

strategy&

Thriving on disruption

&

**Building a
capabilities-led
strategy in the
design and
engineering
industry**



pwc

Contacts

Amsterdam

Marco Kesteloo
Partner, PwC Netherlands
+31-88-792-2921
marco.kesteloo
@strategyand.nl.pwc.com

DC

Joseph van den Berg
Principal, PwC US
+1-703-682-5710
joseph.vandenberg
@pwc.com

Dubai

Marwan Bejjani
Principal, PwC UAE
+971-4-390-0260
marwan.bejjani
@pwc.com

Kuala Lumpur

Edward Clayton
Partner, PwC Malaysia
+60-3-2095-3188
edward.clayton
@strategyand.pwc.com

London

Matt Alabaster
Partner, PwC UK
+44-7866-727-124
matthew.alabaster
@pwc.com

Andre Medeiros
Partner, PwC UK
+44-20-7212-5512
andre.m.medeiros
@pwc.com

Kevin Stansfield
Principal, PwC UK
+44-79-0016-3429
kevin.stansfield
@pwc.com

San Francisco

Bert Shelton
Managing Director, PwC US
+1-415-653-3530
bert.shelton@pwc.com

Singapore

Richard Skinner
Partner, PwC Singapore
+65-6236-4299
richard.skinner
@sg.pwc.com

Sydney

Dominik Baumeister
Partner, PwC Australia
+61-428-644-938
dominik.baumeister
@pwc.com

About the authors

Andre Medeiros is an advisor to executives with Strategy&, PwC's strategy consulting business. He is a partner with PwC UK. Based in London, he works with clients in service-oriented industries on questions of corporate growth strategy and operating model transformation. He has extensive experience serving the global design and engineering sector and a deep understanding of the sector's evolving competitive dynamics.

Kevin Stansfield is a specialist in strategy, performance improvement, and operating model design with Strategy&. A principal with PwC UK, he is based in London, where he focuses on the industrial and consumer sectors. He has broad experience with engineering services clients across Europe, North America, and Asia.

Miles Tackett, a senior manager with PwC UK in London, and Mao Isobe, an associate with PwC UK in London, also contributed to this report.

Executive summary



The design and engineering (D&E) industry is going through a period of rising revenues but declining profits, a period that began with the global financial crisis of 2008–09 but has largely been the result of a perfect storm of factors. These factors include a market preference for bringing in one firm to fulfill all of the requirements of a design and build contract — as opposed to paying firms separately for design and construction contracts — as well as less global demand for building new greenfield structures. And although technology can create new demands, it has also led to simplification and modularization of designs, so that customers have less need to hire D&E firms at premium prices. Significant portions of the work have become commoditized, resulting in a climate where most firms are forced to compete largely on price, rather than on excellence of design and execution, as D&E firms have traditionally done. Yet few have been able to create high-volume businesses that turn a consistent profit.

Although D&E firms know they need to adapt to change, recent efforts to achieve scale through consolidation haven't been as effective as they could be in boosting profits and productivity. What most firms need is a more strategic plan for achieving scale — an economy of scale that comes from investing strictly in assets and acquisitions that will strengthen the areas where the company excels, so that it develops what we call a “right to win” in select, targeted markets. The plan revolves around three imperatives: build scale where you have a right to win; invest in getting the operating model right; and have an explicit strategy for technology and innovation.

A tipping point

International design and engineering (D&E) firms have been struggling to regain the buoyant earnings they enjoyed just before the global financial crisis. Global construction output — the primary driver of demand in the industry — has rebounded beyond 2008 levels, and is growing once again at 3 to 4 percent a year. Sector revenues now exceed pre-crisis levels, yet profit margins have been in decline (*see Exhibit 1, next page*).

