Economist Intelligence Unit

The Economist

Economies of scale

How the oil and gas industry cuts costs through replication

A report from the Economist Intelligence Unit
Sponsored by Oracle

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Preface

Economies of scale: How the oil and gas industry cuts costs through replication is an Economist Intelligence Unit report sponsored by Oracle. It delves into the value of standardisation and effective project management for the oil and gas industry, exploring opportunities and best practices.

To develop this report, we conducted in-depth interviews with senior executives in the oil and gas industry. We would like to thank all interviewees for sharing their time and insight.

The Economist Intelligence Unit conducted the analysis and wrote the report. The findings and views expressed in the report do not necessarily reflect the views of the sponsor. Sarah Fister Gale is the author of the report, and Brian Gardner is the editor.

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Executive summary

Oil and gas companies rely on small and mid-sized construction projects to balance risk and cash flow in their portfolios. These smaller initiatives can be delivered faster and more efficiently than mega-drilling operations, and having a portfolio of them helps to secure steady overall production growth that will offset the long development cycles of larger projects.

To maximise the pay-off of these investments, companies streamline project development by standardising operational processes, supply chain relationships and management techniques. Such standardisation enables project teams to speed construction, cut costs and secure incremental advantages on subsequent projects.

But these benefits are achieved only when owners, contractors and project teams implement strategies to reduce risks and capitalise on lessons learned. This requires a rigorous project management structure and strong leadership of the sort more frequently associated with much larger investments.

Our findings show that:

- **The greatest benefits of replication are achieved when project teams approach their first project with duplication in mind**. Through the standardisation of components and project management methodologies, oil and gas firms can reduce costs on their projects by 15-30% and time to completion by 15-40% once a firm's process is optimised.
- **Standardisation is a long-term process and an integrated approach is crucial**. Such dramatic savings in time and cost are achieved through scaling-up supply chains for volume discounts, building long-term partnerships with contractors, streamlining decision-making and formally implementing a company's lessons learned through an iterative process. This requires several years of acquired expertise to deliver projects with speed and precision.
- **The lessons that produce such gains are achieved when operating teams, contractors and owners collaborate to reduce the time to final project delivery**. This does not necessarily mean that each group should try to maximise their own speed. Rather, they should identify cross-functional optimisation strategies to reduce wasted time and ramp-up productivity for the project as a whole.

- **Firms maximise the benefits of standardisation by developing a portfolio of project templates that address common drilling scenarios**. This gives them the flexibility to mix and match project components to accommodate physical or environmental obstacles, and the scalability of modular processes for expansion.
- **Provided projects are replicated in the same region under the same operating conditions, the compliance process can also be shortened**. There is a learning curve for regulators, so delivering consistent projects can reduce their compliance periods. However, replicating a project in another part of the world is unlikely to yield these benefits. Few regulators will take compliance from another country into account and many will reject it outright.
- **A key challenge to successful replication is that top talent and executive teams are often focused on larger-scale projects**. However, buy-in and support of senior executives, combined with the experience and leadership of a seasoned project manager and a rigorous project management structure, are vital in order for these projects to achieve an attractive return on investment (ROI).

Introduction

Oil and gas company executives excel at selecting and planning capital projects, but they struggle to streamline the finances that support these investments. According to an Economist Intelligence Unit survey of 427 senior executives taken in October 2010, oil and gas respondents cited predicting the long-term costs (47%), assessing their return on investment (ROI; 37%) and effectively managing cash flow over the lifecycle of a project (37%) as their greatest challenges in delivering capital projects.

To offset these risks, oil and gas companies diversify their portfolios, balancing high-risk mega-projects with much smaller initiatives that can be streamlined and replicated to reduce uncertainties, speed delivery and produce a steady stream of profits at increasingly lower costs. "You don't want your portfolio performance to be based only on major projects," says Maarten Wetselaar, executive vice-president of finance at Shell Upstream International.

Portfolio diversity balances risks and ensures steady short-term revenue while larger projects ramp up to production. However, this balance comes with its own set of challenges. "Smaller projects don't necessarily have smaller risks," affirms Mr Wetselaar. They face many of the same project management issues as larger investments and must be carefully managed by skilled leaders in order to avoid problems and achieve the expected ROI.

