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BUSINESS STRATEGIES AND RISK FACTORS

The offshore pipeline construction service industry has seen varying degrees of consolidation and integration over the years. The demand for pipeline construction fluctuates from year to year and by geographic region. During periods of sustained low oil prices demand for services are reduced, causing contractors to resize operations to maintain a competitive position, to form alliances and partnerships in search of opportunities, and to stack and dismantle less competitive vessels to reduce cost. The purpose of this chapter is to describe the business models and strategies employed by offshore construction companies and their impact on operations. Operational and financial risk factors are highlighted, and the chapter concludes with company portraits.

8.1 BUSINESS MODEL

8.1.1 CASH FLOWS

All construction firms that own and operate marine vessels follow broadly similar business models from a cash flow perspective (Fig. 8.1). Firms generate revenue from their business segments and investments, which are used for required spending to remain a going concern and discretionary spending to pursue opportunities and strategic objectives such as the construction of new vessels or secondhand purchases. Contractors use cash generated from operating activities to maintain their vessel fleet and personnel and other costs, and they supplement this with conventional bank loans and by entering the bond market to refinance and with stock offerings (if public) to raise capital.

Financing may be internally or externally sourced, and spending may be required or discretionary. Required spending is needed for operations and maintenance, interest and debt payments, taxes, and administration. Discretionary spending normally includes but is not limited to acquisitions, stock buybacks, and dividends. A company’s leverage often determines the flexibility in which it operates. If a company misses a debt repayment, for example, covenants and other conditions may kick-in immediately, restricting the use of their credit facilities. Management’s ability to foresee the opportunities and risks in the business lines is a key component in successful operations.

8.1.2 OPERATIONS

Operations and initiatives are primarily financed with cash and cash equivalents, including proceeds from term loans and senior secured notes, investments, and cash flows from operations. If economic conditions deteriorate, a company may not be able to refinance outstanding debt when it becomes
due and may not be able to obtain alternative financing on favorable terms. Companies may sell shares and assets to pay down debt.

When vessels are under contract in project work, they generate cash flows for the firm which are used to pay back the interest and principle of its loans and return dividends to its shareholders. Integrated and diversified firms generate revenue from one or more business segments, which may act to smooth out the variation in cash flow across business cycles. Operators can idle or stack vessels to reduce operating cost, sell vessels that are not deemed strategic assets to raise revenue, or scrap vessels to remove them from the market.

**EXAMPLE: SUBSEA 7 CASH FLOW SNAPSHOTS, 2016 VERSUS 2019**

At the end of 2016 Subsea 7 had $1676 million on its balance sheet compared to $947 million at the end of 2015 (Fig. 8.2). Earnings before interest tax depreciation and amortization were $1142 million. Capital spending for the year for vessels and equipment and related long-term purchases was $300 million; repurchase of notes was $106 million, and taxes paid were $141 million.
Cash on hand at July 1, 2019 was $420 million, and at September 30, 2019 was $367 million (Fig. 8.3). Tax paid, capital spending, acquisition cost, share repurchases, repayment of borrowing, and lease payments are depicted. Net cash at September 30, 2019 was $127 million, excluding $368 million of lease liabilities; net debt was $241 million, including lease liabilities; undrawn revolving credit facility was $656 million.
8.1.3 BUSINESS RISK

The different types of business segments that make up a company and the different companies that comprise the industry entail different degrees of business risk in the sector and result in varying levels of cash flow volatility. The total revenue generated from all company (and subsidiary) activities must be adequate to service corporate debt in times of low demand, or the firm will be forced to issue additional debt or sell assets. Offshore contractors generally maintain sizable credit facilities, primarily for acquisitions and capital spending, because business lines require steady working capital. If companies are unable to refinance maturing debt or to renew their bank lines, they will be pressed to meet their debt obligations and distributions.

Cash flow volatility and a company’s ability to repay its debt or acquire additional credit facilities are a main source of business risk and serve as the primary indicator of corporate credit ratings. Credit rating is directly related to a company’s cost to raise capital and access credit markets. Companies with a strong credit rating can acquire greater capital and at a lower cost than companies with lower ratings. Business risk often varies within the same business activity depending on supply and demand fundamentals, the quality of contracts, strength and diversity of customers, geographic diversity, competition, regulatory risk, and significance of market-driven revenues.

Companies that expand into new business lines and acquire additional vessels may have higher exposure to commodity price and volume risk, which increase their business risk to grow and pursue other opportunities (Box 8.1). Legacy vessels are long-lived assets that generally have low reinvestment needs but are constrained in their ability to compete against newer vessels. Over any given period, vessel use may not result in adequate cash flows to pay off debt, in which case revolving bank loans may be needed or asset sales to meet obligations. If the daily revenue made by leasing a vessel exceeds its operating cost, the firm will choose to operate the vessel.

BOX 8.1 AMAZING GRACE ON THE WAY?