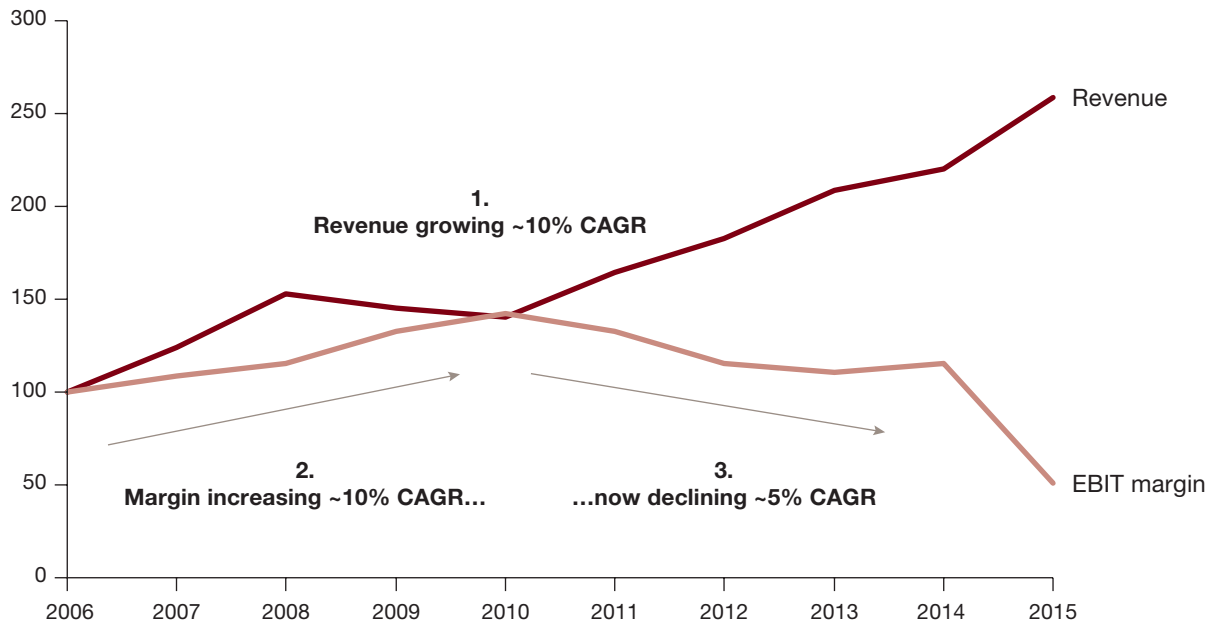
What is happening is an indication of irreversible change taking place in the industry. Global recovery has been able to drive growth in demand, but the price sensitivity of clients has not gone away. Increasingly, D&E firms are finding that winning work is largely a matter of offering the lowest bid. With the pressure to take on more projects for lower fees than in the past, they have not been able to structurally lower their operating costs at the pace necessary to increase their profits.

D&E services are becoming a smaller slice of the pie as demand shifts away from greenfield — or new-build — assets to projects that involve repurposing and extension of existing assets. This is particularly the case in Western economies. The proportion of new-build spending available for traditional design activities is also diminishing. This is driven in part by a change in procurement preferences as the market shifts away from separate contracts for designing and building in favor of integrated design and build contracts. At the same time, there is a gradual expansion upstream in the scope and capabilities of the contracting firm (*see Exhibit 2, page 7*).

Technology has also played a disruptive role. The introduction of common data prototypes such as building information modeling (BIM), which is now firmly established as an industry standard, has laid the groundwork for standardization, component libraries, automation, and work sharing. Offshoring of work packages, and associated labor arbitrage, is commonplace across the industry, with companies sometimes submitting bids with more than 50 percent of work hours delivered in remote locations. The associated bottom-line impact —

