

SUBSEA'S MIDLIFE CRISIS

THE CHALLENGES AND OPPORTUNITIES AS SUBSEA OIL AND GAS MATURES

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IN 1961, SHELL INSTALLED the first subsea production tree in the Gulf of Mexico. By 1997, 1,000 subsea completions were in place, and 15 years later, more than 4,800 Christmas trees had been installed on subsea wells worldwide. By 2014, subsea systems were operating in water depths approaching 10,000 feet. In the past half century—and particularly in the past two decades—subsea development has unlocked enormous opportunities for resource holders and oil companies and profitable growth for innovative service providers.

Although great technical and commercial progress has been made, the industry faces new challenges as it enters its sixth decade, including increased production losses, technical bottlenecks, and a lack of sustainable business models for certain subsea services. At the same time, other less glamorous yet persistent problems remain unsolved, such as reducing delivery lead times, improving recovery factors from subsea fields, achieving planning excellence, and making standardization tradeoffs. BCG has worked with some of the world's lead-

ing subsea operators, equipment suppliers, and service contractors to identify these challenges and the best options for addressing them.

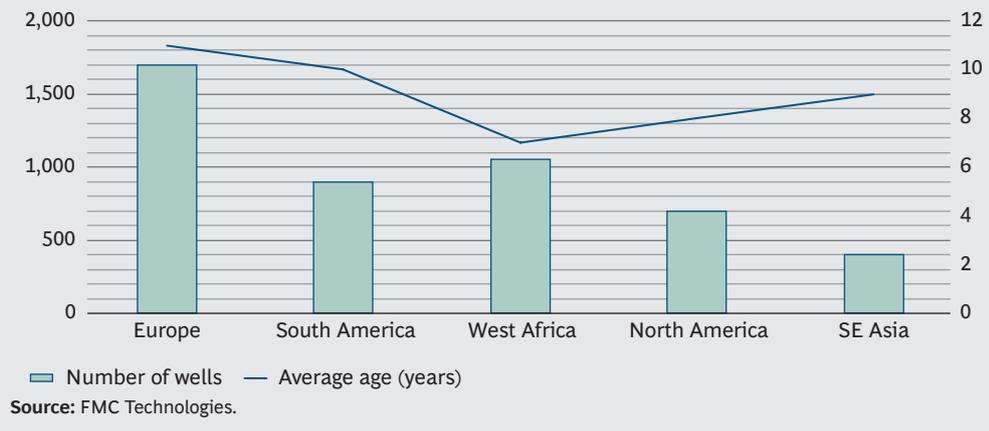
Emerging Challenges

As an industry, subsea is maturing. Installations designed to last approximately 20 years are about to exceed their design lives. The concern is particularly acute in the North Sea and South America, where the average age of producing subsea wells is greater than ten years, in contrast to more recent developments in areas such as West Africa. (See Exhibit 1.)

In our recent work with leading subsea operators and suppliers, we have identified three major challenges that operators and contractors are confronting as subsea fields mature:

- *Increased Production Losses.* Some operators are experiencing increased rates of equipment failure, which in some instances have resulted in a

EXHIBIT 1 | Producing Subsea Wells and Average Well Age, 2012



significant rise in unplanned production losses. Aging equipment is reaching the end of its life before reserves have been depleted, sometimes owing to its use in operations that fall outside projected service conditions. Operators must decide to run the equipment until it fails, invest in replacements, or conduct costly maintenance interventions. These decisions become more difficult when the operator lacks sufficient operating experience with different production systems or has a varied installed base of legacy equipment. In addition, some operators are frustrated with the lack of efficient subsea repair solutions—wells are simply taking too long to bring back into service.

- Legacy Equipment Creating Technical Bottlenecks.* While strategic issues of field life and operational reliability are causing headaches for operators, basic technical limitations are also creating bottlenecks. Older equipment and installation tools are based on different technical specifications, and they experience higher failures rates than their more modern equivalents. Many current standards are not adaptable to older equipment. Given the age of some pieces of equipment, installation tools may no longer be available or specifications may even have been lost. These technical bottlenecks generate inefficiencies such as costly one-off replacement orders and plan deviations caused by a lack of available equipment.

- Evolving and Emerging Business Models for Subsea IMR and Hardware Services.* While the industry has established models for new-well construction, it has struggled to develop a routine and sustainable model for subsea services and maintenance. Few dominant vessel designs or intervention technologies are emerging, and scheduling and predictability—which determine utilization of assets such as vessels and remote-operated vehicles (ROVs)—are often inefficient. As a result, the subsea inspection, maintenance, and repair (IMR) market is a complex and evolving mix of large installation companies, smaller specialists, and vessel operators, some of which are only marginally profitable. Meanwhile, hardware manufacturers have struggled to develop their services businesses, creating refurbishment backlogs for operators and causing suppliers to miss potentially profitable service-market opportunities.

Old Challenges in New Developments

These emerging challenges compound those that operators and contractors have been facing for many years:

- Supply Chain Constraints.* Bottlenecks at the subsupplier level are creating delays in the delivery of equipment such as forged parts and control systems. These delays have a ripple effect in costly areas such as scheduling for rigs and

pipe-laying support vessels. Idle rig time in subsea interventions caused by a lack of equipment can reach 25 percent in the worst cases. Operators need better long-term maintenance planning, some suppliers need to increase investments in maintenance capacity, and both operators and suppliers need to improve transparency.