Edward Heerema thinks big is better and may take another calculated gamble, this one costing about $3.5 billion. After building the world’s largest construction vessel, the Pioneering Spirit (see Box 6.1), Heerema is considering building an even larger vessel with a greater lifting capacity to lift the heaviest, widest, and largest topsides in the world.

There are at least a dozen large platforms in the Northern North Sea that cannot be removed in a single-lift using Pioneering Spirit, either because the topside weight exceeds her capacity (e.g., Troll, Gullfaks, Sleipner, and Oseburg) or the platform size is simply too large (e.g., Thistle, Magnus, and Dunlin). These and several other large platforms worldwide continue to entice Mr. Heerema, who sees a business opportunity, albeit a risky one.

While the new vessel is still only a concept, Heerema indicated that Allseas was expected to make an investment decision by 2022. Once, and if built, the sister vessel will dwarf its older brother both in size and in lifting capacity with a beam of 160 m and topside lifting capacity of 72,000 t. Amazing Grace is not being designed for pipelay operations, nor does it have a jacket-lifting system like Pioneering Spirit, so its primary function will be highly specialized for the single-lift removal/installation of topsides. The vessel will have to make its money on a handful of extreme projects. The question is whether the jobs Heerema lines up will generate enough cash flows to pay the debt schedule on the investment and reward shareholders.
8.2 BUSINESS STRATEGIES

8.2.1 INTEGRATION

Fleet specification is usually associated with firm integration and firms with high-spec fleets are commonly integrated (Fig. 8.4). Integrated firms operate in nonpipelay segments and often provide engineering, procurement, and commissioning services. Firms that operate high specification fleets are frequently large and integrated, but there are exceptions. For example, Morrison has a low specification fleet but is relatively integrated and diversified because they operate in several onshore and offshore business segments.

The position of companies within the service integration and fleet specification space will change over time as well as with respect to one another. Several of the largest integrated construction contractors own and operate regional spoolbases to fabricate rigid and flexible pipeline to better compete for installation contracts (Box 8.2).

FIGURE 8.4

Construction service contractor integration and fleet specification market position c.2020.
BOX 8.2 GULF OF MEXICO SPOOLBASE FACILITIES

A spoolbase is a shore-based facility used to weld steel pipe for spooling onto a reel-lay or construction vessel. Locations are chosen based on demand requirements, access to a skilled workforce, channel length and depth, and connectivity to road, sea, and air transportation. In the Gulf of Mexico, buildings should be situated near the coastline and built for potential storm surge. Properties need to be long and close to deep navigational channels.

**Spoolbases**

Spoolbase facilities in the Gulf of Mexico c.2020 are found in Brownsville, Texas (Subsea 7); Mobile, Alabama (McDermott); and Theodore, Alabama (TechnipFMC). Facilities are owned by construction contractors that serve the deepwater Gulf of Mexico, and typically employ 50–100 permanent workers at each location, mostly high-paying welders (Table 8.1). The investment to construct a yard depends on the facilities and site conditions.

| Spoolbase                  | Inception | Owner       | Size |
|---------------------------|-----------|-------------|------|
| Theodore, Alabama         | 2000      | TechnipFMC  | 130 ac|
| Port Isabel, Texas        | 2009      | Subsea 7    | 58 ac|
| Pascagoula, Mississippi   | 2014      | McDermott  | 50 ac|
| Ingleside, Texas          | 2009      | EMAS        | 120 ac|

*EMAS purchased the Ingleside, Texas, spoolbase facility from Helix in 2013 and foreclosed in 2017.

Theodore, Alabama, spoolbase was constructed in 2000 for $10 million and sits on 130 ac near Mobile (Fig. 8.5). Port Isabel, on the Texas coast close to the Mexican border near Brownsville, is the site for Subsea 7’s pipeline spoolbase, which was reported to cost $40 million in 2009 (Fig. 8.6). The facility covers 58 ac and is 5000 ft long, including a 4000-ft stalk rack and 1000-ft fabrication building. McDermott’s facility started construction in 2014 and was operating in 2016 on a 50-ac site (Fig. 8.7).

**Fabrication**

The fabrication building houses the primary firing line and uses a hydraulic pipe pusher system to index pipe through the fabrication process and onto stalk storage racks. Pipe joints are beveled and girth welded together. Fabrication lines feature automatic, semi-automatic, and manual welding. Each weld is inspected using nondestructive examination techniques, usually automatic ultrasonic testing or radiography. Finally, field joint coating is applied after grit blasting and heating the weld region. This process continues until the pipe joints are assembled into a pipe stalk of approximately 1 km in length. The pipe stalks are stored until the reel-lay vessel is docked and ready for reeling.

**Reeling**

The reeling process begins with spooling of the pipeline onto the vessel. A stalk is pulled from the spoolbase onto the vessel and then plastically bent in a controlled manner around the reel. The process continues until the second end of the stalk reaches the end of spoolbase causeway. The end of that stalk is then welded to the start of the next stalk. Nondestructive examination of the weld is performed, and the field joint coating is applied. The process is repeated until the required length of pipeline has been spooled onto the vessel reel(s).