Exhibit 1
Revenue and margin trends of international diversified D&E firms

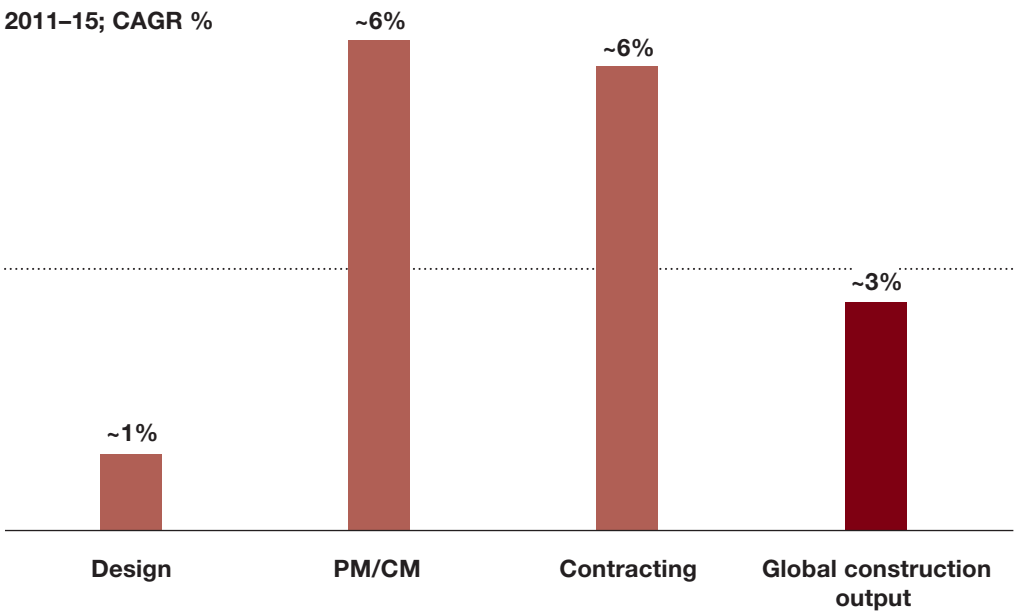
2006–15; indexed
Index (2006 = 100)



Note: CAGR = compound annual growth rate.

Source: Bloomberg;
company annual reports;
Strategy& analysis

Exhibit 2
Estimated market growth for selected D&E services



Note: List of services is not exhaustive; hence, individual averages in aggregate do not reconcile with global construction output.

Source: Engineering News-Record (ENR) 2012, 2016; Oxford Economics; Bloomberg; Strategy& analysis

typically through lower cost design, complexity management, and faster delivery — is not yet consistently realized, although it is improving. This is catalyzing a shift in the role of the engineer away from the traditional focus on technical excellence and de novo design; engineers now also need capabilities involving technological know-how and integration. Solutions that drive further simplification and modularization such as design for manufacturing and assembly and 3D printing promise to reduce the traditional role of the engineer even more.

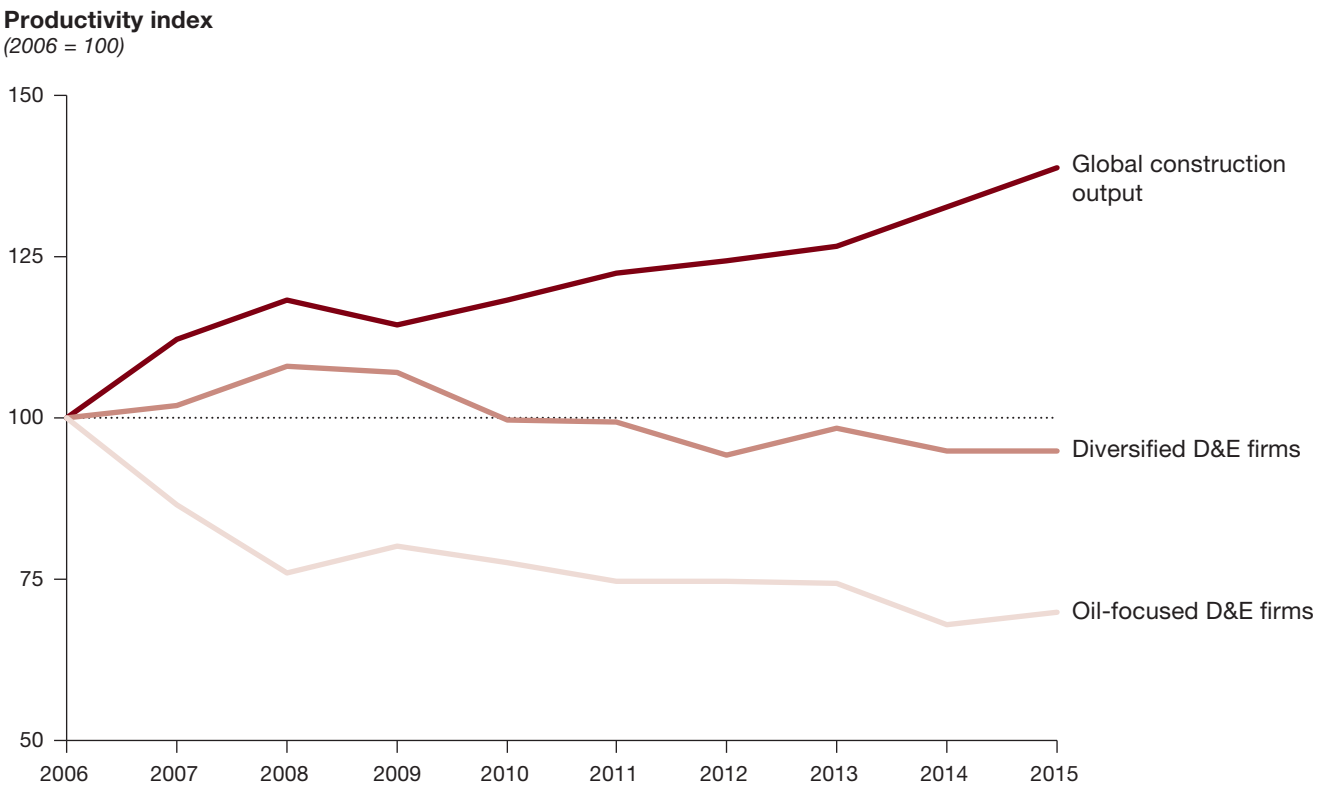
Furthermore, as all but the most complex technical capabilities become commonplace across the industry, significant portions of design work have become commoditized. Large D&E companies are facing increasing competition, not only from one another, but also from design and build contractors and “upskilled” local competitors with a lower cost base than the larger firms. For most client needs, and most project types, it is no longer possible to establish meaningful technical differentiation — i.e., differentiation sufficient enough to justify charging a premium. The exceptions to the downward price trend are projects that require truly bespoke solutions, such as advisory work, or roles along the construction value chain that include heavy stakeholder interaction (for example, program management).

