

What will you do when a competitor beats you by 10%?

Dealing with a digital, industrialised and global construction future.

If you get beaten in a construction bid by 10 percent sometime soon, then you had better expect that your competitor may have another 5 percent up their sleeve. The days of griping over your firm bidding 2.5 percent margin and being beaten by 1 percent will seem like the good old days if you are not adapting.

A lot has been written about the transformation shaping the modern construction industry. There is less written on what this means for modern construction enterprises, their projects and the capabilities of the people who work in them. In this article we will discuss the drivers of modern construction, but firstly we want to re-emphasise a clear distinction between traditional and modern construction enterprises. Modern construction enterprises will be unequivocally clear about their value proposition, and then consistently demonstrate their authenticity through measurable benefits that are relevant to their customers.

The days of a general contractor trying to be all things to all people in our view are numbered. Modern contractors will have clear points of difference and continually build on these to ensure a sustainable competitive advantage. Their clients will be aware of these and engage with them differently. We have observed several construction enterprises exhibiting modern construction characteristics. These firms have identified clearly defined holes in the market where they have developed compelling points of difference. For example, the Broad Group in China identified an opportunity to deliver over 40 storey high rise buildings where, they could achieve over 90 percent of inputs made off-site.

Broad went about proof of concept and delivered 3 projects demonstrating on-site assembly methods and speed of construction that were unheard of. A ninety storey building being fabricated and erected in under a year. Broad reduced traditional onsite construction time by over 60 percent with almost zero waste. They were ridiculed for initial faults and quality issues but these have been systematically resolved and they will get better. All the while their traditional competition looked on. What is striking about the Broad story is that this company transformed from a downstream supplier of world class air conditioning systems to a world class constructor of built environments for end users. The proof of concept phase enabled two important aspects that will now lock in the company's future.

Broad was able to debug and optimise their integrated off-site design and manufacturing systems in semi-permanent facilities that once housed their original air-con business. Since, Broad has developed a new special purpose off-site fabrication hub in a location that could best serve their customers. Broad has created valuable end to end construction fabrication and assembly capabilities or IP that they can now licence. Broad has leveraged these capabilities by selling a number of regional franchises in China. The new off-site design and manufacturing hub has locked itself in as the supplier to these franchises. They have several international markets identified for expansion. They have combined the three key thematics that are redefining construction. Digitisation, Industrialisation and Globalisation.

We have now identified 5 businesses (3 local) that have started similar journeys to Broad. All responded to local market opportunities. A key thematic that we have observed is that each of these enterprises adopt a common rule – *‘build a business before you build a factory’*. This is a powerful metaphor and has universal application. Factory being a broad term. It is clear to us that these organizations know how much their new business models can beat the competition by, and by how much they need to give away to compete and win.

There are many new technologies and construction methodologies all pressing to make their case for how they are leading the charge to improve construction certainty and effectiveness. These include Building Information Modelling (BIM), Design for Manufacturing and Assembly (DfMA), Lean, Big Data, Off-site and Prefabrication, plus constantly evolving applications that enable smarter B2B dealings, monitoring of safety, documentation transmittal and storage, quality and certification management along with a plethora of cloud-based apps that enable remote project and enterprise management.

In this article we will discuss;

- The implications of a digital, industrialised and global construction future,
- Consider what a modern construction enterprise might be like,
- Why productivity and construction effectiveness will be centre stage,
- Consider a hypothetical case study to find a 20 percent competitive advantage so it may be your company making the early move, and not chasing the leaders.

Notwithstanding, the overarching golden rule that has always applied to traditional construction will remain just as important in the future. There will always need to be a single point contractor of record. Someone prepared to put *‘skin in the game’* that commits to *‘in-full, on-time’* construction delivery. Without this surety projects cannot be financed. Customers and banks are unable to provide this certainty. Modern construction methods and practice will however, require the shortcomings of traditional construction sureties and warranties to be resolved. This will add to the competitive advantage of the *‘first movers’*. Business as usual is not a choice. Many constructors will not make it on this journey.

