

Valuing the role of construction in the New Zealand economy

A report to the
Construction Strategy Group

in association with

Construction Industry Council
BRANZ

Final Report

*An economic analysis
of the construction
sector that highlights
its value to the New
Zealand economy and
the issues which affect
its performance*

September 2016



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Geoff Hunt
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30 September 2016

Valuing the role of construction in the New Zealand economy

Dear Geoff,

We are pleased to provide our report on the role and value of the construction sector in New Zealand and the issues which affect its performance.

This report is provided in accordance with the terms of our letter of engagement dated 20 May 2016, and is subject to the restrictions set out in Appendix C of this report.

If you have any queries please do not hesitate to contact us.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Craig Rice'.

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Key points

The construction sector plays a large role in New Zealand's economy, contributing strongly to employment, businesses and GDP. It is New Zealand's fifth-largest sector by employment, comprising around 178,100 FTEs, with another 53,600 FTEs in construction-related services. Together, this accounts for 10% of total employment across the economy. Construction and construction-related services contributed 8% of New Zealand's total GDP in 2015, and has an even greater impact when integration with other parts of the economy is considered.

The Construction sector delivers almost as much of New Zealand's GDP as the whole of the Waikato region, and this contribution is growing. Over the last three years core construction has seen 17% GDP growth, overtaking wholesale trade to become the 8th biggest contributing sector to GDP.¹ Out of the top ten individual sectors by contribution to New Zealand's GDP, construction supported the highest job growth between 2012 and 2015, with core construction contributing one out of every five new jobs in New Zealand (26,000 new jobs). In contrast, the agriculture, forestry and fishing sector, for example, contributed a much smaller 330 new jobs over the same period. Adding in construction related services means the sector is even more significant.

There is a large return to New Zealand's economy from support for a sector that continues to struggle with the cyclical nature of work and low productivity. Since 2012, measured labour productivity has increased by only 1%. Every 1% increase in labour productivity for construction yields an increase in GDP of around \$139m, even before multiplier effects are considered. Supporting the sector by smoothing sources of volatility means that gains in underlying productivity are not lost when the sector encounters a bust. Over the long-term, gains in productivity and multiplier effects would compound to produce even larger benefits.

More broadly, improving performance of the sector provides a range of benefits which will be shared by the industry and consumers. For the industry, this means improved profit margins, better skills development and earning opportunities and a better ability to weather the cyclical nature of the industry. For consumers, this means that high quality construction will cost less, involve fewer project delays and have a wider variety of options to satisfy consumer demand.

Without change, the sector will struggle to meet medium term demand. There is a significant task ahead to accommodate new private sector and government demand, compounded by the housing shortage in Auckland. The recently released decisions version of the Proposed Auckland Unitary Plan provides for an additional 422,000 dwellings over the next 30 years. The opportunity for the construction sector is significant, but the sector will not be able to meet the challenge without change.

This report identifies a number of areas in which government, industry and consumers could make changes that would help improve the productivity and performance of the industry.

A recurring theme from our interviews with industry participants was that the government should take advantage of the current conditions and work more closely to smooth volatility in the cycle. The government could plan its investment programme to support the industry in a downturn. In this regard, the same value of funds would be spent but the timing would be used as a tool to smooth volatility when private sector demand drops. There is the potential to avoid a bust if government sector demand can counteract falling private sector demand.

In addition, a common theme from industry participants was that there was a clear need for government procurement processes to improve. Greater uptake of standard contracts and the potential for MBIE's procurement guidelines to become mandatory during government procurement, unless there were strong

¹ Using 1 digit ANZSIC industries.

reasons not to use these, were touted as areas which would provide an immediate impact for the sector while having minimal impact on the government.

More broadly, initiatives the government could take include:

- encouraging labour supply through immigration and funding training programmes
- increasing the use of standardised contracts
- integrating design and build functions during procurement
- procuring at scale to ensure economies of scale are achieved
- promoting counter-cyclical investment to smooth construction activity
- considering improvements to regulatory regimes that negatively impact on construction sector performance
- assessment of the costs and benefits of new regulations should be undertaken by government before they are introduced, and existing legislation relating to liabilities and retentions should be reviewed through this lens
- consideration should be given to options for streamlining consenting processes and rationalising the number of Building Consent Authorities to improve consistency in consenting and compliance processes.

Recognising that the industry responds rationally to the operational framework constructed by the government, changing that framework creates incentives for the industry to invest, innovate and improve the sector. However, there are initiatives that the industry itself could undertake to assist with improving its own performance:

- The industry could help grow its productivity through investment in skills, training, innovation, promoting better contracting practices and exploring options for improved quality assurance processes.
- The industry is facing a labour shortage across the skills spectrum, with a particular shortage in higher-value roles. The industry could look to recruit workers from other sectors with transferable skills (eg project managers). Design-related roles are currently a key bottleneck, so encouraging graduates in this, and other high-value areas would support the industry over the longer term.

Finally, consumers can also play a role in improving the performance of the construction industry.

- Clients and consumers could contribute to better performance of the industry through encouraging improved project management practices, considering whole-of-life-costs for construction projects and having greater acceptance of standardisation of products and components as well as mass-customisation in construction.

Executive summary

The construction sector is a significant contributor to New Zealand's economy, delivering 8% of gross domestic product (GDP) and 10% of national employment, a contribution which is growing, diversifying and parts are becoming more efficient as the sector develops. However the sector suffers from a number of external and internal constraints which limit its productivity and performance. This report examines the size and scale of the sector, the nature of the constraints it faces, and provides recommendations for government, the industry and consumers to help overcome these issues.

Background to this report

This report provides an update to our 2011 report entitled "Valuing the role of Construction in the New Zealand economy". It was commissioned by the Construction Strategy Group (CSG), in association with the Construction Industry Council (CIC) and BRANZ in order to demonstrate to government and other stakeholders the value and significance of the sector, and ensure the profile of the construction industry is up to date.

Our previous report highlighted the value of the construction sector, and the key role it plays in the New Zealand economy. However, it identified that the boom-bust nature of the sector was clearly a problem, and was a barrier to improving its productivity and overall performance. We stated that Government's key focus needs to be in developing forward certainty for the sector, allowing it to maintain and develop skills, and boost labour productivity. We set out a number of options which Government could consider which could enable a more consistent and predictable environment for the sector.

This report looks at the state of the construction sector five years on. The previous report was written at the bottom of the cycle, whereas today the sector is operating in a boom. However, while the state of the industry has changed significantly, the underlying structural issues which were identified in our previous report largely remain today, and the impact of the business cycle on the sector is just as strong.

Since our 2011 report, there has been some progress on improving the performance of the sector. One of the highlights has been the publication of MBIE's National Construction Pipeline report, an annual feature since 2013. This was a direct response of the Government to provide more certainty on the future work programme for the sector. MBIE's Pipeline report and the Future Demand for Construction Workers report, have been very well received by industry participants to support investment and workforce planning.

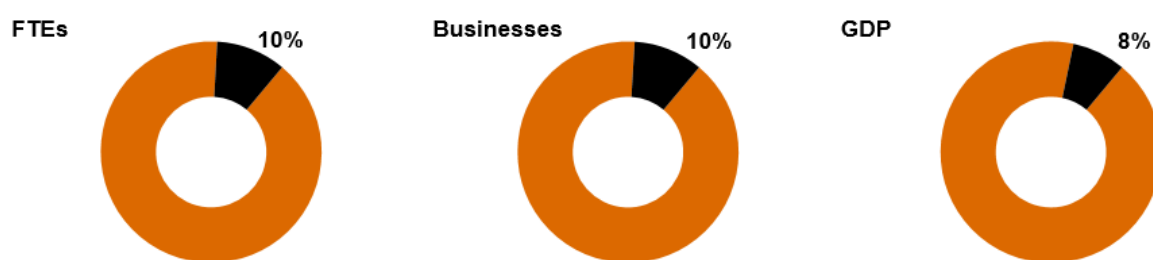
The purpose of this report is to update the information on the value of the sector, and also to reconsider the issues identified in 2011 through a combination of data, literature and interview-based research. We then reconsider opportunities for improving the performance of the sector.

The construction sector is a major part of NZ's economy

The construction sector plays a large role in New Zealand's economy, contributing strongly to employment, businesses and GDP.

It is New Zealand's fifth-largest sector by employment, comprising around 178,100 FTEs, with another 53,600 FTEs in construction-related services. Together, this accounts for 10% of total employment across the economy. Out of the top ten individual sectors by contribution to New Zealand's GDP, construction supports the highest job growth between 2012 and 2015. Core construction contributed 26,000 jobs, or one in every five new jobs in New Zealand, between 2012 and 2015. In comparison, other traditional industries such as agriculture, forestry and fishing which only offered 330 new jobs over the same period.

Figure 1 The Construction sector's share of New Zealand employment, businesses and GDP in 2015



Source: PwC Regional Industry Database

Construction and construction-related services contributed 8% of New Zealand's total GDP in 2015. However, this impact is much greater when the integration with other parts of the economy is considered. Not only does construction impact GDP directly, it also enables other sectors to expand their economic activity, for example through the development of new commercial building space, factories, industrial and storage buildings, farms and infrastructure.

Around 54% of New Zealand's 2015 gross fixed capital formation (GFCF, a measure of the economy's investment in capital assets) was facilitated through the construction sector. This shows that the sector plays the key role in building New Zealand's infrastructure stock, which is the foundation of productivity and economic growth.

Construction activity is concentrated in New Zealand's three main regions – Auckland, Canterbury and Wellington. Together, these three regions make up 60% of total employment in core construction in New Zealand.

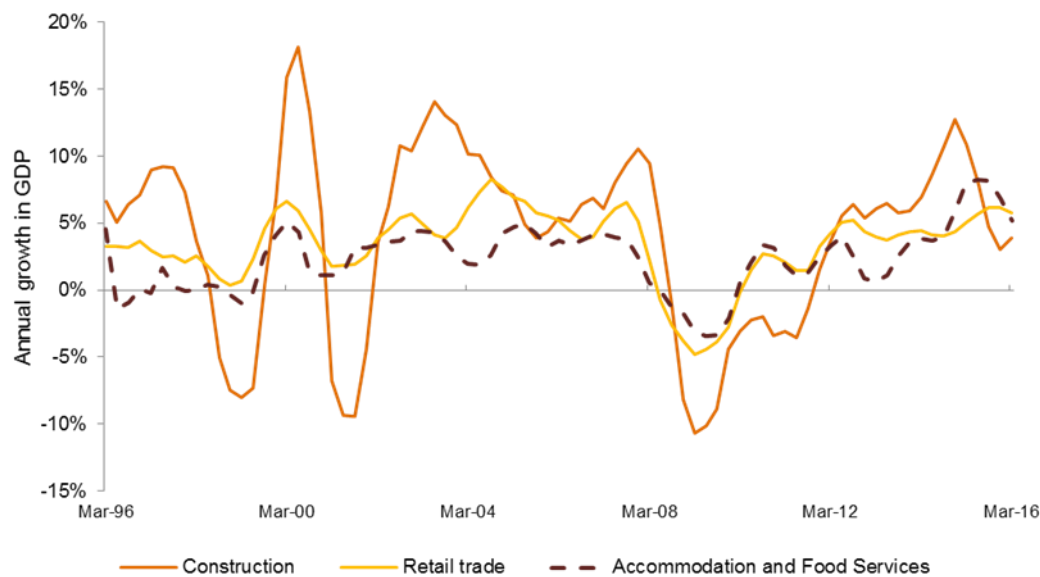
Demand for construction services is largely driven by the private sector, but public demand also plays a key role. Currently, around 25% of overall GFCF investment is contributed by public sector entities. This proportion is typically higher at low points in the construction sector cycle; it was around 31% in 2010.

The national input-output tables show that one dollar invested in the construction sector currently generates around two dollars and eighty cents of total economic activity. The sector has one of the highest multiplier impacts of any sector in the economy. This is because of the major impact that construction spending has in stimulating other sectors in its supply chain and through its workers spending their incomes.

The construction sector is volatile

The construction sector is characterised by high volatility in employment and GDP compared to other sectors in New Zealand. It is even more volatile than other sectors like hospitality and retail trade, which are typically perceived to be disproportionately subject to fluctuations in business cycles.

Figure 2 Despite the strong performance in recent years, construction still exhibits greater volatility than other sectors



Source: PwC analysis, Statistics New Zealand

This has a number of implications for the sector. In periods of high demand, the sector suffers from capacity constraints, while in downturns it sheds a greater number of jobs than in other sectors. In addition, it creates significant uncertainty about future demand. This makes it difficult for businesses to plan for the future. It can discourage investment in skills, additional labour, capital assets, and new processes. In general, the prevalence of large demand cycles underlines the ability of the sector to grow sustainably over time.

Currently the sector is operating in a boom

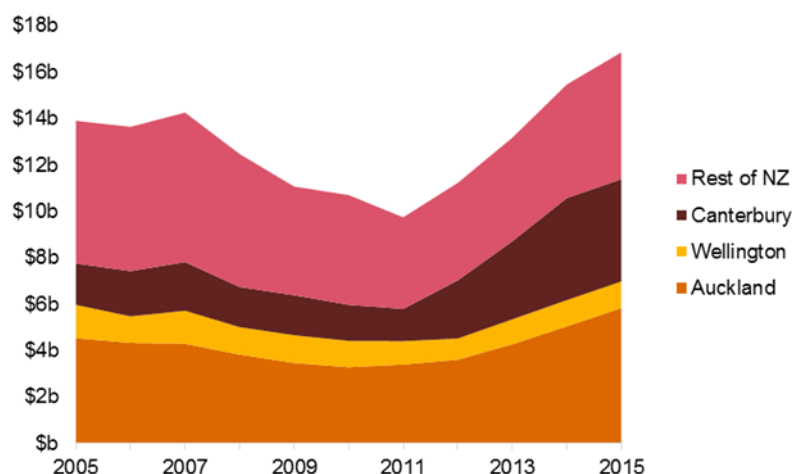
The picture and outlook for construction in New Zealand has changed significantly since our previous report. In the midst of a trough in the construction boom-bust cycle, the 2011 report was prepared at a time when the sector was weak. Today, the situation has changed dramatically as the sector grapples with increased demand from the Christchurch rebuild, earthquake strengthening, leaky building remedial work, strong residential demand in Auckland, increased business confidence and a forward infrastructure plan worth \$54.9 billion over the next 10 years.²

The number of FTEs employed in the sector has increased by over 18% since 2012, which has expanded the size of the sector to 10%. Similarly, construction's contribution to GDP has increased from 4% to 8% since 2010.

Illustrating the growth in demand, consenting levels have increased markedly. The total value of consented work in 2015 was 73% higher (in real terms) than the value in 2011. The majority of this increase has occurred in Auckland and Christchurch.

² Central government and local government investment intentions 2017 – 2026.

Figure 3 Regional breakdown of all construction consents by value (\$2015 real)³



Source: PwC analysis, Statistics New Zealand

Average incomes in the sector are relatively low, but there remain many opportunities for workers including higher-skilled workers

Average earnings in construction have been rising over time, but remain lower than the average for the New Zealand economy as a whole. However there is quite a wide variation of income levels in the sector. In particular, the sector includes a number of relatively high-skilled roles (including design, supervisory and project management roles) which typically require tertiary qualifications and offer high wage opportunities for workers.

The unique requirements of the sector mean that workers are more likely to get a specialist post-school qualification, rather than a university degree. The construction sector has the highest percentage of workers with a post-school qualification (out of 19 industries) as their highest level of qualification, but the lowest percentage of Bachelor degrees. However, the workers in construction with higher education play an important role in the construction value chain, and the number of people with a Bachelor (or higher) degree is increasing. Between the 2006 and 2013 census years, the number of workers in construction with a Bachelor (or higher) degree grew by 49%.

The need for higher-skilled workers is likely to increase over time if the sector moves towards undertaking more innovative approaches to construction. The use of innovative approaches to design and new building models would require graduates and higher-skilled workers to support the new processes.

Even in the absence of significant innovation, there is an increasing need for higher-skilled workers. MBIE forecasts an additional 49,000 construction-related jobs will be needed between 2015 and 2021, including an additional 2,282 jobs for higher-skilled roles such as construction project managers, civil engineering professionals and architectural, building and surveying technicians.

Construction sector workers are younger, on average, than across the whole economy. Construction provides useful opportunities to young workers, including those with relatively little experience, often giving them their first job in their working careers. Construction offers opportunities to workers at all levels across the skill and experience spectrum.

While the construction sector is very much male-dominated, the proportion of women employed has been growing over the last ten years. Furthermore, the average hourly earnings for women is higher than that for male employees (\$27.96 per hour for females vs \$26.14 per hour for males). This is largely a result of

³ Includes consents for new structures, and alterations and additions to existing structures.

the different roles which women take in the sector – they are more likely to be in higher-skilled, higher-paying roles (as evidenced by the relative average hourly wages).

Productivity in the sector is relatively poor

While the sector is currently operating in a boom, there remains a significant opportunity to improve the performance of the sector, resulting in better outcomes for firms and consumers. For firms, this means better profit margins, opportunities for skills development and higher earnings, and better opportunities to weather the cyclical nature of the industry.

Construction is a labour-intensive industry and as such labour availability, capability and productivity are key drivers of sector performance. Labour productivity in the sector is well below the national average and, although this is not uncommon amongst labour-intensive industries, there is scope for significant improvements in this area.

We estimate that a 1% increase in labour productivity for construction yields an increase in GDP of around \$139m, even before multiplier effects are considered. Given the low labour productivity base off which construction is growing, sustained increases in productivity may be more achievable than in many other sectors.

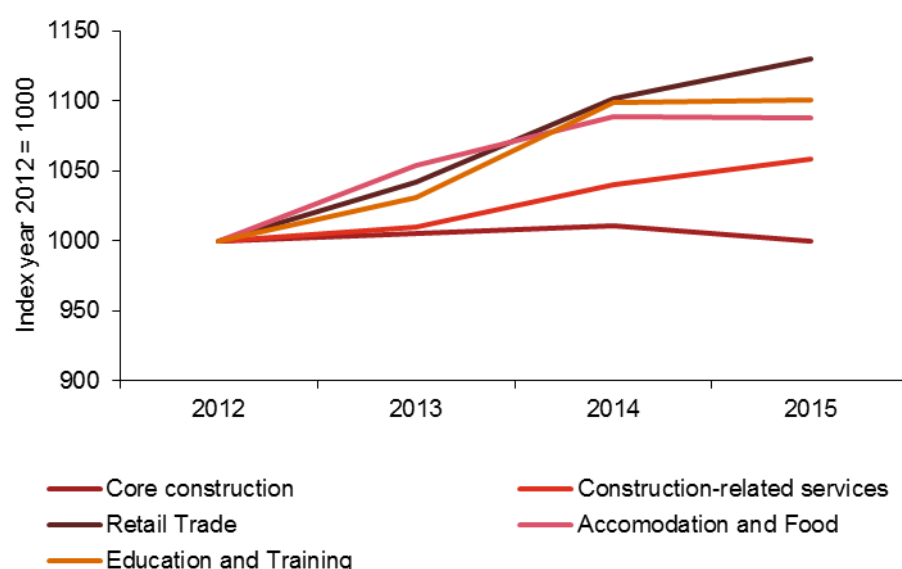
There are a number of factors which contribute to the low rate of productivity.

- The cyclical nature of the sector reduces the average tenure of workers, and this limits the benefits of experience and can also increase training requirements. The industry's volatility also introduces uncertainty for businesses, which makes future planning difficult, and discourages investment in additional resources and capabilities.
- In New Zealand, the construction sector has a predominance of small firms. A lack of specialisation can limit productivity, while these firms also often lack the scale and balance sheet to be able to invest to grow and to manage their business through sector downturns and uncertain futures.
- The level of skills in the workforce hinders productivity growth as too few students are entering higher education courses and entering jobs in the construction sector.
- In addition to the proliferation of small players within the industry, the ways in which it operates can hinder productivity. For example, sub-optimal approaches to contracting, insufficient use of project management practices, and lack of innovation and collaboration all have negative impacts on performance.
- The nature of contracting and procurement processes constrain innovation as traditional construction practices are rolled forward and do not provide flexibility or incentivise innovation. Fragmentation of contracts, separating design and build components, do not incentivise innovation to produce better consumer outcomes and better 'value' for the project and consumers.
- The trend to push risk onto suppliers using bespoke contracts increases the time and cost to negotiate and agree contracts, increasing overall cost-to-build, as suppliers incorporate risk into their pricing.
- Consumer choices can also impact productivity. The use of bespoke designs limits the extent to which the industry can gain efficiencies through mass-customisation. Customers drive pressure for low up-front costs and the best price, often without regard for future costs, particularly in the residential sector.
- A drive for low-cost procurement can also result in reduced allowances for design and project management tasks, and this can cause cost increases at later stages.

- The relatively small scale of developments, particularly in the residential space, limits the extent to which scale efficiencies can be made. A lack of large-scale residential development opportunities appears to be limiting the speed at which additional housing can be constructed in Auckland.
- There also appear to be a number of regulatory elements which are adversely impacting industry productivity. Regulation such as the joint and several liability rule, the new retentions regime and health and safety legislation, noting that regulation is developed in response to managing risk and adverse outcomes, all impose costs on the industry, and can create sub-optimal outcomes through the allocation of risk and accountabilities. In addition, consenting frameworks can add significant cost, delays and losses in productivity.

While still low, industry productivity has improved in recent years. Since 2012, construction labour productivity has increased by 1%. This slight improvement is due to a proportional expansion in GDP and employment in the construction sector. Further inspection shows that measured labour productivity in core construction has remained flat since 2012, while there was a 6% gain in construction-related services labour productivity.

Figure 4 Labour productivity has remained steady in core construction but increased in construction related services over the boom



Source: PwC Regional Industry Database

Improvements to performance are needed to meet the demand challenge

Improved performance and productivity are considered necessary to meet the challenge of an elevated pipeline of work over the next six years. The 2016 National Construction Pipeline Report forecasts a longer and later construction peak than in previous pipeline reports. The real value of construction work is expected to peak in 2017 at \$37.2 billion, and over 2014, 2015 and the six year forecast period the value of construction work in New Zealand is expected to total over \$270 billion.

The strong demand forecast is underpinned by residential demand in Auckland. In 2017, 53% of forecast national construction growth comes from residential building in Auckland, which is a result of meeting the current housing shortfall and new demand.

The recently released decisions version of the Proposed Auckland Unitary Plan (which is still subject to a legal challenge process before it becomes operational) sets out the development potential for 422,000 more homes in Auckland over the next 30 years. It is up to the construction sector to meet market demand for housing in Auckland within the bounds of the planning controls. This will not be possible without changing the approach for construction. Out of the 422,000 new dwelling development potential, approximately 64%

(or 270,000 dwellings) will be accommodated within existing urban areas, through more intensive development. Existing practices will not meet the demand challenge in Auckland.

The approach to construction has not fundamentally changed over the last 40 years, but the nature of the demand has changed. New innovative approaches will be required to meet the demand challenge of more intensive housing and to be successful in its delivery. Without this, there is a real risk that the industry cannot capitalise on the underlying demand and consumers choose to forgo new building projects.

There are a number of options for improving the productivity and performance of the sector

There are a number of areas in which government, industry and consumers could make changes that would improve the productivity and performance of the industry. The current boom provides an opportune time to look beyond the current cycle and improve the performance of the sector over the long-term. Supporting the sector means that any gains in underlying productivity are not lost when the sector encounters a bust. Over the long-term, gains in productivity and multiplier effects would compound to produce even larger benefits for New Zealand.

