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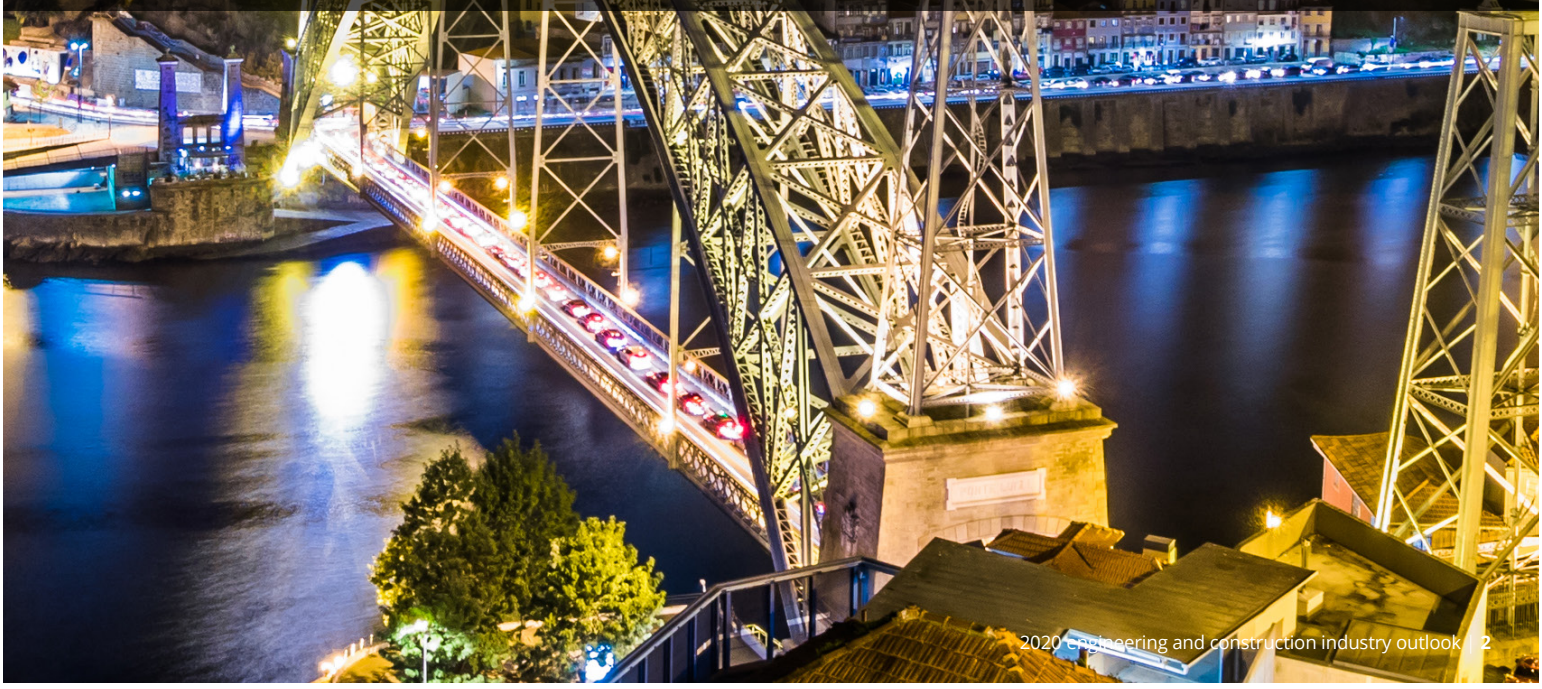
2020 engineering and construction industry outlook

Growth prospects for engineering and construction firms remain upbeat

The engineering and construction (E&C) industry has had a robust year, and E&C firms have been positioned as active participants in building the smart, connected future. Overall market growth is expected to continue through 2019 as construction spending follows the overall GDP growth rate. While firm revenues are steadily rising, the bottom lines are still under considerable pressure. Among the challenges the industry faces are sustained cost pressures, ongoing labor shortages that affect productivity, and trends toward fixed-bid projects that often demand a level of pricing and operations precision that is difficult to obtain with traditional systems. While the industry still trails broader digital adoption maturity,[1] the continued adoption of digital technologies could alleviate some of these issues. It can also present additional hurdles in terms of successful implementations and upskilling the workforce to absorb the technologies.