Klaus Schwab, Chairman of the World Economic Forum recently made this observation;

“in the new business world, it’s not the big fish that eat the small fish – it’s the fast fish that eat the slow fish”.

The implications

The weakness in all of the industry improvement strategies world-wide is construction's fragmentation between its traditional parts, the professions and jurisdictional differences mostly influenced by self-interest and, argument about the need for others to change their behaviours first. Larger organizations have sought to hold on to their traditional market advantage which is determined by scale and influence. Smaller organizations have been constrained by industry governance or representations that enshrine unsophisticated '*one size fits all*' approaches to supply chain engagement. These weaknesses hold everyone back.

In a modern construction industry, three themes will reshuffle all of this;

- **The Digital Economy:** will affect all of the transactional and communication processes of construction. The digitisation of construction involves more than just using new technologies and practices. It will involve reimagining traditional construction business and process flows. It will involve recalibrating the traditional commercial terms and interfaces of the entire construction value chain. It involves integrating all of this with modern client facing digital media. It will involve every piece of construction and each of its players having a permanent digital signature.
- **The Industrialisation of construction:** involves an end to end integration of the parts of construction to deliver an unparalleled value proposition to the industry's customers. Traditional on-site fabrication will increasingly give way to incorporation of value added off-site manufactures and assemblies. This transition will affect how construction is planned, procured, assembled and supported into its functional life and care. Single point accountability will define modern client facing enterprises.
- **The globalisation of construction:** requires recognition that the parts of construction are increasingly being sourced from many places and jurisdictions. The digitisation and industrialisation of construction will drive new construction design, procurement and assembly methods that will call for new products ranging from [insurance underwriting](#), project certification, payments, remote diagnostics and project support services. The [Indo-Pacific Region will be a big player](#) in a global construction market which is expected to reach US \$15 trillion by 2025.

Transformation will not be an easy journey for many of today's construction enterprises. Most will be to inextricably locked into the momentum of their past practices and cultures. It is likely that more agile mid, small and start-up construction enterprises may be spawned from existing construction businesses, but many will start with a clean sheet of paper.

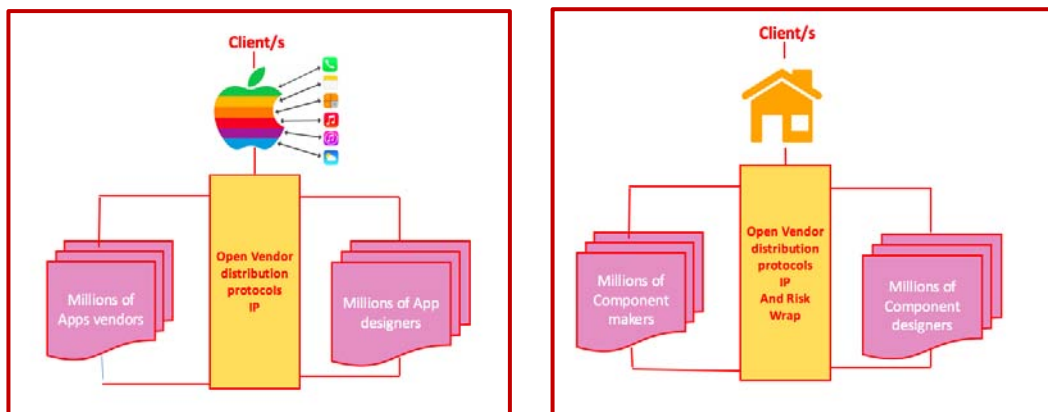
The enterprises

And this is where it gets interesting. Those starting with a clean sheet of paper will have more choices in defining the specific character of their enterprise. Bearing in mind the modern construction context outlined above, constructors may now ask '*what would best describe the customer facing enterprise we have in mind?*' There are many possibilities.