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Maarten Wetselaar, executive vice-president of finance, Shell Upstream International

Using small to go big: project management and construction standardisation

Technological advances have made large reserves of unconventional shale gas in North America economically recoverable. These resources, which will require an abundance of smaller wells to extract, have become an attractive option for executives looking to replace declining production.

The need for a reliable and steady uptick in new production further drives investment in smaller replicable projects because they deliver fast results and can be duplicated to deliver greater ROI, according to Mr Wetselaar. "We lose four percent of production every year due to field declines, so we need to constantly add new projects just to stand still."

Smaller operations are also appealing in regions where larger resources have been tapped, including marginal sub-sea reserves on the Norwegian Continental Shelf (NCS), notes James van Merkensteijn, senior vice-president of strategy and business development for Statoil. "Ten years ago, these reserves were too small to be worth our time." But today the company is aggressively pursuing smaller resources across the NCS to achieve predictable low-risk production and meet its goal to maintain stable production levels through to 2020.

"Standardisation is the only way to make these smaller reserves profitable."

James van Merkensteijn senior vice-president of strategy and business development, Statoil

To offset the lower pay-off of these projects, Statoil has implemented a Fast Track replication methodology for the region that speeds the development process from concept to realisation, achieving economies of scale and cutting the time from discovery to production from seven years to three or four. "It's part of our capital value process," says Mr van Merkensteijn, noting that every project has multiple decision gates, where project leadership and the executive team analyse progress and assess lessons learned.

Initially, these stage gates can each take a year or more, but by taking advantage of institutional knowledge and existing infrastructure, the Fast Track process standardises solutions. Using modularised rigs and components and streamlined project management templates that have been designed over years of developing the site, they can dramatically cut costs and time to production. "Standardisation is the only way to make these smaller reserves profitable," stresses Mr van Merkensteijn.

The company hopes to implement a similar Fast Track mindset for its North American shale development projects, but Mr van Merkensteijn notes that Statoil will have to deliver many projects over several years before it develops the expertise and project optimisation to achieve similar savings. "Fast Track isn't about cutting corners, it's about delivering with speed and precision," he says. "But it takes experience and rigorous project management to make it happen."

The power of replication: driving value through process

"By number three, it was 20% cheaper because we were more efficient in building and we dropped 10-15% from the cycle time."

Maarten Wetselaar, executive vice-president of finance, Shell Upstream International

Replicating a project plan involves standardising the materials as well as the project development process, and then creating a template for delivery that harmonises the efforts of owners, contractors and project teams to eliminate waste and synchronise deliverables. The greatest benefits are achieved when project teams approach the first project with replication in mind, explains Mr van Merkensteijn. "Standardising a design template and decision-making from discovery through realisation dramatically reduces our internal validation process and enables the team to make decisions quicker and more effectively," he says.

To succeed at standardising a project management plan, executives must make replication a criterion of success so that project teams will focus on process as well as infrastructure from the beginning of the project. "It is not just about standardising components; we are standardising a concept for delivering

CASE STUDY Cutting frack time in half

Replication is not just about building structures faster. "It's about learning to learn faster," says Mr Wetselaar.

He points to Shell's development of unconventional shale gasfields in North America. Shell began development of its first field in Pinedale, Wyoming in 2002, drilling hundreds of multistage fracturing wells over the 20,000-acre resource.

The first well took 60 days to drill, but thanks to efforts to replicate and streamline the project management process, by 2010 the schedule had dropped to 25 days, and costs were reduced by 25%, despite a surge in material costs.

Using the lessons learned at Pinedale, Shell began development of Groundbirch, a shale gas field in Canada. The first well took 40 days to drill. Within three years, they were down to 15 days. "It wasn't only that we were able to proportionately achieve the same learning, we were able to learn faster," says Mr Wetselaar.

The trick, he adds, is getting all of the internal development teams and external contractors to focus on the common goal of optimising the final outcome. "Typically in these projects, you get siloed bits where each team works on a task then hands it over to the next group."

When they work in isolation, workgroups tend to optimise their own efforts, but unless those efforts are aligned with the broader project goals, that can be counterproductive. At Pinedale, for example, the team linking the wells to the pipeline system would wait until several wells were ready to connect. This reduced their cycle time, but left many wells sitting idle for several days with no gas flowing. "The project only makes sense when gas flows," says Mr Wetselaar.