**Quay and Dock**

A quay and dock allow pipelay vessels to execute pipe spooling and mobilization of equipment and may also provide support to the company’s fleet of construction vessels in the region. The length of the quayside and dredging requirements are primary factors in construction cost.

(Continued)
FIGURE 8.5
TechnipFMC’s Theodore, Alabama, spoolbase facility.

From TechnipFMC.

FIGURE 8.6
Subsea 7’s Port Isabel, Texas, spoolbase facility.

From Subsea 7.
(Continued)
8.2.2 GROWTH PATHS

Companies grow organically by building on their core businesses and existing capabilities, through mergers and acquisitions, or a combination of approaches. Organic growth tends to be more controlled with less risk exposure (i.e., learning by doing or experience) but is also less able to adapt to rapid changes in industry dynamics. Mergers and acquisitions can deliver a step change in asset base and value, but risk exists on consolidating business lines and creating the synergies to extract value from the larger company. How many mergers and acquisitions really deliver on their purported value and savings? Unless value is created and sustained, stockholders are the primary losers, while those on the winning end include the senior management team who receive generous bonuses for execution and the institutions that facilitate the activity. Risks and opportunities arise in all paths.

8.2.3 VESSEL ACQUISITIONS

Contractors acquire vessels through newbuild programs and secondhand sales to expand their service offerings and to maintain the latest technology capability. The arrangements companies use to account for these investments are as varied as the vessels themselves. Like the marine logistics sector (Kaiser, 2015), leaseback and bareboat charters are common.
8.2.4 VESSEL SALES

Firms sell vessels to raise revenue, to divest older assets, to maintain specialization, and to reduce operating expenses. Since the world pipelay fleet is relatively small and the number of operators is limited, transactions in the secondhand market are sporadic and often complex to decipher. For distressed assets, the purchaser can acquire a vessel at a reduced price. Companies also sometimes buy bonds offered by a distressed firm in anticipation that the distressed firm will be unable to pay, and the company will then seek to receive one or more vessels during bankruptcy proceedings. These are low-cost, high-reward speculative bets with uncertain outcomes.

8.2.5 ALLIANCES AND PARTNERSHIPS

Alliances and partnership models attempt to improve cost savings and project performance through risk sharing and commercial collaboration between suppliers and producers. With EPCI companies and equipment suppliers increasingly compelled to take on a greater share of project risks, several subsea service companies have formed partnerships and joint ventures in recent years. Schlumberger’s acquisition of Cameron and Technip’s acquisition of FMC Technologies and the merger of Baker Hughes and General Electric furthered this trend of consolidation. One Subsea is an alliance among Schlumberger, Cameron, and Subsea 7; Saipem and Aker Solutions have also formed an alliance. In January 2018 General Electric announced its plans to spin-off or sell its Baker Hughes subsidiary.

8.2.6 JOINT VENTURES

Joint ventures are another mechanism to spread risks among multiple parties and to leverage firms’ assets and strengths. A joint venture is a business entity owned and operated by a small group of entities as a separate and specific business or project for the mutual benefit of the members of the group.
The typical purpose of a joint venture includes sharing risks and rewards, combining complementary technological knowledge, and pooling resources in developing regional markets or other facilities. Joint ventures are rare in the pipelay contracting industry, but Sapura Energy Berhad, an oil and gas services provider and relatively new entrant to offshore construction, has recently been involved in multiple joint ventures and operates pipelay vessels with Seadrill, a drilling contractor, and Larsen and Toubro, an Indian engineering firm.

8.2.7 Mergers and Acquisitions

Companies seek mergers and acquisitions as a source of growth opportunity, to expand horizontal and vertical integration or geographic presence, to take advantage of distressed assets, to consolidate in times of low demand and prices, and for various other reasons.

EXAMPLE: Mergers and Acquisition Activity, 2010—2019

In June 2010 Acergy, a UK provider of oil services, agreed to buy Subsea 7, a Norwegian firm, for $2.5 billion in shares, and the merger was finalized in January 2011. Executives from both Acergy and Subsea 7 were involved in the leadership of the merged company.

In September 2011 Technip agreed to acquire Global Industries for approximately $1 billion. At the time of purchase, Global Industries operated 14 vessels, including two newly built S-lay vessels and had strong market positions in the Gulf of Mexico, Asia, and the Middle East. Since the purchase, Technip has sold, scrapped, or no longer operates many of the vessels acquired.

In December 2014 J. Ray McDermott, S.A., a wholly owned subsidiary of McDermott International Inc., exercised its option to purchase Oceanteam’s 50% ownership interest in the entities that own the North Ocean 102 subsea construction vessel for $33 million.