Despite these challenges, E&C firms are poised to potentially benefit from several significant opportunities in the industry: the US transportation and infrastructure upgrade initiative and the rise of smart city mega-projects, to name two. To remain competitive, industry leaders will likely continue to define a new vision and map a comprehensive digital blueprint to realign their business and operational processes to reflect the opportunities that innovation and technology provide. And a persistent theme throughout all of this is the value of partnerships within and across the ecosystems in which these firms coexist.



1

Market disruptions

Intensifying cost pressures are driving E&C companies to plan, manage, and execute projects better

Most E&C firms continue to experience low profitability and margins.[2] Globally, earnings before interest and tax (EBIT) from construction activities is, on average, just 5.5 percent of sales.[3] The industry's traditionally low margins, combined with increasing project complexity, fierce competition from Asian companies, and supply chain constraints, will likely continue to put extra pressure on US companies' profitability in 2020. Construction and input costs for key building materials such as steel are rising, largely driven by limited supply and tariff uncertainties.[4] The third-quarter 2019 Turner Building Cost Index, which measures costs in the nonresidential building construction market in the United States, has increased to a value of 1162, the highest ever in its 13-year history.[5] Talent shortages are another persistent challenge. Bureau of Labor Statistics data suggest that since 2014, while the number of job openings has almost doubled, the number of new hires has only increased by 14 percent.[6] All these constraints make it important for contractors to be proactive in managing processes and operations that contribute to margins and profitability, adding efficiencies and optimization where possible. One way to achieve this could be through partnerships that enable a firm to expand its capabilities or tap into efficiencies of scale, especially as it relates to leveraging the geographic strengths of partners.

Among the trends to watch in 2020 that can affect the current profitability and margin challenges facing many E&C firms is the move toward modularization and prefabrication of components. The rise of module assembly yards—strategically located sites for fabrication and assembling building elements that can then be transferred to a building site for rapid assembly—borrows some of the cost-efficient practices of manufacturing for the construction industry. Modularization has potential to significantly affect productivity and margins for E&C firms. In the year ahead, E&C firms could consider evaluating the potential for adding a module assembly yard to production. They can explore the potential cost savings that pre-assembly and modularization could bring to projects. Modularization and prefabrication not only can save on labor costs but might also ensure better quality and shorten the project schedule with less labor required on-site. This can avoid rework and help improve safety as well.

Another trend that could affect the bottom line is the rise of smart project management, adopting many of the emerging digital technologies. Digital technology and real-time data enable schedulers to make better informed decisions around scheduling labor and materials for a particular project. Project monitoring is moving beyond documenting cost overruns and construction delays to include more real-time and forward-looking insights. These new technologies can eliminate the need for manual data entry and provide the data required to assess project status and identify trends and areas that should be addressed. Digitally optimized operations can provide actionable data that can put projects back on track quickly. And, having state-of-the-art cost budgeting and scheduling tools and technologies is becoming a competitive advantage. Look for some of the industry's M&A activity in 2020, and even the launch of venture funds, to potentially add these productivity-enhancing digital capabilities.

2

Digital

Digital technologies are changing the way many E&C companies operate

Technology is having an unprecedented impact on the E&C industry. From robots to connected job sites, 2019 has seen an incredible array of digital technologies transform how many E&C firms operate. Looking ahead to 2020, these inherently disruptive technologies have the potential to provide the efficiency, productivity, and safety breakthroughs the industry has sought for decades. The following examples highlight some of the digital technology trends that seem to be shaping the future of E&C.

Robots are beginning to enter construction in several areas. From autonomous rovers that can increase the efficiency and quality of site inspections to mechanical arms that can automate highly repetitive tasks like brick-laying, the robotic revolution looks set to gather significant pace in the coming year.

Automation of construction sites, particularly concerning highly repetitive tasks, could significantly improve productivity while creating a safer work environment and helping to address the industry's shortfall in labor. Drones are also set to become increasingly common in construction projects. From performing inspections that would be dangerous for workers to surveying vast areas of land in just a few minutes, the continued rise of drones could considerably improve safety and productivity in construction.