D&E companies recognize that they must adapt to this changing world. Some firms have turned to new business models, with varying degrees of success. Examples of new business models include integrating operations into a one-stop shop across the value chain; establishing an accompanying investment arm; and shifting from discrete service provision to integrated solutions. Yet most firms continue to simply pursue growth at all costs, a race to the bottom in local, undifferentiated markets. It is not surprising that there has been a decline in productivity over the last 10 years (*see Exhibit 3, next page*).

Compounding the urgency to find a way to boost productivity and profitability is a high degree of macroeconomic and political uncertainty in the world. Although construction demand has been on the rise since 2010, the slowdowns across Asia, the Middle East, and Latin America have begun to hamper that demand. In some markets, midsize and smaller players are dependent on the value of local resources. In addition, new civil and infrastructure programs are increasingly susceptible to political pressure and public sector austerity. For example, the U.S. and U.K. have recently seen their lowest proportion of public sector construction spending, although ongoing political developments may herald a slight reversal of public sector infrastructure spending levels, or increased support for public–private initiatives. In the Middle East, low oil prices and the cost of regional military interventions are forcing economies to cut major investment programs or at least put them on hold.

For most client needs, and most project types, it is no longer possible to establish meaningful technical differentiation.

Exhibit 3
Average industry productivity of international D&E firms



Note: Productivity =
net sales per employee.

Source: Bloomberg;
company annual reports;
Strategy& analysis

The race to scale

Many design and engineering firms have sought to counteract market pressures by building scale through acquisition. There has been a wave of consolidation over the last decade or so, resembling the early stages of the rollups that took place in the assurance industry and in strategy consulting.

The consolidation in D&E is driven by the pursuit of growth in slowing markets, not by client needs — clients do not value scale for scale's sake. As options for profitable organic growth diminish, players are seeking other sources of value. Many publicly listed acquirers have taken advantage of capital markets arbitrage, exploiting differences between their own relatively high valuation multiple and that of a more risk-averse, privately held target (typically lower). Longer term, the consolidation is providing value through economies of scale in resource pools, greater cross-boundary leverage of skills and expertise, and volume benefits across the companies' fixed investments.

