

# Cross-Industry Project Management: Translating FMCG Operational Efficiency Into Oil And Gas Capital Projects

Author

## Abstract

Large-scale oil and gas capital projects face persistent underperformance, characterized by cost overruns, schedule delays, and rigid execution structures that limit adaptability once projects enter delivery. Despite decades of refinement in front-end loading, governance assurance, and risk transfer mechanisms, these approaches often reinforce conservatism, fragmentation, and late corrective action rather than execution flow and learning. In fast-moving consumer goods (FMCG) industries, operational models are designed to deliver speed, flow efficiency, demand synchronization, and continuous improvement, even under conditions of high uncertainty and margin pressure. This paper investigates how selected FMCG operational principles can be systematically adapted, rather than directly transplanted into oil and gas capital project environments to improve capital efficiency, schedule reliability, and execution resilience. Drawing on recent literature across project management, lean systems, supply chain strategy, and organizational theory, the study develops a comparative analysis of structural, risk, and governance differences between FMCG operations and oil and gas capital projects. It identifies transferable mechanisms related to lean planning, adaptive procurement sequencing, data-driven forecasting, and flow-based performance measurement, while explicitly accounting for the institutional, regulatory, and contractual constraints unique to hydrocarbons. Building on this foundation, the paper proposes a hybrid project management framework that integrates lean stage-gate governance, adaptive procurement cycles, digital performance dashboards, and incentive realignment to balance assurance with adaptability. Conceptual case-based applications describes how these mechanisms could be applied across upstream, midstream, and downstream contexts, and scenario-based reasoning is used to articulate potential impacts on cost, schedule, and capital allocation without relying on illustrative or speculative claims. The paper contributes to both theory and practice by reframing cross-industry knowledge transfer as a selective, governance-aware process rather than a methodological import exercise. It advances the argument that improving oil and gas project performance requires both additional control layers and a reorientation toward flow visibility, earlier decision feedback, and disciplined flexibility which are principles long embedded in high-performing FMCG systems. The findings offer actionable insights for project sponsors, executives, and policymakers seeking to enhance capital productivity and long-term competitiveness in an increasingly constrained and uncertain energy landscape.

**Keywords And Phrases:** Oil & Gas Capital Projects, FMCG Operations, Lean Project Management, Adaptive Procurement, Flow-based Performance Metrics, Cross-Industry Knowledge Transfer, Capital Efficiency, Project Governance

## I. Introduction

Oil and gas capital projects are symbolic representatives of extreme capital intensity and risk exposure, which are characterized by multiyear timelines, complex engineering interfaces, extensive regulatory compliance, and large financial outlays that often rival national infrastructure budgets. The scale of these endeavors makes them uniquely vulnerable to execution shortcomings: global industry analyses have repeatedly shown that a significant majority of large hydrocarbon megaprojects fail to meet original cost and schedule targets. Independent Project Analysis (IPA) Group (2023) reports that more than 60 percent of oil and gas megaprojects exceed their initial cost and schedule estimates by over 30 percent, with safety performance often deteriorating as delivery teams attempt to recover lost time under mounting schedule pressure (Aigboduwa, 2025). Earlier large-sample evidence supports the persistence of this pattern. Glukhikh et al. (2020), drawing on an industry study of 318 oil and gas capital projects valued above US \$1 billion, found that approximately 78 percent were classified as unsuccessful, exhibiting average cost overruns of about 33 percent and schedule delays approaching 30 percent relative to financial investment decision baselines. More recent analysis reinforces the scale of the challenge. A 2025 McKinsey review of over 300 megaprojects exceeding US \$1 billion in value reported average cost overruns of nearly 80 percent and schedule slippages of roughly 50 percent, underscoring the structural exposure of large energy projects to execution risk despite advances in project controls and digital planning tools (McKinsey, 2025).

Broader megaproject and construction management literature indicate that these outcomes are not isolated to oil and gas but reflect systemic weaknesses in managing scale, complexity, and uncertainty. Abdelalim

et al. (2025) note that cost overruns are increasingly prevalent in construction projects, with SmartPM reporting that 98% of projects in 2022 exceeded budgets or faced delays and Procore Technologies finding in 2023 that 75% of projects surpassed planned budgets, averaging a 15% increase due to mid-project changes—highlighting how the growing scope and complexity of the industry make effective cost management increasingly difficult (Abdelalim et al., 2025). These persistent findings suggest that persistent delivery shortfalls represent more than operational and financial inefficiencies, but also strategic risks for energy companies, capital providers, and host economies that depend on the timely and predictable delivery of large-scale infrastructure.

In contrast to this, the Fast-Moving Consumer Goods (FMCG) sector has become a standard for operational velocity, supply chain responsiveness, and lean execution. FMCG firms operate in markets defined by short product life cycles, high volumes, and intense competition, requiring advanced coordination of production, inventory, distribution, and retail fulfillment so that goods reach consumers quickly and reliably. Guo and Liu (2023) emphasize that systematic supply chain integration and lean principles, such as minimizing lead times, aligning production with near-term demand signals, and reducing waste across value-adding activities are critical in fast-moving consumer goods (FMCG) operations, as they enhance speed-to-market, strengthen competitive advantage, and help mitigate the bullwhip effect. While the structural design of FMCG differs markedly from energy megaprojects, the sector's ability to sustain high throughput with controlled variability raises important questions about the transferability of operational models across industries with disparate asset lives and risk profiles.

The historical performance challenges in oil and gas project delivery, including cost overruns, schedule delays, and scope creep (Al-Bdairi et al., 2025) have been widely documented and remain stubborn despite decades of investment in planning methodologies and governance. These challenges are not merely technical; they often reflect organizational inertia, fragmented decision-making, and suboptimal integration across engineering, procurement, and construction functions.

To resolve this, lean and agile approaches which were originally developed for manufacturing and consumer goods supply chains, have gained attention as potential catalysts for improving flow efficiency, reducing non-value-added activities, and enhancing visibility across the project life cycle. This paper is grounded in the central research question. Addressing how FMCG operational models, particularly those emphasizing lean supply chain management and speed-to-market execution, can be adapted and integrated into the governance of long-cycle capital infrastructure projects in the oil and gas industry, while respecting the inherent engineering rigor and risk sensitivities of the latter?