The rise of artificial intelligence (AI) is also making its mark on construction. On the engineering side, digital capabilities surrounding predictive design, digital building twins, and the use of augmented and virtual reality during the project planning stage can eliminate costs and speed the development timeline for major projects. On the construction side, many connected job sites are using cloud technology to make information about almost every aspect of a project available to all the relevant parties anywhere in the world. The connectedness that digital technologies enable can also enhance ecosystem relationships, as firms can more easily collaborate and work together on projects. These alliances can drive the future of connected construction, creating systems that link physical and digital assets beyond individual construction sites. Many contractors and builders are adopting these technologies to help them build more efficiently, but they are also driven by the need of the owner, who can more easily operate the facility with the use of tools like digital twins and other readily available data about the asset.

Digital technologies bring with them some important impacts to E&C work: who does it, how it is done, and even where it is done. Geolocation, remote site monitoring, personnel location tracking, live mark-ups, and the seamless transfer of as-built information can all optimize communications at connected job sites and improve worker safety. One of the upsides of workforce safety digital tools (e.g., wearable sensors) is the mitigation of risk on the job site, which could cause significant changes in costs related to liability and insurance in the future.

Of course, when looking at the workforce, many of these digital capabilities bring with them new skill requirements and eventually could change engineering and construction jobs. Adding robots to handle repetitive tasks, like bricklaying and tying rebar, could redefine the roles that the humans on job sites perform. It will be important for E&C firms to anticipate these changes and get ahead of them whenever possible. Developing a human and robot talent management strategy that accompanies the move toward digital is expected to be an important ingredient for success. In addition, the use of sensors and tracking software will likely be a challenge as it poses privacy concerns among the construction employees. How this is implemented to balance the benefit of safety while also safeguarding privacy could be the key to success.

3

Infrastructure projects

US infrastructure opportunities could require new partnership models and project structures

2020 will likely see the launch of long-overdue US infrastructure upgrade initiatives, a situation that brings opportunity and challenges to the US E&C industry. America's deteriorating infrastructure—congested roads, unsafe bridges, aging water and wastewater treatment facilities—imposes enormous costs on the US economy, from lower productivity to reduced competitiveness. According to the American Society of Civil Engineers, it will take approximately $4 trillion to repair the current state of the US infrastructure by 2025.[7]

To meet future demands and to restore the country's competitive advantage, the US federal government has agreed, in principle, to spend $2 trillion over the next 10 years, one of the biggest infrastructure investments in US history.[8] This plan to invest in upgrading infrastructure (roads, bridges, water systems, broadband, and the power grid) brings a significant opportunity to the E&C industry, which could drive revenue and spur job creation in the industry. The 2020 US federal budget allocates $200 billion for infrastructure priorities across a range of sectors, including water infrastructure.[9] However, both the impending 2020 US presidential election cycle and the continuation of trade tariffs that are driving up many raw material costs could hamper the potential benefits.

In addition to the federal budget allocations, private funding is expected to be needed, and there is an opportunity for E&C companies to engage in public-private partnerships that are mutually beneficial. 2020 could bring an opportunity for US firms to emulate their global counterparts who have been successful funding major infrastructure projects over a build-operate-transfer model. For instance, France and Italy have roadways managed by private firms. Look for similar models to be posed as part of the increased activity in upgrading US core transportation and infrastructure assets. Additionally, agencies, with the help of contractors, will likely need to spend money on repair and maintenance instead of upgrades and replacements. This could hinge on contractors inspecting the bridges and working with agencies to forecast the deterioration of these assets and when they need to be repaired or replaced.

Companies in the infrastructure project ecosystem could focus on choosing an appropriate partnership model for delivery and funding, as well as using a life cycle approach to project delivery that confers attention to all stages of the project. In addition, making roadways intelligent could facilitate maintenance and enable new monetization opportunities such as congestion or surge-based roadway tolls as part of the build-operate-transfer model. This smart use case is a prime candidate for using new materials that can perform better over their life cycle, are more sustainable, and are easier to repair or maintain.