The most prevalent example has been the emergence of Aecom as a global one-stop shop powerhouse. The company, headquartered in Los Angeles, began as a spin-off from Ashland Inc. of Ashland, Ky., in 1990, and has seen unparalleled growth in recent years through major acquisitions including Earth Tech (2008), Davis Langdon (2010), Tishman Construction (2010), and, most recently, URS (2014). Other firms have been following suit, including Arcadis (most recently acquiring Hyder), Amec (Foster Wheeler), and Stantec (MWH Global).

Yet for the most part, consolidation hasn't led to the expected competitive advantages. We see a way to get there, however.

Our approach requires an integrated operating model built around a plan for strengthening the company's greatest capabilities. In practice, this means taking a few steps back before a company jumps into the race for scale, and asking a couple of questions: What are we good at? What do we want to be good at?

From there, the company must create a fully integrated business in which every division, every offering, and every regional office has a clear role in the overall strategy. Most international design firms still operate as an amalgamation of local businesses. Few have truly integrated their non-client-facing activities, even at a regional level — and certainly not their client-facing activities (e.g., account management, resource deployment, and marketing).

It is understandably difficult to achieve this kind of integration in an industry in which clients value local experience (and often local presence) over and above an international track record, for all but the most complex or “signature” work. Furthermore, it takes time to successfully integrate two large organizations and extract the benefits, and frequently this integration is only partly achieved before management time and attention moves on to the next internal initiative or the next acquisition target.

However, we have found that if they have a plan for growth, D&E firms can achieve the scale and efficiencies they’ll need for a rapidly changing world. We have broken down the growth plan into three broad strategic imperatives: Build scale where you have a “right to win”; invest in getting the operating model right; and, related to your right to win, have an explicit strategy for technology and innovation. Each of these imperatives, outlined below, is designed to fuel more in-depth discussion about what the firm wants to be and how to reach its goals.

Build scale...but only where you have a right to win

Determining where you have a right to win means identifying the areas of expertise where the firm excels, or would like to excel. Are there specific services for which your clients are consistently prepared to pay you premium fees? Are you able to deliver certain offerings at the lowest price and still achieve higher margins than your competitors? Are there particular markets in which your reputation and relationships help you win work at lower cost? When you have a clear sense of what your firm does best, you can then cut back elsewhere and invest in the acquisitions and other assets that will help you gain an edge in the most important areas.

Some firms might find that their right to win lies in high-volume, lower-cost work. They can win with a business model that consistently focuses on scale. The effective return from investments in core fixed assets such as BIM, ERP, and remote design centers increases along with the volume of work. This is also the case for investments in differentiating

capabilities — megaproject management, for example — in which specific individuals or teams can be leveraged across a greater volume of work.

Considering where you have a right to win also applies to your strategy for acquiring offshoring facilities. The decision should be based on whether a facility will be helpful in enhancing your capabilities rather than just on whether it will cut design or production costs. An offshore design center should offer expertise and scale in your specific lines of business, and should be integrated into the firm's overall strategy.

Invest in getting the operating model right

International design firms often seek growth and performance improvement by adding to their business portfolios, rather than tuning their operating models. However, the true value and necessity typically lie in addressing the latter.

As we've noted, the high transaction volume in the sector has led to a large degree of disconnection inside many firms, exacerbated by the fact that most players operate in multiple market segments, often with very different characteristics when it comes to such areas as client needs, buying behaviors, and competitive dynamics. They grapple with centralization versus decentralization, global versus local, sector- versus geography-based, low cost versus best in class, and so on.

A single consistent operating model, and the associated scale that it brings, affords economic advantage and the potential for functional optimization and continuous improvement. Yet this "one size fits all" approach can also destroy value, resulting in an operating model that neither is truly competitive in any one business, nor can flex and adapt with the market. So, more than ever, it's crucial to get the operating model right.

The starting point is setting a clear strategy based on where the firm is going to focus its efforts, build scale, and establish a right to win. If, for example, you are targeting a specific technical segment in which you have the best people and the best track record, your operating model needs to be set up around connecting your experts to your clients. If your right to win is in a low-cost model, the operating model will revolve partly around low-cost delivery centers, but also around driving an efficient utilization model everywhere you operate.

Have an explicit strategy for technology and innovation

Technology is changing both the way firms function and how they provide services, but even more important, it is changing global infrastructure itself — in a way that is disrupting almost every industry. D&E is no exception. As recently as 10 years ago, the D&E industry did not need to seriously consider autonomous vehicles, distributed energy, smart materials, cyber resilience, or climate vulnerability. As in every other industry, changing customer needs are giving rise to new players entering the market.