Any or all of the following may apply;

- 'We are a [value added reseller](#)',
- 'We are a [digital construction enterprise](#)',
- 'We are a [volume purchasing](#) driven enterprise',
- 'We [outsource everything](#) by using smart bundling and system management',
- 'We [leverage our IP](#) to enable winning construction syndications',
- 'We [self-perform key parts of our operations](#) to retain control', or
- 'We [licence or franchise](#) our capabilities to drive growth'.

A modern construction enterprise model might compare with Apple, or any of a number of new disruptive businesses like Uber, Airbnb, Domino's Pizza, Tesla and Amazon. The list is endless, but here is how the Apple model may translate.

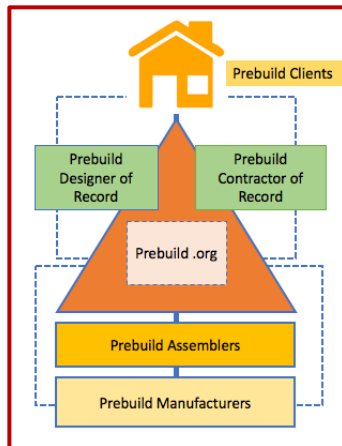


It will be easier for modern constructors to take a simpler view of the industry's value chain. The traditional value chain labels will need repurposing. For these value adders to fit into a customer facing construction business model there will need to be no ambiguity as to who does what, and what will underpin the deliverables. These essentially mirror Apple's, or Uber, or Airbnb's transaction protocols. Sign up to these so we can assure our customers of what they are getting, or don't. And these clearer interface settings will allow the time old tangled web of consultant, constructor, sub-contractor and supplier contracts to be rationalised and brought into the modern industry. A new era of *'good faith and fair dealing'* will benefit those who make the leap. The following table shows how it may look.

Clarity such as this, is the key to creating both certainty to the customer, while describing how the construction enterprise may become confident in organising to deliver on its promises. It matters little if the contractor of record comes from a design, project management, construction or critical manufacture stable. In the end this will turn on their being able to provide a single point risk wrap that ties it all together at the client interface.

Who	Value proposition	Why	How
The Scopers	'We scope and organize the spaces and parts of Prebuild by connecting them to clients'	The customers of Prebuild need help to organize their build	Creators of the spaces and place set pieces and integration with the parts
The Procurers	'We procure and assure the coming together of Prebuild'	The supply chain needs value add	Efficient leadership to optimise performance
The Assemblers	'We are experts in putting prebuild together, better'	Self performing teams get smarter	Outperforming traditional dysfunctional methods
The Fabricators	'We create and make the pieces and parts of Prebuild'	The sum of the parts must be seamless	Shared standards and transaction protocols
The Technologists	'We create innovative, able, value-add business solutions'	Old systems hold back smart + better	Prebuild shareware that just works in background

It's at these cross roads, that modern constructors will need to deal with the business



technologies that will support their enterprises. Historically, construction business tools have been project directed, mostly leaving traditional construction businesses to operate in much the same way as they have forever. The vendors of these technologies have mostly come out of the traditional construction delivery models. There is an endless line-up of accounting, scheduling, cost planning, quality assurance, HR, graphics, safety monitoring and document exchange, asset management ware, that are mostly project focused. Few offer end to end enterprise solutions that correlate with what the customer was promised, how delivery is going and how will it be supported in service. After-build services will open up new business opportunities for customer facing constructors. These will be digitally enabled.

After talking to the technology vendors present at the recent Victorian Construction Technology Summit, it was clear that another phenomenon was at work. Collaboration and open sharing. It goes with [Application Program Interface](#) protocols (APIs) that allow one vendor product to plugin with another. APIs offer important enterprise gateways every modern constructor should be familiar with. These protocols enable the global digital eco-chain to link with one and other across multiple enterprises and markets. One vendor described this as creating '*Glocal*' solutions which facilitate new enterprise capabilities that do not rely on the traditional disjointed project facing systems of traditional construction.