In January 2016 Swiber Offshore Construction Pte. Ltd., a wholly owned subsidiary of Swiber Holdings Ltd., acquired 38% of the equity interest in Deltatek Offshore Limited, which became an associate of the company.

In January 2017 FMC Technologies and Technip completed a business combination agreement in which FMC Technologies, a private company that designs, manufactures, and services systems and products for subsea production and marine loading systems for the energy industry, and Technip, an integrated EPCI offshore service provider, merged to create a larger and more diversified company.

8.3 Risk Factors

Risks are defined as a potential future event that, if it occurs, will negatively impact business outcomes, also known as downside risk or threat. In this section, the primary downside risks related to business operations and financial conditions in the offshore construction industry are identified
The order is random. Opportunities that may arise from joint ventures, asset purchases, portfolio readjustments, entry into new markets, and related factors are not described.

### 8.3.1 FACTORS RELATED TO BUSINESS OPERATIONS

#### 8.3.1.1 Oil and gas prices

Activity in the offshore oil and gas sector is dependent on commodity prices, which are volatile and unpredictable (Box 8.3). When oil and gas prices decline, offshore exploration activity responds and demand for services decline, but because of the long lead times and contract terms for offshore projects, there are typically longer delays between price signals and responses compared to onshore activity. Significant regional differences also exist in capital spending responses.
For example, in the U.S. Gulf of Mexico, the response is quicker in shallow water than in deepwater, and internationally where National Oil Companies are dominant (e.g., Brazil, Persian Gulf), the delay will typically be longer.

**BOX 8.3 A FEW WORDS ON OIL MARKETS AND CRUDE PRICES**

The crude oil market is composed of a physical market and a financial market (Fig. 8.9). The oil market is separate and distinct from the products market and linked via the refining sector and the financial markets (Geman, 2005; Kaminski, 2012; Swindle, 2014). Thousands of producers, refiners, marketers, brokers, traders, and consumers buy and sell physical volumes of crude oil and petroleum products throughout the chain of production. These interactions and the relationships and expectations of the various buyers and sellers lead to the market prices for current and future deliveries of oil.

![Figure 8.9](Continued)
an inherent aspect of all commodity markets (Geman, 2005; Hermann et al., 2010). No one knows—or should pretend to know for that matter—the future price of crude oil.

Crude oil and petroleum products are global commodities, and as such, their prices are determined primarily by supply and demand factors on a worldwide basis (Kenny, 2011). There are periods when the price of oil is relatively stable, and other periods when the price is highly volatile and changing quickly. For some periods, governments and organizations have been able to control prices to reduce volatility, but for much of the history of the oil market, the success of price control has been limited. In 2020, the impact of the latest and greatest Chinese virus, SARS-CoV-2 (coronavirus-19), has caused significant market disruptions and hardships worldwide, and its full effect on oil prices over the next year or two is likely to be significant.

Crude oil prices react to a variety of geopolitical and economic events, but the extent and duration of the impacts are not predictable. Major drivers of high oil prices are generally recognized to be high global economic activity, resulting in crude demand exceeding or approaching supply; low levels of storage, which prevent shocks and market imbalances to be quickly absorbed; OPEC pricing decisions; and war/turmoil. Which factors are the most dominant at any point in time and to what extent they impact the market are subject to endless debate and speculation. In almost all cases, their effects cannot be quantified or reliably predicted, and efforts at forecasting are fanciful at best.

Crude prices are also impacted by the business cycle that characterizes the capital investments required to find and develop crude oil. High prices create greater revenue for oil producers and allow companies to invest additional capital in exploration and development to find and produce more petroleum. At the same time, high crude prices are passed on to the consumer in higher product prices that reduce demand, thus reducing demand for crude oil and pressuring crude prices downward. The time delay between spending capital and producing crude and the cycle imbalance between supply and demand inevitably lead to changing market prices. Over the long term, additional factors enter and perturb the cycle, including technology changes, geopolitical events, regulatory conditions, and so on.
8.3.1.2 Prospectivity
As development activity and production declines in a region, the need for pipeline installation will also decline, while regions with high levels of exploration and development and growing production will typically require greater pipeline capacity. In offshore regions with significant FPSO development, such as Brazil, West Africa, and Southeast Asia, shuttle tankers are the primary means for oil export, and most of the pipelay work is associated with subsea wells and gas export. If regional gas markets are not available or sufficiently developed, gas will be reinjected into the reservoir and gas export lines will not be needed. In a few cases, floating LNG facilities may be constructed.

8.3.1.3 Weather
Marine operations are typically seasonal and dependent on weather conditions. Contractors operating in the U.S. Gulf of Mexico, for example, experience lower vessel utilization rates during the winter and early spring when weather conditions are least favorable for operations. Contractors typically bear the risk of delays caused by some, but not all, adverse weather conditions; hurricane activity is often covered by Force Majeure clauses.

