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The Industry That Time Forgot

What's wrong with the \$1 trillion construction business?

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In April, a gasoline tanker overturned beneath a key stretch of highway in Oakland, California, 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 around 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, high technology – have undergone waves of profound modernization, breeding competitive, innovative companies where on-time, under-

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budget projects are nothing unusual. But the construction industry, which at \$1.23 trillion 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 combination of subcontractors, and nobody – not the lead contractor, not the architect, nor the person who is paying for it all – can say how much a particular project will really cost.

This has always been deeply frustrating for anyone subject to the unpredictable costs and time lines of a construction project, but it is now crucially important as the nation contemplates a wave of new building. 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. One national study found that by 2030, the nation will have to undertake 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 bring with it waste on an almost unimaginable scale.

Construction touches every part of the economy. From infancy through old age we spend our entire lives in buildings designed by architects and engineers and built by our nation's construction industry. Construction affects us by the density of the homes in our neighborhoods, by the height of the buildings in our cities. More significantly, it affects us when it lets light through the windows in our homes, schools and hospitals, and when it provides a safe environment for our families and friends. When constructed properly, we get to enjoy the environments created by these works; when not, we confront the all-encompassing problems of the Big Dig or the collapse of the I-35W bridge in Minneapolis.

And getting it right – making construction faster, less expensive, and more reliable – will free up time and energy for society's higher priorities. Lower construction costs would mean lower rents or costs of corporate facilities. These would mean some of these savings would lead to lower consumer prices and some would go back to swell corporate profits and be available indirectly to shareholders.

Higher construction productivity would mean lower construction costs and hence more construction projects. Improving construction leads to better infrastructure. Lower housing costs would enable more Americans to purchase homes and enjoy a true ownership stake in their country. Most enticingly, lower construction costs would spell lower taxes. Finally, building smarter will enable our construction industry to export improved means and methods overseas where the future growth of the industry can offer even greater profitability.

The modern construction business hasn't changed significantly since the first steel-frame skyscrapers began to arise in the early 1900's. Buildings such as Cass

Over a century after the birth of the skyscraper, the construction industry remains far more fragmented than the car and oil industries ever were. The nation's construction workers are employed by some 700,000 different companies, most tiny. It also ranks lowest of any major industry in productivity.

Gilbert's Woolworth Tower in New York City designed in 1913 and the Chicago Tribune Tower completed in 1925 by Hood & Howells – made possible as the result of its revolutionary steel frame – became true American icons of the construction industry.

By growing ever taller, construction 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 building began to require 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.

In the years since then, 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 nationwide. 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 the 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 computers. As those industries grew, they made expensive commodities cheaper and widely available – and the modern companies that emerged became not just national icons, but linchpins of the global economy, putting American firms in the forefront of one industry after another.

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 take on risky new ideas, and to invest in the research and new technology necessary to transform how they did business.

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

This fragmentation has enormous costs. It traps the industry in conservative practices, ensuring that any new learning will spread slowly, if at all. Fragmentation directly increases the risk of miscommunication or miscoordination between the multiple players working on a building site. In turn, it directly increases the risk to an owner of additional costs and delays. The dissemination of work into small, specialized firms means that an owner who has incurred substantial unwarranted costs or has been severely damaged by delay of that contractor has little chance or recouping millions of dollars from such a company. This is why each year thousands of new construction companies are born at the same time that thousands go out of business. Splintered into so many firms, the construction industry has never developed 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. 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. Each year, thousands go in and out of business, just like small businesses everywhere. This means they are unable to build up the institutional know-how and reserves of capital that fuel large, established companies in other industries.

Even the biggest players, such as Framingham-based Perini Corp., Bovis Lend Lease, 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 results in constant waste and unpredictability for government and private-sector developers.

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.

A recent meta-survey of the construction industry’s productivity recently concluded that up to 50 percent of all money spent on construction labor is wasted because of late deliveries, poorly coordinated subcontractors, and other circumstances preventing employees from engaging in productive, on-site work.

How can such a system persist in a free-market economy, where competition is supposed to weed out companies unable to meet their promises or guarantee a completion date? The answer is surprisingly simple: Nobody holds them to it. When the owner of a new building accepts a contractor’s bid for work, the contractor knows two things: that it has total control over the cost of what it labor and materials it is providing, and that it has monopoly power over the project, i.e. an owner that needs to complete the building has little choice but to pay all additional costs since it is extremely difficult to replace a contractor during a project. Once the ink has dried on the contract, the construction company has become an instant monopolist.

But because of the way construction contracts are written, there's no reason for the contractor to get it right. Big construction contracts 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.

WHAT NOW?

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

Some signs say yes. The example of C.C. Myers, for instance, is a hopeful one. Although the work was an exceptional firm working on 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 potential payments 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: a \$200,000-per-day bonus for completion within 50 days. If it ran over deadline, there would be a parallel daily penalty for lateness. And when C.C. Myers got underway, state inspectors worked closely with the firm, approving supplies and work early in the process – even traveling to the factories where they were manufactured – so delays were minimized. 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 consolidate dozens or even hundreds of small specialized players.

The financial markets, too, may enact 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, Toll Brothers and Lennar 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 very surprising place. Wireless devices would track material deliveries and issue immediate payment upon the owner's approval. Simple robots, already common in manufacturing, would use laser guides to measure, cut and install the studs and sheetrock for corporate interiors. Overall coordination will be improved by new building information modeling and collaboration software that will take an architect's design from the computer directly to the fabricator and on to installation in the field. Ultimately, the owner of the building will use the same base model to control all building systems from a centralized location.

By getting it right, we can reap far more than financial rewards. Transforming the construction industry from a vast jumble of local businesses to a truly national industry will deliver untold benefits, freeing resources to be deployed on something other than wasted time and labor. And the good news abroad is that 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 version of the American construction industry – already a \$1.23 trillion business – to emerge as yet another world leader.

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