To address this question, the paper is structured as follows. A section develops a detailed comparative analysis of industry dynamics, contrasting the time-to-market pressures and supply chain frameworks of FMCG with the long-cycle, risk-intensive nature of oil and gas capital projects. Another section explores key operational efficiency principles in FMCG, including lean execution and supply chain integration. The project management challenges endemic to oil and gas capital delivery will also be examined. The paper proposes a hybrid management model that translates selected FMCG principles into the oil and gas context. The implications for project performance and cost control will be discussed, and a conclusion with insights on cross-industry knowledge transfer and future research directions.

## **II. Literature Review**

### **Project Performance in Oil and Gas**

Jia et al. (2023) explain that megaprojects, characterized by numerous stakeholders, political sensitivity, long construction periods, technical difficulty, complex structures, and high stability requirements, present management challenges beyond the capacity of project managers' knowledge and skills, making growing complexity a critical factor in project success and underscoring the need for explicit evaluation to guide resource allocation and risk-reduction strategies. The persistent underperformance of oil and gas capital projects has been widely documented, with researchers identifying structural and organizational causes that extend beyond typical project risk factors. Roshdi et al. (2023) study on cost overruns in EPC oil and gas megaprojects (e.g., in Malaysia) reinforces the recurring nature of cost escalation and resource scarcity problems in large oil and gas projects. This growing body of studies views oil and gas megaprojects through complexity theory, which recognizes that tightly interlinked engineering systems, multi-tiered supply chains, and lengthy decision cycles create dynamic interdependencies that traditional linear project management models struggle to address. Ackah and Boadu (2025) investigate the impact of strategic procurement practices on mitigating cost and schedule risks in petroleum projects, analyzing 120 cases with descriptive statistics, correlation, and regression modeling, and find that supplier relationship management and early supplier involvement significantly reduce cost overruns, while contract alignment shows a marginal but negative effect on cost growth. These empirical research in infrastructure contexts indicates that the complexity of megaprojects often amplifies cost and schedule risks beyond the reach of conventional planning, with studies linking high complexity to systemic delays and overruns and showing that

standard governance arrangements are frequently inadequate for managing emergent challenges arising from such interdependencies.

Xegwana (2024) observes that project failures in cost and budget management strain financial resources, cause delays, undermine stakeholder confidence, disrupt schedules, and damage organizational reputations, thereby underscoring the importance of addressing underlying causes to improve project success and sustainability. Within oil and gas, capital project governance failures are frequently cited as structural barriers to performance improvement (Al-Bdairi et al., 2025; Abu Aisheh, 2021). These project delivery frameworks show that governance systems in major energy projects tend to emphasize formal controls and risk avoidance, which can slow critical decisions and inhibit cross-functional integration, thereby exacerbating cost and schedule variances. Strategic misalignment between owners and contractors, as well as fragmented accountability, further weakens early risk identification and adaptive response capacity. Research on procurement practices in petroleum projects highlights these dynamics, showing how traditional procurement approaches often prioritize short-term savings over integrated value creation, resulting in poor contractor performance and misaligned incentives that propagate delays and cost escalation (Ackah & Boadu, 2025).

The limitations of Front-End Engineering Design (FEED) as a performance lever have also been scrutinized. Cobéal's 2024 presentation on "FEED" underscores the critical role of Front-End Engineering and Design in minimizing project risks and ensuring successful execution by showing how thorough scope definition, budget planning, and risk assessment during FEED can reduce lifecycle costs, accelerate project completion, and strengthen safety compliance (Hollsten et al., 2024). While comfortable FEED is designed as a means to reduce uncertainty by improving scope definition and risk assessment, this studies indicate that FEED processes in oil and gas projects can institutionalize optimistic assumptions and incomplete scopes that are difficult to revise once execution starts. Project management research, including studies on optimism bias, shows that early estimates such as those developed during FEED are often shaped by overly optimistic assumptions that underestimate time and cost, leading planners and decision-makers to set unrealistic baselines that become difficult to correct as projects progress (Chadee et al., 2021). These adaptive front-end strategies that incorporate continuous learning and risk refinement throughout the project life cycle are essential, since conventional planning alone cannot manage the complexity of megaprojects without mechanisms that enable dynamic adjustment during delivery.

Also, issues related to risk allocation and contractor misalignment have been linked to adversarial project environments in oil and gas. Risk analysis in construction projects serves to monitor economic and financial outcomes, verify quality variations, and track time delays, providing criteria for selecting effective risk management approaches, while studies show that many projects fail to meet budgeted targets, these make time, cost, and quality the key measures of project success (Ibrahim et al., 2025). When contractual frameworks transfer excessive risk to EPC contractors without corresponding performance incentives, collaboration suffers and defensive behavior emerges, reducing the effectiveness of joint problem-solving and increasing transactional costs. Risk mitigation illustrates a clear divide, with megaprojects relying on lean-driven adaptive planning and small projects emphasizing incremental process improvements, highlighting the need for tailored lean enablers such as policy alignment and digital integration to address megaprojects' scale-driven challenges as a gap this study aims to bridge (Ibrahim et al., 2025). Integrated risk-sharing and alignment mechanisms are essential to promote cooperative execution and counter the adversarial tendencies common in large capital projects under traditional contracting, with evidence from construction and infrastructure research remaining highly relevant to oil and gas megaprojects due to similar governance and contractual dynamics.