8.3.1.4 Capital intensity
Offshore construction capacity requires investment in expensive, specialized vessels that are long lived, not frequently used, and compete against other vessels that perform similar activities. Some vessels may not be capable of serving all markets and may require additional maintenance and capital expenditures due to age or other factors, creating periods of downtime. Vessel construction is often financed through debt, and, as a result, firms may be highly leveraged. Because of the cyclic nature of the industry, this can cause cash flow problems for firms at times of low demand. Newer and more technologically advanced vessels are often in higher demand, require less maintenance, and have a higher uptime than older vessels. Companies that are unable to manage their fleet efficiently and find profitable opportunities for their vessels will have deteriorating operations, and their financial position and cash flows could be adversely affected.

8.3.1.5 New business lines
Companies that expand into new business lines may be exposed to business and operational risks that are different from those experienced historically. Management may not be able to effectively manage these additional risks or implement successful business strategies in new lines of business. Competitors in new lines of business may possess substantially greater operational knowledge, resources, and experience than the company.

8.3.1.6 Joint ventures
Joint ventures in foreign areas with local companies may be a requirement in doing business. Though the joint venture partner may provide local knowledge and experience, entering into joint ventures requires a company to surrender a measure of control over the assets and operations devoted to the joint venture, and occasions may arise when disagreements over the business goals and objectives occur, which could make the continuation of the relationship unwise or untenable.
Assets dedicated to the joint venture may be at risk or affect the continuity of business. Unwinding a joint venture may prove difficult or subject to a partial or complete loss.

8.3.1.7 International operations

International operations are exposed to risks that are not typically experienced in domestic operations such as changes in currency valuation, government expropriation, terrorism, complications associated with remote operations and changing regulatory requirements, especially cabotage laws. Changing political conditions and changing laws and policies may affect trade and investment.

8.3.1.8 Customer base

Offshore contractors may derive a significant amount of revenues and profit from a relatively small number of customers. Problems or cutbacks from one or more customers may materially impact business operations. Customers change over time as contracts are fulfilled, but, if new contracts are not replaced or found, financial conditions and cash flows could be adversely affected. Loss of a major customer may adversely impact financial conditions.

8.3.1.9 Marine operations

Marine operations are inherently risky, and vessels can suffer damage, grounding or sinking during operations. Storms and hurricanes greatly increase these risks. Vessels are insured against most losses. If vessels are the only means by which firms generate revenue, loss or damage to a vessel may result in a relatively long-term impairment of cash flow.

8.3.1.10 Regional development

As oil and gas-producing regions mature and new discoveries decline, the number of new developments declines along with the demand for construction services. As a result, pipeline contractors will periodically reposition their fleets to take advantage of new geographic opportunities, but it may not be cost effective to reposition vessels and build out port facilities, especially for low-spec barges, or where a high degree of competition already exists. Field developments in regions that do not have extensive export pipelines, such as West Africa and the South China Sea, require a different vessel fleet to perform offshore work.

8.3.1.11 Consolidation

Oil and gas companies and energy service companies periodically undergo consolidation. Consolidation reduces the number of customers for a company’s equipment and may negatively affect exploration, development, and production activity, which could adversely affect demand for pipeline services.

8.3.1.12 Competition

High levels of competition can depress charter and vessel day rates and utilization and adversely affect financial performance. Construction service companies compete on the basis of price, reputation, quality, technical capabilities and availability of vessels, safety and efficiency, and national flag preference. Competition in international markets may be adversely affected by regulations,
flagging, ownership and control of vessels, and various local content restrictions on construction, awarding contracts, employment, and purchase of supplies.

8.3.1.13 New entrants
New entrants increase competition. Market entry is capital intensive, however, because vessel construction is expensive and establishing experienced crews requires time, which provides protection to current participants and reduces the frequency of new entrants, but once new vessel capacity is constructed, it will continue to impact the market for a substantial period of time. Asset sales, upgrades, and modifications are common and contribute to varying levels of market supply and competition over time.

8.3.1.14 Vessel construction and upgrades
Vessel construction, upgrade, refurbishment, and repair projects are subject to risks, including delays and cost overruns that can have an adverse impact on a firm’s cash resources and results of operations. These risks may result from shipyard delays and performance issues, shortages of skilled labor, failures or delays of third-party equipment vendors or service providers, unanticipated change orders, design and engineering problems, work stoppages, and unforeseen increases in the cost of equipment, labor, and raw materials. Vessels undergoing upgrades, refurbishment, and repair activities do not earn revenue when they are out of service.

8.3.1.15 Overcapacity
Excess construction vessel capacity usually exerts downward pressure on day rates and contract prices in competitive markets. Excess capacity can occur when newly constructed vessels enter regional fleets or when vessels are moved between regions. An increase in vessel capacity without a corresponding increase in demand could result in an oversupplied condition, which may have the effect of lowering charter rates and use, which, in turn, would result in lower revenues.