The government sets the regulatory regime within which the construction sector operates. As such, it has the ability to constrain or support growth in the sector with the extent and quality of the regulation it imposes. There is a role for regulation in the construction sector to manage risk. For example, health and safety regulation is imposed to ensure that construction workers can perform their tasks while the risk of adverse outcomes is managed. However, it is the role of government to ensure that the regulatory regime is fit for purpose, that the broader costs and flow-on effects of imposing regulation are well understood and are balanced with the broader benefits of regulation.

As an example, the Construction Contracts Act is likely to impose significant flow-on costs to the end consumer. The new requirements mean that risk profile and cost of borrowing are likely to increase for firms, which are all costs that are passed to the end consumer and could jeopardise the operations of many small businesses. The government must ensure that the costs and unintended outcomes are balanced with the benefits and intended outcomes of any regulation.

More broadly, initiatives that government could take include encouraging labour supply through immigration and training programmes (even more so than what is currently occurring), and considering improvements to regulatory regimes that negatively impact on construction sector performance. This should include reviewing the costs and benefits of regulations regarding liabilities, health and safety, along with consideration of options to streamline consenting processes and rationalise the number of Building Consent Authorities (BCAs).

The government is also a major source of construction demand, particularly in the downturn of the cycle. There is an opportunity for the government to streamline the procurement process and time its investments to support the on-going success of the industry. This is essentially neutral from a cost perspective – only the timing of the investment shifts. There has been an increasing trend for government to use non-standard contracts. The process is costly for the industry through additional time and (legal) cost to negotiate the variations, which becomes a divisive and adversarial process. A common theme from industry stakeholders was that the government should make adoption of MBIE's procurement guidelines mandatory in central and local government procurement, unless there is a justification for not doing so. We also suggest that the government could consider increasing the use of standard contracts, and increased adoption of MBIE's procurement guidelines, to reduce the additional time and cost involved in negotiating contracts for the government and industry.

More broadly the government has tried to limit its risk by using traditional procurement methods, such as design-bid-build, which separates the different parts of the construction value chain. This often incentivises 'value engineering' and hinders innovation across the construction value chain. Flexibility in government procurement approaches, particularly more integration between design and build, would provide flexibility for firms to undertake innovation in their approach and produce better project outcomes. In addition, the government could encourage economies of scale in residential development through aggregation of separate Housing New Zealand Corporation contracts.

Finally, the government could play a role in promoting counter-cyclical investment and use timing to support the industry when private sector demand is low. This does not mean creating new projects, but rather bringing forward already planned work to stimulate demand in the sector. A sink fund would be required to ensure that government could bring forward projects ‘on-demand’.

The construction industry could help grow its productivity through additional investment in skills, training, innovation, promoting better contracting practices and exploring options for improved quality assurance processes. There may also be opportunities to incentivise training and skills development for existing workers in the industry, as well as incentivising more high skill workers, with cross-functional skills, into the industry to address the existing and future labour shortages. There is a marketing challenge to this – to overcome perceptions that the industry culture is ‘blokey and labouring’. Adopting innovative approaches to construction, such as investment in mechanisation and off-site construction could assist with the industry meeting the demand challenge and improved communications of project successes will assist with changing public perceptions.

Clients and consumers can contribute to better performance of the industry through encouraging improved project management practices, considering whole-of-life-costs for construction projects and having greater acceptance of more standardisation and mass-customisation in construction.

Recommendations

There are a number of areas in which government, industry and consumers could make changes that would improve the productivity and performance of the industry. These are discussed throughout the body of this report and are summarised here, with a reference to the corresponding report section.

Recommendations for government

- Consider changes to policy settings to increase labour supply during industry shortages. (Section 5 on labour availability)
- Consider working with other governments eg Australia to fill labour shortages where demand is counter-cyclical and labour is mobile. (Section 5 on labour availability)
- Work with tertiary providers to improve alignment between the training cycle and labour demand. Assist with overseeing better standardisation of qualifications for polytechnics and training organisations (Section 5 on labour availability)
- Encourage public sector agencies to use standard contracts to limit the time and cost for all parties involved. (Section 5 on government contracting)
- Procure for large scale projects to encourage the industry to gear up to deliver at scale and to attract international players (driving improvements in efficiency and effectiveness). The Capital Infrastructure Plan may be an opportunity for this. (Section 5 on government contracting)
- Consider changes to traditional procurement approaches such that design and build functions are separated, helping to reduce fragmentation in the industry and improving project management and incentivising innovation across the construction value chain (Section 5 on government contracting and consumer choices)
- Plan the timing of government investment to help smooth the construction industry's boom-bust cycle, helping provide stability for construction labour and stabilise prices for consumers. (Section 5 on government contracting)
- Undertake better assessment of regulation before imposing it, to ensure that the intervention is proportionate to the risk being managed and the benefits of the intervention outweigh the costs. (Section 5 on regulation)
- Undertake better ex-post evaluation of the effectiveness of regulation and make changes where it is found to be ineffective. (Section 5 on regulation)
- Consider an alternative or amended regime for retentions which provides the required protections while lowering the financial burden on the sector (PwC's 'hybrid model' included in our submission on the Construction Contracts Amendment Act 2015 is an illustrative example). (Section 5 on retentions)
- Consider alternatives to the joint and several liability rule which better reflects the share of the risk that each party is responsible for. (Section 5 on joint and several liability rule)
- Building on changes implemented through the Health and Safety at Work Act 2015, consider how to improve transparency around compliance, reduce compliance costs and ensure fees and other ramifications are proportionate to the level of risk and probability of adverse outcomes. (Section 5 on health and safety)
- Consider amendments to the building consent process which provide industry with more certainty regarding timeframes, minimising flow on impacts to the build time. (Section 5 on consents)
- In conjunction with local government, consider options to reduce the number of BCAs to ensure more consistent, and higher quality, application of the building code. (Section 5 on consents)

Recommendations for the construction industry

- Support continuous training to ensure that the skills of workers within the industry support the on-going success of the industry. In particular, explore options for up-skilling the construction workforce's project management skills. (Section 5 on labour skills and project management)
- Consider options for facilitating industry-wide innovation (a recent example being the introduction of BIM processes). (Section 5 on technology and innovation)
- More widespread use and uptake of mechanisation and off-site construction. (Section 5 on technology and innovation)
- Consider greater use of integrated contracting approaches to promote greater collaboration between design and build functions. (Section 5 on contracting approaches)
- Consider the use of more partnerships and alliances to improve scale (Section 5 on industry scale)
- Consider how to facilitate a shift back towards best practice contracting and risk allocation, where the party who is most able to control the risk bears the consequences of risk materialisation. (Section 5 on contracting approaches)
- Explore options for improving quality assurance processes, for example through a use of quality assurance documentation or peer-review processes. (Section 5 on project management)

Recommendations for consumers

- Demand sound project management by contractors working on construction projects. (Section 5 on project management)
- Consider whole of life costs (including impact on operating costs and eventual outcomes generated) when commissioning construction projects. (Section 5 on drive for low cost construction)
- Increase acceptance of mass customisation and standardisation in construction, helping to drive down costs and improve productivity. Better understand the impact that bespoke designs have on cost. (Section 5 on preference for bespoke builds)

1. *Introduction*

This report provides an update to our 2011 report entitled “Valuing the role of Construction in the New Zealand economy”. This report was commissioned by CSG, in association with CIC and BRANZ, in order to demonstrate to government and other stakeholders the value and significance of the sector, and ensure the profile of the construction industry is up to date.

Our previous report highlighted the value of the construction sector, and the key role it plays in the New Zealand economy. However, it identified that the boom-bust nature of the sector was clearly a problem, and was a barrier to improving its productivity and overall performance. We stated that Government’s key focus needs to be in developing forward certainty for the sector, allowing it to maintain and develop skills, and boost labour productivity. We set out a number of options which Government could consider which could enable a more consistent and predictable environment for the sector.

This report looks at the state of the construction sector five years on. The previous report was written at the bottom of the cycle, whereas today the sector is operating in a boom. However, while the state of the industry has changed significantly, the underlying structural issues which were identified in our previous report largely remain today, and the impact of the business cycle on the sector is just as strong.

The purpose of this report is to update the information on the value of the sector, and also to reconsider the issues identified in 2011 through a combination of data, literature and interview-based research. We then reconsider opportunities for improving the performance of the sector.

In this report we:

- set out the scale and value of the construction sector today, considering the sector’s share of GDP and employment, along with consideration of regional differences and the demographics of the industry
- consider the construction sector’s inter-industry relationships across the economy and the wider economic benefits that it brings
- assess the performance of the construction sector, reviewing recent growth trends and providing a future outlook
- consider structural constraints to improving the performance of the construction sector, looking at the sector’s use of labour and capital, operational approaches and the impacts of consumer choices and regulation, and consider opportunities for addressing them
- discuss a number of common misconceptions of the construction sector.

We have applied both qualitative and quantitative approaches in order to provide a holistic view on the construction industry in New Zealand. We have undertaken analysis of data from Statistics New Zealand, along with other internal and external sources. This analysis has been combined with information sourced from previous reports on the construction industry along with insights gained through interviews with industry personnel. The time and assistance of our interviewees, who provided valuable input to this study is acknowledged. Members of the CSG Board, BRANZ, CIC, as well as other non-CSG/CIC interviewees are gratefully acknowledged.

In addition, we acknowledge the contribution of Gareth Stiven and David Norman, co-authors of the previous report, who provided helpful advice during the development of this report.

2. The scale and value of the Construction sector

The picture and outlook for construction in New Zealand has changed significantly since our previous report was prepared. In the midst of a trough in the construction boom-bust cycle, our previous report was prepared at a time when the sector was weak. Fast-forward five years and the situation has changed dramatically as the sector grapples with increased demand from the Christchurch rebuild, earthquake strengthening, leaky building remedial work, strong residential demand in Auckland, increased business confidence and a forward infrastructure plan worth \$54.9 billion over the next 10 years.⁴ The cyclical nature of the industry has not changed – but it appears that underlying demand for construction will remain strong for a number of years.

This section outlines the scale and economic value of the construction sector in the New Zealand economy and how this has changed over the last five years. The sector is a major contributor of employment in New Zealand, employing 178,100 full-time equivalent workers (FTEs) directly in construction, and a further 53,600 in construction-related services in 2015.

Construction is made up of a core construction industry (consisting of division E of the ANZSIC06 classification⁵) and construction-related services (consisting of industries *F333 – Timber and Hardware Goods Wholesaling* and *M692 – Architectural, Engineering and Technical Services*). Our definition is unchanged from our previous report, which enables comparison to the previous analysis and long-run trends over time to be identified where the data permits this.⁶ In our analysis, we have separated construction and construction-related services where the data from Statistics New Zealand permits this. If construction-related services cannot be isolated from the broader industry in which they sit (F333 sits in Wholesaling and M692 sits in Professional, scientific and technical services), our analysis in that section only pertains to core construction. References to the “Construction sector” relates to the aggregate of core construction and construction-related services. This is illustrated in Figure 5, and further definitional work of the sector can be found in Appendix A.

Figure 5 Definition of the Construction sector



⁴ Capital investment intentions for central government and local government 2017 – 2026 for all capex available at <http://www.infrastructure.govt.nz/plan/evidencebase>

⁵ Australia and New Zealand Standard Industrial Classification 2006, a shared classification of industries used by New Zealand and Australia.

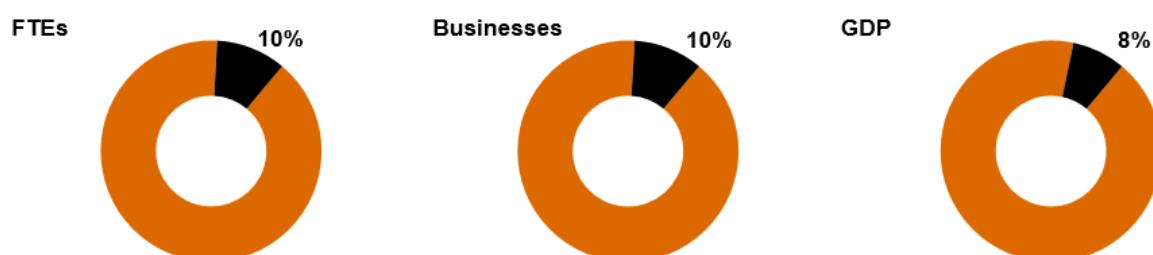
⁶ Note that there was a change in calculation method for the Regional Industry Database which means that there was a series break between the 2011 report and the update report, which impacts on the availability of a long-run time series for employment and productivity.

Note that our previous report, published in 2011, contained data for the 2010 year. As such, the analysis in this report relates to changes in the construction sector over the five year period between 2010 and 2015 unless otherwise specified.

Employment, GDP and business units

The Construction sector is a major contributor to New Zealand's economy

Figure 6 The Construction sector's share of New Zealand employment, businesses and GDP in 2015



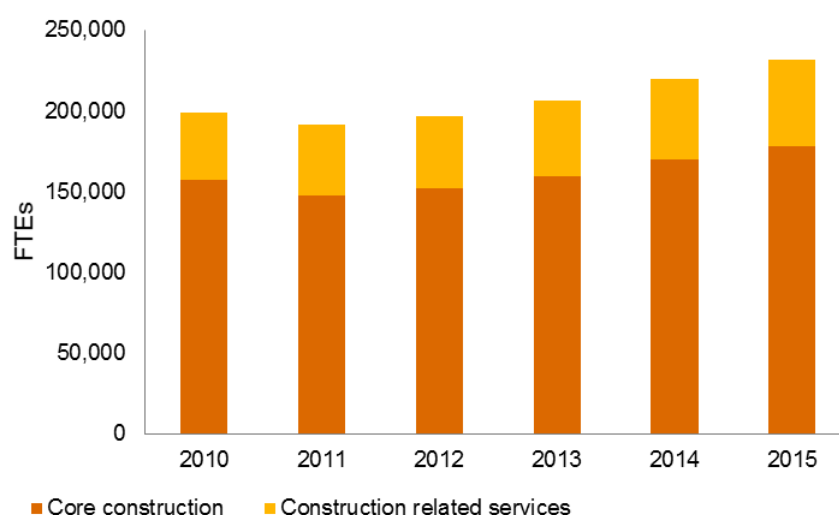
Source: PwC Regional Industry Database

Employment

As Figure 6 shows, the Construction sector is a major contributor to New Zealand's economy, contributing strongly to employment, businesses and GDP.

Employment in core construction was estimated at 178,100 FTEs in 2015, with construction-related services estimated to have 53,600 FTEs in 2015. Together, employment in the construction sector was 231,700 FTEs which accounted for 10% of total employment in New Zealand in 2015, up from 8% in 2010. The gain was equivalent to 32,100 new FTEs over the five year period since our previous report (as shown in Figure 7). FTEs have grown at an annual average of 3% over the last five years.

Figure 7 Employment in construction since 2010⁷



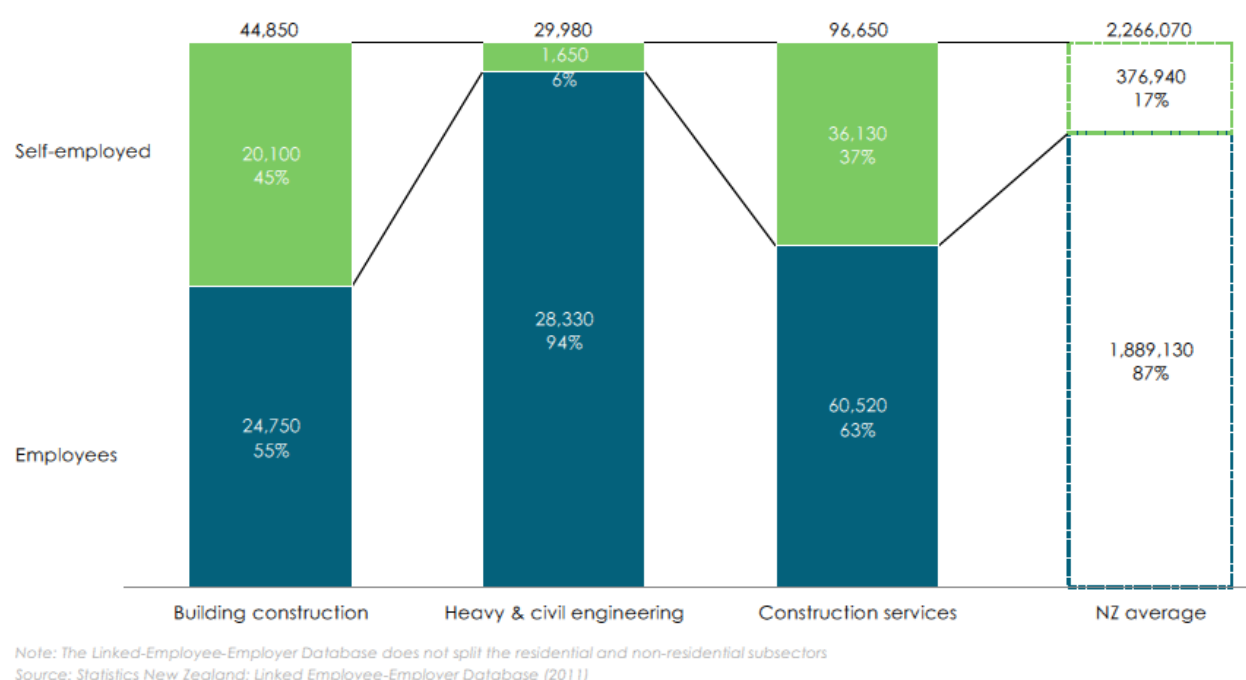
Source: PwC Regional Industry Database

⁷ Note there is a series break in the data between 2010 and 2011 due to a change in methodology to improve our employment and GDP estimates.

The gain in the number of businesses between 2010 and 2015 in core construction was more modest. Approximately 54,500 core construction businesses were operating in 2015, up 2,700 from 2010. Core construction businesses made up 10% of the total number of businesses in New Zealand, a similar percentage to 2010. This implies that firms are taking on more staff rather than new firm start ups, which has been observed in previous booms.

Our previous report noted that construction has a high proportion of small businesses, much like the New Zealand economy as a whole, a statement which has not fundamentally changed since 2010. Figure 8 below shows the breakdown of core construction workers into employees and self-employed workers. The construction sector is characterised by a small number of large businesses and large number of small businesses (including self-employed workers and sole-traders). In building construction and construction services, the proportion of self-employed workers is much higher than the New Zealand average. In addition, approximately 90% of businesses in construction had between 0 and 5 employees in 2015. Greater than 94% of businesses in construction had fewer than 10 employees in 2015.

Figure 8 The construction sector is dominated by self-employed workers



Source: As cited in MBIE (2013) *New Zealand Sectors Report*, Featured Sector: Construction

Output / GDP

The Construction sector contributes strongly to New Zealand's GDP. In 2015, core construction contributed \$13.9 billion to New Zealand's economy and construction-related services contributed a further \$5.0 billion. Together, the Construction sector contributed \$18.9 billion to New Zealand's GDP, equivalent to 8% of New Zealand's economy in 2015. Seen from another perspective, the Construction sector's contribution to New Zealand's GDP in 2015 was just shy of the entire Waikato region's share of New Zealand's GDP across all industries (\$18.9b compared to \$19.6 billion in 2015).⁸

Over the last three years core construction has seen 17% GDP growth, overtaking wholesale trade to become the 8th biggest contributing sector to GDP.⁹ Out of the top ten individual sectors by contribution to New Zealand's GDP, construction supports the largest number of jobs.

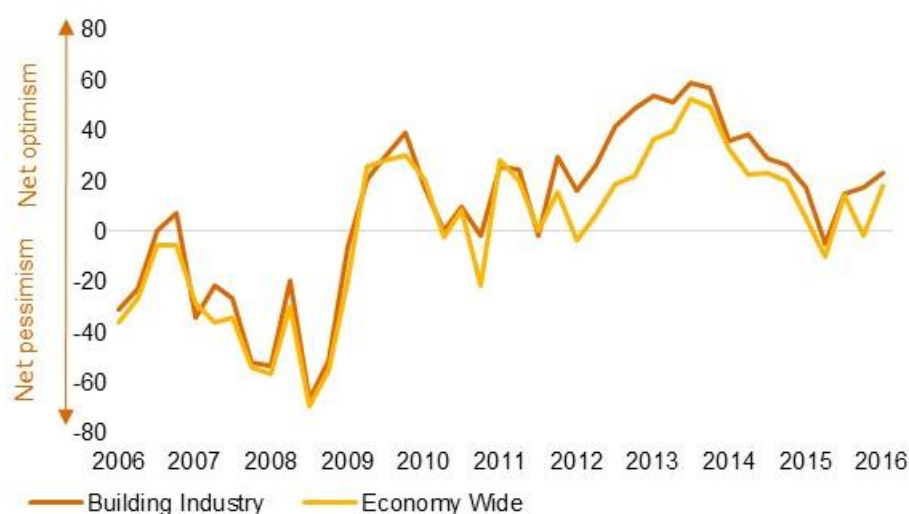
⁸ Statistics New Zealand Regional GDP – year to March 2015

⁹ Using 1 digit ANZSIC industries.

Since 2010, the Construction sector has grown from 4% of New Zealand's economy to 8%. This growth has been underwritten by strong confidence in the sector. Firms in the building industry have generally been optimistic about trading conditions since around 2011, as shown in Figure 9 and Figure 10. In particular, Figure 9 shows that firms in the building industry (firms involved in building and construction, and building materials) have been particularly positive about their situation and their short term outlook since 2012. Up until 2011, the outlook of firms in the building industry was on-par with overall firms in the New Zealand economy. Figure 9 also shows that confidence in the building industry has been persistently higher than economy-wide perceptions since 2011.

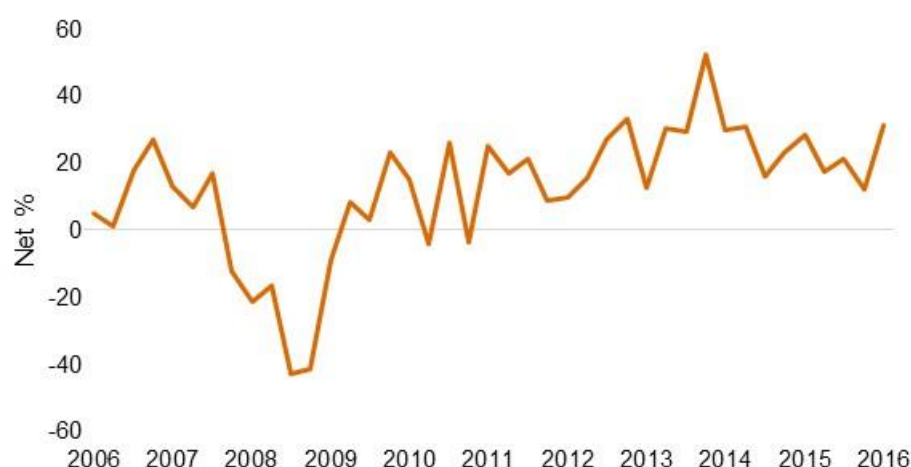
Figure 10 shows that most firms in the building industry expect that the amount of output they will produce over the next quarter will increase compared to the same quarter of last year. The persistent optimism in the sector is correlated with increased economic activity over the same 2011 to 2015 period.