### **Lean and Agile Principles in FMCG**

Research on lean manufacturing offers core insights into the principles of operational efficiency, emphasizing responsiveness and waste reduction as strategic imperatives across sectors. The Toyota Production System (TPS) is more than an organizational method—it represents a philosophy of work grounded in discipline, stability, and respect for people, with its power stemming from the idea that sustainable performance depends on balance: balancing quality with productivity, innovation with stability, and technical progress with human development (Lean Six Sigma Belgium, 2025). Before the Toyota Production System (TPS), the company struggled with imbalanced inventory, surplus equipment, and excess workers, prompting a shift toward a production model that minimized stock by manufacturing only the necessary products, at the necessary time, and in the necessary quantities to shorten the cycle from material entry to vehicle completion (Kanban Zone, 2025). Originating in the Toyota Production System (TPS), lean emphasizes value-stream perspective, continuous improvement, and waste elimination as mechanisms to enhance flow and reduce non-value-added activities—a philosophy that has been extended into supply chain and service contexts. The work of Womack and Jones highlights lean as a systemic approach to doing "more with less" while meeting customer expectations, which has informed the evolution of lean supply chain management in multiple industries (Womack & Jones, 2003).

Specifically, Just-In-Time (JIT) supply chain optimization has been extensively studied as both a production and logistics strategy that aligns material flows with actual demand, minimizing inventory while

exposing process variability for early correction. A JIT supply chain minimizes inventory by relying on timely supplier deliveries, enabling firms to reduce costs, improve quality, shorten lead times, enhance responsiveness, boost customer satisfaction, and strengthen competitive advantage (Yang et al., 2021). JIT enhances operations by streamlining processes, boosting production efficiency, and improving product quality through defect reduction, while also driving continuous innovation in product design and manufacturing methods (Susanti et al., 2025). In lean supply chains, JIT is coupled with information integration across suppliers and distributors, enabling firms to respond to demand fluctuations with minimal lead times and higher service levels. Supply chain research like Ike et al. (2022) affirms that lean practices like value stream mapping and JIT are central to responsiveness and waste reduction across complex global networks, even as technologies like real-time data analytics enhance coordination.

In FMCG environments, demand forecasting and inventory control are recognized as critical capabilities that link market signals to operational decisions. Accurate demand forecasting is a cornerstone of supply chain management, enabling firms to optimize inventory, reduce costs, and allocate resources strategically while mitigating the risks of stochastic demand, market uncertainty, and long lead times to improve customer service and overall performance (Harahap et al., 2025). Advanced forecasting techniques, often supported by collaborative planning systems, allow firms to anticipate short-cycle demand shifts and adjust production and logistics accordingly (Dhongde & Nanda, 2024). This integration reduces the need for large safety stocks and enables more synchronized supply chain flows. High-performing FMCG operations stand out through accurate forecasting, effective information sharing, and cross-functional decision-making, illustrating how lean thinking extends beyond shop-floor efficiency to strategic coordination.

Continuous improvement (Kaizen) underpins both lean and agile practices by embedding incremental enhancements into everyday work rather than relying on occasional large-scale redesigns.



*Figure 1: The PDCA Cycle*  
*Source: Oladipupo et al. (2022)*

Kaizen has been shown to ensure employee participation in problem-solving, reinforce a culture of operational discipline, and gradually reduce process variability across production and supply chain activities. Kaizen is a continuous improvement philosophy that empowers all employees to identify and eliminate waste, optimize processes, and enhance productivity through small, incremental changes, guided by principles of customer focus, process flow, firsthand observation, people empowerment, transparency, and the iterative PDCA cycle (Oladipupo et al., 2022). Kaizen practices are well-suited for higher education institutions because they ensure a culture of continuous improvement, empowering staff and faculty to enhance processes, eliminate inefficiencies, and ultimately strengthen organizational performance and the future of the education system (Hashim et al., 2022). Small, frequent Kaizen-style improvements accumulate into significant long-term gains in cost efficiency, quality, and responsiveness, with proven impact not only in manufacturing but also across logistics and service operations.

### **Cross-Industry Knowledge Transfer Theory**

Understanding how practices from one industry can inform another finds conceptual support in dynamic capabilities theory, which posits that competitive advantage arises from an organization's capacity to integrate, build, and reconfigure internal and external competences in response to changing environments. Shiferaw and Amentie (2024) highlight the dynamic capabilities view as a crucial framework for building transformative institutions, offering the first systematic analysis across diverse business practices and national contexts to show how strategic management perspectives interconnect. Dynamic capabilities emphasize sensing opportunities, seizing them through flexible operational routines, and reconfiguring systems to incorporate new knowledge. This theoretical lens suggests that the value of FMCG practices for oil and gas lies not in direct transplantation but in an organization's ability to adapt external knowledge to its own structural and institutional context (Aka-Wolugbom & Onuoha, 2021).

Research in organizational learning models further elaborates how firms internalize new practices. Organizational learning, as described by Akwaowo and Kalio (2021), is a multi-level process, spanning individuals, groups, and organizations that unfolds through intuiting, interpreting, integrating, and institutionalizing, and may take the form of adaptive single-loop learning or generative double-loop learning, while also involving organizational unlearning and maintaining a dynamic memory. These models distinguish between superficial adoption—where tools are implemented without altering underlying assumptions—and deep learning, where new routines lead to changes in governance, coordination, and problem-solving processes. Organizational change can be driven by internal and external forces such as technological advancements, competitive pressures, or shifts in market demand, and to manage it effectively, organizations must proactively and strategically adapt to evolving circumstances (Christou & Piller, 2024). This effective knowledge transfer, especially across industry boundaries, is often contingent on mechanisms that support reflection, shared interpretation, and iterative adjustment, rather than simply copying external practices. At the same time, scholars note the role of institutional constraints in moderating cross-industry translation. Industry-specific regulatory standards, professional norms, and risk cultures can constrain which practices can be adapted and how they are interpreted (Moses, 2024; Sustainability Directory, 2025). In safety-critical, capital-intensive industries such as oil and gas, strict institutional requirements for engineering rigor and risk governance often limit the straightforward adoption of agile or lean practices from consumer goods, with the literature portraying cross-industry knowledge transfer as a selective, interpretive process that must be carefully aligned to the specific demands of the receiving sector.