The technologists referred to in the table above are already working on powerful cloud bases solutions that allow multiple enterprises to share back of house technologies that can be unique to a single business, or common for a cluster. These organizations will then be freed to work on developing and delivering on their uniqueness. Holding back these innovators are traditional construction firms who still believe their enshrined systems are the heart of their competitive advantage. Few have yet to translate better, smarter, faster, safer and cheaper into a measurable and more certain '*better deal*' for their customers.

Modern construction enterprises and their people will create the '*meat on the bone*' of future construction. Many factors will go to defining the successes and failures of tomorrow's constructors. Fundamental to their success will be the degree to which those enterprises are led by *professionally qualified constructors* who have the knowledge of what makes-up the parts of construction, how those parts come together and to run a business. These enterprises and their people will require the business ethics and abilities that will enable transactions across multiple regulatory jurisdictions that assure the public's confidence in construction's built future. Central to that confidence will be the need for more robust financial performances and real enterprise value creation to become the norm.

Gone will be the days where constructors can start businesses with a '*ute and a mobile phone*' leaving their, and their customers future to an uncertain role of the dice which enables blame to be directed at some uncontrollable variable. Credible business

propositions, sound capitalisation and sustainable recurrent earnings will distinguish modern construction enterprises. It is that robustness which will unleash opportunity.

We have considered two key aspects of value creation for the purposes of this article.

I. Establishing the concept of Business Economic Units (BEUs)

Many businesses start-up without a clear line of sight to what they are selling and how this may be converted into measurable predictable enterprise value. Many start without having adequately determined who their customer is, what definable benefit they are offering and most importantly an economic growth strategy. Building a case for client belief in the enterprise, value chain buy-in and importantly future investor interest is essential if modern construction enterprises are to ascend above their humble establishment origins.

We believe all enterprises should be able to point to the economic reasoning upon which they are basing their prospects. We call these Business Economic Units (BEUs). There should be a minimum level of BEU's in sight to start-up, and then to build a growth trajectory. Below are ideas as to what BEU's could become reasonable start-up for growth platforms. Anything less than these would seem naive and consign the aspirant back to the ute and mobile business of 'start-up and hope' model. That simply won't work in a modern industry.

Enterprise	Basic BEU Measure	Value of BEU Equivalent	Minimum BEUs to start Y1	Nominal BEU value Y1 Turnover
The Scopers	1000 bill-able hrs.	\$100/hr	2.0	\$200,000
The Procurers	100 m2 of GFA	\$2500/m2	5.0	\$1,250,000
The Assemblers	100 units of install	\$1000/unit of install	2.0	\$200,000
The Manufacturer and Suppliers	1000 units of supply	\$500/ unit of supply	500	\$250,000
The Technologists	100 monthly users of service	\$250/ user/per month	0.5	\$150,000

II. Defining a path to enterprise value creation

None of these things are ever simple. The construction industry has never been comfortable with pre-determined measures and benchmarks. This evasiveness has applied as much to measuring project productivity and effectiveness as it has to enterprise robustness and value. Terms such as tier 1, 2 and 3 contractors are often self-acclaimed and without prior definition. Most traditional construction enterprises even after surviving for 10 years are unable to attract third party investment or to confidently demonstrate their value to a prospective purchaser or financier. Most end up relying on re-mortgaging their homes or holding-up supplier payments in the absence of more viable capital options.

In the Construction Enterprise Characteristics table presented below, we have set a framework that may be useful for first mover modern constructors to keep in mind. We feel that a tangible correlation between BCUs, enterprise graduation and value should provide a framework that can mutually benefit enterprises and their investors.