Figure 9 Short term confidence indicators for the building industry have been positive for several years



Source: NZIER QSBO

Figure 10 Expectations of increased output in the next quarter have been positive since 2011



Source: NZIER QSBO

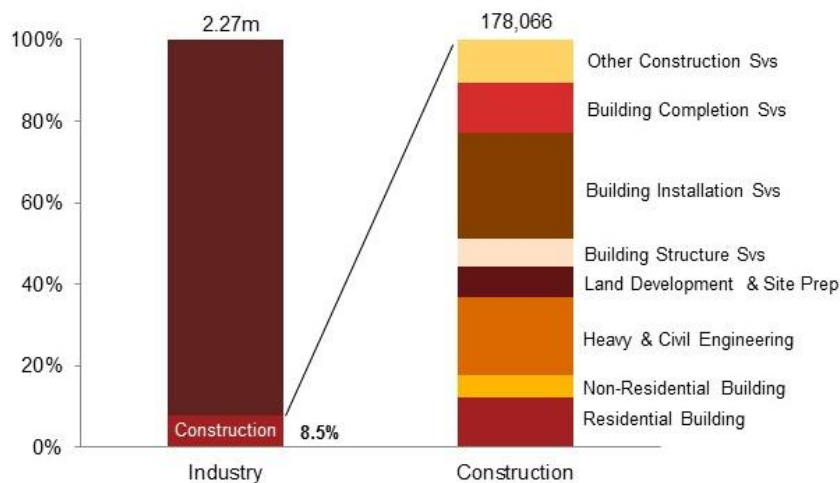
Employment by construction subsector varies

The core construction sector has eight sub-components, with each subsector servicing a different part of the construction value chain. Figure 11 provides a breakdown of employment by each of the eight core construction sub-sectors. The top four sub-sectors, by employment, are:

- building installation services (plumbing services, electrical services, air conditioning and heating services, fire and security alarm installation services, other building installation services)
- heavy and civil engineering construction
- residential building construction
- building completion services (plastering and ceiling services, carpentry services, tiling and carpeting services, painting and decorating services, glazing services).

These make up 70% of total employment in the core construction sector. Much of this employment is comprised of sole traders providing sub-contract services.

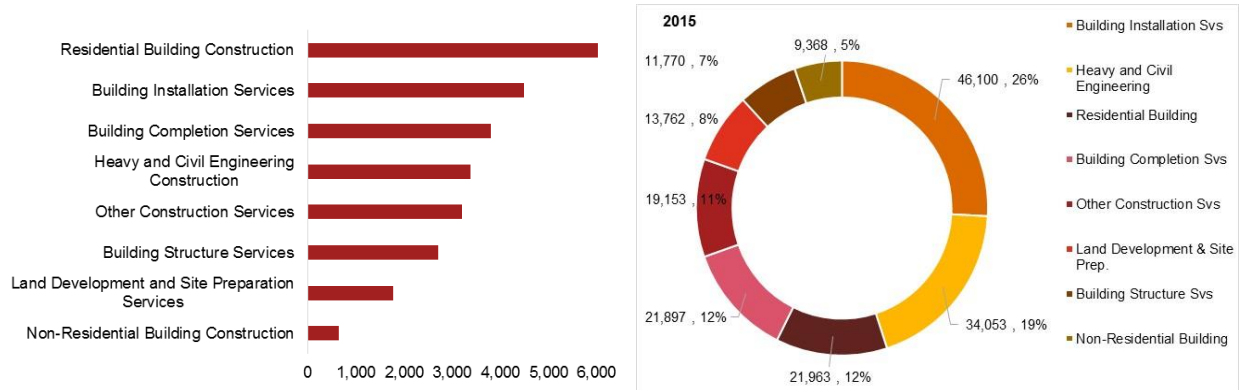
Figure 11 Building installation services and heavy and civil engineering are dominant subsectors of core construction (Total New Zealand employment)



Source: PwC Regional Industry Database

In comparison to 2012, there was an increase in the number of people employed in all eight sub-sectors. The largest gains were in the residential building construction and building and installation services sub-sectors. These subsectors experienced employment growth of over 6,100 FTEs and 4,400 FTEs between 2012 and 2015 respectively. Figure 12 shows the breakdown of employment in core construction and job growth by subsector since 2012. Building installation services, heavy and civil engineering and residential building make up over 60% of employment in core construction.

Figure 12 Breakdown of core construction and job growth by sub-sector



Source: PwC analysis, Statistics New Zealand

Regional picture of construction in New Zealand

Construction activity is concentrated in New Zealand's three main regions – Auckland, Canterbury and Wellington. Together, these three regions make up 60% of total employment in core construction in New Zealand. Figure 13 shows the regional breakdown of core construction employees and New Zealand's population. The proportion of employment in construction in Canterbury is higher than the share of Canterbury's population, a feature of the flow of construction labour to support the Canterbury rebuild effort. Conversely, Auckland's share of national core construction employees is less than its population share. This reflects the diversity of employment opportunities in Auckland and local economies of scale in the construction sector, both features of Auckland's size. However, it is likely that there is still a large shortfall in construction labour, which is needed to support Auckland's residential and non-residential growth and the under-build since the Global Financial Crisis. Wellington is also under-represented in construction FTEs relative to its share of the population, but to a lesser extent than Auckland.

Figure 13 Breakdown of FTEs in construction and population by New Zealand region 2015

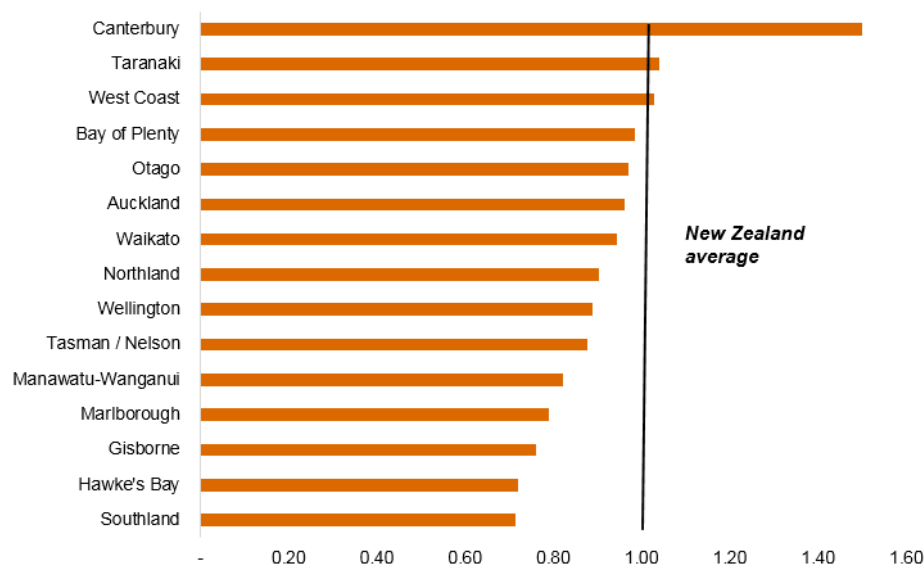


Source: PwC Regional Industry Database, Statistics New Zealand

Figure 14 sets out the employment concentration for regions in New Zealand – that is, the construction employment relative to total employment in the region. A value above one means that construction's share of total regional employment is greater than the national average; ie that the region has a specialisation in construction.

Canterbury is an outlier in terms of its specialisation, with construction being a much greater share of employment than in any other region. This is a feature of workers supporting the Canterbury rebuild. We expect this value would moderate as the Canterbury rebuild work winds down. Auckland has a value below one, but still relatively high compared to regions other than Canterbury. As stated above, Auckland has a substantial construction sector, but also strong employment across many sectors, and it benefits from economies of scale in terms of labour requirements.

Figure 14 Employment concentration index for construction shows that there is strength in Canterbury

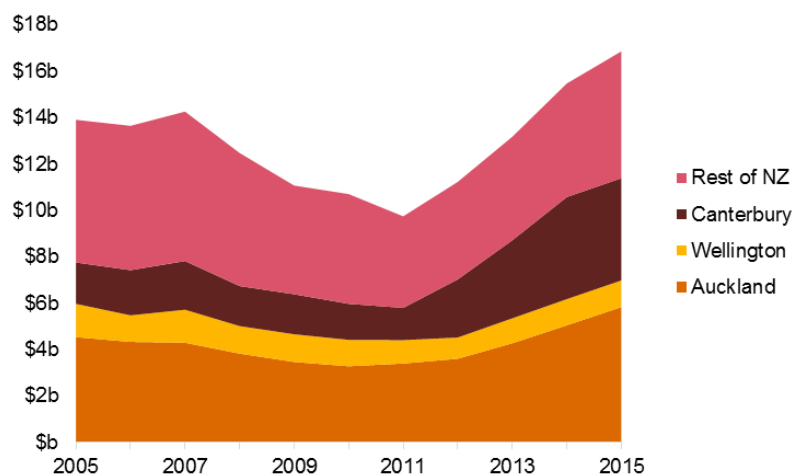


Source: PwC Regional Industry Database

Since 2011 there has been an upswing in consenting activity across New Zealand. Figure 15 shows the value of consents approved in Auckland, Wellington, Canterbury and the rest of New Zealand over the last 10 years. It includes the value of all construction work, including residential buildings, non-residential buildings, and non-building construction (eg civil work, infrastructure and others). In the 2015 calendar year, the value of construction work consented was over \$16.8 billion, although we note that work does not necessarily get constructed in the year it is consented, and not all consented work proceeds to construction. However, on a like-for-like basis, the value of consented work in 2015 was 73% higher than that in 2011.

The Auckland and Canterbury regions have dominated the consents landscape since 2011-2012. The construction work from the Canterbury rebuild, spanning residential building, non-residential building and infrastructure building is a large driver of the construction activity in Canterbury. Meanwhile Auckland's construction is currently being driven by residential construction activity (see Figure 16).

Figure 15 Regional breakdown of all construction consents by value (\$2015 real)¹⁰



Source: PwC analysis, Statistics New Zealand

¹⁰ Includes consents for new structures, and alterations and additions to existing structures.

As shown in Table 1, construction activity in Wellington, and the rest of New Zealand, is not currently experiencing the same level of growth observed in Auckland and Christchurch.

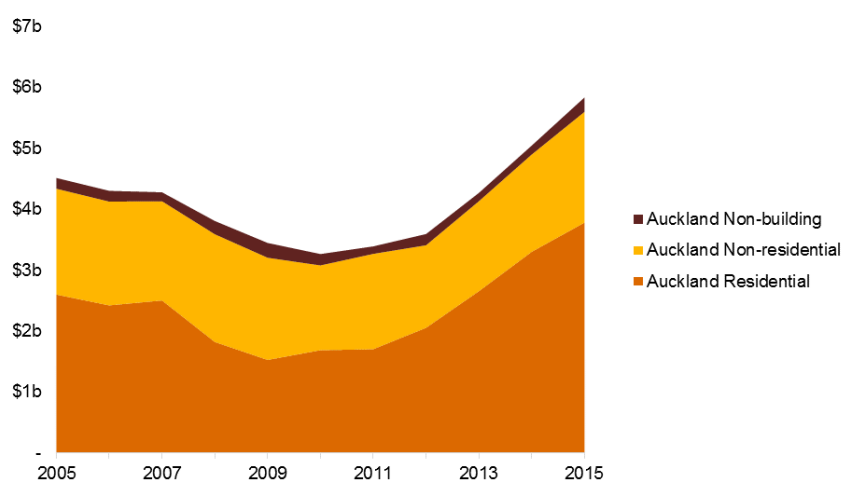
Table 1 Growth in building consents between 2011 and 2015

Region	Inflation-adjusted change in the value in building consents, 2011-2015
Auckland	14%
Wellington	3%
Canterbury	33%
Rest of New Zealand	9%

Source: PwC analysis, Statistics New Zealand

Figure 16 illustrates the strong demand in residential construction in Auckland since 2011. This reflects a period of under-investment in Auckland's residential housing stock in the preceding five years. The under-build of residential housing in Auckland is shown in Figure 17. Residential dwellings consented (again noting that not all consented structures are built) has not kept pace with population growth in Auckland in recent years. Strong demand for residential construction is expected to continue over the next five years, as the industry accommodates pent-up demand and Auckland accommodates a population growing at an average estimated rate of 63 persons per day over the next 30 years.¹¹ The decisions version of the Proposed Auckland Unitary Plan allows for an additional 422,000 dwellings in Auckland over the next 30 years, to accommodate the expected growth in Auckland's population.

Figure 16 Building consents approved in Auckland \$2015 real values¹²

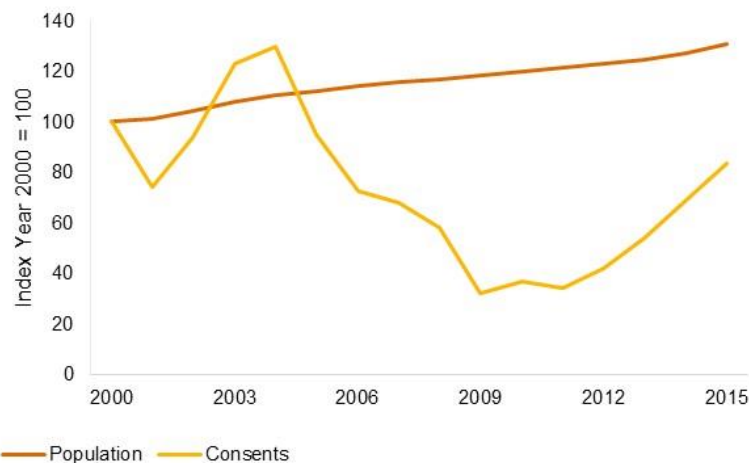


Source: PwC analysis, Statistics New Zealand

¹¹ Based on Statistics New Zealand medium subnational population projections for the 2013 to 2043 period for the Auckland region.

¹² Includes consents for new structures, and alterations and additions to existing structures.

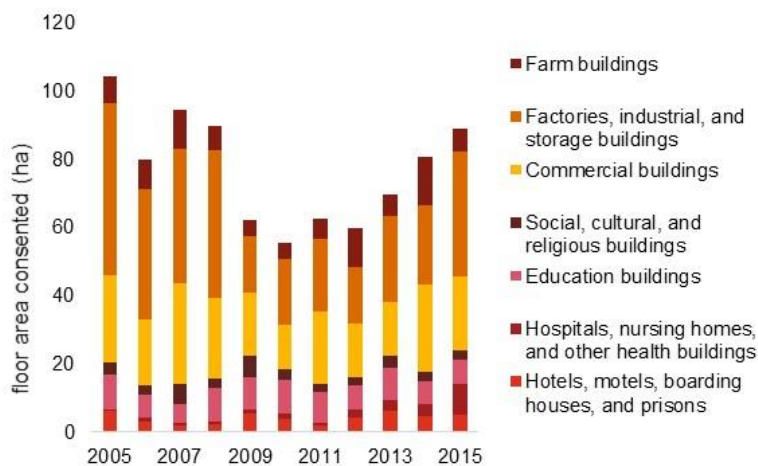
Figure 17 Consented residential developments have not kept pace with population growth in Auckland



Source: PwC analysis, Statistics New Zealand

Non-residential building construction is the realisation of investment in the productive capacity of an economy. Expansion in the capital stock broadly means that an economy enables firms to produce more output, improving productivity. Auckland and Canterbury make up the lion's share of primarily private sector, non-residential building investment in New Zealand. Figure 18 shows the floor area of non-residential buildings consented in Auckland between 2005 and 2015. In line with Auckland's areas of comparative advantage, the majority of the new consented floor area relates to new commercial buildings (eg offices, shops, restaurants) and factories, industrial and storage buildings.

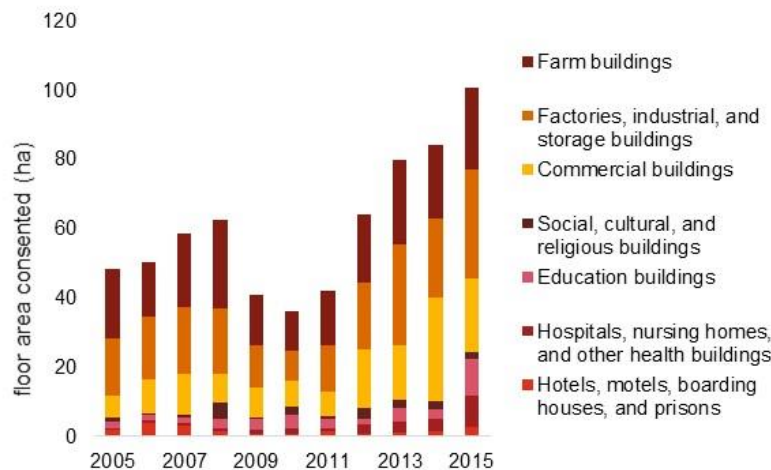
Figure 18 Floor area of non-residential buildings consented in Auckland



Source: PwC analysis, Statistics New Zealand

Figure 19 shows the floor area of non-residential buildings consented in Canterbury. The residential component of the Canterbury rebuild is largely complete, so the attention is now turning to the non-residential sector. The consented work will be a mixture relating to the Canterbury rebuild and supporting broader economic growth. Similar to Auckland, the Canterbury landscape features commercial buildings and factories, industrial and storage buildings. In addition, Canterbury has a significant proportion of farm buildings in its mix of non-residential buildings. Supporting the agricultural sector in the region in 2015, almost one-quarter (by floor area) of the Canterbury region's new consented non-residential buildings were farm buildings.

Figure 19 Floor area of non-residential buildings consented in Canterbury



Source: PwC analysis, Statistics New Zealand

As noted previously, the Construction sector contributed 8% of New Zealand's GDP in 2015. Not only does construction contribute to New Zealand's economy directly through construction activity, it also enables sectors to expand economic output. Between 2005 and 2015, Auckland consented over 200 hectares of new commercial building space, and just under 280 hectares of new factories, industrial and storage buildings. Over the same timeframe, the Canterbury region consented over 130 hectares of commercial floor space, over 190 hectares of new factories, industrial and storage buildings and a similar 190 hectares of new farm buildings. Not all the consented buildings will proceed to the construction stage (due to limitations around finance, changes in trading conditions etc) but this represents a significant expansion of New Zealand's potential to produce economic output, which is directly facilitated through construction activity.

Gross fixed capital formation

GFCF is a measure of realised investment in capital assets, including residential buildings, non-residential buildings, plant, machinery and equipment, transport equipment and other investment to expand New Zealand's capital stock.¹³ GFCF is a gross figure – it does not capture depreciation of capital assets and is inclusive of investment in new assets and replacement of existing assets.

Approximately 54% of New Zealand's GFCF investment was facilitated through construction in 2015. GFCF through residential buildings, non-residential buildings and other construction was worth over \$29 billion in 2015. New Zealand's annual GFCF investment facilitated through construction is shown in Figure 20.

¹³ GFCF also includes investment in weapons systems, computer software, research and development and mineral exploration.

Figure 20 Gross fixed capital formation facilitated through construction



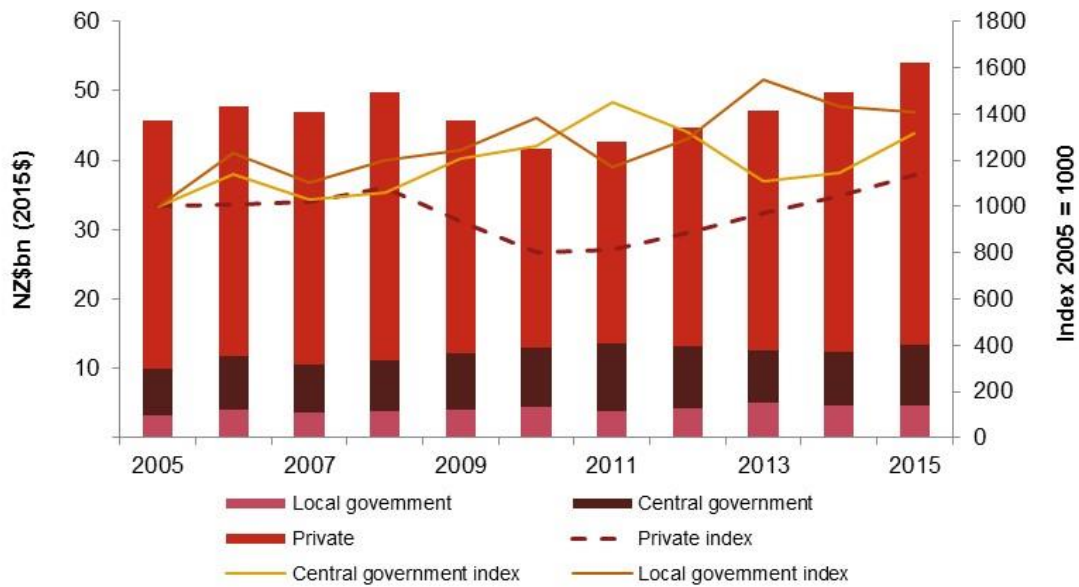
Source: PwC analysis, Statistics New Zealand

There has been steady investment in residential buildings, non-residential buildings and other construction in New Zealand over the last decade. About half of this investment is GFCF through residential buildings, which is primarily driven by private sector investment.

More broadly, investment in overall GFCF, including investment not facilitated by construction, is driven by the private sector. Figure 21 shows the value of GFCF by institutional sector over the last decade. Around 75% of overall GFCF investment was by private sector investment and around 25% of overall GFCF investment was by central and local government in 2015. In value terms, annual government sector (central and local government) GFCF was between \$10.0 billion and \$13.6 billion over the last 10 years, relative to average annual GFCF investment by the private sector of \$34.7 billion.

While the private sector dominates GFCF, government still plays a significant role, particularly during periods when private sector investment is low. For example, government's share of GFCF was 31% in 2010 when private sector GFCF was at a seven year low, compared with 25% in 2015.

Figure 21 GFCF investment by institutional sector



Source: PwC analysis, Statistics New Zealand

Demographics of workers in construction

While much of the construction sector is capital intensive, such as heavy and civil engineering works, workers are an integral part of construction processes. This section describes the demographic characteristics of core construction by looking at educational attainment, ethnicities, gender, and age groups employed in the sector.

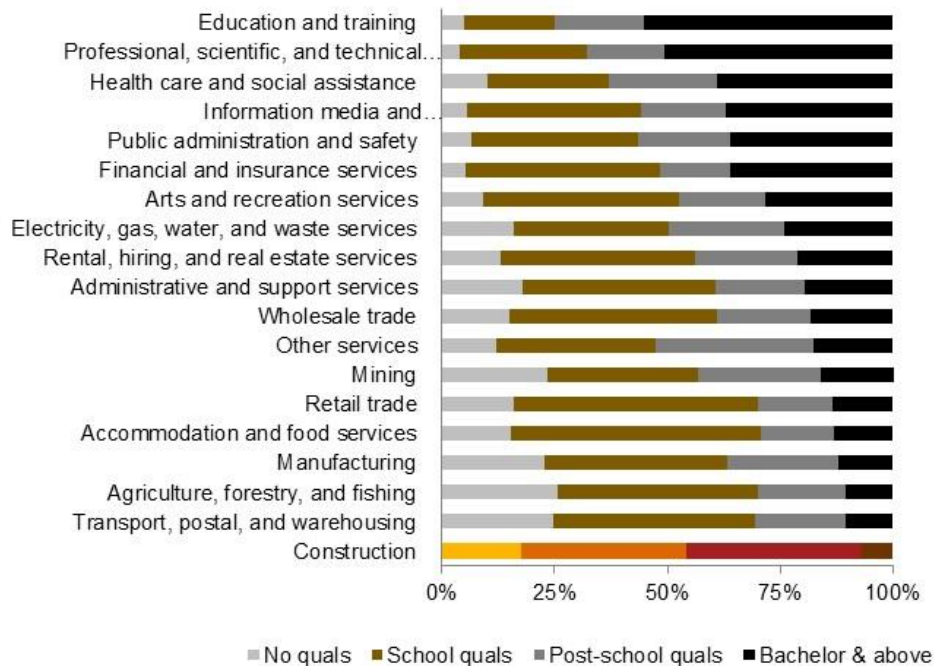
Educational attainment of workers is mid-field

Our previous report showed that educational attainment levels for workers in core construction is mid-field relative to other sectors in New Zealand. Figure 22 shows that not much has changed for construction, relative to other sectors in 2015. Approximately 46% of workers had a post-school qualification, Bachelor (or higher) degree in construction, compared to 48% for the New Zealand average.

