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## The industry that time forgot

*The Boston Globe*

### **The Big Dig was no fluke -- it was just another day at the office for the most wasteful, least productive industry in America. What's wrong with the \$1 trillion construction business?**

By Barry B. LePatner | August 12, 2007

IN APRIL, A gasoline tanker overturned beneath a key stretch of highway in Oakland, Calif., erupting into flames that melted the steel of an overpass and brought a section of road crashing to the ground.

Repairs were projected to cost \$5.2 million and snarl Bay Area traffic for months. The state solicited bids for the work, offering a set of bonuses for finishing early, and got a surprising offer: One company said it would take the job for \$867,000.

The firm, C.C. Myers, set to work around the clock, working closely with suppliers and fabricators across the country. The repairs took just 18 days, earning the company a \$5 million bonus, giving commuters a smooth drive home far sooner than anyone expected -- and sending waves of surprise through the industry.

"I haven't encountered anything like this," one union official told the San Francisco Chronicle as he watched the project unfold.

American construction is the industry that time forgot. Over the last century, the nation's other great industries -- oil, automobiles, even computers -- have undergone waves of profound modernization, breeding competitive, innovative companies where on-time, under-budget projects are nothing unusual. But the construction industry, which at \$1.2 trillion in annual revenues constitutes 5 percent of the nation's economic output, remains a bastion of waste and inefficiency.

Protected by a tradition of contracts that insulate them from the costs of their own mistakes, the nation's thousands of construction companies have resisted innovation and now survive as the last large mom-and-pop industry, where each project brings together a new assortment of subcontractors, and nobody -- not the lead contractor, not the architect, not the person who is paying for it all -- can say in advance how much a particular project will really cost.

This has always been deeply frustrating for anyone wrestling with the industry's unpredictable costs and timelines, but it is now becoming an urgent problem on a national scale. The deadly and dramatic collapse of the I-35W bridge in Minneapolis -- and the growing tally of troubled roads and bridges -- has brought home just how much building must be done to make our infrastructure safe. In Massachusetts alone, the repair tab could be more than \$17 billion, according to a recent Pioneer Institute study. Another national study found that by 2030, America faces some \$25 trillion in new construction just to build houses, schools, and offices for our growing population. If the construction industry is not reformed, this will lead to waste on an almost unimaginable scale.

Construction touches every part of the economy. It creates the buildings where we live and work, our hospitals and schools, and the roads we use to reach them. Done right, it transforms our cities and towns for the better - - but more often, its inefficiency inflates home prices and bogs down corporate growth, fattens our tax bills and delays civic improvements.

Making construction faster, less expensive, and more reliable will free up time and energy for society's higher priorities. Saving even 5 percent on a school project would translate into millions of dollars to spend on books and teacher salaries, or simply return to the taxpayer. It would make home ownership more accessible and make companies more nimble and competitive. And even more broadly, a genuine transformation would give birth to a new American export, a construction industry that can lead the world.

The modern construction business hasn't changed significantly since the first steel-frame skyscrapers began to rise in the early 1900s. Early tall buildings such as the Tribune Tower in Chicago and the Woolworth Building in New York grew too complex to remain under the purview of a single "master builder," the architect who knew and supervised every detail of the project. Instead, each required an assembly of specialists -- electricians, plumbers, heating contractors, excavators. Dozens, then hundreds of companies arose to handle those systems, each a local family-run shop that drove its truck to one project at a time. Today, in 2007, that's still basically how the business works.

Since that time America's other large industries have undergone almost total overhauls, some more than once. A century ago, it took weeks for hundreds of small-scale entrepreneurs to build individual cars in their individual garages. Then Henry Ford and his investors revolutionized the auto industry by consolidating the diverse spectrum of parts suppliers and introducing assembly-line labor. The result was one of the great industries of the 20th century. A handful of powerhouse carmakers competed on price and quality, bringing cars within the reach of millions of American drivers and exporting them around the world.

The same change has swept one industry after another, from oil refining and steelmaking to high technology. As those industries grew, they made once-expensive products cheaper and widely available. The modern companies that emerged became not just national icons, but linchpins of the global economy.

The companies that made those leaps all had certain things in common. They had enough reach and breadth to bring complex elements together smoothly. They had significant negotiating power. Investors trusted them with money, giving them a financial cushion to survive slow periods, to tackle risky new ideas, and to invest in the research and technology necessary to transform themselves.

No such changes have ever come to the construction business. More than a century after the birth of the skyscraper, it remains far more fragmented than the car and oil industries ever were -- the nation's 7.6 million construction workers are employed by some 700,000 different companies, most of them tiny.

This fragmentation has enormous costs. It guarantees that any building site will be an assembly of strangers, with a high risk of miscommunication. It traps the industry in conservative practices, ensuring that any new learning will spread slowly, if at all. Splintered into so many firms, the construction industry has never developed the economies of scale, financial cushions, or comfort with risk that would allow it to enter a new phase and truly modernize.

As a result, construction ranks lowest of any major industry in productivity. In aggregate, all other US industries have enjoyed increases in productivity per worker of approximately 250 percent since 1964. In construction, over the same period, productivity per worker has dropped approximately 25 percent, according to the US Bureau of Labor Statistics.