## **III. Comparative Industry Analysis**

### **Structural Differences**

At a structural level, the most visible distinction between FMCG operations and oil and gas capital projects lies in the contrast between speed-to-market imperatives and long-cycle infrastructure development. Fast-moving consumer goods (FMCG) are nondurable, low-cost products that sell quickly, and the sector that is home to many of the world's most recognizable brands, has long delivered returns on invested capital exceeding 20%, while remaining vast, highly competitive, and driven by large volumes and intensive marketing (Kenton, 2025). FMCG products are characterized by short shelf lives and are highly influenced by rapid shifts in consumer preferences and market dynamics, requiring constant adaptability from businesses in the sector (Olutimehin et al., 2024). FMCG organizations operate in environments where competitive advantage is tightly coupled with rapid product turnover, compressed planning horizons, and the ability to convert demand signals into production and distribution decisions within weeks rather than years. Fast-Moving Consumer Goods operations consistently shows that superior performance is driven less by fixed asset intensity and more by cycle-time compression, responsiveness, and end-to-end flow efficiency. Empirical evidence from Bangladesh's FMCG sector indicates that improvements in supply chain responsiveness, particularly reduced lead times and closer supplier coordination—are significantly associated with enhanced operational performance (Emon, 2025). Complementary findings from South Africa demonstrate that supply chain flexibility and strategic integration correlate strongly with both financial and operational outcomes in FMCG networks (Oyeyemi et al., 2024). Industry analyses further emphasize that high-performing FMCG firms prioritize inventory optimization and lean operating principles to manage throughput volatility and frequent demand shifts, reinforcing agility and flow reliability as foundational sources of competitive advantage (Argon & Co, 2024). These studies position speed not as a tactical capability but as a structural attribute of FMCG operating models, embedded in organizational design, planning logic, and incentive systems that continuously reinforce responsiveness and execution flow.

Oil and gas projects demand massive upfront capital and extended development timelines, creating a high-risk financial profile that can discourage investment, particularly amid uncertain demand and shifting regulatory environments (Cognitive Market Research, 2025). These oil and gas capital projects, by contrast, are governed by extended development cycles that routinely span a decade from concept selection to first production. Studies of upstream In the oil and gas sector, once projects move beyond the financial investment decision, the

scope for structural change quickly contracts due to engineering interdependencies, regulatory obligations, and contractual commitments, while capital projects themselves are marked by massive investment horizons, long lifecycles, and exposure to market volatility across multi-stage value chains that demand coordinated planning among technical, financial, and regulatory stakeholders (Onyechi, 2024). This temporal rigidity explains why early assumptions exert disproportionate influence on eventual outcomes and why late-stage corrections often generate cost escalation rather than recovery.

These differences are further strengthened by contrasting capital structures. FMCG firms are relatively asset-light, with value creation driven by the efficient orchestration of manufacturing capacity, logistics networks, and brand portfolios that can be reconfigured with limited sunk-cost exposure. Schroedel (2024) offers analysis of FMCG business models, identifying recurring patterns and emphasizing that the sector's structure is built around rapid product turnover, short usage cycles, and competitive agility rather than reliance on heavy capital investment. These strategic operations demonstrate that such capital flexibility enables rapid redeployment of resources in response to shifting demand. Oil and gas projects, in contrast, are fundamentally asset-heavy, with capital committed upfront to location-specific infrastructure that is economically viable only over long operating horizons. Rather than canceling or cushioning at-risk capital projects, they should be rigorously challenged—especially given that large-scale initiatives in oil and gas average cost overruns of nearly 80% and schedule delays of about 50% (McKinsey, 2025). Evidence from McKinsey's Overruns Predictive Capability Database further shows that oil and gas projects consistently rank among the sectors most prone to late delivery and escalating costs (McKinsey, 2022). Once deployed, this capital constrains managerial optionality and magnifies the financial impact of deviation from initial assumptions.

A further structural divergence lies in the dominant sources of uncertainty. FMCG firms primarily face demand variability driven by consumer behavior, seasonality, and competitive dynamics, yet this volatility remains partly predictable and manageable through forecasting, inventory strategies, and rapid replenishment, which can enhance operational efficiency but also supports resilience and risk management during demand fluctuations (Dhongde & Nanda, 2024). Oil and gas projects are vulnerable to commodity price volatility that lies outside project execution, and when combined with fixed capital commitments this volatility magnifies downside risk, with research showing it can fundamentally reshape commodity price, project value after capital has been irreversibly committed and thereby intensify pressure on delivery performance (Chen et al., 2024).

### **Risk Profiles**

The structural contrasts between FMCG and oil and gas translate directly into divergent risk profiles. In FMCG environments, market risk dominates operational decision-making (Fareniuk, 2022; Oyeyemi et al., 2024). FMCG firms face risks such as demand misalignment, rapid product obsolescence, and competitive displacement that quickly surface in sales and inventory signals, yet these risks are generally reversible, enabling firms to exit product lines or reallocate capacity with minimal long-term asset impact, which is why FMCG risk management shows responsiveness and continuous learning rather than exhaustive upfront risk elimination.

Oil and gas capital projects, by contrast, are shaped by strict regulatory and engineering risks (Kassem, 2022), that can be path-dependent, and often irreversible. Regulatory compliance, environmental permitting, and safety assurance impose hard constraints that shape project architecture and execution sequencing. Attempts to accelerate delivery or compress costs under these constraints frequently intensify technical risk rather than mitigate it. Engineering risks associated with subsurface uncertainty, novel technologies, and interface complexity further compound exposure, particularly once construction is underway (McKinsey, 2025).

Differences in supply-chain fragility further accentuate risk asymmetry. FMCG supply chains are designed for high velocity and modularity, with multiple sourcing options and relatively low switching costs. In supply-chain resilience studies highlight that while FMCG networks are sensitive to disruption, their redundancy and standardization enable rapid reconfiguration (Hasan et al., 2026; Bandinelli & Fani, 2025). Oil and gas project supply chains, by contrast, rely heavily on custom-made equipment, long-lead components, and highly specialized contractors. Disruptions in a single critical package can cascade across the project, halting progress and generating disproportionate schedule and cost impacts.