However, the requirements of the sector mean that workers are likely to get a post-school qualification, rather than a Bachelor (or higher) degree. Core construction has the highest percentage of workers with a post-school qualification (out of 19 industries) as their highest level of qualification as this type of training is appropriate for the sector.

Consequently, core construction had the lowest share of workers with a Bachelor (or higher) degree out of all sectors in New Zealand in 2015, which was also observed in 2010. The 7% of workers with a Bachelor (or higher) degree provide much of the input at early stages of the construction value chain through for example engineering services, project management, and project supervision and oversight of construction processes. The number of workers with higher education in construction is growing, from 6,800 in 2006 to approximately 10,000 in 2013. Incentivising more high skilled workers to the sector will support better project outcomes and productivity growth, particularly in project management and high skill roles in the construction value chain (refer section 5).

Figure 22 Educational attainment in Construction is mid-field

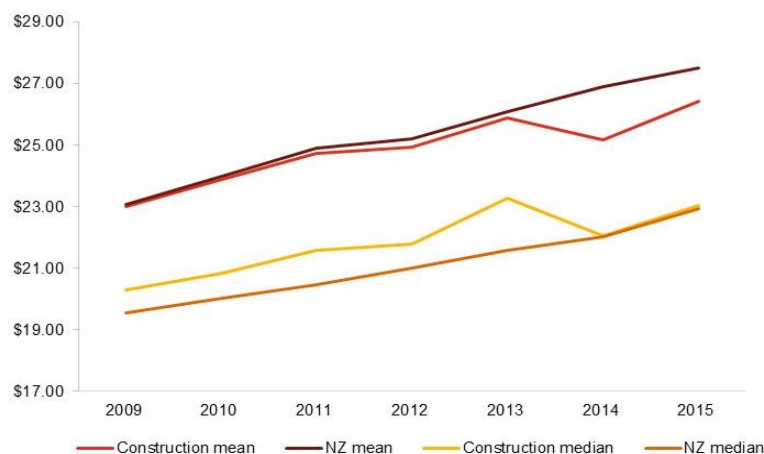


Source: PwC analysis, Statistics New Zealand Census 2013

Income levels are mixed

Average hourly earnings in core construction was \$26.40 per hour in 2015. As shown in Figure 23, this has been rising over time but remains lower than the New Zealand average, indicative of the low productivity in the sector. Figure 23 also shows the median hourly earnings for core construction and the New Zealand average. The median hourly wage for core construction, \$23.02 per hour in 2015, is lower than the mean hourly wage, indicating that the wage distribution in core construction is skewed towards high wage jobs. The median hourly earnings for core construction workers is higher than the median for New Zealand, due to a higher proportion of part time (lower wage) jobs in sectors such as retail and hospitality, which influence the result.

Figure 23 Mean and median hourly earnings



Source: PwC analysis, Statistics New Zealand

Salaries are varied within the sector due to the type of construction work involved. High skill roles which require tertiary qualifications offer high wage opportunities for workers. The wage spectrum is highly skewed as the mean is much higher than the median wage as there are many high wage opportunities for graduates in the sector. MBIE's latest forecasts show that a 10% increase in workers in high value roles between 2015 and 2021 will be needed, in roles such as project managers, civil engineering professionals and architectural, building and surveying technicians.¹⁴

There are also opportunities for workers without tertiary qualifications. As shown in Figure 22, 76% of workers have either a school qualification or post-school qualification, which could include trade-related or vocational training for a career in trades.

The income levels for some specialist trades are listed in Table 2. The salaries are for full time roles and are within the range, or higher, than the New Zealand median full time salary of around \$53,000.¹⁵ Since there are some specialist trades which you can enter directly under apprenticeships and earn while you learn, specialist trades can be an attractive career proposition.

Table 2 Salaries of specialist trades ¹⁶

Trade	Salary range	Median salary
Electrical	\$37,000 - \$70,000	\$60,000
Painting	\$37,000 - \$70,000	\$50,000
Plumbing	\$37,000 - \$75,000	\$60,000
Roofing	\$32,000 - \$75,000	\$55,000
Building and Carpentry	\$37,000 - \$80,000	\$55,000
Flooring	\$37,000 - \$65,000	\$50,000
Glaziers	\$35,000 - \$65,000	\$50,000

Source: TradeMe Jobs Salary Guide tables

The outlook for specialist trades is positive in some areas. Table 3 outlines the forecast job growth for selected specialist trades in Auckland over the 2013 to 2023 period. Expected job growth is stronger in some areas than others but demand for specialist trades is forecast to continue to support growth in the construction sector.

Table 3 Outlook for selected specialist trades in Auckland¹⁷

Specialist trade occupation	Job growth 2013 – 2023
Carpenters and joiners	2,350
Painting trades workers	640

¹⁴ Source: MBIE, Future demand for construction workers, July 2016

¹⁵ Source: Statistics New Zealand, NZ Income Survey, June 2015 quarter median full time salary per week \$1,016, annualised by 52 weeks.

¹⁶ Source: TradeMe Jobs, Salary Guide tables for "Trades & services salary information", for full time roles listed between July 2015 and December 2015

<http://www.trademe.co.nz/jobs/salary-guide/trades-services.htm> accessed 16 August 2016

¹⁷ Source: Market Economics (2014) Auckland's Construction and Infrastructure Labour Requirements 2013 - 2023

Specialist trade occupation	Job growth 2013 – 2023
Plumbers	880
Electricians	1,360
Building and plumbing labourers	1,170

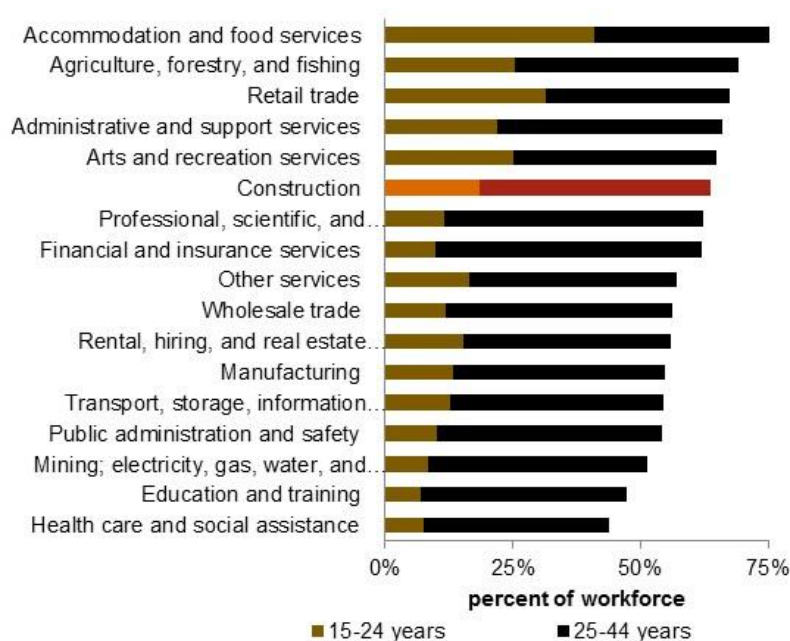
Source: Market Economics

Age groups – construction employs younger workers

Construction employs relatively young workers on average. Figure 24 shows that core construction has the sixth highest (out of 17 industries) proportion of workers between the age of 15 and 24 and the third highest proportion of workers between the age of 25 and 44. Core construction provides opportunities for young workers, with relatively less experience, often giving them their first job in their working careers.

Our previous report noted that workers in the 25 to 44 brackets are more likely to have families or dependents to look after, and mortgages to pay. The implication of this is that downturns affect workers in core construction relatively more than other sectors in New Zealand.

Figure 24 Construction employs younger workers than most sectors



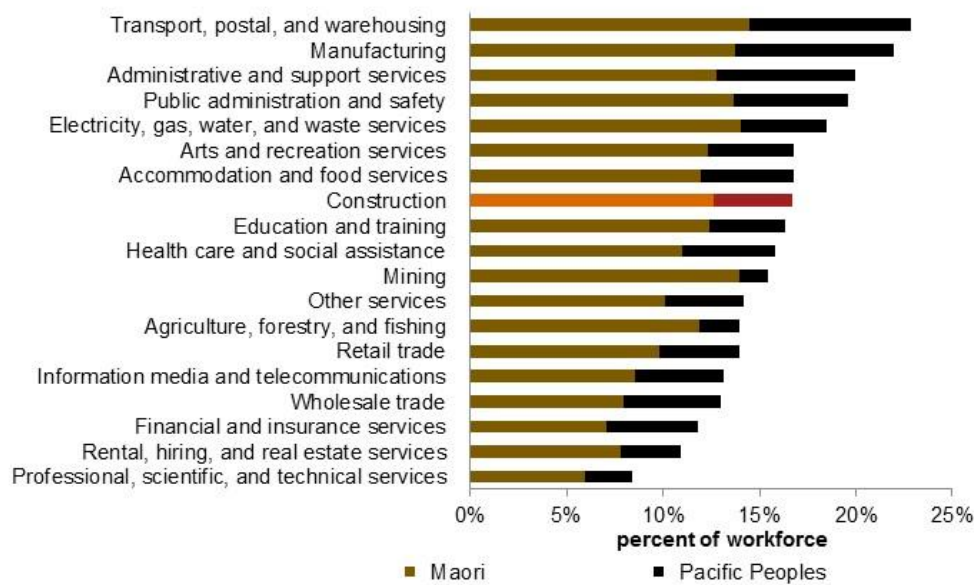
Source: PwC analysis, Statistics New Zealand

Ethnicity

Figure 25 illustrates the diversity in the construction workforce and other sectors in New Zealand. Construction has the eighth highest proportion of workers identifying as Maori or Pacific peoples, which is mid-pack out of the 19 industries assessed.

Our previous report noted that these two groups are characterised by higher unemployment rates and lower educational attainment rates. The Construction sector offers significant employment opportunities for these ethnic groups.

Figure 25 Workforce identifying as Maori or Pacific peoples

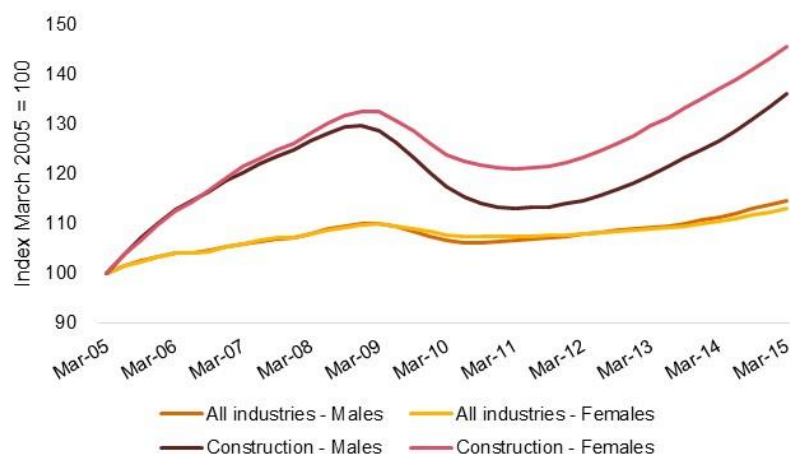


Source: PwC analysis, Statistics New Zealand

Gender

The construction sector is a male dominated sector, but female employment in the sector has been growing at a faster pace than males, although off a lower base. Whereas job growth across the New Zealand economy is similar for males and females, in core construction job growth for females has outpaced job growth for males since 2005, as shown in Figure 26. This means that the ratio of male to female workers has been narrowing over time. In 2005, the ratio of male to female workers was 6.3 to one; by 2015 the ratio had decreased to 5.9 to one.

Figure 26 Job growth by gender in construction and nationwide



Source: PwC analysis, Statistics New Zealand

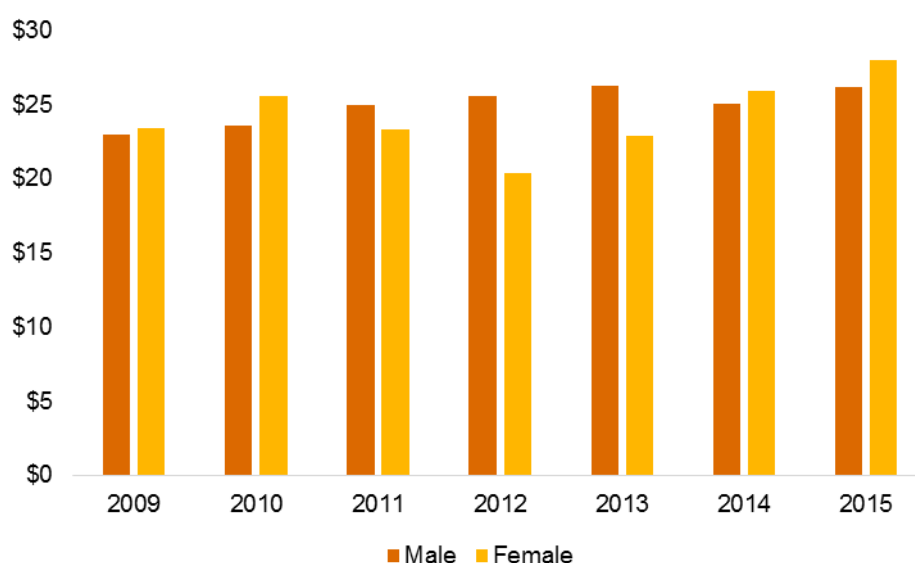
The growth in jobs for female core construction workers has meant that there are an additional 5,887 female workers in construction over the 10 years to March 2015, equivalent to an increase of 45% in the sector's female workforce.¹⁸

¹⁸ Statistics New Zealand, LEED, March 2015 quarter, total filled jobs.

In the last two years, mean hourly earnings for females has been higher than for males as shown in Figure 27. However, when translated to mean weekly earnings, male earnings are higher than the female equivalent. On average women work fewer hours than men per week (ie part time), resulting in lower weekly earnings.

The mean hourly earnings for females is higher than the equivalent median hourly earnings figure in core construction. In 2015, the average earnings for females in core construction was \$27.96 per hour, compared to the median rate of \$22.92 per hour. This suggests that the wage distribution for females is highly skewed for females, more so than for males. In particular, this implies that the women in the sector are more likely to be in higher value roles. There are high income and promising career opportunities for women in core construction.

Figure 27 Mean hourly earnings for females has been higher than males in the last two years in core construction



Source: PwC analysis, Statistics New Zealand

3. The construction sector's inter-industry relationships

Any investment in a particular sector has flow-on effects to other sectors in the economy. The sector buys inputs from other sectors, creating employment for its suppliers (indirect impacts). Workers then use their earnings to buy goods and services for their household creating jobs in retail, personal services and other sectors (induced effects). It is thus crucial to examine how a sector interacts with other sectors in the New Zealand economy.

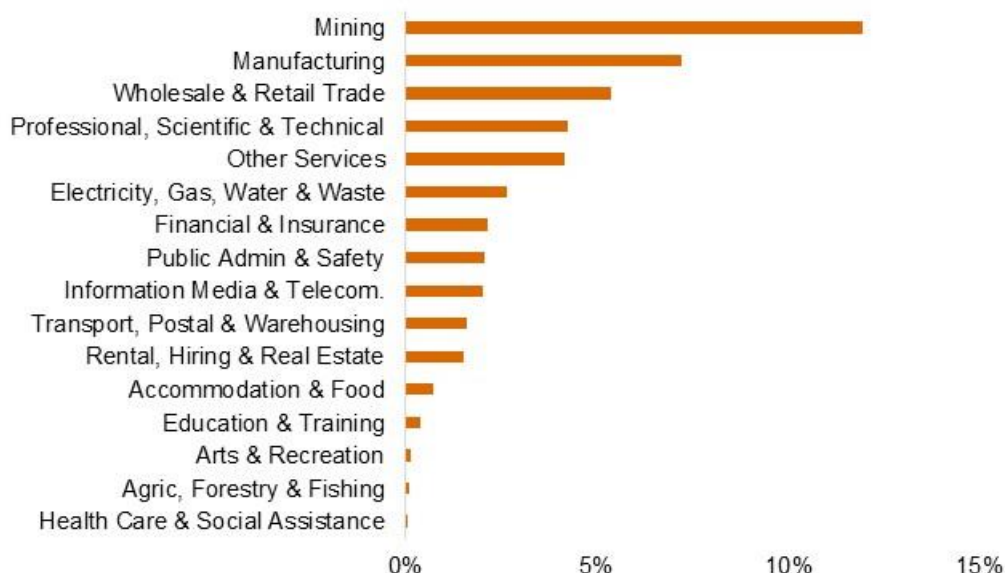
The New Zealand national input-output tables help explain how the economy fits together by showing the extent to which industries interact, supplying each other, and benefitting from the outputs of each other. The input-output tables also allow us to estimate the effect on GDP and employment of a one dollar investment in a particular industry. This helps show which industries are likely to stimulate larger flows of money, and investment in industries to be compared.

Construction is highly integrated across the economy

Construction uses the outputs from a number of key sectors across New Zealand. Figure 28 shows the proportion of each sector's output which contributed to core construction. This gives an indication of how important the Construction sector is in absorbing outputs from other sectors.

Approximately 12% of the total output from the mining sector is used in construction, while construction also uses over 7% of the output from the manufacturing sector. Other key sectors which rely on the demand from the construction sector are the wholesale and retail trade sector (demand from the construction sector accounts for 5% of the sector's total demand) and professional, scientific and technical services (construction demand accounts for 4% of total sector demand).

Figure 28 Construction absorbs output from a wide range of sectors

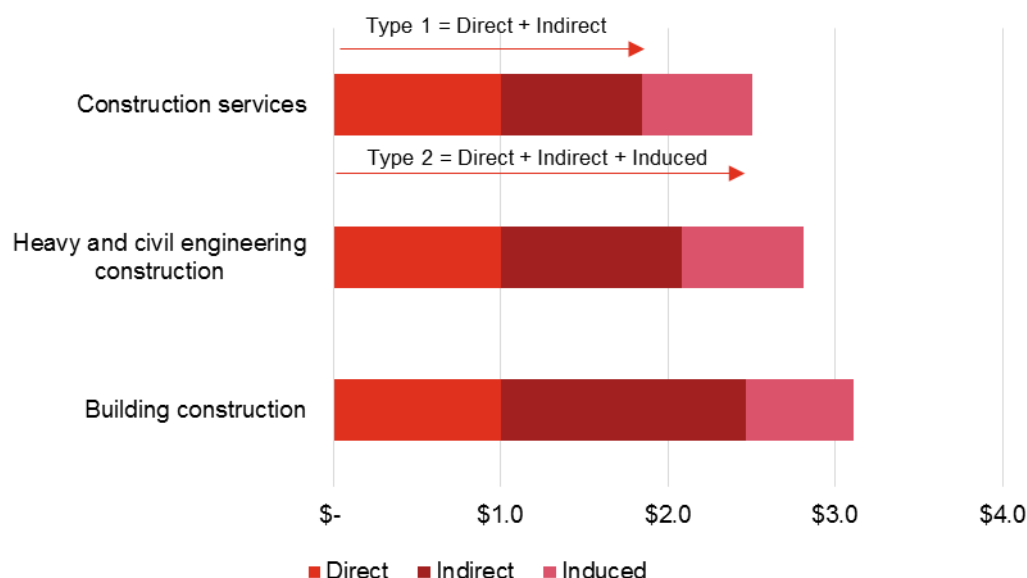


Source: PwC analysis, Insight Economics IO Tables 2011

This shows that construction is highly integrated across the economy and the success of the construction sector has flow on effects to the success of other sectors, in particular mining, manufacturing, and professional, scientific and technical services.

Multipliers measure the extent to which investment in a particular sector affects other sectors, upstream and induced (or downstream) effects. Estimates of the impact of investment (or expenditure) in one sector is on other parts of the economy are based on New Zealand national input-output tables. Figure 29 shows the multiplier effects for three components of construction. It shows the three types of impacts discussed above: direct, indirect and induced impacts.

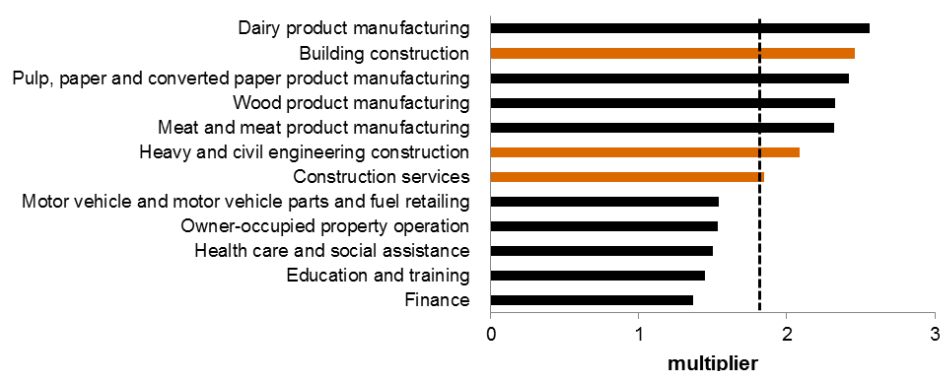
Figure 29 The multiplier effect for construction investment is large



Source: PwC analysis, Insight Economics IO Tables 2011

Figure 29 shows that one dollar invested in construction produces between \$2.51 and \$3.11 in economic activity. The indirect impacts in Figure 29 show the dollar value of the relationship between construction and the broader economy, including the mining; manufacturing; and professional, scientific and technical services sectors, as well as other sectors to a smaller extent. The Type 1 multiplier measures the direct and indirect impact of one dollar invested in construction. Figure 30 shows the direct and indirect impact of investing one dollar into one of the three components of construction, and selected other industries. Investment in building construction has the second highest Type 1 output multiplier out of 55 sub-industries. Heavy and civil engineering construction has the 12th highest Type 1 output multiplier out of 55 sub-industries, while construction services is around the New Zealand average.