- *An Inability to Improve Productivity.* Although equipment standardization has been a priority for many operators, the industry has yet to see significant productivity gains as a result. Suppliers are struggling to meet varied customer demands and evolving technical specifications. As the complexity of subsea projects increases, the average number of engineering hours per project is increasing in tandem. Suppliers lack adequate engineering capacity to meet this demand, and local content constraints add to the difficulty of training and developing new sub-suppliers in certain regions. In the years since the Macondo disaster in 2010, health, safety, and environmental compliance has further increased the need for engineering.
- *Rising Delivery Costs.* While both prices and demand for subsea equipment have increased, suppliers' margins have been flat or falling, and suppliers have been unable to reap the benefits of higher prices and increased demand. (See Exhibit 2) Subsea installations have become so expensive that in some

cases operators still prefer dry-tree systems to subsea solutions.

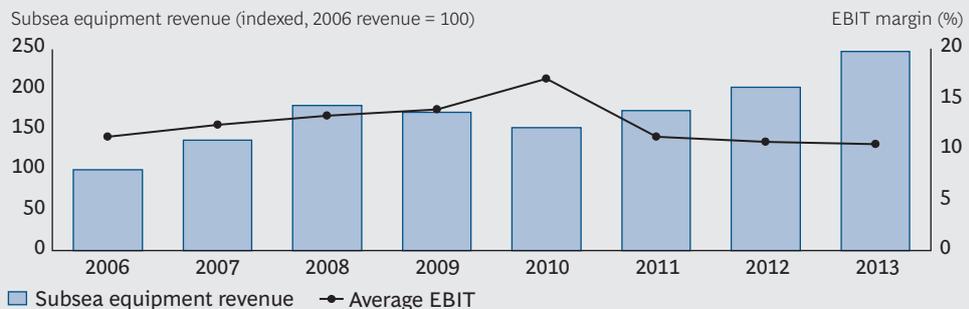
- *Slow Adoption of Subsea Processing.* Despite the widely heralded potential of subsea processing to revolutionize offshore developments, operators have been understandably cautious about the technologies involved. As a result, progress down the experience curve has been slower than many in the industry hoped—and slower than many analysts projected. In an environment of increasing capital discipline for oil companies, both the costs and customers' perception of the risks of subsea processing must be reduced in order for the technology to gain widespread adoption.

Collaboration Will Be Key

How can subsea operators and contractors respond? Although they face fundamental challenges, we believe they can continue to prosper by adapting to subsea's new era of maturity. Many will have to act in five areas:

- Strengthen subsea planning throughout the supply chain by sharpening the focus on long-term maintenance planning, not just new equipment, and by demanding greater transparency from equipment suppliers around material availability to eliminate delays in the delivery of materials to rigs and pipe-laying support vessels.
- Enforce standardization of equipment, enabling compatibility across generations

EXHIBIT 2 | While Revenue Is Rising, Subsea Operators' Margins Are Flat to Falling



Source: BCG analysis of subsea-equipment-manufacturer data.

and ensuring rigorous governance of technical specifications to further alleviate bottlenecks and “complexity creep.”

- Establish a robust subsea maintenance strategy from the outset of new projects that accounts for the costs of failure, anticipated equipment performance, and the tradeoffs between repair and replacement.
- More clearly embed service and maintenance performance in new subsea-equipment contracts, as is routine in areas such as rotating equipment. Operators should contractually ensure sufficient supplier maintenance and refurbishment capacity to service anticipated demand and adopt detailed service-level agreements and governance models to reduce failure rates for older equipment and tools during interventions. They also should ensure that suppliers are responsible for providing subitems used in maintenance.
- Ensure the technical integrity of subsea installations through rigorous integrity reporting and better data regarding equipment history and performance.

Equipment suppliers must take four actions to mirror the moves of operators and proactively address clients’ service and maintenance needs:

- Improve internal-planning capabilities and integrate them with customers’ systems to improve responsiveness and reduce volatile client demands.
- Learn from other industries to successfully design and price a profitable and competitive service business alongside new-equipment offerings.
- Create “standardization with choice” by introducing modular product designs, enabling the standardization benefits of reduced engineering, documentation, and lead time while still catering to varying customer needs.

- Develop more strategic partnerships with subsuppliers to turn supply chains into a competitive advantage.

New Investment Opportunities

We believe these challenges for the maturing subsea market also present three investment opportunities for both suppliers and financial investors:

- New entrants can address the growing demand for equipment refurbishment and maintenance and the associated maintenance bottlenecks that are emerging.
- Consolidation among existing subsea IMR companies will help generate a more sustainable IMR business in some areas.
- Consolidation of second- and third-tier equipment suppliers will create suppliers with greater scope, increasing competition.

THE TONE OF the subsea industry is changing. While high-tech megaprojects remain a crucial element of the market, the world’s largest subsea operators have learned that proactively planning for maturity in subsea developments—covering equipment specs, maintenance strategies, and intervention planning—is critical in order to avoid enormous and unexpected loss of value. As operators worldwide emphasize increased cost efficiency and capital discipline in the years ahead, addressing subsea’s midlife crisis is an opportunity that can no longer be ignored.

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5/14