Supply Chain Improvements in Oil and Gas: Building an Operations Factory

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New markets. Extraction breakthroughs. Shifting geopolitical relationships. Extreme price and resource volatility (see Figure 1). In less than a decade, North American oil and gas production has changed dramatically. Estimates of technically recoverable hydrocarbon reserves have risen fast enough to spawn what might be termed a “21st century black gold rush.”

Exploration and production (E&P) and oilfield services (OFS) companies have strived to deal with these changes, which also include rapid shifts in venues and resource availability, such as moving from gas-rich shale plays to oil-rich shale plays (see Figure 2). Toward these ends, the top priorities previously were working with landowners, signing leases, securing contracts, and learning to apply newer unconventional methods for extracting and producing.

Now, however, the real work begins: satisfying shareholders whose calls for higher, more predictable returns are getting louder. This highlights a growing need for speed, quality, flexibility and cost efficiency—a quest for operational excellence. Leading the charge will be companies that can manage short, but highly effective, project life cycles by getting into a site quickly, getting the oil out quickly and getting to the next well quickly. These organizations also will excel at cost effectively chasing prices by moving rapidly and efficiently to wherever their research reveals a desirable blend of high, yet predictable, returns.

To seek to achieve these goals, Accenture believes that both E&P and OFS companies need to move toward a factory mode of operation, combining high levels of insight and innovation with factory-like parameters, such as standardization, integration and metrics-driven decision making. This paper looks at three capabilities that could help E&P and OFS companies operate more efficiently, consistently and profitably.
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Key operations
factory capabilities

The three capabilities that support a factory mode of operation include:
1. Increase collaborative planning

E&P companies expect a lot from their service providers and OFS companies want to deliver. However, poor material planning—exacerbated by market volatility and supply limitations—often dampens speed and productivity.

Responsibility for fixing the problem rests with both sides. OFS companies might attempt to increase the flexibility of their material supply chains. But these efforts probably will not be successful if E&P companies are not willing and able to supply more detailed planning information.

Several E&P companies are now concentrating on this very thing, but their efforts are largely ad-hoc and manual. A systematic method of collaboration has not been formulated.

Consistent, effective and collaborative planning between E&P companies and OFS providers is needed. We see opportunities for OFS companies to improve their flexibility and competitive position; E&P companies to increase the speed and predictability of production and cash flows; and both sides to get better at managing costs and reducing time-to-first oil (the period between when drilling commences and when a well begins yielding oil or gas).

deploy cloud-based collaboration platforms

E&P and OFS companies may be able to share more information more effectively by designing a cloud-based interchange of planning information. Via this common platform, E&P companies can furnish OFS providers with real-time data in a standardized format. OFS providers can then use the information to do a better job of forecasting their material and resource needs, and consequently serving E&P companies.

consistent, effective and collaborative planning can help E&P companies improve flexibility and competitive position, and OFS providers increase the speed and predictability of production and cash flows.

Accenture research\(^1\) has shown that the energy industry in general has been slow to adopt cloud-based solutions, and that many oil and gas companies are reluctant to share data outside their internal firewalls. However, the cloud has successfully demonstrated itself to be an effective planning and collaboration tool on several large-scale oil and gas joint ventures, with large amounts of data exchanged between companies. E&P and OFS companies owe it to themselves to consider similar collaborative initiatives, possibly using neutral platforms and structures to increase security.

Develop an analytics-based forecast-improvement program

E&P and OFS companies should be able to access, analyze and apply large amounts of complex historical data. Unfortunately, both sides struggle to produce demand plans that can enhance their own forecasting efforts, as well as those of their supply chain partners. To overcome the problem, companies should consider a collaborative standardization and translation initiative. This approach can paint a detailed picture of market responses to vacillating prices and production levels; gauge the cost impacts; and create a more effective, more disciplined and mutually valuable planning process.

Consider facilitated (outsourced) planning assistance

E&P companies and OFS providers may not have the capabilities and skills to develop robust planning and forecasting organizations. However, they could collaboratively engage a third party to marshal and analyze data, coordinate simulations, and facilitate the pan-company planning process. In this context, the third party becomes a vital link in E&P and OFS companies’ efforts to create an end-to-end planning and forecasting process.