4

Smart cities

E&C firms are deploying smart technologies to continue transforming cities

2019 saw the continued proliferation of digital transformation projects within smart cities around the globe. This aligns with the global megatrend toward urbanization, with 68 percent of the world population projected to live in urban areas by 2050, growing from 55 percent today.[10] Urban planners are turning to smart solutions to support this trend, and the coming year is expected to continue to present a multitude of opportunities for E&C firms to take part in the activity. Several trends center on environmental sustainability and digital enablement to improve urban quality of life.

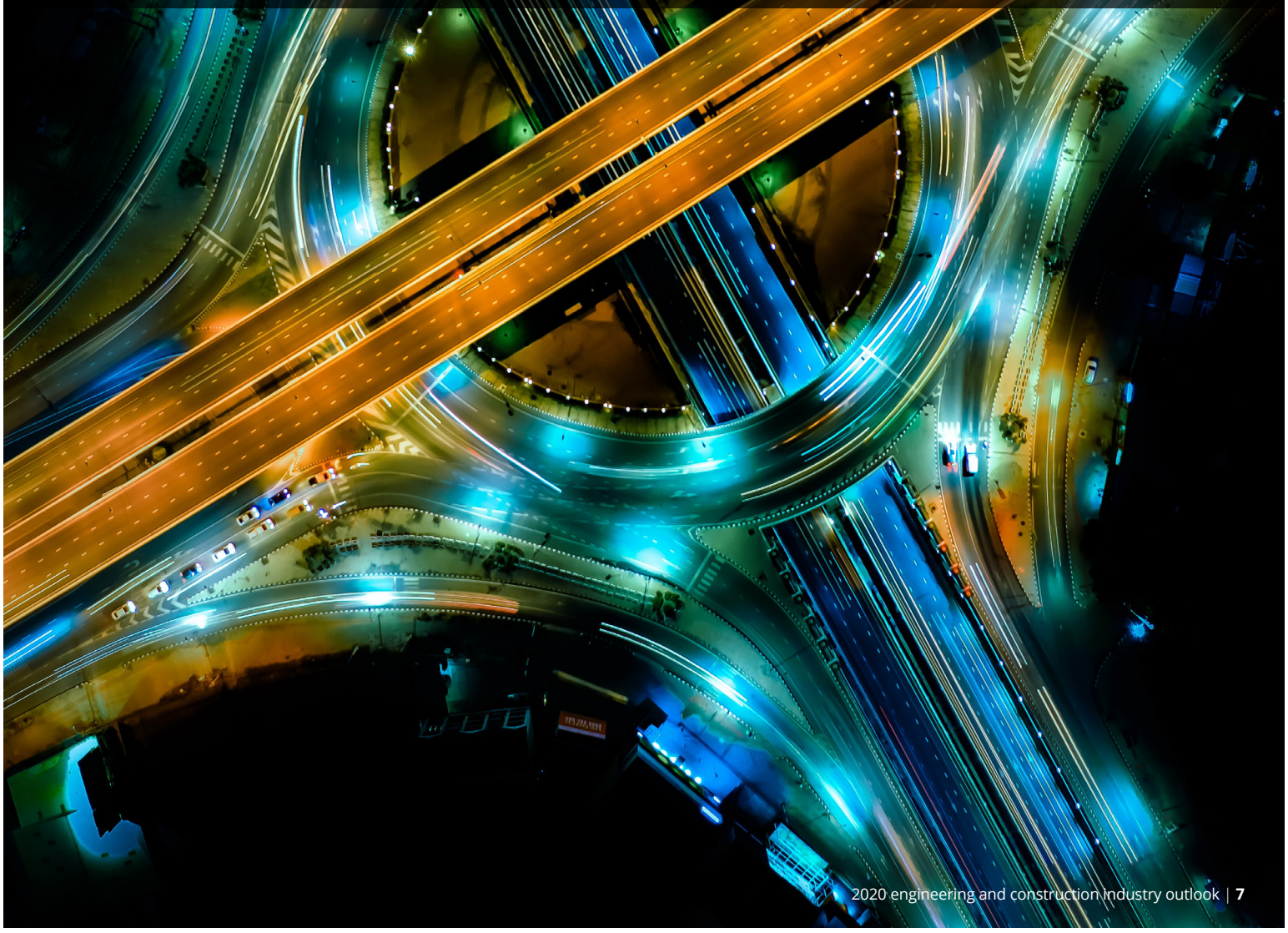
As city leaders consider how to create more sustainable, equitable, and resilient communities, many are turning to smart technologies that support urban sustainability. This encompasses the familiar LEED certification for buildings and applies it to Cities and Communities (LEED v4.1). As E&C firms engage with cities to build the smart infrastructure within these smart cities, initiatives will likely range from sustainable buildings to energy, water, transportation, and many other factors that contribute to quality of life. For example, the rise of intelligent buildings that can self-optimize their operations and all-encompassing building management systems to better serve their inhabitants over time is a rising trend powered by AI.