### **Governance and Decision-Making Models**

Decision-making and governance structures in FMCG and oil and gas sectors mirror their distinct risk profiles and structural characteristics. FMCG operations are typically coordinated through centralized operational command systems that integrate demand planning, production scheduling, and distribution decisions in near real time. Strategic operations management (SOM) is a cornerstone of FMCG success, encompassing the planning, organization, and control of production and distribution processes to drive maximum efficiency and effectiveness (Olutimehin et al., 2024). When centralized control is paired with high-quality data and clearly defined decision rights, issues can be escalated and resolved quickly without unnecessary bureaucratic friction, while accountability concentrated at the operational level reinforces speed and execution discipline.

Oil and gas capital projects operate within multi-stakeholder governance environments involving asset owners, joint-venture partners, regulators, EPC contractors, and local stakeholders. In stakeholder relationship management (SRM) proactive engagement and transparent communication, the pursuit of mutual value creation through win-win solutions, and the establishment of robust grievance mechanisms together form the foundation of effective stakeholder management, enabling companies to build trust, ensure long-term partnerships, and prevent conflicts from escalating into legal or reputational crises (Emeka-Okoli et al., 2024). Governance decision authority in these contexts is dispersed across contractual and institutional boundaries, raising coordination costs and slowing decision-making, while formal approval processes intended to safeguard capital and ensure regulatory compliance often delay responses to emerging risks even when early warning signals are evident at the project level.

Project management study further notes that oil and gas governance frameworks tend to emphasize assurance and compliance over learning and adaptation. Project management research in the oil and gas sector indicates that governance frameworks often prioritize assurance and regulatory compliance over organizational learning and adaptive decision-making. Reviews of governance and risk management frameworks highlight a strong emphasis on alignment with compliance standards and formal risk monitoring, while empirical studies of structured management frameworks in offshore projects note that these tools are frequently implemented as compliance instruments rather than strategic enablers of adaptive learning and performance improvement (Bakare et al., 2024). While this orientation is understandable in safety-critical environments, it can fragment accountability and inhibit timely intervention when assumptions begin to erode (McKinsey, 2025). In contrast, FMCG governance models privilege information transparency and empowered decision-making, enabling faster corrective action but relying on strong operational discipline to prevent drift. The implication is not that FMCG governance can be transplanted wholesale into oil and gas projects but that selectively adapting principles such as clear decision rights, rapid information flow, and penalty-free escalation may help reconcile engineering rigor and regulatory compliance with governance mechanisms that reduce coordination loss and decision inertia in complex capital project environments.

#### **IV. Transferable Operational Efficiency Models**

##### **Lean Planning and Waste Reduction**

Lean planning in FMCG environments is grounded in the systematic identification and elimination of non-value-adding activities across end-to-end processes. Kanban and VSM are two Lean approaches, and this paper introduced new VSM icons tailored to in-store retail operations, enabling more effective inventory management and fresher product replenishment that reduced food waste and enhanced sustainability performance (Marques et al., 2022). A central tool enabling this discipline is value stream mapping (VSM), which provides visibility into material, information, and decision flows and distinguishes value-creating activities from delays, rework, and handoffs. Recent project-based applications of VSM like (Costa et al., 2024; Martínez-Ceró et al., 2024), demonstrate its relevance beyond manufacturing, with studies showing that applying value stream analysis to engineering-intensive projects can expose hidden queues, redundant reviews, and approval bottlenecks that inflate cost and schedule without improving technical outcomes.

In oil and gas capital projects, a significant proportion of effort is absorbed by non-value-added engineering work, including excessive document iterations, late design changes triggered by poor interface definition, and fragmented discipline coordination. Recent lean engineering research shows that applying lean planning and waste-reduction methods such as value stream mapping correlates with substantial cycle time improvements in complex design processes—for example, a 2025 study noted a roughly 15.6 % reduction in cycle time and nearly 39.1 % reduction in lead time after using lean tools to eliminate waste and improve information flow in product development workflows (Goettems et al., 2025). NWEYE (2024) synthesizes evidence on lean practices across diverse contexts, highlighting benefits from tools such as total productive maintenance, mistake proofing, workplace organization, and continuous quality improvement, while emphasizing that effective implementation enhances maintenance, training, and control mechanisms to reduce production waste, and that lean waste reduction provides a viable framework for improving the Triple Bottom Line by cutting costs and optimizing lead times, with the study ultimately underscoring the role of dynamic capabilities, integrated methodologies, and strategic frameworks in driving operational efficiency and sustainable performance across financial services and other sectors. Unlike traditional work breakdown structures that focus on task decomposition, lean planning emphasizes flow reliability and workload balance, enabling engineering teams to focus effort on activities that directly reduce technical and execution risk rather than administrative overhead (Pereira et al., 2025; Taher & Bashar, 2024) .

##### **Agile Supply Chain Structuring**

FMCG supply chains derive efficiency not from breadth of vendors but from intentional consolidation around strategically aligned suppliers capable of rapid response and consistent quality. Vendor consolidation

reduces coordination complexity and transaction costs while enabling deeper collaboration, shared forecasting, and joint improvement initiatives. Empirical studies like Fabio et al. (2025) and Gupta & Gupta (2025) in the FMCG sector demonstrate that firms with concentrated supplier portfolios achieve superior delivery reliability and lower total landed costs compared to those relying on highly fragmented sourcing models.

Translating this principle to oil and gas projects requires a shift from transactional procurement toward long-term strategic supplier partnerships. Early supplier involvement and framework agreements can significantly reduce schedule risk and procurement-driven rework by aligning design decisions with manufacturing and logistics realities (Othman, Ayman & Elsaedy, 2022; GEP, 2025)

Demand-synchronized procurement, where purchasing decisions are dynamically linked to updated engineering maturity and construction readiness—further mirrors FMCG replenishment logic, replacing rigid purchase milestones with rolling commitment windows that preserve flexibility while protecting cost certainty (Icron, 2026; Icron, 2024). Such approaches have been shown to reduce late material expediting and minimize idle construction labor caused by supply mismatches.

