

Efficiency eludes the construction industry

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NINE years ago the first concrete was poured for Berlin Brandenburg airport. It was expected to open in 2012, to cost €1.2bn (\$1.8bn) and to welcome 34m passengers each year. Today the only people in its terminals are those with hard hats. Six times over budget, the project has had 66,500 building errors in need of fixing. Last year its spokesman was sacked after calling the project a “shit-show” and saying no manager who was not “addicted to pills” could guarantee an opening date.

Berlin’s airport is an extreme example of a broader problem. Superficially, the construction industry would seem healthy enough. The global market is worth \$10trn. Euler Hermes, an insurer, expects 3.5% growth this year. Yet more than 90% of the world’s infrastructure projects are either late or over-budget, says Bent Flyvbjerg of Saïd Business School at Oxford University. Even the sharpest of tech

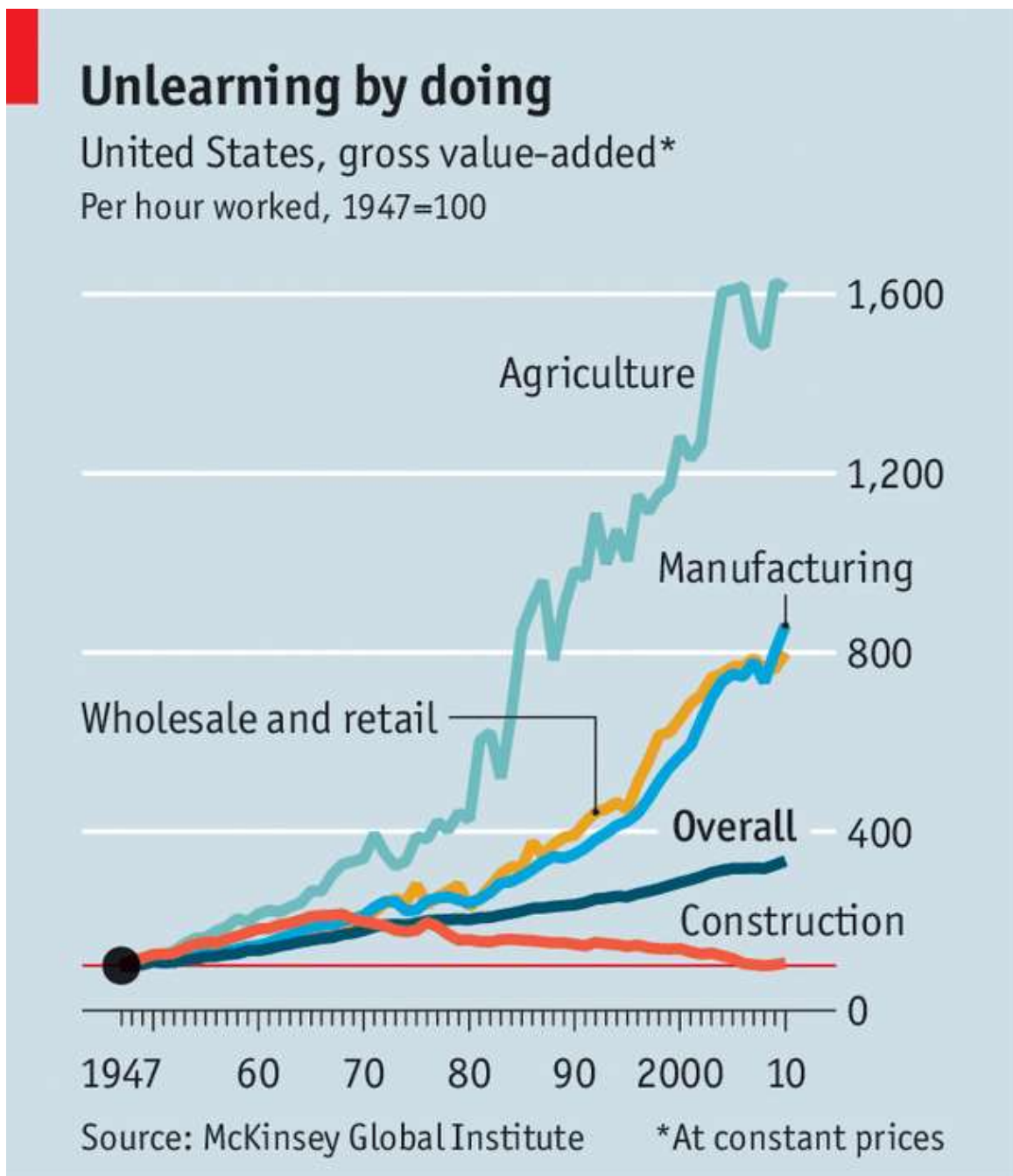
firms suffer. Apple's new headquarters in Silicon Valley opened two years behind schedule and cost \$2bn more than budgeted. Smaller projects have similar woes. One survey of British architects found that 60% of their buildings were late.