To make any significant changes would require large investments in research and technology that current construction firms simply don't have the cash to make. The vast majority of construction firms survive month to month on the few jobs that they can take on at one time.

Even the biggest players, such as Framingham-based Perini Corp., Whiting-Turner, or Gilbane, are far smaller than they might appear. They may bid for billion-dollar projects, but they simply serve as overseers -- behind the Perini flag on a towering crane is a collection of dozens of contractors, subcontractors, and sub-subcontractors.

On the day-to-day level, it's not hard to imagine how such a deeply fragmented industry wastes time and money for the developers and public agencies that depend on it. Picture the site of a new building, or a bridge project. Every day, behind the fenced-off site, labor and materials arrive from numerous distribution points. Hordes of workers employed by separate small companies are expected to mesh seamlessly, delivering and installing materials to meet the owner's critical completion date. When a single delivery of steel or glass or sheetrock is delayed, it can easily have a ripple effect on several different groups of workers, starting with those who need to spend the day waiting around before they can install it.

Staggeringly, up to 50 percent of all money spent on construction labor is wasted because late deliveries and poor coordination leave workers idle, according to a study of the construction industry's productivity published

in the Journal of Construction Engineering and Management in 2005.

And when something goes seriously wrong, it can be virtually impossible to assess responsibility. Last week, searching for a culprit in the 2006 Big Dig ceiling collapse that killed a 38-year-old Jamaica Plain woman, the Massachusetts attorney general filed criminal charges against a small New York company that provided about \$1,300 worth of glue for the ceiling's bolts. And that's likely just the beginning: Investigators are still looking into the more than a dozen firms and agencies involved in designing, building, and inspecting that one stretch of tunnel ceiling.

How can such a system persist in a free-market economy, where competition is supposed to weed out companies unable to meet their deadlines or guarantee their work? The answer is surprisingly simple: Nobody forces them to change.

When the owner of a new building accepts a contractor's bid, it essentially gives the contractor monopoly power over the project. The developer or state agency has little choice but to pay all additional costs, since it is extremely difficult to replace a contractor during a project, and too much has already been invested to change course.

And because of the way construction contracts are written, there's no reason for the contractor to stick to the original price. Big construction contracts typically leave huge amounts of room for add-on costs, limit the damages for delays, and call for payments to be made even if the construction team itself has caused delays to the project. When contracting giant Bechtel forgot to include the FleetCenter in its design drawings for the Big Dig, it was taxpayers who footed the \$1 million bill.

Although such a contract might seem unusual in another industry, it's standard in construction, and has deep roots in the fragmented history of the business. Individual contractors and subcontractors are simply too small and far-flung to take on the liabilities for going over budget on a huge project. The party left holding the bag is the owner.

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Is there hope that a vast industry -- dominated by small firms, doing projects so complex that transparency is almost impossible -- can really change?

Some signs say yes. The example of C.C. Myers in Oakland, for instance, is a hopeful one. Although the work was an exceptional firm rebuilding a very standard piece of highway, it offers some pointers.

First, the state of California's transportation department, Caltrans, didn't offer a typical "standard form" contract, loaded with loopholes for overruns and delays. Instead, the agency demanded that bidders come forward with a precise scope of work to be performed for a truly fixed price. No extra costs would be allowed.

The agency did, however, create an incentive: It set a 50-day deadline and offered \$200,000 for every day by which the firm could beat it. If it ran over deadline, there was a parallel daily penalty for lateness. And when C.C. Myers got underway, state inspectors minimized delay by working closely with the firm, approving supplies and components early in the process -- even traveling to the factories where they were manufactured. Though the Caltrans experiment won't work for every project, a tougher, more transparent approach to private and public-works contracts could have a powerful effect on the industry overall.

Under a regime of incentives and real accountability, construction companies would begin to transform. The industry would spawn a few winners that, as they prospered, would acquire the capacity to research new techniques, retain skilled employees through down periods, and buy up dozens or even hundreds of small specialized players.

The financial markets, too, may force their own transformations. Although the low profit margins and cyclical nature of the industry have discouraged deep-pocketed private equity interests, the potential for steady profits could begin to attract the private capital needed to build a cadre of truly national construction powerhouses.

Some precedents exist: Large-scale home builders such as Pulte Homes, Toll Brothers, and Lennar Corp. are examples of intelligently managed companies that have secured high returns for their investors. Others will come in the years ahead.

As they do, more construction projects will start to look like that Oakland highway. And with even basic technology improvements, the construction site of the future could be a surprisingly efficient place. New software would take an architect's design from the computer directly to the fabricator and on to installation in the field. Wireless devices would track deliveries and issue prompt payment. Simple robots, already common in manufacturing, would use laser guides to install studs and sheetrock quickly in office buildings.

By getting it right, we can reap far more than financial rewards. Transforming construction from a vast jumble of local businesses to a truly national and accountable industry will deliver untold benefits, freeing resources to be deployed on something other than wasted time and labor. And there's one more piece of good news: Overseas companies haven't figured it out yet either, giving an advantage to the first American firms who can export these improvements, and clearing the way for a new, 21st-century American industry to emerge as yet another world leader.

*Barry B. LePatner is a construction attorney in New York City and author of the forthcoming "Broken Buildings, Busted Budgets: How to Fix America's Trillion-Dollar Construction Industry" (University of Chicago Press). ■*

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