8.3.1.16 Acquisition risks
Acquisitions may incur substantial indebtedness or equity (i.e., stock) to finance, which may impose a significant burden on operations and financial conditions. It may not be possible to successfully consolidate the operations and assets of an acquired business or vessel within existing business lines. Acquisitions may not perform as expected and may be dilutive to operating results. Management may not be able to effectively manage a substantially larger business or successfully operate a new line of business.

8.3.1.17 Restricted markets
Many markets have regulatory or political barriers to market entry, and this is often the case when the E&P market is state run. For example, Brazil, Mexico, and Nigeria all have local content laws that make market entry difficult. Joint ventures with state-run firms may be pursued, but these are subject to risk of compliance and issues related to joint ventures. Cabotage laws are another means to restrict access to market participants.
8.3.1.18 Contracting

EPCI contractors entail a significant risk of cost overruns since the contractor agrees to provide a fully functional pipeline (or other offshore infrastructure) to the customer at a specified price and time. Most cost risk associated with weather delays, pipe quality, subcontracting delays, cost inflation, or installation problems are borne by the contractor, with certain specified exceptions (e.g., hurricanes). To compensate for this increased risk, EPCI contracts command a price premium. Smaller firms are either technically unable to conduct the engineering and project management associated with EPCI contracts or are unwilling to take on the risk associated with potential cost overruns. Change order awards are common and can have a negative effect on revenue if change orders are under dispute or not resolved in the contractor’s favor.

8.3.1.19 Unconventional production

The rise in the production of unconventional crude oil and natural gas resources in North America and the commissioning of several new liquefied natural gas export facilities around the world may contribute to oversupplied oil and gas markets. Prolonged increases in the worldwide supply of crude oil and natural gas, whether from conventional or unconventional sources, without a commensurate growth in demand will act to depress prices. Prolonged periods of low prices will likely have a negative impact on development plans and may result in a decrease in demand for offshore construction services.

8.3.2 FACTORS RELATED TO FINANCIAL CONDITIONS

8.3.2.1 Reduced lending

Credit risk that develops in distressed industries will transfer to the facilities that provide loans. Credit facilities and lenders under stress may reduce their loan exposures to the energy sector and impose increased lending standards, collateral requirements, or refuse to extend new credit or amend existing credit facilities. All these factors may complicate the ability of borrowers to achieve a favorable outcome in negotiating solutions to stressed credits.

8.3.2.2 Debt and funded debt levels

Debt and funded debt levels and debt service obligations can have negative consequences, including requiring a company to dedicate significant cash flow from operations to the payment of principal, interest, and other amounts payable; making it more difficult to obtain necessary future financing; reducing a company’s flexibility in planning or reacting to changes in the industry or market conditions; making a company more vulnerable to downturns; and exposing a company to increased interest rate risk for variable interest rate loans.

8.3.2.3 Letter of credit capacity

EPCI contractors are often required to post letters of credit to customers which indemnify customers should the company fail to perform its obligations under the applicable contracts. If a letter of credit is required for a project, but the contractor is unable to obtain it due to insufficient liquidity or other reasons, the contractor may not be able to pursue that project. The market capacity for letters of credit is limited, and letters of credit may be difficult to obtain or may only be available at
significant cost. Inability to obtain adequate letters of credit could have an adverse effect on a contractor’s business, financial condition, and results of operations.

8.3.2.4 Foreign exchange risk
Contractors that work on a worldwide basis with substantial operations outside their domestic market are subject to currency exchange risk. To manage some of the risks associated with foreign currency exchange rates, companies may enter foreign currency derivative instruments, but these actions may not always eliminate all currency risk exposure. A disruption in the foreign currency market could adversely affect hedging instruments and subject a contractor to additional currency risk exposure.

8.3.2.5 Counterparty risk
Companies with significant international operations may enter into various financial derivative contracts that involve credit risk associated with hedging counterparties.

8.4 CORPORATE SNAPSHOTS
8.4.1 PUBLIC FIRMS
8.4.1.1 DOF Group
DOF Group ASA organizes itself into subsea projects and vessel chartering business segments. Subsea projects cover operations in the Asia Pacific region, the Atlantic region, Brazil, and North America. Vessel chartering is managed and operated by DOF Management (associated company) and Norskan (sister company). In 2018 DOF operated a fleet of 28 subsea vessels, 18 AHTS, 18 PSVs, and 67 ROVs.

8.4.1.2 McDermott International
McDermott International is incorporated under the laws of Panama and operates globally through one or more subsidiaries focusing primarily on designing, constructing, and installing offshore oil and gas projects (fixed and floating structures, pipelines, subsea systems) but also pursues projects through ventures with other parties in new industries and regions. McDermott’s reporting segments are geographic and grouped according to North, Central and South America; Russia and Caspian; the Middle East and North Africa; and Asia.