2. Excel at advanced materials management

Materials management challenges are common in oil and gas production. For example, take inventory control in the natural gas business. Growth in the number of wells, horizontal drilling, a move toward multi-well pads and the deployment of 24-hour crews have greatly increased the volume of fluids, proppant and materials used in drilling and completions. This makes it harder to manage inventories in transit and at well sites. The fact that oilfield customers are looking for accelerated services only compounds the problem. Some OFS companies have responded by learning to move more quickly from location to location (reducing downtime between jobs). This is a positive development, but it raises the likelihood and impact of errors and does not solve the inventory management problem.

Redundant, non-standard metrics and measurement processes add more fuel to the fire. It is common for field personnel to measure material volumes in different ways, which increases confusion and wastes time. Even when companies have established policies and procedures, adherence by field operators often varies.

Growth in horizontal drilling, a move toward multi-well pads and the deployment of 24-hour crews have greatly increased the volume of chemicals used in hydraulic fracturing. This makes it harder to manage inventories in transit and at well sites.

Manual tracking processes make all of the above problems worse. Simply put, the automation of tracking and accounting has not kept pace with the boom in unconventional energy sources. As a result, onsite inventory management problems are common, and there is often a disconnect between on-hand inventories and the information contained in a company’s various systems.

These challenges may be surmounted by instilling the following practices:

**Deploy advanced inventory management tools and techniques**

High performers in the oil and gas business are more likely than their less savvy peers to:

- Standardize inventory measurement and management practices before, during and after a job.
- Ensure that consistently formatted, high-quality inventory data is exchanged between field operators and materials managers.

Unfortunately, the industry’s frontier mentality often means that there is little standardization of field processes. OFS crews do their job in whatever fashion they feel is appropriate. The resulting errors and inconsistencies may cause field tickets to stay open longer thus delaying billing. They can also spawn over-billing (and the subsequent issuing of credits) or under-billing (and the subsequent loss of margin). Costs go up. Capital efficiency goes down. Back-office functions are burdened with extra work.

Using advanced tools and consistent inventory management processes does more than help increase efficiency and shrink project life cycles. It also shows customers that the company understands how to properly manage water, proppant, and less-conventional types and quantities of chemicals. Efforts to standardize tools, techniques and processes can be enhanced with change management programs.
Develop formal materials management programs for the field

E&P and OFS companies excel at safety-related training for their field workforces. However, training programs focused on greater field workforce efficiency have been less successful.

One solution to this problem might be developing more formal field materials management training programs. Such initiatives could include new process orientations that help field personnel streamline work methods—learning to perform various tasks onsite instead of at a field camp. Another possibility is day-in-the-life programs that show field operators how materials staff manage field materials throughout the life cycle, from procurement to customer billing. In both cases, aligning field materials management training with a company’s performance management processes is key.

Better accuracy, economy, efficiency and expediency are the most desirable benefits associated with a well-trained field workforce. But it also is likely that these skills will be recognized by E&P customers as core competencies and competitive differentiators. In addition, formal materials training (including a better understanding of how field materials tasks trickle up the supply chain) could make personnel feel more vested in the process—empowered to take ownership of materials and the quality of results. A good example might be taking the initiative to correct errors, instead of passing them through to back-office personnel.

Create a mobility strategy

High performers are more likely than most to leverage mobile tools—technology that can:

- Replace manual data entry and paper-driven processes.
- Allow personnel to track and manage materials on-site in real time.
- Increase visibility to asset locations.
- Accelerate information sharing with superiors and supply chain partners.

These same high performers also recognize the importance of a formal mobility strategy that establishes specific mobile technology goals; defines success measurement metrics; and specifies the optimal platform, operating system, architecture, host application environment, security approaches, and data collection, tracking and sharing methods.
3. Improve asset management with a formal logistics strategy

Shorter project life cycles and new extraction techniques—combined with more sites, more movement and more players—can only mean one thing: more assets. This reality highlights the importance of a formal logistics strategy focused on the management and optimization of assets.

A great logistics strategy has a lot of ingredients. But three capabilities—centralizing operations, understanding total cost of ownership (TCO), and investigating the appropriateness and potential of lower-cost opportunities such as outsourcing—speak directly to the asset management needs of E&P and OFS companies.