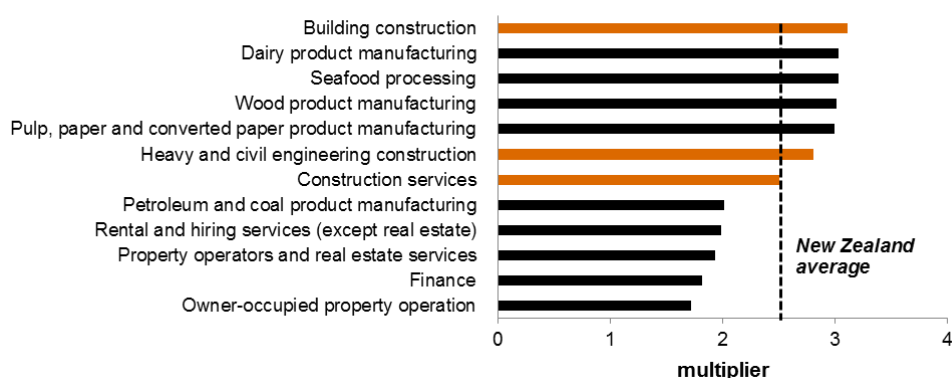
Figure 30 Construction spending quickly stimulates the economy through indirect impacts (selected sectors)



Source: PwC analysis, Insight Economics IO Tables 2011

The sum of the direct, indirect and induced impact is referred to as the Type 2 multiplier. The Type 2 multiplier includes the impact of household expenditure for workers by sector. For each dollar spent in construction, there is between 66 cents and 73 cents of economic activity which results from increased household income and expenditure. Figure 31 shows that the building construction sub-sector has the highest Type 2 multiplier out of 55 sectors (only the three construction sub-sectors, top five and bottom five sectors are shown). The Type 2 multiplier for heavy and civil engineering is the 7th highest and construction services is mid-field.

Figure 31 Investment in building construction produces the largest stimulus effect (selected sectors are shown)



Source: PwC analysis, Insight Economics IO Tables 2011

The wider benefits of construction

The inter-industry relationships of the construction sector show that the sector has wide ranging impacts across other sectors of the New Zealand economy. Construction generates economic activity directly and also facilitates expansion of economic activity in other sectors through building new manufacturing plants, new cafes, new shops etc which, once operational, produce more output.

There are also significant non-economic benefits of construction, for example:

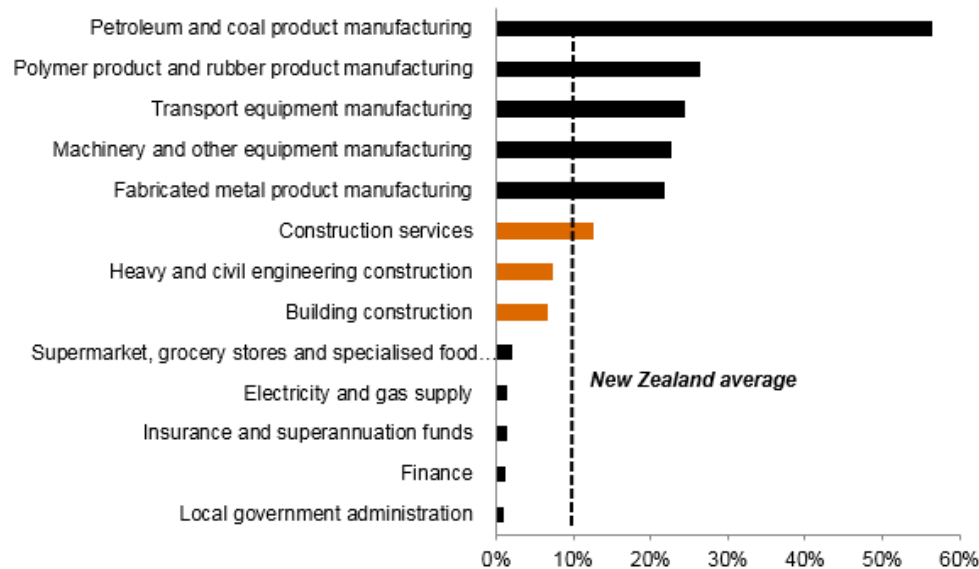
- Construction of new transport infrastructure generates travel time savings for people moving from A to B and can make the journey safer.
- Construction of housing provides homes for people reducing overcrowding.
- Construction of a new hospital wing generates health benefits for patients.
- Construction of a new school generates education benefits for students.
- Construction of a new community hall provides space for community events and meetings.

Imports and exports

As noted in our previous report, the Construction sector is largely domestic focused. The sector utilises the outputs of the manufacturing sector, and turns them into usable infrastructure and extends the capital stock, adding significant value as part of this process. In our previous report, Construction sector exports were estimated at 0.7% of output. Our revised recent estimate has fallen slightly, to 0.6% of output.

The Construction sector has greater international engagement through importing materials. Imports by the construction sector, as a percentage of output generated, sit around the New Zealand average. Figure 32 shows the imports as a percentage of output, for the construction sector, and the top five and bottom five sectors (out of 55 sectors). As can be observed, the three construction sub-sectors are below the New Zealand average.

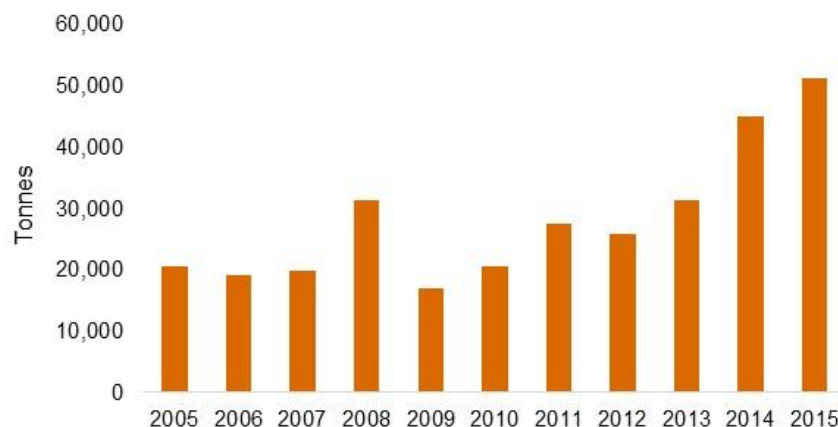
Figure 32 Construction sits mid-field in import dependency



Source: PwC analysis, Insight Economics IO Tables 2011

However, imports by the construction sector have been increasing over the last decade. In particular, the volume of imports of steel for use in structures¹⁹ has increased, as shown in Figure 33. The volume of imports of steel for use in structures has increased by almost two-and-a-half times (148%) since 2010.

Figure 33 Imports of steel products for use in structures (HS code 7308)



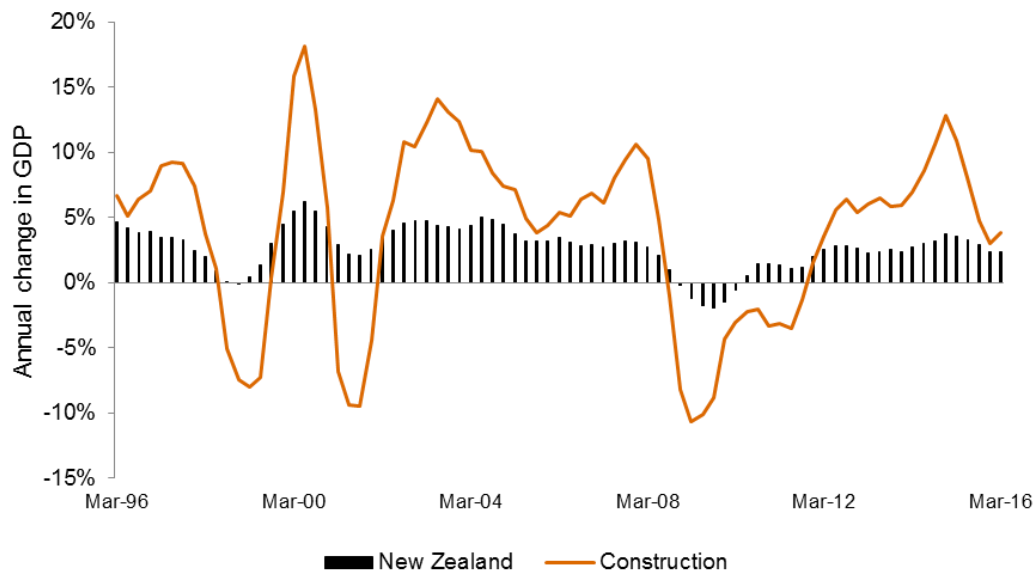
Source: PwC analysis, Statistics New Zealand

¹⁹ HS code 7308, structures of iron or steel and parts thereof, plates, rods, angles, shapes, sections, tubes and the like, prepared for use in structures.

4. Performance of the construction sector

As noted previously, the Construction sector has been performing strongly since 2010. The sector is in a boom part of the boom-bust cycle and it appears that this boom will last longer than previous highs in the construction cycle. Annual GDP growth in construction has outpaced the New Zealand economy since March 2012, as shown in Figure 34. Annual GDP growth in Construction was 3.9% in the year to March 2016, compared to 2.3% for the New Zealand economy over the same period. Figure 34 also shows that the Construction sector has been expanding since December 2011, in line with the trend in consenting activity. This change was to some extent foreseen in our previous report in 2011, due to expected requirements of the Canterbury rebuild and the cyclical nature of the sector generally.

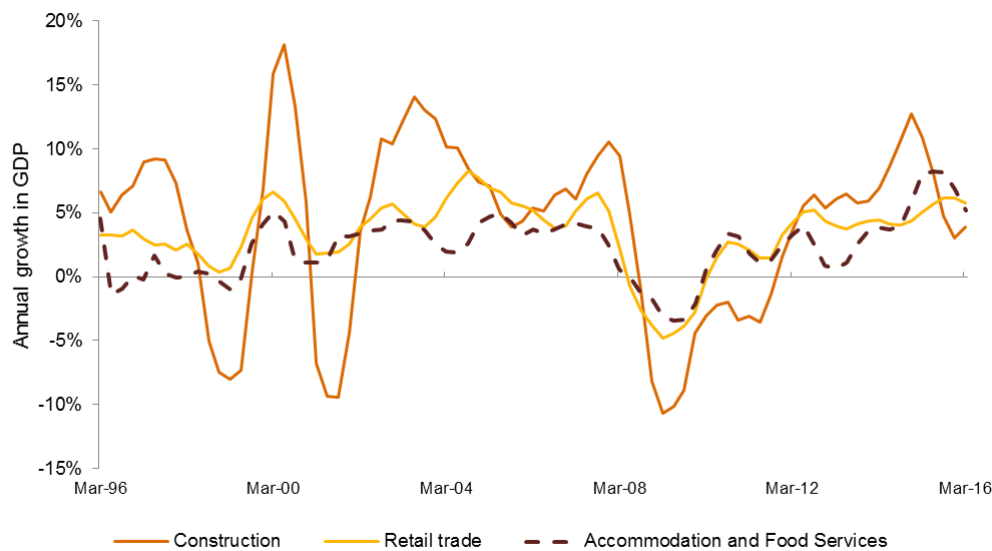
Figure 34 Construction growth has outpaced the New Zealand economy over the last four years



Source: PwC analysis, Statistics New Zealand

Despite the strong performance in recent years, the Construction sector is still prone to boom and bust cycles and exhibits greater volatility than other sectors. Figure 35 shows the construction sector performance relative to two other cyclical service sectors, retail trade, and accommodation and food services. Over the last 20 years, the construction sector has exhibited double digit annual growth and decline. Neither retail trade, nor accommodation and food services experience the same level of volatility (both highs and lows are less than half the size of those in construction).

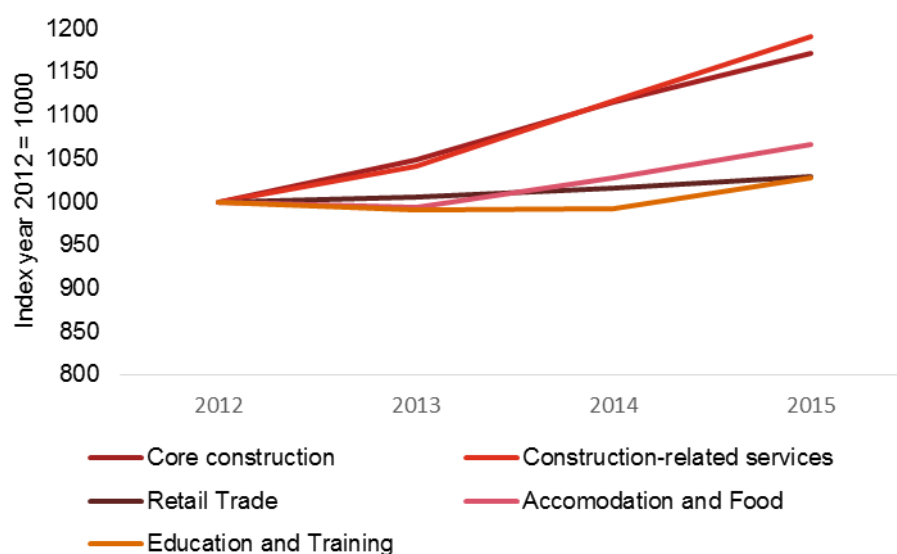
Figure 35 Despite the strong performance in recent years, construction still exhibits greater volatility than other sectors



Source: PwC analysis, Statistics New Zealand

Figure 36 shows the job growth in the industry over the last 10 years. Job growth has been volatile for construction and construction-related services, more so than for retail trade and accommodation and food services. Since the upturn in the construction sector began in late 2011, jobs have increased by 17% in core construction and 19% in construction-related services. The boom and bust cycle for construction has implications for job growth and productivity. Once construction projects drop off, construction workers leave the industry. As the sector picks up again, new workers slowly join the labour force. This has implications for the productivity of the sector. Due to the composition of the industry and the prevalence of sole traders, employment in construction falls slowly going into a bust. Relative to the output produced, this means the sector suffers from low productivity. On the other hand, when moving into the boom part of the cycle, employment grows slowly (relative to workload) resulting in strong productivity gains.

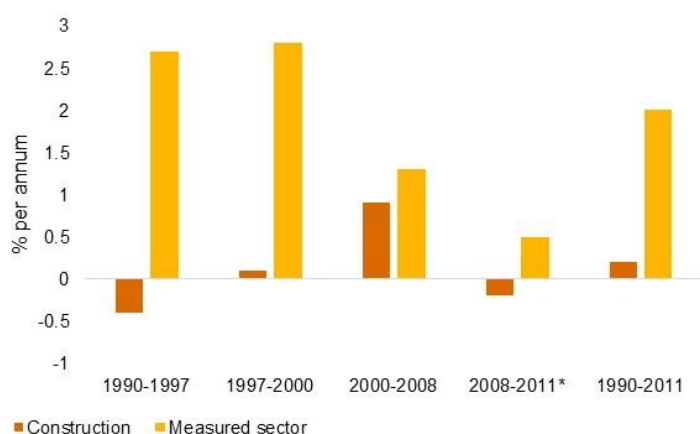
Figure 36 Job growth in the sector has followed expansion in output and activity



Source: PwC Regional Industry Database

Historically, the construction sector has suffered from low growth in measured labour productivity. Figure 37 shows the growth rate in labour productivity for the construction sector and overall measured sector until 2011. Over the 21 year period between 1990 and 2011 labour productivity grew by 0.2% per annum in construction, compared to 2% per annum for the measured sector in New Zealand. In particular, the period between 2008 and 2011 (an incomplete productivity cycle) saw labour productivity in construction decrease by 0.2% per annum, although it was not the only sector to experience a fall in labour productivity over this period. Productivity in other sectors, such as administrative services and support, fell by even more (-5% per annum).

Figure 37 Labour productivity growth over the 20 years to 2011 has been slow

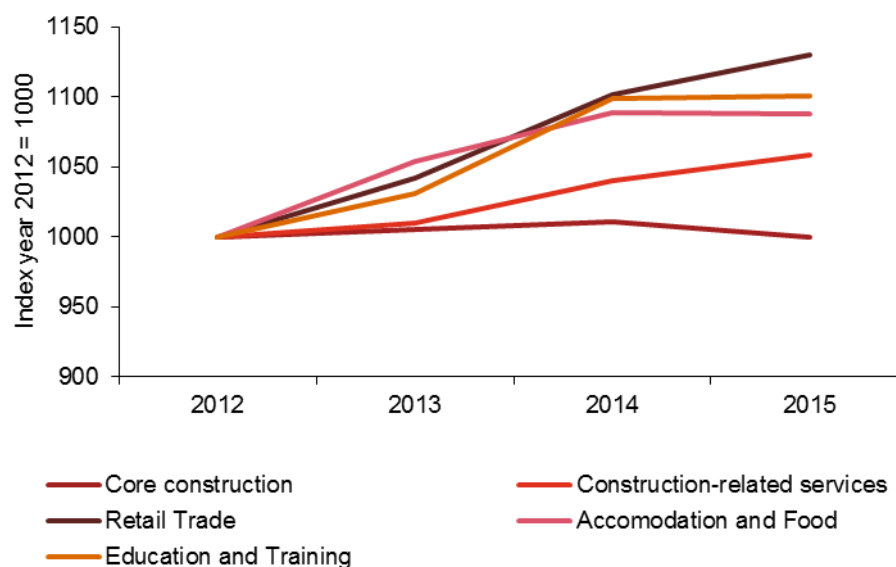


Source: NZ Productivity Commission

The expansion in construction's output, growing faster than the expansion in the construction's labour force, over recent years has supported improvements to labour productivity. Figure 38 shows the ratio of annual sector GDP to annual sector employment for construction and selected sectors, indexed to the year 2012. The chart shows that since 2012, labour productivity in construction and construction services has grown by approximately 1%.²⁰ However, further inspection shows a positive story that there has been marked improvement in construction-related services, which increased labour productivity by 6% since 2012. This is counter-balanced by no substantial productivity gain in the much larger core construction component of the Construction sector.

²⁰ Labour productivity here is measured as GDP per FTE. As such it has not accounted for multi-factor productivity growth, or capital deepening. The figure is also not adjusted for inflation.

Figure 38 Labour productivity has improved over the boom



Source: PwC Regional Industry Database

A recent study on productivity in the construction industry shows that the aggregate statistics on industry performance hide positive stories on individual firm productivity gains. As part of Motu's Working Paper series²¹, the in-depth assessment using firm level data by Jaffe et al (2016) shows labour productivity of the average firm in the construction industry grew by 1.7% annually over the 2001 to 2012 period, in contrast to 0.5% per annum for the overall measured sector.

Jaffe et al (2016) also find that firm characteristics, such as firm age and industry sub-sector, influence productivity. They find high-productivity firms tend to be younger, suggesting that the bust part of the cycle weeds out poor performers, which are replaced by higher productivity firms in the boom part of the cycle.

Productivity growth can also be hindered by regulatory impediments. Analysis by Westpac showed that the changes in the new Building Act and revised Building Code between November 2004 and March 2005 was correlated with a decrease in sector productivity of around 12%. Westpac's analysis suggested that worker productivity rates have never recovered.²²

Outlook

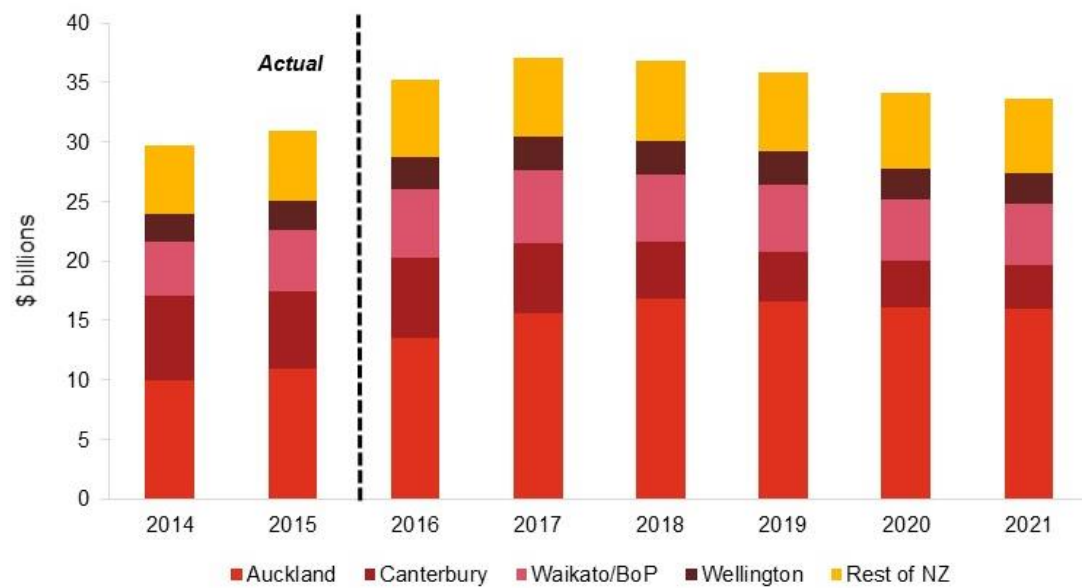
MBIE's 4th National Construction Pipeline Report, prepared by BRANZ and Pacifecon and released in July 2016, shows that demand for construction will grow beyond current levels over the forecast period, as shown in Figure 39. The real value of construction work is expected to peak in 2017, at \$37.2 billion. Over the six year forecast period, the value of construction work in New Zealand is expected to total over \$270 billion.

The Pipeline Report also notes that construction activity is expected to remain higher than current levels until 2021. The current boom is expected to last longer than previous highs, in part due to historical under-investment in housing and infrastructure, particularly in Auckland, and strong confidence in the broader economy.

²¹ Available at <http://motu.nz/our-work/productivity-and-innovation/firm-productivity-and-performance/productivity-distribution-and-drivers-of-productivity-growth-in-the-construction-industry/>

²² Westpac (2015) Outlook for Auckland residential construction: How many dwelling should we be building, and can we?

Figure 39 Demand is expected to remain strong over the next six years

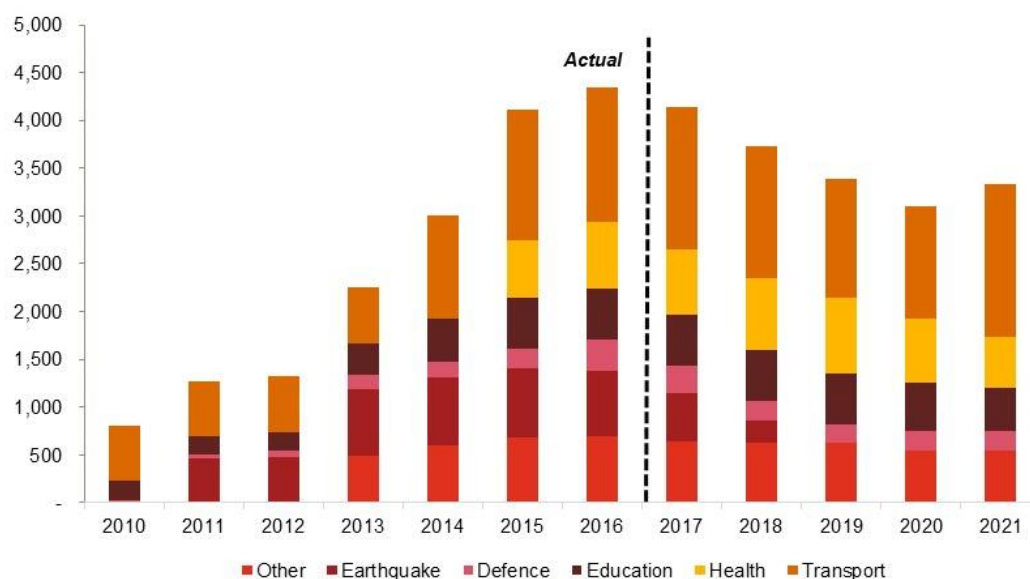


Source: PwC analysis, BRANZ, Pacifecon

By 2017 and beyond, Auckland makes up more than 40% of construction demand, with demand tilted towards residential building. Since the National Construction Pipeline Report was released, the Auckland Council released the decisions version of the Proposed Auckland Unitary Plan. Although it is not yet operative, the plan allows for an additional 422,000 homes in Auckland over the next 30 years, which presents a significant opportunity for the sector.