### **Data-Driven Forecasting and Scenario Modeling**

Advanced forecasting and scenario modeling are central to FMCG operational excellence, where predictive analytics are used to anticipate demand fluctuations, supplier constraints, and logistics disruptions (Olutimehin et al., 2024). Similar analytical approaches are increasingly applied in project-based environments to enhance procurement foresight and risk anticipation. Oyeyemi (2023) and RTS Lab (2025) studies demonstrate that predictive procurement analytics, combining historical performance data, supplier capacity indicators, and market signals can materially improve cost predictability and reduce emergency procurement events in large capital projects.

In oil and gas projects, early risk detection models supported by data analytics enable project teams to identify schedule slippage, cost pressure, and supply-chain fragility well before they manifest in earned-value metrics (Tan et al., 2022). Integrating scenario modeling into front-end and execution-phase planning allows decision-makers to test alternative sourcing strategies, sequencing options, and contingency responses under different market and execution conditions (EngiMates, 2023; Azmi, 2024). These capabilities shift project control from reactive variance management toward proactive risk shaping, aligning closely with FMCG practices of continuous demand sensing and rapid adjustment.

### **Performance Metrics Recalibration**

A critical barrier to efficiency transfer lies in how performance is measured. Oil and gas projects traditionally rely on milestone-based tracking systems that emphasize phase gate completion and earned-value compliance. While necessary for governance, such metrics often obscure flow inefficiencies and delay corrective action until deviations are already entrenched (Alshibani et al., 2023). In contrast, FMCG operations prioritize flow-based performance indicators—such as cycle time, throughput stability, and schedule adherence at the process level—which provide earlier signals of systemic stress. Olutimehin et al. (2024) emphasize that best practices such as demand forecasting, lean inventory principles, and just-in-time (JIT) systems are critical for reducing stockouts, minimizing waste, and improving supply chain efficiency, while also highlighting production planning and scheduling as a key dimension of strategic operations management in the FMCG industry.

Recalibrating capital project metrics involves complementing milestone control with flow-oriented indicators that monitor engineering maturity progression, constraint removal rates, and the stability of work-ready backlogs (Dare et al., 2022; Arar et al., 2025). Integrating operational KPIs into engineering environments has been shown to improve coordination across disciplines and reduce late-stage rework by making bottlenecks visible while they are still manageable. An intelligence model that integrates real-time dashboard visualization enhances strategic operational control in manufacturing by using key performance indicators, such as production efficiency, downtime, and quality control to give decision-makers immediate visibility into critical metrics (Omisola et al., 2023). Such metric integration does not replace traditional controls but augments them, enabling oil and gas projects to retain assurance and compliance while adopting FMCG-inspired transparency and responsiveness that support continuous performance improvement.

## **V. Proposed Hybrid Project Management Framework**

### **Structural Components**

This article introduces a hybrid project management framework that combines lean flow discipline, agile responsiveness, and formal governance to apply FMCG efficiency principles within oil and gas capital projects. Rather than replacing established control mechanisms, the framework is designed to overlay adaptive execution logic onto existing governance structures, preserving assurance while improving responsiveness, predictability, and value delivery.

### **Lean stage-gate governance**

Traditional stage-gate systems in capital projects provide essential investment control and risk assurance but are often rigid, with limited feedback between gates once formal approval is granted (Scavetta, 2024; Arbulu et al., 2021). Lean stage-gate governance recalibrates this structure by embedding continuous flow monitoring and decision feedback within each phase, allowing scope, sequencing, and resource allocations to be refined as constraints are resolved. Engineering-intensive industries has shown that hybrid stage-gate models, combining formal gate reviews with lean flow metrics improve schedule reliability and reduce late-stage rework without undermining governance integrity (Taher & Bashar, 2024; Pereira et al., 2025). In oil and gas projects, this approach enables gates to act as approval checkpoints as well as mechanisms for learning and alignment, grounded in real execution data.

### **Adaptive procurement cycles**

Adaptive procurement cycles replace rigid, milestone-driven purchasing with rolling commitment windows aligned to engineering maturity and construction readiness. In agile procurement demonstrates that incremental commitment strategies reduce exposure to demand uncertainty, supplier volatility, and design instability, particularly in complex, long-cycle projects (Othman et al., 2022; Cooper, 2024). In FMCG and project-based supply chains show that synchronized procurement—where order release is dynamically linked to validated demand and execution signals—reduces expediting costs and idle labor while preserving cost discipline (Gupta & Gupta, 2025; Fabio et al., 2025; Icron, 2026; Icron, 2024). Applied to oil and gas projects, adaptive procurement cycles enable earlier supplier engagement while deferring irreversible cost commitments until technical and interface risks are sufficiently resolved.

### **Integrated digital performance dashboards**

Integrated digital dashboards form the informational backbone of the hybrid framework by consolidating schedule, cost, procurement, and engineering maturity indicators into a single operational view. In digital performance management shows that real-time visualization of flow-based KPIs enhances cross-functional coordination and accelerates corrective action compared to static, report-driven controls (Omisola et al., 2023). In project environments, dashboards that integrate operational and engineering metrics improve decision quality by exposing emerging bottlenecks before they propagate into cost and schedule overruns (Dare et al., 2022). Within the proposed framework, dashboards are not passive reporting tools but active decision-support systems aligned with lean and agile execution logic.

### **Implementation Architecture**

#### **Organizational readiness assessment**

Effective adoption of a hybrid project management framework requires a structured assessment of organizational readiness across governance maturity, digital capability, and cultural alignment. Studies on lean and agile transformation consistently identify readiness gaps—particularly in leadership alignment and decision authority—as primary causes of implementation failure (Alshibani et al., 2023). Readiness assessments enable organizations to identify constraints related to decision latency, siloed accountability, and data fragmentation before structural changes are introduced. In capital-intensive industries, such assessments have been shown to reduce transformation risk by sequencing interventions in line with organizational capacity (Elragal & Elgendy, 2024).