8.4.1.3 Saipem
Saipem S.p.A. is a diversified Italian company that is a major player in offshore drilling, construction, heavy lift, and pipelay markets. Saipem reports its business activities in four market segments: offshore construction and engineering, onshore construction and engineering, offshore drilling, and onshore drilling. Construction and engineering represent integrated services from design, procurement, management, and construction services principally to the oil and gas, civil and marine infrastructure, and environmental markets. Offshore construction and engineering are typically the largest of Saipem’s four operating segments.
8.4.1.4 Sapura Energy Berhad

Sapura Energy Berhad is a Malaysian integrated offshore services firm that conducts drilling, EPCI services, fabrication, and explores and produces hydrocarbon resources. They are involved in Southeast Asia, India, Australia and Latin America. In 2013 SapuraKencana began accepting delivery of a variety of marine vessels and as of 2019 has a fleet of six pipelay vessels, six derrick vessels, four dive support vessels, one subsea construction vessel, two AHTS, and various other support vessels.

8.4.1.5 Solstad Rederi

Solstad Rederi A.S. was established in 1964 by Captain Solstad and in 1997 was listed on the Oslo Stock Exchange under the name Solstad Offshore ASA. In 2016 the Aker Group entered as majority owner and merged with Rem Offshore ASA. The company offers integrated shipping to petroleum and renewable energy activities using their own or chartered vessels. A merger with Farstad Shipping and Deep Sea Supply was completed in 2018. Solstad’s fleet is currently divided into four segments: strategic, international, subsea and renewable, and aquaculture. The strategic segment focuses on AHTS and PSV operations in Brazil, Norway, and Australia. The international segment covers West Africa, North Sea, Southeast Asia, Mediterranean, and Americas. Total fleet c.2019 is composed of 45 AHTS, 61 PSVs, 33 subsea, and 10 aquaculture vessels.

8.4.1.6 Subsea 7

Subsea 7 S.A. is a UK firm headquartered in London. The company operates a fleet of 33 high specification subsea construction and inspection vessels of which 18 have pipelay capacity c.2020. Company operations concentrate on the markets in subsea equipment, umbilicals, risers and flowlines; life-of-field, hook-up, ROV and intervention support; renewables, heavy lifting and decommissioning. Subsea 7 operates globally with a strong presence in the North Sea, West Africa, and Brazil; however, they also operate in the Gulf of Mexico and own a spoolbase in Port Isabel, Texas. The SURF and conventional segment usually account for the majority of operating revenues.

8.4.1.7 Swiber Holdings

Swiber Holdings Ltd. is an EPCI contractor headquartered in Singapore with international operations but is much smaller than the largest public players in the market. Swiber operates three major segments, including construction, charter hire, and diving services. Pipelay activities are included in the construction segment and normally accounts for the majority of total revenues.

8.4.1.8 TechnipFMC

TechnipFMC plc is a diversified French company that carries out a broad range of activities in the oil and gas sector. In 2019 TechnipFMC reported four business segments: subsea, onshore/offshore, surface technologies, and corporate. The subsea segment includes products and systems used to control the flow of oil and gas from the reservoir to the host facility and integrated design, engineering, manufacturing, and installation services for infrastructure and subsea pipe systems. The onshore/offshore segment includes gas processing, petrochemicals, and refining engineering and facilities, and the design, manufacture, and installation of fixed and floating production units and natural gas
liquefaction facilities. Offshore combines EPC and project management within the entire range of fixed and floating facilities. Surface technologies include the products and services used in offshore exploration and production such as wellhead systems and high-pressure valves and pumps used in stimulation. TechnipFMC’s subsea and onshore/offshore segments accounted for about three-fourths of its 2019 revenues, and although TechnipFMC has no direct connection with the French E&P major Total, it is frequently the contractor of choice for many of its projects.

8.4.2 PRIVATE FIRMS

8.4.2.1 Allseas Group
Edward Heerema founded Allseas Group S.A. in 1985 after departing the Heerema Group (headed by his brother) in 1984 and signing a 10-year noncompete clause. Edward Heerema is the sole owner and president of the company, which operates a fleet of specialized pipelay and support vessels designed and developed in-house. Allseas has three high specification deepwater pipelay vessels (*Solitaire*, *Audacia*, and *Lovelay*), and three ultrahigh-spec vessels, including the *Pioneering Spirit*, the largest construction and pipelay vessel in the world capable of lifting topsides up to 48,000 t and jackets up to 20,000 t in a single piece.

8.4.2.2 Bisso Marine
In the 1870s Joseph Bisso began constructing wooden boats to ferry passengers and commodities across the Mississippi River in New Orleans, Louisiana, and by the 1940s the companies’ third generation began to support the emerging offshore oil and gas industry with pipeline installation, offshore construction, and diving services. In 2005 the companies’ fifth generation relocated the headquarters to Houston, Texas, and expanded operations worldwide.