Investment in social and transport infrastructure by central and local government to support a growing population and economy is set to reach \$17.8 billion over the five years between 2017 and 2021 as shown in Figure 40. Central government earthquake related capital investment in Canterbury tapers off by 2018. Investment in transport infrastructure is expected to make up at least a third of central government capital investment over the next five years.

Figure 40 Proposed investment by central government over the next five years is significant



Source: PwC analysis, Infrastructure Capital Intentions Plan, Treasury

MBIE projected the labour requirements to support the increase in construction work based on the projections in the National Construction Pipeline Report in the Future Demand for Construction Workers report.²³ The report sets out a forecast of 49,000 new jobs required in construction between 2015 and 2021, with a need for a mixture of skilled and unskilled labour to satisfy construction demand from the government sector and private investment. As the sector evolves and innovative approaches to construction are employed, the demand for graduates and other highly skilled labour will rise even further.

As noted above, there is a role for government (central and local) to support the construction sector, and the role becomes more significant when private sector investment is slowing.

The National Construction Pipeline Report provides the best available snapshot of planned investment over the next six years. The outlook for the sector is positive, with construction activity forecast to remain higher and longer than previous Pipeline Report forecasts. A range of conditions, such as government policy or offshore economies, will influence the outlook for the sector. If conditions change significantly and over a short period of time, individual firms may find themselves with excess resource (capital, labour or both) and the associated costs.

²³ MBIE, Future Demand for Construction Workers, July 2016, prepared by Market Economics

5. *Structural constraints and opportunities for addressing them*

In this section, we discuss a number of structural issues in the construction sector, which are constraining it from improving its low productivity and overall performance.

Improving performance of the sector provides a range of benefits which will be shared by the industry and consumers. In a nutshell, improved productivity and performance means getting a better outcome for less resource. For the industry, this means improved profit margins, better skills development and earning opportunities and a better ability to weather the cyclical nature of the industry. For consumers, this means that high quality construction will cost less, involve fewer project delays and have a wider variety of options to satisfy consumer demand.

Improved performance is also a partial solution to the severe shortage of skilled and unskilled labour in the industry. Better use of labour through improved project management and resource re-deployment provides the opportunity to optimise resource (staff and contractors) to increase outputs.

Without change the sector will struggle to meet medium term demand. There is a significant task ahead to accommodate new private sector and government demand, compounded by the housing shortage in Auckland. Estimates of the housing shortage in Auckland vary, but most place the shortfall at between 10,000 and 20,000 homes, while Auckland Council noted the current shortfall could be as high as 40,000 dwellings.^{24, 25} The recently released decisions version of the Proposed Auckland Unitary Plan provides for an additional 422,000 dwellings over the next 30 years, although it is not yet operative. The opportunity is significant, but the sector will not be able to meet the challenge without change.

In the next section we outline issues which impact the performance of the sector and outline opportunities for change to address the issues. These issues are all inter-related, and in many cases the key underlying driver is the boom-bust nature of the industry. We have grouped the discussion into the following five topics:

- labour
- capital
- operations
- consumer choices
- regulation.

The majority of the issues which we discuss in this section were also identified in our previous report. They are not typically straightforward to address. While incremental improvements have been made in a number of areas, in general the same structural issues that were identified in 2011 remain today.

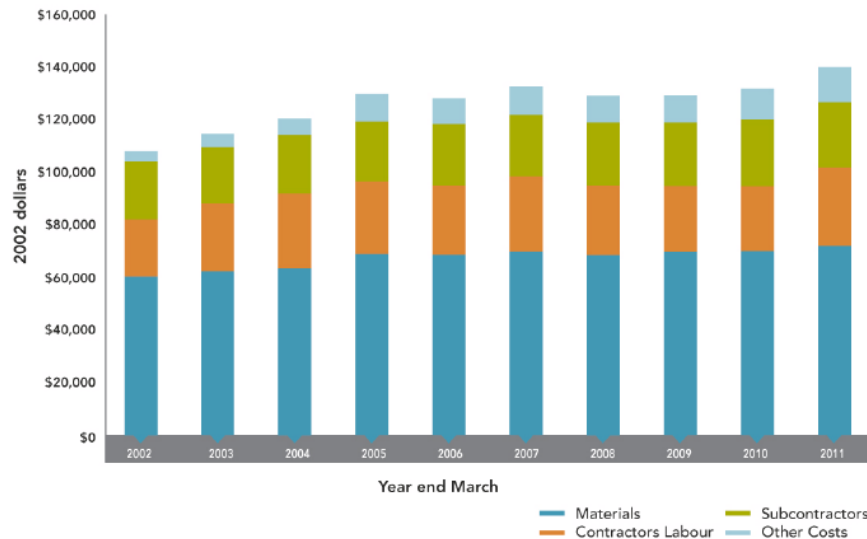
²⁴ Refer BNZ analysis <http://tonyalexander.co.nz/wp-content/uploads/2015/04/Sporadic-6-April-29-2015.pdf>

²⁵ Refer Briefing on Independent Hearings Panel recommendations <http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/plansstrategies/unitaryplan/Documents/ihprecommendations/paupbriefingonihprecommendations.pdf>

Labour

Construction is a labour-intensive industry, particularly in residential construction where labour makes up 20% of the direct costs of building a house, but the actual figure is likely to be in the range of 35% - 45% of build cost once all contracted (and sub-contracted) labour is included.²⁶ As such, labour productivity, availability and competencies are key drivers for performance in the industry.

Figure 41 Cost components of a standard new house, 2002-2011 (in 2002 \$)

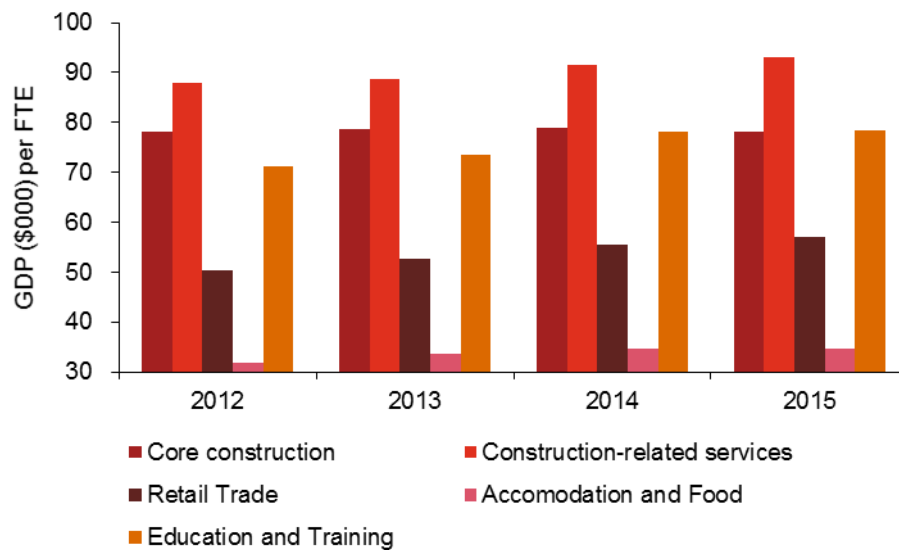


Source: New Zealand Productivity Commission (2012) Housing Affordability Inquiry

Labour productivity

As shown in Figure 42 below, labour productivity in the construction sector has increased slightly over recent years, with a 1% increase since 2012, potentially in response to pressures from increasing demand in the current boom cycle.

Figure 42 Labour Productivity trend by Industry

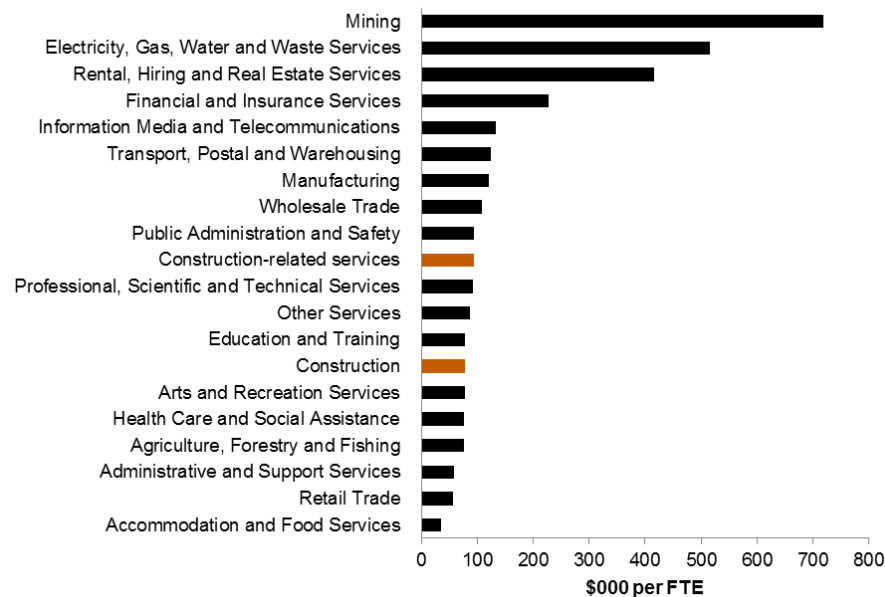


²⁶ New Zealand Productivity Commission (2012) Housing Affordability Inquiry

Source: PwC Regional Industry Database

However, these productivity gains are made from a relatively low base, with construction and construction-related industries having below average productivity when compared across other New Zealand sectors, as shown in Figure 43 below.

Figure 43 Labour productivity by industry (2015)



Source: PwC Regional Industry Database

Capital intensive sectors like Mining or Electricity, Gas, Water and Waste have a significantly higher labour productivity in comparison to the New Zealand average. In contrast, the Construction sector has a relatively low labour productivity, at nearly \$78,000 per FTE. This is due to the fact that, excluding major infrastructure projects, most of the activities performed by this sector are labour intensive.

As noted above, productivity in the construction and service sectors has improved considerably in the last few years. Since our 2011 report, construction has moved from 16th to 14th place for productivity in terms of GDP per FTE, and construction-related services from 12th to 10th. This improvement occurred over a relatively short time period but it is questionable whether it will be able to be sustained over the longer term, and in the face of the next downturn in the economic cycle. In terms of long-run productivity, between 1990 and 2011 (ie before the recent increase), the sector saw an average increase in productivity of only 0.2%, significantly below the average increase of 2% seen in other measured sectors across the economy.²⁷

Given the sector's size and large multiplier effects, improvements in its labour productivity have substantial impacts on the national economy. We estimate that a 1% increase in labour productivity for construction yields an increase in GDP of around \$139m, even before multiplier effects are considered. Given the low labour productivity base off which construction is growing, sustained increases in productivity may be more achievable than in many other sectors, were the changes suggested in this report implemented.

²⁷ New Zealand Productivity Commission, 2013, Productivity by the numbers

Labour availability

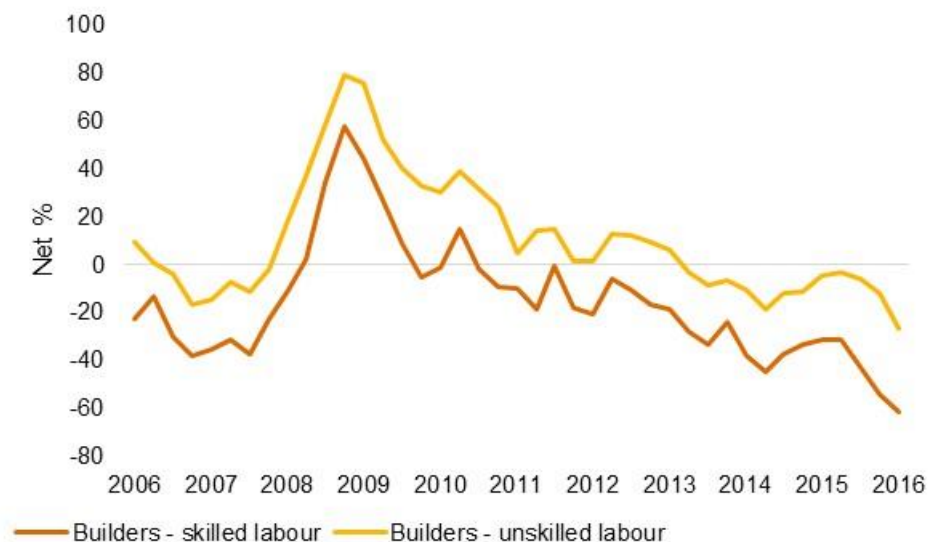
In 2015, the construction industry was the largest contributor to New Zealand's annual employment growth, employing an additional 27,500 people in the year to December 2015.²⁸ However, despite this increase in numbers, the industry is still facing significant shortages in labour.

Labour demand in construction-related occupations is forecast to increase by 49,000 between 2015 and 2021, to a total workforce of 539,500.²⁹ This represents an annual average increase of 1.6%, slightly higher than the national average of approximately 1.4%.³⁰ The demand for construction jobs is set to remain in line with national job growth projections, suggesting that the bust is still expected to be a while away.

Industry participants highlighted labour shortages as a noticeable issue that constrains their businesses, with clear impacts on productivity. The broader industry has struggled to find labour to support growth, as shown in Figure 44. The industry has struggled with finding skilled labour since 2011, in particular design and other technical skills have proven to be a bottleneck, and recently it has been increasingly difficult to find unskilled labour too. There is strong competition from construction companies for contractors, with companies looking for novel ways to differentiate themselves as a preferred employer in order to attract labour. Larger companies invest in international roadshows to attract employees and contractors from overseas in order to address the shortages in the New Zealand labour force, and provide enhanced amenities in order to attract and retain labour.

These labour shortages are exacerbated by the cyclical nature of the industry. During downturns in the construction sector, labour emigrates to overseas markets such as Australia, or into other industries. Attracting labour back to New Zealand's construction sector can be costly (as evidenced by companies that travel overseas for recruitment roadshows) or unachievable, as workers may be unwilling to return to an industry where they are at risk of being the victim of another boom-bust cycle. The cyclical nature also negatively impacts recruitment of new employees into the industry, as it is sometimes not perceived to be a stable career choice.³¹

Figure 44 Ease of finding labour: Survey of building industry participants



Source: NZIER QSBO

²⁸ MBIE, 2016, Future Demand for Construction Workers

²⁹ *ibid.*

³⁰ MBIE (2012) Medium-Long Term Employment Outlook: Looking ahead to 2021. The 1.4% annual average growth refers to the five year period between 2016 and 2021.

³¹ Karaitiana (2010) as cited in New Zealand Productivity Commission (2012) Housing Affordability Inquiry

There could be an opportunity for Wellington to collaborate with Canberra and develop an Australasian construction labour force. New Zealand and Australian construction cycles have historically often run counter-cyclically, which would mean that labour shortfalls in one country could be filled by excess labour in the other. This would have an added benefit of retaining workers in the sector, rather than losing them completely in a bust. Similarly, temporarily relaxing immigration rules could help increase the supply of skilled and unskilled labour to deliver the construction pipeline.

The level of new entrants into the construction industry is also heavily impacted by connections with training institutes and availabilities of apprenticeships. One issue that has often been commented on in previous reports is the poor alignment between the training cycle and demand.³² Young people are often recruited during a boom period, but due to the time taken to undergo training, they are often finishing education in a bust cycle, and are unable to find jobs. This lag between training timeframes and labour demand negatively impacts the industry's ability to find labour when it is needed, and compounds the perception of the industry as a poor career choice. Certainty of on-going work will encourage new entrants to join the industry. There is a role for the government in communicating the on-going needs for the sector for infrastructure projects as well as smoothing the construction cycle (see the section below on Government contracting for further details) which will support growing the construction workforce.

Labour skills

As shown in Figure 44 above, it has been increasingly difficult for the construction industry to find labour, and in particular skilled labour. Industry participants have commented on the long-term difficulty in finding sufficient project managers, designers and supervisors, and the negative impact that this has on productivity.

High turnover of staff within the industry was also a recurring theme in interviews with industry personnel.

This is contributed to in part by the cyclical nature of the construction industry, as workers often exit the industry in a downturn and may not return. In addition, the industry has a highly contract-based workforce, which increases labour mobility and reduces continuity for individual firms.

The high industry turnover has a negative impact on productivity due to the need to continually retrain new staff in the business' ways of working and provide other specific upskilling or knowledge on health and safety compliance that may be needed to perform their role productively and safely. Along with continuity in the workforce, education and training is a critical component of labour skills. Within the construction sector, there is a recognised lack of formal training, particularly in relation to management up-skilling, and project management and oversight. As shown in Figure 22 above, only 7% of employees in the construction industry have Bachelor's degrees or higher, compared to the national average of 24%. Again, this is in part driven by the cyclical nature of the industry which leads to a reluctance to invest in staff training, but also due to the industry culture of on-the-job learning, and lower emphasis on formalised education.³³

There is an opportunity for the industry to support continuous training to ensure that the skills of workers within the industry support the on-going success of the industry. For large projects, industry could commit to a small percentage of employees on a project to have a training aspect to their role or for formal training to take place on site. The up-skilling of workers will support on-going productivity growth, and higher wages in the industry. Individual firms are committed to training and development of employees, but not all firms, particularly small firms or sole traders, have the spare resource, or potentially desire, to invest in training. There may be a role for the government to provide training subsidies to support a more productive workforce. In this situation, the government would be investing in the long term success of the sector.

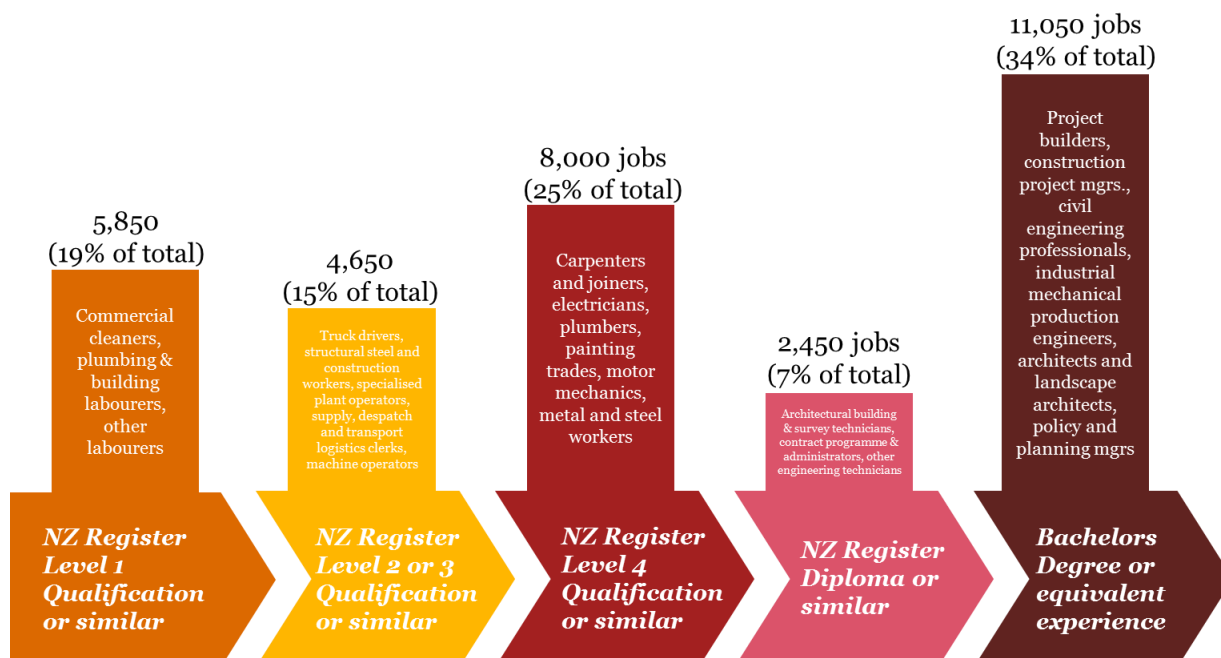
There is an increasing role for graduates and other higher-skilled workers in construction. While the modelling is slightly dated, the Workforce Skills Roadmap for the Auckland Construction Sector shows the trend for high skill workers in Auckland, with higher education required to support the demand from the

³² New Zealand Productivity Commission (2012) Housing Affordability Inquiry

³³ BCSPT (2009) as cited in New Zealand Productivity Commission (2012) Housing Affordability Inquiry

construction sector. Figure 45 shows the employment growth between 2013 and 2018 in Auckland, across the varying components of the construction value chain and skill spectrum. Construction jobs which require a minimum of a Bachelor degree (or equivalent) made up 34% of the total job growth over the forecast period. The trend is expected to be the same in construction across the rest of New Zealand. Higher skill workers will support additional productivity growth in the sector.

Figure 45 Construction employment growth in Auckland by skill level 2013 - 2018



Source: Workforce Skills Roadmap for Auckland Construction Sector (2013 – 2018)³⁴

As indicated in the ‘or similar’ references in Figure 45, there are a range of qualifications and standards in the industry, which is due to the range of courses and qualifications offered by training organisations, polytechnics and others. The industry has noted that better standardisation of qualifications would assist with easier identification of skill levels.

There are also new initiatives to support the development of skills in the workforce. For example, at Auckland Airport tertiary education providers have coordinated to provide specific training and education requirements for the development at the airport. The ‘stackable credits’ come from a trainee learning one skill for which they are certified and then stacking up another certificate in another skill, with each skill becoming an employable asset for the trainee. The industry hopes that this model can be rolled out to other major projects and building sites in Auckland, to boost skill levels and address labour shortages. Funding support from the Tertiary Education Commission could also assist with the broader roll out of the training model.

Capital

In addition to labour, capital is the second key internal driver of productivity for the construction industry. However, capital productivity is constrained due to both the industry’s investment level and the uptake of innovation to drive greater productivity from investment.

³⁴ Available at: <http://www.unitec.ac.nz/workforce/wp-content/uploads/2014/07/CI-Workforce-Roadmap-Summary.pdf>

Investment into capital

The construction industry is characterised by many small firms and owner-operated businesses, which lack the scale to invest in capital for future growth. Weak balance sheet positions hinder small firms' ability to fund expansion activities, prohibiting firms from growing – where they seek to do so. Sole operators may not have growth aspirations and do not want to scale up their business. Instead, they prefer to operate within their own bounds and avoid the risk of taking on staff.

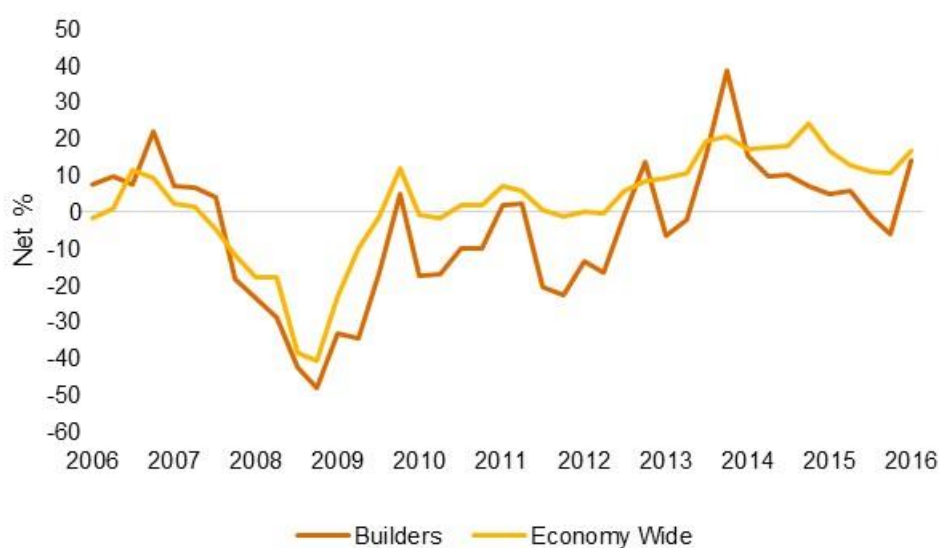
The cyclical nature of the construction industry further hampers firms' ability and appetite to secure finance to undertake capital investment.