#### **Change management strategy**

The transition to a hybrid framework necessitates deliberate change management to address resistance arising from entrenched functional silos and compliance-driven mindsets. Lean and agile adoption thrives when focused on execution reliability, risk reduction, and customer value, thereby minimizing waste and inefficiency to enhance quality, effectiveness, and cost efficiency (Alzoubi et al., 2022). In oil and gas, aligning the hybrid framework with existing safety, assurance, and regulatory imperatives improves legitimacy and stakeholder acceptance. Continuous communication, leadership sponsorship, and visible early wins are critical to sustaining momentum during the transition phase

#### **Capability development and cross-training**

Capability development under the hybrid framework emphasizes cross-functional literacy rather than deep specialization alone. Studies in both FMCG and project-based industries show that cross-trained or cross-functional teams exhibit greater coordination efficiency and faster problem resolution. Research on cross-functional collaboration in supply chain and project environments has demonstrated that bringing together diverse expertise from procurement, production, logistics, and other functions enhances decision-making speed, improves problem-solving capabilities, and contributes to reduced lead times and better operational performance. Cross-

functional teams help streamline workflows, minimize redundancies, and facilitate coordinated action across disciplinary boundaries (Smith, 2024). Training programs focused on lean planning, agile procurement logic, and data interpretation equip engineering, procurement, and project controls teams with a shared operational language. Such capability alignment reduces handoff delays and enhances collective ownership of execution outcomes (Taher & Bashar, 2024).

### **Risk Mitigation Mechanisms**

#### **Supplier redundancy planning**

Supplier redundancy planning mitigates supply-chain risk by balancing consolidation benefits with resilience. While strategic supplier partnerships improve efficiency, research highlights the vulnerability of overly concentrated supply bases in volatile markets (Allianz Trade, 2025; Gurtu & Johny, 2021). Hybrid sourcing strategies—combining primary strategic partners with qualified secondary suppliers—have been shown to improve continuity without materially increasing total cost when managed through framework agreements (Fabio et al., 2025). In oil and gas projects, such redundancy planning reduces exposure to geopolitical, capacity, and logistics disruptions.

#### **Real-time cost monitoring**

Real-time cost monitoring enhances risk visibility by shifting cost control from retrospective variance analysis to forward-looking trend detection. Predictive cost analytics demonstrate that integrating procurement, productivity, and market data enables earlier identification of cost pressure points than traditional earned-value systems alone (Tan et al., 2022). When embedded within digital dashboards, real-time cost indicators support proactive intervention, allowing project teams to adjust sourcing, sequencing, or scope before deviations escalate into overruns (Oyeyemi, 2023).

#### **Contractual incentive realignment**

Contractual incentive structures play a critical role in aligning supplier behavior with project flow objectives. Relational and performance-based contracting, with incentives linked to throughput reliability, quality stability, and collaborative problem-solving, consistently outperforms traditional cost-only or milestone-driven models in complex projects. Realignment contracts to reward early constraint resolution and schedule stability encourages suppliers to engage proactively in risk mitigation rather than reactively managing claims. Such alignment has been shown to reduce adversarial behavior and improve overall project performance in capital-intensive environments (Arar et al., 2025).

## **VI. Case-Based Conceptual Applications**

Empirical research on procurement in complex project environments consistently shows that closer alignment between procurement and engineering functions, together with deeper supplier integration, improves delivery coordination and reduces late disruptions in material flows. Studies of buyer–supplier dynamics in capital projects indicate that early and sustained integration supports synchronized execution and lowers the incidence of supplier-related delays, while oil and gas–focused research links lean procurement practices to improved supply-chain timeliness, coordination, and overall performance (Ali et al., 2023; Umasekar, 2024; Raj et al., 2025).

In midstream and downstream infrastructure projects, scale and geographic dispersion amplify coordination challenges, making them well suited to modular sequencing principles adapted from FMCG production planning. Modular project sequencing decomposes large scopes into standardized, repeatable work packages with clearly defined interfaces, enabling parallel execution and reducing interdependency complexity. Evidence from industry analyses and systematic reviews shows that modularization and standardization—particularly when combined with off-site fabrication and on-site assembly—can materially shorten project timelines and improve schedule predictability by reducing sequential dependencies, late-phase rework, and uncertainty propagation across project phases (Adarabioyo & Odebode, 2021; Zohourian, 2024).

Distributed logistics coordination further extends this logic by replacing centralized, batch-driven material flows with synchronized, location-specific replenishment strategies. Research in industrial logistics demonstrates that digitally enabled distributed coordination—supported by real-time tracking and supplier integration—improves material availability while reducing transport congestion and excess storage requirements, as enhanced visibility and cross-functional coordination improve flow reliability across supply networks (Zirong et al., 2025). Applied to downstream projects, this approach allows logistics systems to respond dynamically to localized construction readiness rather than static master schedules that rapidly lose relevance during execution.

From a modeling perspective, the combined application of lean planning, adaptive procurement, and flow-based control enables scenario-based estimation of cost, schedule, and capital-efficiency impacts. Simulation-based and comparative studies of capital projects suggest that reductions in non-value-added

engineering effort, excess inventory holding, and procurement rework can collectively yield meaningful lifecycle cost improvements, particularly in long-duration projects where small inefficiencies compound over time. These gains arise less from unit-cost reductions than from systemic waste elimination and improved decision timing.

Schedule-compression modeling further indicates that flow-oriented control systems reduce cumulative delay by identifying constraint accumulation earlier than milestone-based tracking approaches. Comparative studies show that projects using continuous flow indicators enable earlier corrective intervention and experience lower schedule volatility than those relying primarily on earned-value metrics (Alshibani & Zhu, 2023). Capital allocation optimization emerges as a complementary benefit: by delaying irreversible procurement and inventory commitments until progress is validated, projects retain optionality deeper into execution. Financial and project-governance research shows that staged capital release linked to verified progress improves capital productivity and reduces downside exposure under demand or market uncertainty (Yin et al., 2022). Collectively, these mechanisms support a shift from capital intensity toward capital efficiency, mirroring the asset-light logic that underpins high-performing FMCG operations.