8.4.2.3 Grup Servicii Petroliere
Grup Servicii Petroliere, member of the Upetrom Group, was established in 2004. The company operates a fleet of six (chartered) offshore drilling rigs, six supply and transportation vessels, and one DP2 derrick pipelay barge called *Big Foot*. The company is headquartered in Romania and operates in the Black Sea. Its first newbuilt vessel, *Ceona Amazon*, was delivered in early 2015 but was later sold to McDermott.

8.4.2.4 Heerema Marine Contractors
Constructora Heerema was established in 1948 and specialized in the construction and installation of drilling platforms on Lake Maracaibo, Venezuela. In 1978 Heerema commissioned the world’s first semi-submersible crane vessels *Balder* and *Hermod*, and in 1989 Heerema and McDermott created a joint venture called HeereMac to stay afloat during an economic downturn. In 1997 the HeereMac joint venture was terminated and operations continued under the name of Heerema Marine Contractors. After acquiring the *SSCV Thialf* (ex DB102) from McDermott, *Balder* was converted into an advanced Deepwater Construction Vessel now known as *DCV Balder*. In 2013 the *DCV Aegir* was added to Heerema’s fleet, and the two crane *SSCV Sleipner* was added in 2019.
8.4.2.5 Morrison, Oceanic Marine Contractors, Sea Trucks, Telford Offshore, Van Oord

Morrison (formerly Chet Morrison) is a shallow-water Gulf of Mexico specialist with pipelay and other marine operations capability, fabrication services, land construction, and well services.

Oceanic Marine Contractors operates a single high specification barge that works primarily in the Persian Gulf, and Sea Trucks is primarily a West African offshore contractor.

Telford Offshore is headquartered in Dubai with subsidiaries throughout the world offering offshore accommodation and construction services. The company has three DP3 pipelay and accommodation vessels and have installed pipeline in Australia, Brunei, Argentina, Mexico, and Nigeria.

Van Oord is a civil engineering construction specialist that entered the offshore pipelay market in 2012 with the delivery of the shallow-water pipelay barge Stingray, the only pipelay vessel in its fleet.

8.4.3 STATE-OWNED FIRMS

The Chinese National Offshore Oil Corporation Group is majority owned by the Chinese government and one of its four subsidiaries, CNOOC Offshore Oil Engineering Company, owns four pipelay vessels c.2020. Shares of the subsidiaries are traded on the Hong Kong Stock Exchange. CNOOC operates its pipelay fleet within Chinese territorial waters and does not currently lease the vessels to outside E&P firms.

8.4.4 RECENT DEPARTURES

Several firms with pipelay installation capacity left the market between 2009 and 2019, including Boskalis (a marine construction and dredging firm), Ceona (a privately held pipelay specialist), International Marine Contractors (a supply and utility boat operator), and Oceaneering (an offshore engineering services provider).

On March 3, 2015 Cal Dive International, Inc. and five of its subsidiaries that provided diving, pipelay, platform installation and salvage, and light well intervention services filed for relief under Chapter 11 of the U.S. Bankruptcy code. The Houston-based company listed $286 million in secured debt during its Chapter 11 filing, and most of its fleet of ships and businesses were sold for $46 million. On February 7, 2017 Cal Dive asked the bankruptcy judge to convert the case to Chapter 7 liquidation because it had no remaining assets and wanted to wind down the business.

EMAS Offshore Limited (EOL) was incorporated in February 2007 to provide offshore services to the oil and gas industry in Asia Pacific and Africa. EOL is owned by Ezra Holding’s Limited of Singapore and has business segments in offshore support vessels, marine (shipyard) services, and subsea services. EOL did not release a 2017 annual report due to financial exigency, and in 2018 the Oslo stock exchange delisted the company and the CFO resigned. Ezra’s discussion with various stakeholders to obtain additional working capital has not been successful, and it appears Ezra and EOL may not be able to continue as a going concern. In 2019 proposed investment by its wholly owned subsidiaries EMAS Offshore Pte Ltd and Udenna Corporation was terminated.
REFERENCES
BP, 2019. Statistical Review of World Energy. BP, London.
Geman, H., 2005. Commodities and Commodity Derivatives. John Wiley and Sons, Chichester.
Hermann, L., Dunphy, E., Copus, J., 2010. Oil and Gas for Beginners: A Guide to the Oil and Gas Industry. Deutsche Bank, Frankfurt.
Kaiser, M.J., 2015. Offshore Service Industry and Logistics Modeling in the Gulf of Mexico. Springer-Verlag, London.
Kaiser, M.J., Liu, M., 2018. Global offshore pipeline construction service market review 2017 — part II. Ships Offshore Struct. 13 (1), 96—118.
Kaminski, V., 2012. Energy Markets. Incisive Media, London.
Kenny, N., 2011. Energy Fundamentals: Understanding the Oil and Gas Industries. Energy Intelligence Research, New York.
Swindle, G., 2014. Valuation and Risk Management in Energy Markets. Cambridge University Press, New York.