Tier 1-4 Construction Enterprise Characteristics					
Tiers	Characteristics	Investment Type	Equity	EBIT	Investor ROI
Tier 1	> \$1 Billion Turnover x 2 Years > \$1.5 Billion in orders +2.5% Equity (of orders) 7-10 x EBIT	IPO (All/Part) Trade Sale (All) Valuation basis 7-10 x EBIT	\$ 37,500,000	\$ 60,000,000	420m/60m 14%
Tier 2	> \$100 Million Turnover x 2 Years > \$150 Million in orders +2.5% Equity (of orders) 4-6 x EBIT	Trade Sale (All/Part) Sophisticated Investors (Part) Valuation basis 4-6 x EBIT	\$ 3,750,000	\$ 5,000,000	20m/5m 25%
Tier 3	> \$25 Million Turnover x 2 Years > \$37.5 Million in orders +2.5% Equity (of orders) 2-3 x EBIT	Sophisticated Investors (Part) Valuation basis 2-3 x EBIT	\$ 937,500	\$ 1,000,000	2m/1m 50%
Tier 4	> \$250,000 Turnover x 2 Years +10% Equity (of orders) 0 x EBIT	Sponsored Investors (Part) Valuation basis 0 x EBIT	\$ 25,000	\$ 7,500	
Enterprise Transition Volume Tier 4 to Tier 3 $100 \text{ m}^2 \times 100 \text{ (CEUs)} \times \$2,500/\text{m}^2 = \$25 \text{ Million Per Annum}$ Base Construction Economic Unit (CEUs) equivalent $100 \text{ m}^2 \times 1 \times \$2,500/\text{m}^2 = \$250,000 \text{ Per Annum}$			© Chandler - Hardie		

Creating enduring enterprise value based on a compelling competitive value proposition will be the defining distinction between modern constructors and their traditional construction forebears. Contractors in the past have often turned to adding development to their business as a means of leveraging their capabilities and avoiding the margin vagaries of the tender market. Few have exercised their mind about how they can be different and capture value recognition commensurate with that difference. Being a developer is a core business, it is not a core construction business. It adds unmanageable volatility and fails to deliver the shield from market cycles many dream of. It creates difficult to assess enterprise risks that would distract from the potential of having built a sound modern construction enterprise. We now move to discussing how it will be possible to beat or be beaten by the competition by 10 and 15 percent. We discuss how the first movers are breaking away from the rest.

Productivity and construction competitiveness of projects – now centre stage,

For the purpose of this conversation we have adopted first two the performance goals set out in the UK's 2025 Construction Strategy as our start point. These include;

- Lower Costs by 33 percent,
- Faster Delivery by 50 percent,
- Lower Emissions by 50 percent
- Improve Exports by a 50% by reducing the trade gap between total exports and total imports for construction products and materials (and services).

The point we are making here is that these achievements are now considered to be within reach of modern construction industry that is systematically working through all of its former processes 'on and off-site' to eliminate waste and improve competitiveness.

The challenge to achieving industry wide buy-in to a universal basis to measure improving performances is fear that one enterprise may expose an idea that they want to shield from a competitor. Others are simply overwhelmed by the prospect that the transformations involved are culturally and practically beyond them. Often one party waits for another to move first or to resist change until it is finally mandated by a third party. The first movers we are observing are no longer waiting for others to change first. Especially their clients and the traditional consultants who advise them. Industry wide measures are evolving, slowly.

These first movers have already spotted the speed, the methods and supply chain re-organization they can turn to a competitive advantage now. In the case of Broad Group, they build 60 percent faster than their near competitor, apply integrated BIM + DfMA technologies from the start, back in their fabrication plants and then take high value add components to site for easy, safe and quality assembly. Time is money for clients as well as constructors. For the companies we are observing, their prospective customers now approach them directly first to engage rapid, reliable performance. Broad allows the customer to select the concept designer and then they nominate Broad upfront as the lead single point delivery agency. Broad then organises the designer and assures the final result.

Broad employs mass production/fabrication methodologies that show how the parts can be organised almost limitlessly to create the impression of mass customisation. In fact, the key attribute of the Broad high rise system is rapid structure, core infrastructure and enclosure priority, allowing far more latitude towards the subsequent loose fit of internal components and fitout if clients so desire. However, most clients want to take advantage of rapid completion of the whole of their projects so they may commence delivering economic returns and providing the services for which they are intended. Time is money.