Industry participants commented that uncertainty over future requirements also leads to conscious underinvestment in business capital. Firms are reluctant to invest due to the risk of over-capitalising prior to a market downturn, and as such they often resource the minimum required for current delivery, rather than upscaling to enable growth.

These views are supported by the QBSO survey results which showed that intentions to invest are lower among builders than across the economy as a whole.

The prolonged construction boom and general optimism in the sector has meant that firms are looking to invest to boost their production capacity. It is likely that the building industry has been delaying investment in new machinery and now that the boom is expected to last several more years, firms are willing to invest on this basis.

Figure 46 Intention to invest in plant



Source: NZIER QBSO

Technology and innovation

The construction industry is not typically perceived as one that is particularly innovative or technologically advanced. Construction practices have not fundamentally changed in 40 years. Despite broader technological advances, mechanisation is not widespread in construction at this stage. However innovation and investment into technology is at the forefront of many new developments in the industry, and can be a key to unlocking greater productivity.

Currently the construction industry has one of the lowest rates of innovation activity across all New Zealand sectors.³⁵ In 2011, innovation activity was undertaken by 41% of construction firms, down from 45% in 2009, and the rate was lower than the New Zealand average of 46%.³⁶ However, the true figure is likely to be lower, as these statistics exclude firms with fewer than 6 people. Small firms and owner-operated businesses make up 90% of the construction industry, and may not be making investment into innovation due to their lack of scale. Where construction firms are conducting innovation activity, the main focus is on processes such as organisational or managerial processes (27%), with less focus on marketing methods (23%), goods and services (21%) or operational processes (20%).³⁷

A recent report from NZIER noted constraints to innovation in the industry due to risk-aversion and lack of scale, which both restricts the ability to borrow funds for investment, and hampers the ability for the industry to develop the critical mass needed for networked-technologies.

There is also some evidence that the low profit margins, contracts focused on cost rather than value, and procurement processes hinder innovation within the sector. For example, large projects which are split into a design component and a build component with separate tenders do not incentivise innovation along the entire construction value chain as well as combined tenders do.

There is evidence that commitment to innovation produces successful outcomes. The risk that investment in innovation does not produce tangible benefits is one reason why firms do not undertake innovation activity. However, while the rate of innovation is low in construction (41% as noted above), the success rate is high. Three-quarters of construction firms with innovation activity implemented the results of that activity.³⁸

Where innovation in the industry takes place, there is a clear beneficial impact on productivity. One example provided in industry interviews was Fletcher's introduction of elevated work platforms, an innovation introduced to improve worker safety. As well as decreasing accident rates, the platforms have contributed to an increase in productivity, providing multiple beneficial gains for the firm. Other potential innovations being investigated by industry participants include digital design tools, 3D printing to support pre-construction work and increased use of robotics and automation. As well as firm-level approaches, innovation across the industry is important to drive forward meaningful increases in productivity. This is one area in which the construction industry has often lagged, due to the fragmented nature of the industry and the small scale of many of the players. These features mean that the industry can be slow to form the critical mass required to support networked innovations. With greater innovation in design and build processes, a higher skilled workforce is necessary to support innovation in the sector. As the sector evolves, there will be increasing opportunities for graduates and higher skilled workers in the sector, which will improve productivity.

However, there is visible progress in this area, for example through the introduction of Building Information Modelling (BIM) in New Zealand. A BIM model provides a digital representation of the physical and functional characteristics of a built asset, in order to optimise its design, construction and operation. While uptake to date has been slow, there is clear evidence of the benefits of this modelling, and a strong push from government, industry and training partners to increase its use.³⁹

Advances in production processes has enabled success in mass-customisation of homes. Pre-fabricated construction off-site enables buildings to be completed faster – up to 30% to 60% faster and reduces waste through improved precision and measurement enabled by technology and an innovative approach to

³⁵ MBIE (2013) New Zealand Sectors Report, Featured Sector: Construction

³⁶ Statistics New Zealand Business Operations Survey 2011

³⁷ *ibid*

³⁸ *ibid*

³⁹ BRANZ, Building and Construction Productivity Partnership, Productivity Benefits of BIM. Accessed from <https://www.building.govt.nz/assets/Uploads/projects-and-consents/building-information-modelling/nz-bim-productivity-benefits.pdf>

construction.⁴⁰ It is estimated that pre-fabrication could produce cost savings of 9.3% for a typical one-off small to medium building project and improve industry productivity by 2.5%.⁴¹ It also reduces uncertainty, improves work scheduling for construction firms and reduces the risk of workplace accidents.

The benefits of pre-fabrication also flow through to the consumer. Due to the cost savings and improved productivity in production, construction is cheaper. There are non-financial benefits to the consumer too, including improvements to the quality of product, and reductions in the uncertainty around the timing of construction.

A recent BRANZ study found that pre-fabrication is already established in certain parts of the construction supply chain. In particular, BRANZ found that wall and roof framing accounts for most of the \$2.96 billion of pre-fabrication that already occurs in New Zealand.⁴² The same report noted the market potential for pre-fabrication and standardisation could lie between \$5 billion and \$7.7 billion, but there are a number of market failures which are barriers to increasing the uptake of pre-fabrication and standardisation:

- imperfect information – there is a knowledge gap regarding the benefits and risks of prefabrication
- coordination failure – there is uncertainty on the roles of industry players and consumers regarding who should take the lead on improving information flows on the use of pre-fabrication
- incentives – builders perceive the use of pre-fabrication as a reduction in their potential revenue, reducing their incentive to use more pre-fabricated products.

Operations

In addition to labour and capital inputs, the ways in which the industry operates can be a significant help or hindrance to performance. In particular, approaches to contracting, including contracting with government, and project management can impact on productivity and performance, along with the small-scale nature of the industry. This is compounded by the trend towards a main contractor and multiple sub-contractors, which increases the complexity and cost associated with negotiating work and outcomes.

Contracting approaches

The traditional lowest-price contracting model is commonly used across a broad range of construction projects in New Zealand. However, this is rarely the optimal approach to use, and has a significant number of disadvantages including high whole of life costs, potential for cost over-runs due to poor scoping and imposing limitations on the ability to innovate.⁴³ This approach to contracting has been noted as a significant constraint on productivity, due to lack of collaboration, inappropriate allocation of risk and lack of maturity in contracting approaches.

Collaboration

Integrated contracting approaches promote greater collaboration between design and build functions, which may significantly improve outcomes from both a cost and usability perspective. Where design and build functions are separated, the design process may not adequately account for the practical implications or availability of particular features or materials. This can result in builders substituting alternatives that may incur higher long-term costs, lower quality or reduce the desired functionality. This also has implications for quality assurance and council compliance processes, as the evidence of equivalence or performance to specified products may be unclear. Stronger links between design and build helps to

⁴⁰ Refer to http://www.nzherald.co.nz/property/news/article.cfm?c_id=8&objectid=11579838

⁴¹ Prefab (2014) Value case for prefab: How offsite construction can deliver better cost-effective housing to more New Zealanders

⁴² BRANZ (2014) Prefabrication and standardisation potential in buildings

⁴³ Department of Building & Housing (2009) Weather-tightness - Estimating the Cost

mitigate these issues with increased collaboration estimated to help reduce initial construction costs by up to 30%, as well delivering projects with greater operational efficiency and lower whole-of life costs.⁴⁴

Increasing specialisation in the workforce has exacerbated this issue, with a design phase potentially including multiple, un-aligned contractors such as architects, designers, geo-technical engineers, and structural engineers all with separate aims and intentions for the design. There is a role for better coordination and project management across all parts of the construction value chain.

Separation between design and build functions can also result in substitutions or alterations that may require re-work at a later stage. Requirements to re-do work that is not up to specification is a significant driver of lost productivity in the construction sector. A recent survey found that 61% of residential builds in New Zealand required an element of re-work to be undertaken.⁴⁵ While the re-work itself may be minor, the need to return to a site, and the flow-on impacts to timelines on other projects creates costs and congestion impacting the broader sector.

Potentially, the introduction of BIM will help improve collaboration in the design phase of a project, allowing project stakeholders to access and share information regarding design, materials, costs and scheduling, an approach that would help mitigate these issues.

Risk allocation

Risk allocation in contracting is an important way to drive the correct incentives and ensure best outcomes for the contracting parties. Best practice in contracting and risk allocation is for the party who is most able to control the risk to bear the consequences of risk materialisation. However, there appears to be an increasing trend to pass on as much risk as possible to the supplier, through use of increasingly complex contracts, and as evidenced through the proliferation of non-standard contracts in public sector procurement (discussed further below). However, this approach only succeeds in increasing the costs involved in negotiating and agreeing contracts including legal costs, and increasing overall cost-to-build, as suppliers incorporate risk into their pricing.⁴⁶

Contracting maturity

In residential construction projects, buyers are typically one-time purchasers and do not engage repeatedly with the construction industry. This increases the overheads for negotiating contracts, understanding build requirements and ensuring that these are fit-for-purpose. The lack of repeat buyers also reduces the pressure on the construction industry to improve project management approaches, as noted below. In areas where there are higher rates of repeat commissioning of work, such as vertical construction, construction contracting approaches have significantly higher maturity. Vertical and horizontal construction is often undertaken through relationship-based approaches, alliance contracting (particularly for horizontal infrastructure) and design-and build contracts, all of which have been shown to have better outcomes in both theory and practice.⁴⁷

Government contracting

Public sector approaches to contracting are a common pain-point for larger industry participants. While there are standard templates in place, such as MBIE's procurement guidelines, these are only provided as recommendations, and organisations can include bespoke variations to the standard agreement. Practitioners in the industry cited examples of additional variations that ran to over 100 pages, with obvious implications for costs, due to both additional legal costs and the need to price risk into contracts.

Bespoke contracts also significantly increase the degree of uncertainty in contracting. For example, the standard agreement for NZS 3910 for the Conditions of Contract for Building and Civil Engineering

⁴⁴ New Zealand Productivity Commission (2012) Housing Affordability Inquiry

⁴⁵ Page (2011) as cited in New Zealand Productivity Commission (2012) Housing Affordability Inquiry

⁴⁶ Parke & Warren (2014). The Effects of Boom Bust on National Construction Industry Performance

⁴⁷ Parke & Warren (2014). The Effects of Boom Bust on National Construction Industry Performance

construction is well understood by the industry and a large body of case law exists to help in its interpretation.⁴⁸ By contrast, variations could be interpreted in different ways by different parties, leading to complex litigation.

Industry participants considered that the use of non-standard contracts reflected a lack of maturity in procurement practices, particularly in government, and created adverse time and cost impacts for all parties involved.

In addition to these sub-optimal contracting approaches, industry productivity is impacted by the lack of scale in government procurement. In New Zealand, significant public infrastructure works are not delivered regularly and there are rarely large tracts of greenfield land available for development. Where there are large scale projects available such as residential developments, these are often split in to multiple smaller projects in an attempt to reduce or spread risk. This lack of large procurement hinders the ability for the industry to gear up to deliver at scale and makes it difficult to attract large international players. We note that the Tamaki Regeneration Company is currently considering options for large-scale residential development contracts for its Auckland site, but similar opportunities are rare.

As noted above, the government has a preference for traditional procurement methods, which separates design and build functions. In the same theme, the government attempts to de-risk large scale residential projects by splitting them up. Housing New Zealand Corporation, New Zealand's largest single source of residential procurement sometimes allocates tranches of work, which limits the ability to achieve economies of scale at specific sites.

Through the National Infrastructure Unit's Capital Intentions Plan, there may be opportunities for government to bundle large scale civil and public projects in order to enable our industry to scale up, and to attract larger international construction companies, who would help drive improvements in efficiency and effectiveness in the New Zealand market.

The role of government in industry planning and smoothing the boom-bust cycle

As highlighted previously, central and local government funded construction represents around a quarter of overall GFCF investment, on average, but reached a high of 32% of GFCF in 2011. As a major procurer of construction, government has an opportunity to communicate its investment intentions and provide certainty to the sector to help predict future demand for construction.

MBIE's National Construction Pipeline Report is a direct response from the Government to provide better information on the forward work programme for the construction sector. The National Infrastructure Unit's Infrastructure Capital Intentions Plan, outlining prospective capital investment for central government, local government and the private sector provides further detail on the forward procurement programme for construction and construction-related services.

Better visibility of prospective projects for the sector will enable firms to make long term decisions which can support firm level performance and industry productivity. One interviewee noted that one of the constraints to faster construction of a specific residential project was the availability of specialised machinery to transport building materials to the site (there was only one of its kind in Auckland). Firms are unwilling to invest in new machinery as they are unsure that there will be a high enough return on their investment over time.

There is a major opportunity for government (central and local) to plan the timing of its investment, to smooth the boom-bust cycle. In particular, counter-cyclical demand by the government would reduce the volatility present within the sector, and in effect, reduce the magnitude of the bust. Certainty of work and less fluctuation in work supports labour force planning as workers may be less likely to leave the sector if the volatility within the sector is managed better, improving sector performance and productivity.

⁴⁸ The Institute of Professional Engineers New Zealand (IPENZ) provides continuing education courses on interpreting NZS 3910 on a regular basis. Refer to <http://pd.ipenz.org.nz/courses/138-nzs-3910-conditions-of-contract>

There are also consumer benefits that would result from better management of the construction boom-bust cycle. Interviewees noted that they undertook demand-based pricing during the current boom, in order to balance demand and available resource. If the timing of government projects were shifted to smooth the cycle, the pressure on existing resources could ease, reducing the practice of demand-based pricing and potentially reducing the cost of certain projects, providing better value for money for taxpayers.

Interviewees had mixed views on whether government related counter-cyclical investment was achievable. Some interviewees noted that it is difficult for public sector entities to fast track projects in order to start sooner, and that delaying approved projects may run the risk that the project approval is relitigated at a later stage or poses political sensitivities.

Other participants considered that this was indeed an achievable approach for the public sector to take, particularly for construction relating to asset maintenance and noted the 30 year planning time frames that are already in use in a number of public sector entities. The Treasury's push to require better long-term planning across investment intensive entities, such as through the new Long-Term Investment Plan (LTIP) requirements, will also help enable better forward planning that could be leveraged for counter-cyclical investment. One participant noted that to support countercyclical investment a sink fund would be a practical requirement and that the fund needed to be available on an as-needed basis.

The recommendations set out in The Thirty Year New Zealand Infrastructure Plan⁴⁹ promote government agencies taking a more targeted approach with investments in order to help balance the boom-bust cycle. The Infrastructure Plan also recommends a number of other approaches that would also enable better procurement choices, encouraging greater collaboration between government agencies, better integration of planning, clear decision making regarding investment approaches and alignment between these and economic goals and consideration of whole-of-life costs.⁵⁰ This approach to government contracting would likely improve the operations and overall productivity of the sector.

Project management

The use of project management practices is seen as poor across the construction sector. This is due to the small scale of many players in the industry (as discussed below), the lack of management skills in the workforce (as discussed above) and the lack of pressure from buyers to demand good project management. Due to the sequential nature of the industry, poor project management can cause delays in contractors moving onto other building sites, creating a flow-on impact and causing congestion across the industry. This shortcoming has been noted as "low hanging fruit" and an area that should be focussed on for improving productivity in the industry.⁵¹

There are positive moves towards greater recognition of the importance of project management and implementation of this discipline within the industry. The implementation of BIM, for example, is expected to provide positive progress in this area. A report on the productivity benefits of BIM has noted that projects employing these processes have lower error rates, shorter project delivery timeframes, and better management of project outcomes.⁵²

Poor project management could be addressed by improved industry training in project management, or incentivising high skilled workers with cross-industry skills to join the sector. There may be a role for education providers to offer a new qualification to meet specific industry needs.

⁴⁹ Available at <http://www.infrastructure.govt.nz/plan/2015/nip-aug15.pdf>

⁵⁰ National Infrastructure Unit (2015) 30 year plan

⁵¹ NZIER (2014) Bespoke residential housing demand and construction innovation

⁵² BRANZ, Building and Construction Productivity Partnership, Productivity Benefits of BIM. Accessed from <https://www.building.govt.nz/assets/Uploads/projects-and-consents/building-information-modelling/nz-bim-productivity-benefits.pdf>

Quality assurance

The industry is seen as having poor quality assurance practices, which is linked to poor project management. BCAs observe that internal quality assurance is limited in small firms and that these firms often effectively rely on council inspectors to quality assure their work. We have heard examples of builders making multiple appointments with the building inspector, on the expectation that they would fail their first inspection and need to book in a subsequent inspection for the re-work. At the other end of the firm size scale, one project manager was expected to have oversight of 30 projects.

Individual firms have a clear role to play in ensuring that their work satisfies industry standards and meets regulations. Individual firms, contractors or sub-contractors have an obligation to perform a task to the requisite standard.

On a broader scale, the industry has a role to improve quality assurance processes for all firms. There may be a role to use peer-review processes more widely, where this is practical, including for example for consent applications or design work.

Industry scale

New Zealand's construction industry lacks scale, both in the size of the projects completed and of the entities within it.

In Australia, for example, the core construction workforce is 7.3 times greater than in New Zealand. The small size of our industry constrains the ability to realise economies of scale in purchasing and manufacturing, which in turn impacts efficiency in construction delivery and increases the end-cost to the consumer. In addition, as noted above there is a lack of procurement at scale from government, which impacts the industry's ability to leverage economies of scale in order to grow. In contrast, large Australian cities have larger brownfield development areas, on a scale not found in New Zealand.

The construction industry is also characterised by many small and owner-operated businesses, along with rates of self-employment that are significantly higher than the New Zealand average, as shown in Figure 8 above. There has been an increasing trend for the use of subcontractors, which increases the complexity of jobs due to the additional contracts required, which also impacts on productivity.

As noted throughout the earlier sections in this report, the small scale of players within the industry imposes a number of constraints on the sector's performance and productivity. This is evident in the lack of investment into capital and innovation, as smaller players are unable to access or allocate the funding needed to invest in these areas. In regards to labour skills, smaller firms are less able or willing to invest in training. Contracting and project management approaches are also limited by scale, as small businesses do not have the ability to invest resources into providing adequate overheads in these areas. Additionally, the lack of scale of individual businesses impacts their purchasing power, with small or sole-trader firms lacking the ability to procure building materials at scale. All of these factors drive up costs for the consumer and reduce the efficiency of the sector.

Fragmentation also plays a role. The industry is made up of a collection of specialists. Greater collaboration and partnerships produce benefits on two levels. Firstly, greater collaboration enables better project management and better project outcomes for consumers as the disconnect between various specialists is reduced. Secondly, greater collaboration may enable procurement at scale. Improved certainty for the sector, particularly for large projects, could provide incentives for businesses to scale up their own firms, or form partnerships and alliances with other firms, resulting in bigger contracting enterprises.

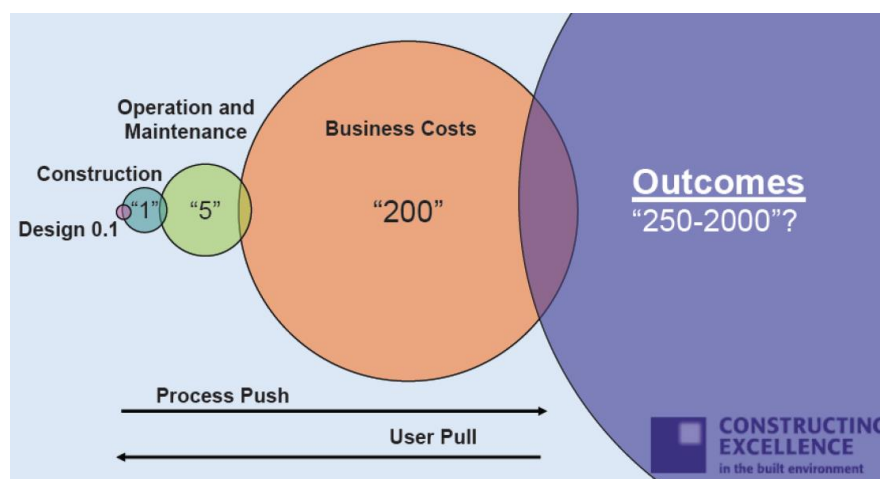
Consumer choices

Drive for low cost design & construction

Consideration of whole-of-life costs is important in the commissioning of construction projects, as these costs are typically well in excess of the initial design and build outlay. As illustrated in Figure 47, the costs of design and construction are dwarfed by the operating costs of the facility, the costs of running the business housed by the facility and the eventual outcomes generated.

As an example, while the design and build of a hospital will require a significant capital investment, the operating costs over its lifetime would be expected to be around five times greater than the construction cost. In addition, the business costs, eg the cost of delivering services at the hospital, are likely to be 200 times higher than the construction costs, and the financial value of improvements in the population's health as a result of the hospital (titled 'outcomes' in the diagram below), would be even greater. Consideration of these whole of life costs could lead to investment in the design and construction to generate considerable benefit across the facility's lifecycle.

Figure 47: Cost ratios of a facilities lifecycle



Source: Constructing Excellence Ltd (2009). DBH Building & Construction Taskforce Procurement Working Group, Material for Meeting No.1.

New Zealand consumers (private individuals and in some instances public sector agencies) have a tendency to focus on 'value engineering' (ie minimising design elements which have visible upfront costs), without accounting for the significant impact on future facility-related outcomes.⁵³ This can be exacerbated when design, construction and maintenance functions are contracted separately, as the different parties have conflicting interests. The focus on present costs can have a significant negative impact on the whole of life costs of a construction project, and can come at the expense of desired long-term outcomes.

There are also differences in consumer choices driven by whether the consumer has a vested interest in the long run outcome. Consumers drive the ultimate decision around the cost of a project and the quality of the fittings and fixtures. Consumers may not consider the whole of life costs of a project, inadvertently choosing lower upfront costs but higher maintenance and operating costs over the long run. This can be the situation for many residential projects, where expected tenure in the dwelling is short term.

The public-private partnership (PPP) model of procurement provides the opportunity for public sector agencies to ensure whole of life costs are minimised when procuring long run assets. Specifications around the performance of the building asset, both during the contract period and when it is passed back to the public sector entity, are contracted with a private sector provider, which means the private sector provider has an interest in ensuring the maintenance costs are minimised during the time the asset is still operated by the private sector provider. A better awareness of whole of life costs can improve performance of the sector in the long run, by reducing re-work.

Consumers' preference for low cost design and construction may also impact the quality of construction materials being imported into New Zealand. The perception from some interviewees was that there is a growing number of low quality, and possibly substandard, imports. Structural steel was one example where concerns have been raised regarding the quality of imports.⁵⁴ The volume of imports of steel for use

⁵³ Parke & Warren (2014). The Effects of Boom Bust on National Construction Industry Performance

⁵⁴ <http://www.radionz.co.nz/news/national/305400/steel-buyers-were-told-price-'too-low'>

in structures⁵⁵ has increased, as shown in Figure 33. The volume of imports of steel for use in structures has increased by almost two-and-a-half times (148%) since 2010.