According to early estimates, total technology spending across architecture, engineering, construction, and operations exceeded US\$5 billion in 2016, a significantly higher amount than in any previous year. The number of early-stage engineering and construction technology firms is proliferating, including in solutions around augmented reality, drones, and 3D printing. More significant for international design firms, however, are startups looking to disrupt the core activities of the sector. For example, one early-stage company is developing a central aggregation of historic bid values, price trends, and operations costs that will drive further transparency and pressure in bid pricing; another translates simple 2D sketches into 3D sketches, significantly reducing the number of hours of work for conceptual design. A third is focusing on collaboration tools for architects and engineers, and has publicly stated its ambition to have a complete open-access library of standard design modules within the next 10 years, which could significantly erode the available market for traditional design firms. In our experience, very few design firms have a true understanding of this landscape or of the transformational impact that new disruptive technologies will likely have on their core businesses.

D&E firms must remain alert to the evolving role of technology and innovation in two key areas: *technology-enabled efficiency* (e.g., standardization, modularization, and automation of common design activities), and *new technology-enabled services* (e.g., areas of opportunity emerging at the interface of built assets and digital/big data, such as digital infrastructure). It is now imperative that any large design firm have the capability to continuously monitor developments in the industry, and assess their relevance and potential impact at regular intervals. This should feed a dynamic strategy that has the teeth to realign the organization as required. At the same time, investing in a digital strategy or an innovation strategy needs to be linked to the company's other capabilities.

Technology is changing both the way firms function and how they provide services — and it is changing global infrastructure itself.

Most D&E firms do not have strong capabilities when it comes to innovative technology, the exceptions being those with an established culture of innovation, or the financial muscle to establish a venture arm. Others may want to deploy a “fast follower” approach, and still others may need to partner with an external player. Often the firm will have to look outside the D&E industry to become nimble at adapting to technology, particularly as disruption may well come from outside the field of traditional competitors.

Conclusion

Changes from the outside are forcing D&E firms to look inward in ways that will strengthen their business over the long term. Although most players in this industry tend to start out small and tightly focused on a few specialties, they often grow through acquisitions, adding on highly diverse services as they expand. The expertise they acquire is complementary in theory, but the approach to bottom-line concerns such as staffing, sales effort, thought leadership, and strategic planning might vary from one division to another.

Now, however, with profitability in jeopardy across the industry, it is imperative that a D&E firm adopt a capabilities-driven plan that it can implement throughout the company. To a large extent, specialization has given way to commoditized services in the industry, but a company can still enlist all of its divisions in determining where its own best strengths lie. With that kind of evaluation, the firm can determine which capabilities are worthy of premium prices, which areas are most important to the business, and which capabilities it should boost with more investment. In a global marketplace that has recently presented a number of surprises and a healthy degree of uncertainty, D&E firms that are clear on where they have the right to win, and then invest in getting their operating model right and stay prepared for technology disruption, will be best positioned to plot a path of sustainable growth and profitability.

Strategy& is a global team of practical strategists committed to helping you seize essential advantage.

We do that by working alongside you to solve your toughest problems and helping you capture your greatest opportunities.

These are complex and high-stakes undertakings — often game-changing transformations. We bring 100 years of strategy consulting experience and the unrivaled industry and functional capabilities of the PwC network to the task. Whether you're

charting your corporate strategy, transforming a function or business unit, or building critical capabilities, we'll help you create the value you're looking for with speed, confidence, and impact.

We are part of the PwC network of firms in 157 countries with more than 223,000 people committed to delivering quality in assurance, tax, and advisory services. Tell us what matters to you and find out more by visiting us at strategyand.pwc.com.

www.strategyand.pwc.com

© 2017 PwC. All rights reserved. PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details. Mentions of Strategy& refer to the global team of practical strategists that is integrated within the PwC network of firms. For more about Strategy&, see www.strategyand.pwc.com. No reproduction is permitted in whole or part without written permission of PwC. Disclaimer: This content is for general purposes only, and should not be used as a substitute for consultation with professional advisors. .