Broad Group already outperforms all 4 of the UK's 2025 industry transformation targets. And our 5 first movers are already on the way to similar achievements. They will certainly be in a position to outbid their slower moving competitors by 10 percent and more in the near future without erosion of margin, while adding value to their underlying business cases. We believe standardised productivity and effectiveness measures will benefit first movers.

A work through case study to find a 10 percent competitive advantage

There are no industry wide standard measures which could help interpret why our first movers will soon be at least 10 percent and more, competitive than they have been in the past. Past studies have been caught up in definition and resistance by those who do not believe that measurably faster, better quality, safer and less wasteful project delivery should result in significantly lower construction costs. They do not see these aspirations as anything other than an attack on their profitability (margins) and ability to conduct construction as they always have. If these measures were to be legislated they would be seen as more red tape. But, the reality is they shelter inefficiencies that are not sustainable.

We take a different approach. Our challenge is for constructors to first work through a hypothetical case study and start to form their own views. We are looking for the first

movers because in the end, these efforts would be wasted on trying lift the whole industry over this hurdle. It is possible that fewer than 40 percent of construction enterprises in business today will still be operating in 10 years from now. There is little value in fighting the status quo or the voices that advocate for them. Best to find the first 50, *'first movers'*, to help them tease out a viable value proposition and then how to make that competitively defensible. In the end their customers, their value chain, their employees and most importantly their enterprises will be the enduring winners. So here is the challenge.

The productivity and performance effectiveness leap to be gained here will only be optimised if all of the pre-build and on site assembly possibilities are visited. The optimum outcome will be arrived at by identifying what could be done differently to effect the best possible time and residual on-site performance. We are focusing initially on non-price measures. These are looking at tell-tale data that is readily available. They include;

- Measuring the total days spent on-site from possession to handover,
- Collecting the total on-site workforce inputs (management and direct workers on-site for all everyone who goes on site) from start to finish of physical work,
- Assembling the lost time accident records to correlate with unit outputs, and
- Recording the cubic volume of all waste removed from the project, excluding initial demolition, remediation and excavation.

The following case study seeks to uncouple the collection of competitive price details from clients and their contractors as a precursor. By focusing on the non-price data collection and performance improvements we envisage, it will be possible to correlate these with price improvement potential in due course. This challenge is not to compress margins but costs.

The case study

We want you to imagine a residential project with the metrics as outlined below. We do not want to debate the starting assumptions of our approach to this hypothetical project. That's not the point. Everyone's answer will be different and each will interpret the possibilities differently. Adjustment can be made to the assumptions, but in the end this challenge is to enable the respondents to test what might be possible, and how they might go about achieving a step change in the way they re-organise project formation and delivery. Ideally it would be good for teams comprising a Builder, Architect, QS, potential assemblers, fabricators and technologists to work collaboratively to unpick this challenge.

Assumptions:

- A 2000 m² residential build comprising 20 dwellings over 5 levels and a sub-basement. Average residential size 100m² GFA,
- Current cost of construction \$3500/m² = ~ \$7.0m
- Normal construction duration 18 months,
- Average site workforce 12 (Average rate \$75/hr x 42 hr week = \$3150/w)
- Number of traditional trades total = 30 (with average 6 on site at any time)
- Cost of time related site overheads – preliminaries for scaffolds, sheds = 8% (excluding supervision and attendant labour - included in average workforce)
- Total site waste generated 300m³ (150mm/m² GFA)

Digitization, industrialization and globalization in construction

- Total cost of waste \$750/m³ including initial supply, load-in, load-out, tip fees,
- Crane on site – 12 months,
- LTI Rate – 17 from [Worksafe Australia 2015](#) annual report.
- Lost time due to weather, delay, disruption and resources 2 months (11%),
- Average off-site workforce charge-in rate \$60/hr – when deployed,

The table below summarises the targeted productivity and construction effectiveness assumptions we have made for the hypothetical project.