Where imports can meet the same quality standards required of New Zealand-made products, there is potential to utilise imported building materials and finished products to reduce the cost of construction of homes, buildings and infrastructure. The cost differential could be significant, but it is likely to depend on specific products as in some instances the the cost savings could be marginal. In this situation, consumers have the benefit of accessing global markets and prices achieved due to economies of scale and more importantly, it offers consumers a wider range of options and choice.

However, there is an issue when imported products are of a lower quality, and do not meet New Zealand product standards. In particular, there is a major issue when there are doubts over the veracity of the certification of imported products to meet industry (or New Zealand specific) standards.

In the case of steel, there have been numerous instances of substandard imported steel products, purportedly meeting industry standards being used in New Zealand. The issue is widespread enough that the Commerce Commission is investigating the issue.⁵⁶

The use of substandard products imposes a range of costs onto a construction project, which ultimately get passed on directly or indirectly to customers. The types of costs which can be imposed are outlined in Table 4.

Table 4 Costs imposed from the use of substandard products

Direct costs	Indirect costs	Societal costs
Building failure	Time and delays	Government inquiry costs
Additional council inspections	Uncertainty	Costs to correct information asymmetries in the market
Labour costs from re-work		New regulation costs
Additional product costs from re-work		Monitoring and compliance costs
Variation management costs		
Litigation costs		

The costs borne by the consumer, both financial non-financial, can be substantial. A full assessment of the use of substandard products would require quantitative data on the frequency of product failures to estimate the cost to society of remedial work due to substandard products.

Our review also showed perceived risk aversion from BCAs and from clients to new and innovative overseas products despite meeting more rigorous overseas regulatory assessments, and complying with the building code.^{57, 58} This has the potential to constrain innovation, limit downward pressure on price, and could impact industry productivity.

⁵⁵ HS code 7308, structures of iron or steel and parts thereof, plates, rods, angles, shapes, sections, tubes and the like, prepared for use in structures.

⁵⁶ See for example <http://www.comcom.govt.nz/the-commission/media-centre/media-releases/detail/2016/update-on-commerce-commission-steel-mesh-investigation>

⁵⁷ NZIER (2014). Bespoke Residential Housing Demand and Construction Innovation

⁵⁸ Ministry of Business, Innovation and Employment (2013). The New Zealand Sectors Report 2013: Construction

Preference for bespoke builds

New Zealand consumers appear to have a strong preference for bespoke builds, which in turn drives higher costs. The prevalence of bespoke builds can be attributed to:⁵⁹

- New Zealand's unique site characteristics, with site-specific topography and natural hazards limiting standardised approaches.
- Socioeconomic change, and in particular increasing incomes and changing family makeup driving preferences for larger houses which, by their nature, tend to include more bespoke elements.

Bespoke builds also contribute to information asymmetry for consumers, inhibiting their ability to influence price.⁶⁰ Increasing the level of standardisation of parts and components and mass-customisation in construction, in particular residential construction, can drive down the price of building materials and components, and improve productivity as builders are familiar with installation processes etc.

Regulation

Regulation can add significant costs for the construction industry with varying impacts on productivity. There are a number of key regulations which may be negatively affecting industry performance.

In general, many stakeholders felt that government should undertake better assessment of regulation, eg cost-benefit analysis to assess appropriateness of regulation before imposing it. This would help ensure that the regulatory intervention is proportionate to the risk being managed, and that the benefits of intervention outweigh the costs. Ex post evaluation of the effectiveness of regulation and change where regulation is found to be ineffective will also be important to regulatory-facilitated productivity improvements.

Industry participants also noted the need for regulation to be more transparent. Transparency around the desired outcomes of regulation and decision making processes is important to ensure that regulation is not seen as unwarranted costs (and not an undue hindrance on productivity of the industry). For example, regulation involves making trade-offs around the use of resources (eg the requirement to provide a carpark or extra dwelling floor space). Industry participants noted that decision making for regulation needed to be more transparent, particularly when it imposes costs on private sector operations, and the trade-offs for decision making needed clarity.

Retentions

With the intent of bringing greater financial stability into the property and construction sector and improved recoveries (ie reduced losses) in the event of corporate failure, a new statutory trust regime for retentions was introduced last year (subpart 2A of the Construction Contracts Amendment Act 2015 refers).

The regime comes into effect on 31 March 2017 and requires that retention money must be held in trust by 'party A' (typically the principal or main contractor), for the benefit of 'party B' (either the main contractor if party A is the principal, or sub-contractor, if party A is the main contractor). The retention money must be held in the form of cash or other liquid assets. The arrangement ends when one of the following occurs:

- The money is paid to party B
- Party B, in writing, agrees to give up any claim to the money
- The money ceases to be payable to party B under the contract or otherwise by operation of law.⁶¹

⁵⁹ NZIER (2014) Bespoke residential housing demand and construction innovation

⁶⁰ New Zealand Productivity Commission (2012). Housing Affordability Inquiry

⁶¹ Construction Contracts Amendment Act (2015) Subpart 2A

Principals, contractors and sub-contractors will have a smaller asset base to borrow against. A reduction in assets means that principals, contractors and sub-contractors are likely to shift to a different risk profile, which results in pushing up the cost of construction and limits borrowing. Firms will have to seek additional finance, at an even higher borrowing cost, to make up borrowing shortfalls. This means that credit will be harder to access for firms of all sizes.

PwC has undertaken initial high level analysis which indicates that the direct funding cost of the new regime, in its current form, may be more than \$30 million per annum. This could materially exceed the loss risk that the new regime seeks to eliminate. To illustrate, the two most recent large head contractor failures, Mainzeal in 2013 and Hartner in 2001, had reported retention liabilities of \$18m and \$6m respectively when they were placed into receivership.

The additional cost will likely be borne across the supply chain through a combination of increased construction costs for the end user and reduced margins for principals, contractors and sub-contractors. This may put further financial strain on the sector at a time when increased capacity is needed to meet market demand. Further, increased costs without corresponding improvements in performance will affect industry productivity through an increase in administrative and compliance costs. In addition, any inability of firms to comply with the new regime could lead to business closures, particularly at the small end of the scale.

In PwC's submission on the Construction Contracts Amendment Act 2015 a 'hybrid model' example was incorporated, which sought to provide the required protection with both a lower financial burden on the sector going forward and a substantially reduced initial impact. While illustrative only, the hybrid model demonstrated that there are viable alternatives which generate improved outcomes.

We understand MBIE is currently considering our and others' submissions, including the content of any regulations to accompany the new legislation.

Joint and several liability rule

The rule of joint and several liability provides that two or more persons who have caused a particular loss will each be liable for the full extent of the loss.⁶² The rule can distort incentives for parties involved in a build, curtailing innovation and leading to higher costs and ultimately, lost productivity.

On the one hand, it can lead to greater risk taking by certain agents, because the risk is spread across all parties rather than being focussed on the agent or agents who have the ability to manage or mitigate it. For other agents, it can result in risk aversion and avoidance. Risk aversion is particularly prominent among BCAs, architects and engineers who tend to carry a disproportionate share of the burden relative to building contractors and sub-contractors.⁶³ BCAs in particular can end up being the 'last man standing', due to their unique ability to levy rates to fund liabilities.

To reduce the risk for BCAs, some industry participants considered that inspection processes carried out by BCAs were excessively rigorous in terms of the number of inspections, the level of detail and information required, and length of the process. This leads to higher costs to industry. If this delivers minimal gain in the performance of the industry resulting from the more stringent process, productivity is again expected to be impacted. However, we note that stringent inspection processes may have longer-term benefits in terms of building quality and reduction in additional later work.

Most States in Australia adopt a proportionate liability approach instead, made possible by a mandatory building insurance scheme which is in operation. Proportionate liability provides that parties are liable for the share of the loss and damage which they were responsible for. This approach was considered in two separate reviews in 2011 (the Sapere/Buddle Findlay Report Review of the Application of Joint and Several Liability to the Building and Construction Sector and the Law Commission's Review of Joint and Several

⁶² Law Commission (2011) Review of Joint and Several Liability

⁶³ <http://www.mbie.govt.nz/publications-research/publications/building-and-construction/cab-paper-review-joint-and-several-liability.pdf>

Liability). These reviews considered the costs and benefits of a change in approach for different parties, but on balance it was determined that this was unlikely to result in better policy outcomes. However, while it may be unlikely to result in better policy outcomes, it could significantly improve the performance and operations of the sector, to overcome a culture of risk aversion.

Health and safety regulation

The Health and Safety in Employment Act 1992, and more recently the Health and Safety at Work Act 2015 (which came into force in April 2016 and replaces the former) aims to protect the health, safety and welfare of workers and workplaces. A guiding principle of the Health and Safety at Work Act is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable.⁶⁴ It focusses on taking action based on the level of risk involved and what the business can actually control.

In contrast to the majority view of parties interviewed, one major industry player felt that the amended health and safety legislation is appropriate and well-overdue. New Zealand's workplace injury rates are about twice that of Australia and almost six times that of the UK.⁶⁵ Worker fatalities in the construction sector are more than double the average for all other sectors, with 68 fatalities as a result of workplace accidents in the construction sector and thousands more suffering serious injuries.⁶⁶ Their view was that the regulations not only improve safety but they also improve productivity, by encouraging the industry to consider alternative, more effective, approaches to carrying out their duties.

However, health and safety legislation, and its enforcement, has historically been criticised for:

- excessive regulation
- ambiguity within that regulation regarding how exactly industry can comply
- high compliance costs (including both fees and amount of resource required to conform with legislation)
- disproportionate application of guidelines by officials and fines.⁶⁷

While the full impact of the new Act is still to become clear, our consultation with industry stakeholders broadly supported the above assessment. Stakeholders generally commented that the regulation was affecting business decisions, and in turn productivity. However, there is a lack of understanding of the legislation and individual obligations.

The divergent views suggest that greater assessment of the regulation is required and the results of the assessment are communicated to construction firms, to ensure common understanding of the risk and regulation.

Consenting

Section 40 of the Building Act 2004 states that a BCA must grant a building consent for the construction, alteration, demolition or removal of a building.⁶⁸ The building consent considers design specifications, practicalities, legislative and local land use requirements and verifies that the plans comply with the building code. In the year to April 2016, just over 68,000 building consents were issued.

BCAs are required to process and assess consent applications within 20 working days. However, a 'stop the clock' provision allows BCAs to pause the application to seek further information. In practice this can result in considerable variation in the length of a consenting process. Uncertainty regarding consenting

⁶⁴ WorkSafe New Zealand (2016) Introduction to the Health and Safety at Work Act 2015

⁶⁵ Independent Taskforce on Workplace Health and Safety (2012) Safer Workplaces Consultation Document

⁶⁶ www.construction.worksafe.govt.nz

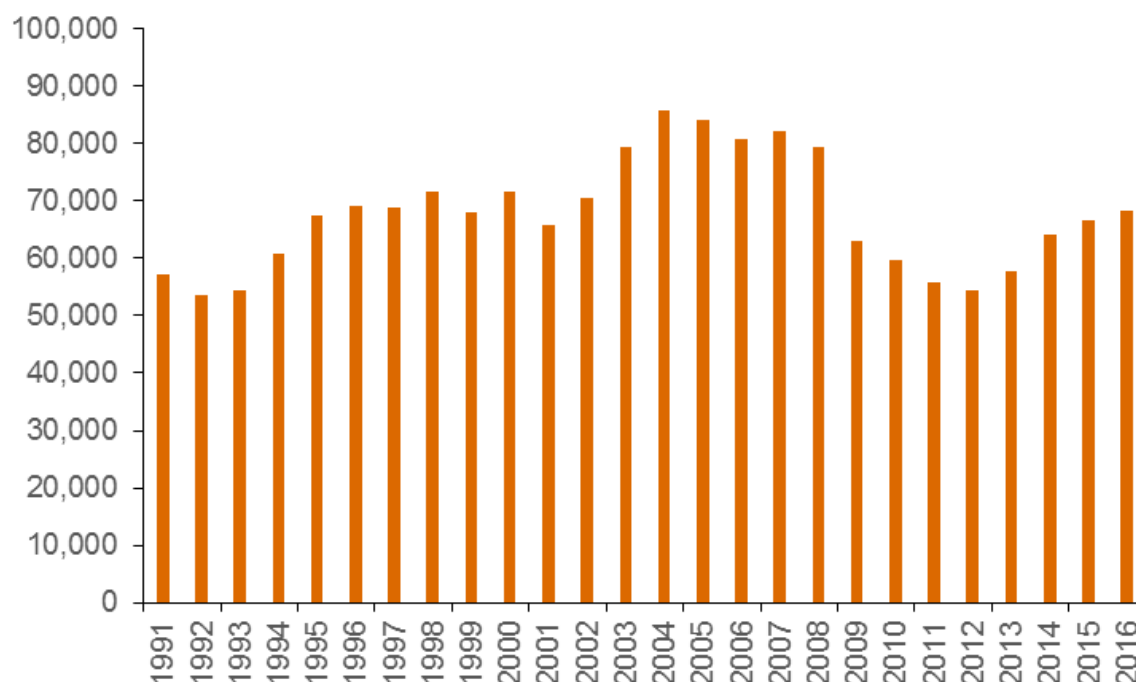
⁶⁷ Rules Reduction Taskforce (2015). Rules Reduction Taskforce Report to the Minister of Local Government

⁶⁸ <http://www.legislation.govt.nz/act/public/2004/0072/latest/whole.html#DLM306376>

timeframes has a flow-on impact to total build times, for example because project managers cannot organise sub-contractors until consent has been granted.

While we have not been able to evidentially verify this, some industry participants considered that BCAs are misusing the stop the clock provision, arguably amplifying delays.⁶⁹ BCA's view is that there are wide-ranging and recurring issues with the quality of the information supplied in an application. Auckland Council is calling for industry to put in place quality standards or high-quality standardised responses to help improve consent applications and, in turn, to reduce the length of the consent process.

Figure 48 Total number of building consents issued (New Buildings and Altered Buildings)



Source: Statistics New Zealand (April 2016)

A multiple-use approval was introduced in 2010 to speed up the consenting process for those wishing to build standardised designs (known as MultiProof). The approval is a statement by MBIE that a set of plans and specifications for a building complies with the building code.⁷⁰ Builders must intend to build the standard design a minimum of 10 times within two years. Building consent must still be sought for each build to ensure that the design is largely unchanged from the MultiProof approval, the site is appropriate and complies with the Building Code, and to establish the inspections required. However, consent is supposed to take 10 working days, rather than the typical 20.

Between 2010 and 2012, only 29 MultiProof approvals had been issued, with the Department for Building and Housing finding that consents following MultiProof approvals could take up to 40 days and cost between \$900 and \$15,000 in practice.⁷¹ These statistics are supported by industry feedback, which indicates that MultiProof approvals do not allow for sufficient design or site variations.

Lack of standardisation across BCAs, and in particular inconsistent application of the building code and varying consenting costs, is another issue frequently cited. There are several reasons for the lack of standardisation:

⁶⁹ New Zealand Productivity Commission (2012). Housing Affordability Inquiry

⁷⁰ <https://www.building.govt.nz/building-code-compliance/product-assurance-and-multiproof/multiproof/>

⁷¹ New Zealand Productivity Commission (2012). Housing Affordability Inquiry

- Each BCA has different regulations, planning blueprints, land use requirements and processes.
- The large number of BCAs (there are 69 BCAs across New Zealand⁷²) compete for resource, meaning capability can vary and there is an inconsistent interpretation of the building code across the smaller BCAs.
- The updating of technology and innovation is slow in some BCAs, and many do not utilise technology which would facilitate standardisation of a repeated process.

The large number of small BCAs also poses issues with an inability to achieve economies of scale.

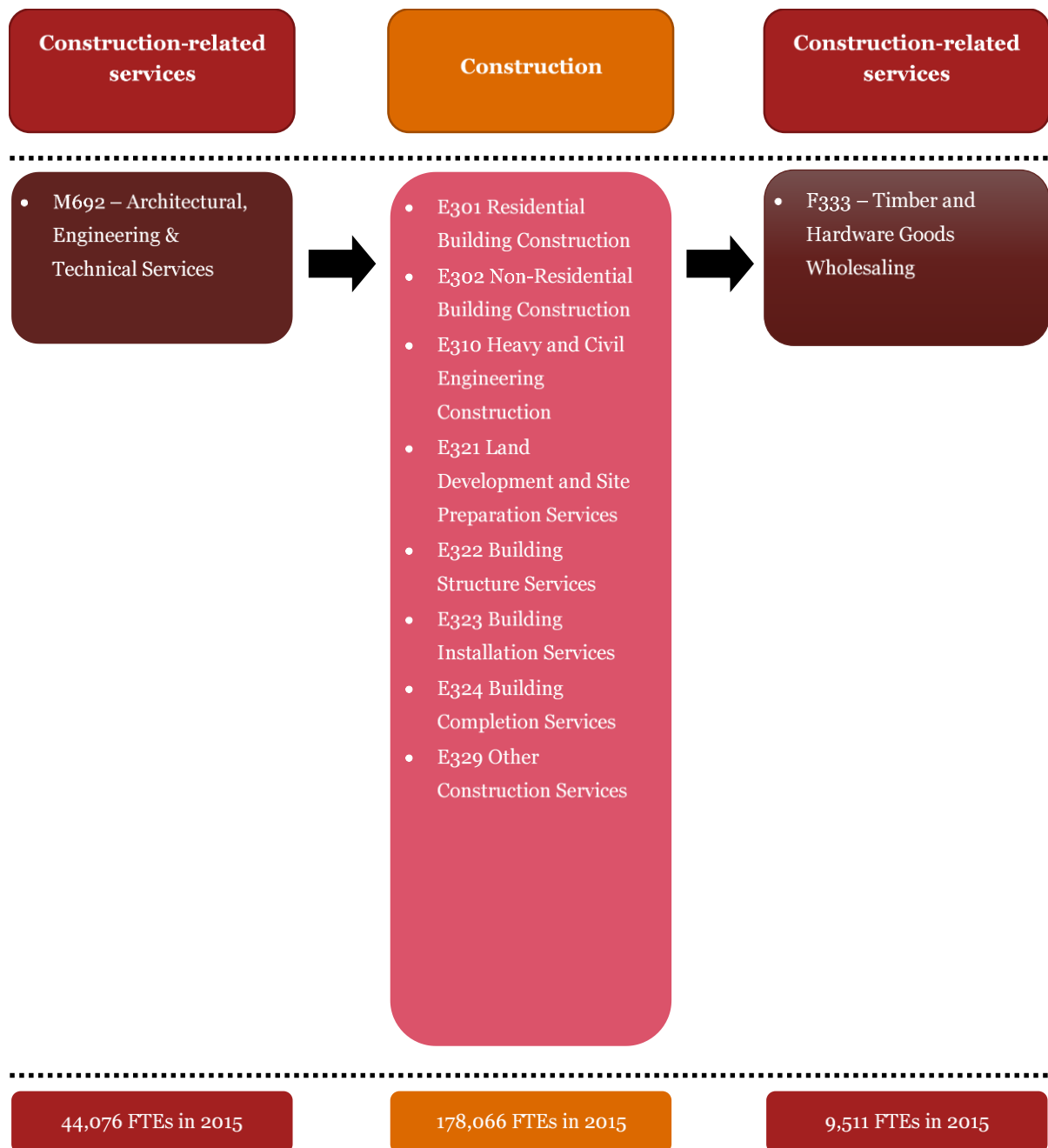
- Smaller BCAs are unable to generate sufficient economies of scale, meaning the take-up of new technologies or systems is lower and costs higher (which are then passed on to the consumer).

Rationalisation of the number of BCAs could generate efficiencies through economies of scale and standardise processes. Aggregation of some of the smaller BCAs could improve the consenting and compliance processes and provide a more consistent process for the construction sector, including consistent interpretation of the Building Code.

There is no requirement for consents to be granted by BCAs within the same region, and as such no real rationale for the high number of BCAs. BCAs need not be a local government authority – a privately contracted company could also perform these functions and provide competition for this service. As mentioned in various publications and by a number of commentators, the industry would likely benefit from fewer BCAs with greater depth of capability.

⁷² New Zealand Productivity Commission (2012). Housing Affordability Inquiry

Appendix A: Data classification



PwC Regional Industry Database, Statistics New Zealand

Appendix B: Joint statement by CSG and CIC chairs

The Construction Strategy Group and the Construction Industry Council thank PwC for this Update Report to the original industry study undertaken in 2011. The 2011 study confronted the apparent undervaluing of the Building and Construction Industry's contribution to the wider economy and the destructive nature of the boom and bust cycles that had plagued the industry for decades. It is pleasing that in this 2016 report, PwC has identified the important role that the industry plays in the NZ economy, as both an employer and a generator of economic growth.

However, the significant growth period which occurred post-2011, first of all through the activity associated with the Christchurch Rebuild and more latterly as a result of the booming commercial, residential and infrastructure build in Auckland, has reminded us all that it takes considerable time for the industry to recover from the downside of the cycle. Pressures arise from a lack of skills availability at all levels. All sections of the industry are now engaged in efforts to further grow the skills base. We want to impress on a new generation that the sector offers a bright future for graduates, technicians, tradespeople and those who can accumulate on site skills of a basic nature that are essential to the successful performance of the industry as a whole.

We know that there is no silver bullet to deal with industry volatility. New Zealand has not been alone in grappling with the troughs and peaks that often accompany construction activities. But the lesson of past cycles is that we have to find a better way of coping with them. The way to do that is through close partnership with government. Both industry and the public sector must be committed to smoothing the highs and the lows.

It is our view that the spirit which gave rise to the establishment of the Productivity Partnership between Government and Industry following publication of the 2011 PwC Report should be rekindled. The 2016 PwC Report offers some guidance as to what might be achieved: An emphasis on skills acquisition rather than academic qualifications may offer a better pathway for recruits into our industry through the tertiary education system; government might make it a requirement for agencies of state and local government to follow the guidelines for the state sector which aim at best value procurement rather than lowest cost; and accumulation of housing land by government to give a benefit of scale to development over time can help the progress of lower cost housing through customisation using off-site manufacture.

The importance of the industry including as an employer and generator of economic growth is, as disclosed in the PwC Report, now such that attention to preserving its commercial health should, in our view, be a priority across the public sector. As representatives of industry participants, our respective organisations are committed to adding value to the contribution the sector makes to New Zealand's economic performance.

Geoff Hunt
Chairman
Construction Strategy Group

David Kelly
Chairman
NZ Construction Industry Council

Appendix C: Restrictions

This report has been prepared for the Construction Strategy Group in association with the Construction Industry Council (CIC) and BRANZ to provide an economic analysis of the construction sector in New Zealand. This report has been prepared solely for this purpose and should not be relied upon for any other purpose. We accept no liability to any party should it be used for any purpose other than that for which it was prepared.

To the fullest extent permitted by law, PwC accepts no duty of care to any third party in connection with the provision of this report and/or any related information or explanation (together, the “Information”). Accordingly, regardless of the form of action, whether in contract, tort (including without limitation, negligence) or otherwise, and to the extent permitted by applicable law, PwC accepts no liability of any kind to any third party and disclaims all responsibility for the consequences of any third party acting or refraining to act in reliance on the Information.

We have not independently verified the accuracy of information provided to us. Accordingly, we express no opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

The statements and opinions expressed in this report are based on information available as at the date of the report.

We reserve the right, but will be under no obligation, to review or amend our report, if any additional information, which was in existence on the date of this report, was not brought to our attention, or subsequently comes to light.

This report is issued pursuant to the terms and conditions set out in our letter of engagement dated 20 May 2016.