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Construction holds the dubious honour of having the lowest productivity gains of any industry, according to McKinsey, a consultancy. In the past 20 years the global average for the value-added per hour has inched up by 1% a year, about one-quarter the rate of growth in manufacturing. Trends in rich countries are especially bad. Over the same period Germany and Japan, paragons of industrial efficiency, have seen nearly no growth in construction productivity. In France and Italy productivity has fallen by one-sixth. In America, astonishingly, it has plunged by half since the late 1960s.

Prices for building materials are not to blame. They are subtracted from measures of value-added (and have not risen in any case). The burden over time of complying with regulation—applying for permits, for instance—is only partly responsible. In America such rules account for one-eighth of the productivity lost since 1987, according to the Bureau of Labour Statistics.



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More culpable are two broader structural trends. First, the industry has become less capital-intensive, with workers replacing machinery. This shift is more understandable in countries with access to inexpensive labour. In Saudi Arabia, for example, it is cheaper to import workers from India or Pakistan than to buy machinery. In many countries, however, labour costs might be expected to spur firms to substitute workers with capital.

Instead, volatility in demand for construction has trained builders to curb investment. “The industry has learned through bitter experience to prepare for the next recession,” says Luc Luyten of Bain & Company, a consultancy. Capital-heavy approaches to construction bring high fixed costs that are difficult to cut in downturns. Workers, in contrast, can be fired.

The second big problem is that the industry has, for the most part, failed to consolidate. Efficient firms should theoretically squash laggards, yielding bigger, more productive companies. “But construction is an industry that appears to have defied Adam Smith,” says Mr Luyten. That is partly because building codes differ not just between countries but within them, which makes it harder to reap the benefits of scale. The customised nature of most projects further limits the usual advantages of size. Because the designs of most projects differ, contractors have to start from scratch for each one.

America now has about 730,000 building outfits, with an average of ten employees each. In Europe there are 3.3m with an average of just four workers. Competition is fierce and profit margins are thinner than for any industry except retail. This fragmentation creates its own problems. Slim margins make investment even less likely. Often projects have more than a dozen subcontractors, each keen to maximise profit rather than collaborate to contain costs, says Thijs Asselbergs, a professor at Delft University of Technology.

The result is an industry that raises prices for clients and mostly ignores tools that might improve productivity. “While we are all using iPhones, construction is still in the Walkman phase,” says Ben van Berkel, a Dutch architect. Many building professionals use hand-drawn plans riddled with errors. A builder of concrete-framed towers from the 1960s would find little has changed on building sites today, except for better safety standards.

Examples of how the industry might move forward are not hard to find. More builders could use computer-aided design, as is standard among architects. Other methods are in earlier stages, but show promise, such as remote-controlled cranes

and self-driving bulldozers (Komatsu, a Japanese equipment-maker, is developing the latter). A few niches, such as maritime construction, have shown how investments in technology and mass production can boost efficiency (see article).

On land, a few firms are mass-producing homes. BoKlok, a spin-off from IKEA, a Swedish flat-pack-furniture seller, does only one-fifth of its construction work on site; the rest is done in factories. Parts can be standardised and costs cut as a result. BoKlok reckons that it builds twice as quickly as the industry norm. An American firm called Katterra also builds prefabricated sections of apartments at a factory in Arizona. It helps that each firm does every stage of construction itself, rather than relying on a tangle of subcontractors.

The fastest gains are in China. Labour productivity is racing ahead at 7% a year, albeit from a low base. Tightening labour supply has prompted firms to test automation—WinSun, a construction company, has built flats using 3D printing. Modular building is also on the rise, with one company erecting a 57-storey tower in 19 days.

However, such techniques remain unusual. For most firms, slim margins and the spectre of future downturns continue to restrain investment. Even for companies that do adopt new methods, growth may be limited by doubts about the quality of new techniques. A few modular towers in China have seen water seep between units. In Britain, past attempts at mass-produced housing are a sour memory: poorly built modular social housing from the 1960s has been demolished. British mortgage lenders shun homes built with “non-traditional construction methods”. BoKlok and Katterra hope their buildings will last a century. But perceptions, like so much else in construction, can be slow to change.