Centralize asset management

The amount of multi-well pad work is increasing, with less need for field operators to return to their base locations for material replenishment. As a result, centralization—viewing and managing assets from a single location—is becoming more vital, while making overly local decisions increasingly leads to lost synergies and reduced economies of scale.

One of the best ways to make centralization happen is by erecting a supply chain control tower that consolidates governance of supply chain assets across regions. Working through the control tower, E&P and OFS companies can make smarter TCO decisions about deploying materials and assets, and possibly outsourcing various functions.

The tower also can become a launch pad for more improvements, such as enhancing real-time visibility across the supply chain, implementing process improvements, and using analytics to support new cost reduction and asset utilization programs. For example, an E&P or OFS company might be looking to consolidate the deployment and management of transportation assets across North America. Aggregated, standardized data flowing through the control tower would help the company make informed decisions about where assets are most needed based on varying business conditions (e.g., examining country-wide opportunities as opposed to opportunities within a specific region).

Understand total cost of ownership

Recent increases in venues and volume have forced companies to quickly add suppliers and alter logistical approaches. As a result, some organizations are less able than ever to quantify total delivered costs, understand each cost component, and assess the cost impact of changing modes or service levels. In particularly fast-paced environments like hydraulic fracturing, the relationship between efforts and outcomes has become dangerously hazy.

To make more informed total cost of ownership decisions, companies need to do a better job of capturing, understanding and applying data. Implementing a centralized supply chain control tower is the foundation point.
E&P and OFS companies can then work to improve their internal and external information capture capabilities by building real-time data feeds and implementing integrated business intelligence solutions. Collected data can be optimized by standardizing report outputs so groups inside and outside the organization can make decisions that reflect any asset management initiative’s impact on the business as a whole.

With better data capture capabilities and standardized reporting outputs, companies are better able to combine descriptive analytics (understanding what already happened) with more advanced prescriptive analytics (developing fact-based insights about what might happen). In a supply chain context, predictive analytics might help companies answer questions like “What’s the best cost-related outcome that could result from the various actions (e.g., outsourcing) we are considering?”

**Develop a logistics outsourcing strategy**

E&P and OFS companies with strong, centralized logistical operations and a great handle on total cost of ownership are not always prime outsourcing candidates. But they are in a far better position to understand the potential challenges, nuances, risks and rewards associated with an outsourcing initiative. Centralized operations also make it easier for companies to oversee external service providers, while strong TCO capabilities simplify the formation of performance metrics and service level agreements.

More prescient outsourcing is particularly relevant because some OFS companies have begun outsourcing discrete transportation and distribution functions—often in response to anomalous events and usually without understanding the overall business impact. More often than not, the result is less efficient and under-optimized end-to-end operations. In some cases, the problem relates to failing to take a pan-country or pan-product view of outsourcing’s impact. Other possibilities include absent or incomplete TCO assessments at the beginning of the outsourcing initiative or operations that are too decentralized to oversee third parties properly.

Yet another problem might be the lack of a formal logistics strategy. Most E&P and OFS providers could benefit from a formal logistics outsourcing strategy that considers the effect of the outsourcing move on risk and flexibility, as well as its organization-wide costs. Vertically extending the logistics strategy to include other well site partners (E&P or OFS) also is a good way to leverage volumes across regions and business units, identify mutually advantageous cost reduction and scale building opportunities, and increase supply chain wide flexibility.
Operational excellence is never unimportant. But for E&P and OFS companies, the achievement of operational excellence has never been more important. Gone are the days when relentless growth is sufficient. Shareholders now want higher, more predictable returns. And great execution is one of the best ways to make this happen.

In order to seek to succeed, companies can adopt a factory mode of operating, weaving goals such as efficiency, consistency, standardization, integration and metrics-driven decision making into the fabric of exploration, production and supply operations.

As we have discussed, E&P and OFS companies may be able to accomplish this by improving collaboration, and managing materials and assets more effectively and creatively. There might be other routes to success, but these three capabilities will permeate those efforts as well. After all, higher profits, greater share and increased differentiation are more attainable when both sides work together like a well-oiled machine—achieving high performance by effectively managing the techniques and tools of their trade.
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