Construction productivity improvement and effectiveness targets			
Assumption	Year start	Year 3	Year 5
Reduce onsite workforce	Average 12 persons Business as usual	Average 8 persons Improve by 33%	Average 6 persons Improve by 50%
Shift from trade to elemental packages	30	20 – self managed	10 self performed and managed
Lost time due to weather and delays	2 months 11% of 18 months	1.5 months Improve by 25%	1 month Improve by 50%
Off-site workforce productivity lift	Nil Business as usual	20% lift for on-site work replaced	40% lift for on-site work replaced
On-site time -total Calendar days	548 days	411 days 25% reduction	274 days 50% reduction
On-site crane requirements	12 months	6 months 50% efficiency gain	4 months 67% efficiency gain
Waste generated on site due to build	300 m ³	150 m ³ 50% reduction	60 m ³ 80% reduction
LTI rate/1000 persons Work-safe Australia	17	8.5 50% reduction	3.4 80% reduction

Respondents may achieve the most significant improvements by adopting the prebuild organisation nomenclature's outlined in this article. The role of off-site fabricators becomes essential in delivering optimised value added sub-assemblies and components to the work place that require minimal further on-site fabrication. The role of the assemblers may then shift from trade based fabricators to multi-skilled elemental work groups. These work groups should be adequately skilled and require little if any on-site supervision.

The contractor of record should work with the technologists to remap the enterprise organisation and systems to align with the critical on-site data collections and interpretation dash boards. All of the competitive advantage will not occur from site only based productivity and efficiency improvements. This challenge is systemic in nature.

Prior work in system-wide [improvements of this nature have demonstrated](#) that non-price measures of the type proposed for this case study influence radical overall value benefits.

The following table summarises the competitiveness impact of applying the productivity and effectiveness assumptions to the hypothetical project case study.

Productivity and competitiveness impact			
Item Revised Cost	Year start	Year 3	Year 5
Total labour on and off-site inputs	\$2,948,000 936 weeks (on-site)	\$2,514,124 627 weeks (blend)	\$2,055,816 468 weeks (blend)
Time on site O/Hs \$7,179/w	\$560,000 Business as usual	\$419,927 25% reduction	\$279,981 50% reduction
Crane time (\$150/h x 42/w)	\$201,600 12 months	\$151,200 6 months	\$100,800 4 months
Waste from build process \$750/m3	\$225,000 300m3	\$112,500 150m3	\$45,000 60m3
LTI time off +6.4w Per incident \$17.3k	\$16,174 5.99 weeks	\$8,087 2.96 weeks	\$3,732 1.4 weeks
Total Cost	\$3,950,774	\$3,205,838	\$2,485,329
Saving impact on \$7.0m base project	Nil	- 10.64%	- 20.9%

This case study suggests that traditional constructors should not be surprised by losing a tender by more than 10 percent in the foreseeable future. It will happen sooner than later.

Summary – Construction Futures Lecture Series

Constructors will by now, have had the opportunity to expand their appreciation of the transformations now taking hold in today's construction industry. Traditional construction risk and delivery methods will need to undergo massive recalibration to shift from their defensive and disruptive past to embrace a client facing modern construction future.

The implications of the digitization, industrialization and global thematic now pushing construction into a modern era are too powerful to ignore. Tomorrow's constructors should not be dazzled by these forces, they should take the time to envision and consider what is coming and how it may shape their future. Once embraced, the modernisation of construction is rich in opportunity. There will be new markets and capabilities needed to serve them. Most importantly today's constructors should not underestimate the value of a professional qualification to enable them to take an authoritative leadership position.

This article was prepared for Year 3 Construction and Engineering Undergraduates at Western Sydney University, Sydney, Australia. This article has a companion piece which was published at: <https://sourceable.net/whats-the-biggest-risk-in-construction-today/> We hope that the insights and references shared here help inform your successful future.