana Prihadikta P contributed to the conceptualization, research design, methodology, data collection, analysis, interpretation of findings, and preparation of the original manuscript. Achmad Fajar Hendarma contributed to supervision, validation, theoretical refinement, critical analysis, and review and editing of the manuscript. Both authors collaboratively contributed to the development of the research framework, interpretation of the findings, manuscript revision, and finalization of the article.

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