In the future, data arising from these digitally-enabled assets could be used to assess trends and to inform the design of future buildings. Using these technologies, including sensors and building management systems, could enable communities to better optimize their asset consumption (e.g., water, energy). Insights drawn from these data can then be used by local governments to nudge behaviors toward environmental sustainability. Similarly, sensing and intelligent technology can be used to optimize traffic in urban environments, public transportation, utilization of public spaces, and other aspects of city living.

As E&C firms become further embedded in smart city development, it is expected to be important for them to bring digital capabilities to the smart city planning table. Often this will require an ecosystem approach, where partnerships across the various capabilities and offerings can be presented to city leaders as a cohesive solution. Understanding the landscape of this ecosystem play can help E&C firms identify and invest in those smart technology capabilities that are most strategic for demonstrating proficiency in digital offerings related to smart cities, and subsequently develop expertise and experience in these areas.

2020: New opportunities indicate a dynamic year ahead

Given the opportunities and potential challenges that are facing the E&C industry, the year ahead promises to be dynamic. As several major trends play out at the national and global levels, including infrastructure upgrades and smart city initiatives, E&C firms have opportunities to play central roles. However, sustained cost pressures will not evaporate and trade uncertainties persist; therefore, firms should consider how to mitigate some of these challenges. Building a solid digital roadmap can help with operational challenges while also delivering competitive advantage for the early adopters.



Endnotes

1. Gerald C. Kane, Doug Palmer, Anh Nguyen Phillips, David Kiron, Natasha Buckley, "Achieving digital maturity: Adapting your company to a changing world," MIT Sloan Management Review and Deloitte University Press, July 13, 2017, https://www2.deloitte.com/insights/us/en/focus/digital-maturity/digital-mindset-mit-smr-report.html.
2. CSI Market, "Construction Services Industry Profitability," https://csimarket.com/Industry/industry_Profitability_Ratios.php?ind=205.
3. Javier Parada, "Global Powers of Construction," Deloitte, July 2019, https://www2.deloitte.com/global/en/pages/energy-and-resources/articles/deloitte-global-powers-of-construction.html.
4. Turner Construction, "Turner's Third Quarter Building Cost Index: Large Project Starts Continue to Lift Construction Activity," 2019, http://www.turnerconstruction.com/cost-index.
5. Ibid.
6. U.S. Department of Labor, Bureau of Labor Statistics, *Construction Industry: Employment, Hours, and Earnings from the Current Employment Statistics Survey* (National).
7. American Society of Civil Engineers, "Failure to act: Closing the infrastructure investment gap for America's economic future," 2017, https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-Failure-to-Act-2016-FINAL.pdf.
8. Annie Karni, Emily Cochrane, Alan Rappeport, "Trump and Democrats Agree to Pursue $2 Trillion Infrastructure Plan," *New York Times*, April 30, 2019, https://www.nytimes.com/2019/04/30/us/politics/trump-infrastructure-plan.html.
9. White House, *2020 Budget Fact Sheet: Deliver 21st Century Infrastructure*, https://www.whitehouse.gov/wp-content/uploads/2019/03/FY20-Fact-Sheet_Infrastructure_FINAL.pdf.
10. UN Department of Economic and Social Affairs, "68% of the world population projected to live in urban areas by 2050, says UN," May 16, 2018, https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html.

Let’s talk

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Michelle is a principal in Deloitte Consulting’s Technology practice and leads the Engineering & Construction practice. Michelle brings over 25 years of consulting experience with a focus on leading large, often global, finance and information technology transformation programs by leveraging technology. She helps clients integrate best-in-class technologies with organizational and process standard practices to achieve both qualitative and quantitative benefits.

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