By examining the lifecycle of the project with the end goal in mind, the teams identified cross-functional optimisation strategies, including hooking up each well as soon as it was ready, even if it added time to the overall hook-up process.

Shell is now applying these same strategies for optimisation and project replication in China, where they anticipate faster and more streamlined drilling operations thanks to the lessons learned in North America. "It's only when you approach integrated optimisation from a lifecycle standpoint that you achieve these benefits," comments Mr Wetselaar.

these projects," says Mr Wetselaar. That means identifying ways to streamline decision-making, reduce time lags between tasks and define the most efficient path for meeting key milestones.

One example is Shell's production of the Groningen gas field in the Netherlands. This mature reserve was losing pressure as the resource was extracted, and required seven new compression stations to maintain the necessary pressure for continued drilling. Rather than construct them simultaneously, the executives overseeing the project had the development team design and build the first station, identifying areas for improvement as they went. Then they used the same construction team, design and methodology to repeat the project six more times.

"By number three, it was 20% cheaper because we were more efficient in building," Mr Wetselaar says. "And we dropped 10-15% from the cycle time." He affirms that these improvements are typically available on projects with multiple replication opportunities, estimating that replication delivers 15-30% savings in cost and 15-40% reductions in cycle time once the standardisation process is optimised. "You get very significant savings from doing the same thing over and over."

Techniques of replication: supply chains, outsourcing, templates and management

Oil and gas companies maximise cost and time savings in their replication projects by standardising materials so they can take advantage of volume discounts, and by optimising process steps to speed delivery and reduce human error. According to Mr Wetselaar, Shell standardises components, modules and even complete platform solutions, and often works with a single supplier for all projects to drive volume savings across the business.

Such supply chain benefits are of even greater value to smaller oil and gas companies, notes Theo Bergers, chief operating officer for Oranje-Nassau Energie (ONE), a Dutch exploration and production company. "The more we standardise project templates, the more we can buy in bulk," he says. ONE even partners with other oil and gas organisations to make group purchases in order to achieve greater volume discounts. According to Mr Bergers, this shared logistics approach "helps us all keep costs under control".

"By the third or fourth project, they understand our standardisation process, and the learning curve disappears."

Theo Bergers, chief operating officer, Oranje-Nassau Energie

ONE uses its supply chain to take advantage of contract expertise, working with third-party engineers and drillers to reduce overhead. Working with contractors can lower the company's overhead costs and enable it to accommodate ebbs and flows in its production cycles. To minimise the risks of using contractors and optimise delivery, ONE develops long-term partnerships with these contractors, bringing the same teams of drillers and engineers onto every project. The long-term relationship benefits the vendor by providing a steady stream of work, and they in turn offer ONE volume discounts for their services, which cuts projects costs.

These long-term relationships also reduce the time to ramp-up and the risk of errors on the job, because contractors become familiar with ONE's reporting and workflow processes, which reduces the need for training and additional oversight of these teams. "By the third or fourth project, they understand our standardisation process, and the learning curve disappears," confirms Mr Bergers. This cuts times and costs for the project, and eliminates the need for a complex record of processes and procedures. "It makes us all more efficient," he says.

Companies must also take the time to develop a portfolio of templates that will address common structural design demands based on careful analysis of the environment and complexities of the resource site, adds Mr Bergers. In the North Sea, for example, ONE has standardised templates for vertical wells of varying depths, as well as deviated wells for short and long distances to accommodate shipping lanes, windmill farms and military testing sites. "By having multiple standardised designs, we have a fallback plan for each of these scenarios," he says.

Further savings are achieved through the use of rigorous project management processes and seasoned project leaders who have the experience and authority to identify risks, and create accountability and oversight across the lifecycle of the project, notes Mr Wetselaar. However, companies are often challenged in attracting strong leaders to these projects. "Bigger projects attract the best people," he says. But it is just as important to have experienced staff on smaller projects, particularly as they have fewer resources on the ground and receive less governance from senior management.