## **VII. Barriers To Cross-Industry Adoption**

Barriers to cross-industry adoption of FMCG operational principles in oil and gas capital projects are deeply institutional rather than technical, arising from the interaction of organizational culture, regulatory environments, contracting traditions, and risk perceptions. Engineering-led project organizations in the oil and gas sector are shaped by professional norms that prioritize technical assurance, procedural control, and hierarchical decision-making. These organizational characteristics have been shown to inhibit learning-oriented and adaptive practices such as lean flow management and agile coordination, as entrenched centralized hierarchies and formalized structures create resistance to flexible and collaborative ways of working that have demonstrably improved performance in other industries. (Bello, 2025). These cultural dynamics are reinforced by highly prescriptive regulatory regimes governing safety, environmental compliance, and procurement transparency, which—while essential—often shift managerial attention toward documentation, audit readiness, and conformance rather than continuous performance improvement, thereby constraining experimentation with adaptive planning and procurement models. Legacy contracting structures further entrench this rigidity, as traditional EPC and risk-transfer contracts prevalent in oil and gas projects frequently shift the bulk of execution risk onto contractors, encouraging defensive behaviour, inflated contingencies, and a strong focus on claims management rather than collaboration. Fixed-price and heavily risk-loaded EPC arrangements have been shown to promote conservative bidding, extensive risk loading, and contract dispute dynamics that prioritize local optimization over shared performance goals. Under such contractual structures, early problem disclosure and cooperative learning, critical precursors to flow-based coordination and integrated execution are often discouraged because acknowledging emerging issues can expose contractors to commercial disadvantage and financial liability (Lawani et al., 2022; Wambeti Legal, 2024; Shefchik, 2025). Engineering-led organizations in oil and gas often exhibit a pervasive risk-averse mindset driven by the scale, irreversibility, and long lifecycles of capital investments. This risk aversion contributes to front-end loading, over-specification, and conservative controls, reducing adaptability during execution. Research on project lock-in and escalation of commitment shows that decision-makers with strong risk aversion are more likely to double-down on initial assumptions and project paths, maintaining conservative plans despite new evidence that suggests flexibility could improve outcomes, which is a phenomenon that mirrors behavioral risk avoidance in capital-intensive environments (Cantarelli et al., 2022). These factors create a self-reinforcing system that stabilizes traditional project management approaches and limits the effective translation of FMCG agility, underscoring that successful cross-industry transfer requires not only methodological innovation but also deliberate institutional and governance transformation.

## **VIII. Strategic Implications For Energy Sector Competitiveness**

Adopting cross-industry operational efficiency models requires several strategic implications for enhancing competitiveness in the energy sector. First, national energy infrastructure resilience can be improved through adaptive planning, lean procurement, and predictive supply chain management, reducing vulnerability to disruptions and enhancing operational continuity in both upstream and downstream projects (IEA, 2025; Schmitz et al., 2025). Second, capital efficiency and investor confidence benefit when projects integrate flow-based performance metrics and agile procurement strategies, enabling more predictable cost management, schedule adherence, and transparent reporting that mitigate financial risk perception among stakeholders (Tanaka et al., 2021; Zhe et al., 2022; Cantarelli et al., 2022; Cognitive Market Research, 2025). Third, supply chain localization potential has become as firms strategically consolidate vendors and establish resilient regional networks, which not only lowers lead times but also reduces exposure to global supply shocks and geopolitical volatility, aligning with broader industrial policy and economic security objectives (Hasan et al., 2026; Bandinelli & Fani, 2025). Finally, long-term sustainability alignment is strengthened when operational models emphasize waste reduction, energy efficiency, and lean material utilization, integrating environmental, social, and governance (ESG)

considerations into project planning and execution while maintaining competitiveness in a carbon-conscious global market (Marques et al., 2022; NWEYE, 2024). These strategies suggest that selective adaptation of FMCG-derived operational practices can materially enhance the performance, resilience, and sustainability of capital-intensive energy projects, offering a pathway to improved sectoral competitiveness and strategic robustness.

### **IX. Policy And Executive-Level Recommendations**

At the policy level, governance reform should ensure cross-sector innovation by replacing rigid project assurance regimes with adaptive oversight models that safeguard safety while enabling learning-based adjustments during execution, in line with OECD guidelines on project governance. At the executive level, structured training in cross industry methodologies drawing on FMCG lean operations, digital supply chain management, and agile decision making should be institutionalized to strengthen leadership capacity for managing complexity and uncertainty, consistent with World Economic Forum guidance on future ready industrial leadership. Incentive structures should be recalibrated to reward flow reliability, early risk disclosure, and cross functional collaboration, rather than focusing narrowly on milestone compliance. Public-private collaboration is essential for modernizing energy supply chains, particularly through shared digital infrastructure, supplier capability development, and localization initiatives. These measures are identified as critical for enhancing resilience, capital efficiency, and long-term sustainability in energy-intensive economies.

### **X. Conclusion**

This paper demonstrates that the persistent performance challenges in oil and gas capital projects stem less from purely technical or financial issues and more from structural, governance, and operational design choices that diverge significantly from those found in high-performing FMCG systems. Analyzing these contrasts through complexity theory, lean operations, and cross-industry knowledge transfer, the study demonstrates that FMCG operational excellence—particularly in flow management, supply chain synchronization, and data-driven decision-making—offers transferable principles that can enhance capital project delivery while maintaining engineering rigor and safety assurance. The proposed hybrid project management framework illustrates how lean stage-gate governance, adaptive procurement cycles, and integrated performance visibility can reconcile agility with control, enabling earlier risk detection, improved coordination, and more disciplined capital allocation.

Lastly, the value of cross-industry translation lies beyond replicating FMCG practices wholesale, but in selectively adapting their foundational logic to suit the institutional realities of oil and gas projects. When supported by executive leadership, aligned incentives, and enabling policy frameworks, such adaptation can enhance delivery reliability, restore investor confidence, and improve the resilience of national energy infrastructure. In an era of heightened capital discipline, supply-chain volatility, and sustainability pressure, the ability of the energy sector to internalize these lessons may prove decisive in determining its long-term competitiveness and societal legitimacy.

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