Such expertise is equally important for smaller oil and gas companies that outsource many of their project tasks, adds Mr Bergers. "You need to put your best people in charge of these replication projects because they understand the risks and can manage all of the outsourced relationships," he says. "Without that experience, you get delays and cost overruns."

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In the regulatory environment: learning to stay ahead of the curve

The April 2010 Deep Water Horizon disaster, the most expensive oil spill in US history, combined with concerns about the environmental impact of extracting unconventional gas, has led to increased regulatory scrutiny and public demands for greater accountability on oil and gas projects worldwide. Companies have to build regulatory issues into the project plan and keep an eye on developing issues, such as changes in environmental or tax laws, according to Mr Wetselaar. "These projects can be quite dramatically impacted by outside events, and you need a project organisation that is nimble enough to respond," he says.

Addressing environmental concerns as part of the planning process is vital to get an accurate assessment of risk, says Mr van Merkensteijn. He points to Statoil's new fracking projects with partners on the Marcellus Shale, where community concerns about water contamination have caused delays in project progress. "It wasn't surprising, but it was more intense than we expected," he notes.

"The regulator has a learning curve. Once they go through it the first time you get faster cycle times for approvals."

Maarten Wetselaar, executive vice-president of finance, Shell Upstream International

They are offsetting concerns through public outreach, community meetings and scientific validation to appease regulators, and hope to get the current projects up and running with fewer delays on future wells. This experience will also shape project plans for shale projects in Eagle Ford, Texas, where the company is just beginning development. "Through learning at Marcellus, we hope to get Eagle Ford up and running more efficiently," reports Mr van Merkensteijn.

Replication can offset some of these regulatory pressures and potential community push back by simplifying the compliance process. According to Mr Wetselaar, the time to approval is reduced when they repeat accepted designs—if projects are replicated in the same region under the same operating conditions. "The regulator has a learning curve. Once they go through it the first time you get faster cycle times for approvals," he says.

If an attempt is made to replicate a project in another part of the world, however, the regulatory process may backfire. Some regulators will take compliance from another country into account, particularly if the regulators are all within the EU, but others will reject it outright. "We often find that regulators are mistrusting of their colleagues in the rest of the world," comments Mr Wetselaar.

At ONE, project teams offset the time delays of meeting regulatory compliance by beginning concept engineering as soon as the project is given the internal go ahead—and well before regulatory approval is secured. While this adds some financial risk, it enables ONE to achieve its goal of moving from discovery to first oil in just 12 months. "It's a low-risk way to cut five or six months from the delivery time," Mr Berger says. "And if the project falls through, we can always use those designs for a future project."

Conclusion

Being able to turn a single successful upstream development project into a process that can be replicated gives oil and gas companies multiple strategic advantages. It cuts costs, reduces risks, smoothes cash flow and streamlines production, making the most of smaller reserves. But these benefits are only achieved through strong and formal project management, which entails effective cross-functional optimisation and directed dissemination of lessons learned.

"It isn't just running one project through the capital value process; it's making sure you've got the right learning and experience from previous projects and making sure the institutional knowledge is applied in the right places," Mr van Merkensteijn says. "Through experience, each new project should benefit from the one before."

Executives interviewed for this research offer the following advice on how to successfully replicate smaller projects and maximise results:

- **Put experienced project managers in charge.** "These projects get less governance and oversight from the executive team so they need expertise on the ground," says Mr Wetselaar of Shell.
- **Bring contractors and work groups together** to identify optimisation opportunities between tasks. "The best learning benefits come from integration between project activities," advises Mr Wetselaar.
- **Create a formal project management template and a rigorous project management process that can be easily duplicated.** "When standardisation is simple, project management becomes easier as well," says Mr Bergers of ONE.
- **Use standardised templates to purchase bulk parts and material** in advance of construction. "It's cheaper and you can avoid long lead times," says Mr Bergers.
- **Implement a formal "lessons learned" process** and share those lessons across the company, advises Mr van Merkensteijn of Statoil. "You've got to corral that knowledge if you want to develop things quickly."
- **Keep an eye on the broader environment.** These projects don't exist in isolation, and changes in environmental regulations, fiscal policies, and community concerns can derail even the most efficient project plan, notes Mr van Merkensteijn. "The business context changes rapidly, and it is incredibly important to be able to adapt."

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