



The economic cost of defects in new residential buildings in New Zealand

The economic cost of defects discovered during new residential construction is estimated conservatively at \$2.5 billion per year by the New Zealand Institute of Economic Research (NZIER), an independent economic consultancy. The flow-on effects to the rest of the economy were considered as well as direct costs to the building industry. Construction defects create rework costs, increase construction costs and decrease housing affordability. Eliminating quality issues would improve the productivity and performance of New Zealand residential construction, meaning capital investment across the economy would increase. Households would have an estimated \$1.9 billion additional income available to spend on goods and services.

Defects in construction quality can have wide-ranging and long-lasting financial, economic and environmental effects.

Taken together, construction defects directly affect the financial performance of the residential construction industry.

The costs of remedying defects can fall on builders, building firms and related industries such as construction service specialists. Rectifying defects involves costs in time and materials and reduces productivity, which in turn can affect the rate of supply of new housing.

Defects and their causes

A review of domestic and international literature was undertaken by NZIER to determine definitions for quality construction and defects in quality and to determine the types of issues found in New Zealand.

Two types of defect were considered in this study:

- Compliance defects: failure to meet the requirements of the Building Code and departures from good practice.
- Basic quality and appearance defects: visible defects on final inspection.

Previous BRANZ research into the common causes of defects in New Zealand and internationally showed direct and wider causes (Table 1).

Factors affecting construction quality

At the time of writing, labour shortage is still an issue for the construction industry, meaning some builders are not adequately trained or supervised. Building inspection

can help rectify defects before they become a long-term problem, but labour shortages and high build rates mean that building inspections are falling behind. Delayed or no inspections mean that builders are not easily brought back to remedy any defects. Clients also show an unwillingness to pay for building inspections, even though inspectors are more likely than the clients themselves to find building compliance defects early on.

Consent documentation is integral to delivering a quality build. A previous BRANZ review of consent documentation for 52 houses found that 85% of documents contained well-documented specifications. However, 30% also had elements that were poorly documented in that they had missing details, drawings needed the reader to reference separate standards rather than including the detail and no list of materials was included, even if other parts of the specification were well documented.

An annual survey conducted by BRANZ, the New House Construction Quality Survey, provides some of the most detailed information on the prevalence and nature of construction quality defects in New Zealand and was used as an input to the economic modelling in this study. In the 2014 survey, 92% of new houses had one or more quality and appearance defect. Around half the houses surveyed had more than three defects, and 16% of houses had six or more defects.

BRANZ also found that new houses often fall short of the basic level of quality due to aesthetic or compliance defects in both New Zealand and overseas. Some buildings may meet the enhanced quality level, but this largely depends on the relationship between the client, builder and designer and the willingness to invest from the client.

Table 1. Common causes of defects in residential buildings (from BRANZ Study Report SR387, 2017).

DIRECT CAUSES	WIDER CAUSES
Build error	Unique production processes
Procedural error	Complex products
Material faults and failures	Lack of product standardisation
Poor coordination between trades	Poor information flow between industry members
Poor workmanship	Fragmented construction industry
Poor design	

Estimating the cost of construction defects

The cost of construction defects on the New Zealand economy for the 2018 calendar year was estimated using an existing model (the NZIER ORANI-NZ CGE model).

Three modelling scenarios were developed as inputs to the modelling (Table 2). These scenarios assumed that the prevalence of quality defects in non-new house construction is the same as in new house construction, international estimates of the costs of residential construction quality defects are applicable to New Zealand and findings from earlier years are applicable to the construction industry in 2018.

Wider impact on the New Zealand economy

Eliminating all construction defects is not realistic. However, considering this possibility provides a sense of the 'size of the prize'. This scenario would improve the productivity and performance of residential construction in New Zealand, meaning a construction

increase of 1.1% or \$112 million annually (an additional 345 dwellings built per year), and capital investment across the economy would increase by 1% annually.

The modelling also calculates the knock-on effect – the productivity improvement in residential construction would lead to a 1.3% increase in wages throughout the whole economy. Households would be better off and increase spending in other parts of the economy.

Economy-wide effects of an increase in productivity in residential construction would mean New Zealand's GDP would rise by 0.9% or \$2.5 billion (Figure 1). Households would have an additional \$1.9 billion to spend on goods and services, which would increase living standards in general.

Discussion

The research shows that the economic effects of quality defects are not limited to the construction industry.

For building companies, reducing rework to fix defects improves the profit margin from

Table 2. Variables for input into the partial equilibrium modelling to estimate the cost of construction defects on the New Zealand economy.

VARIABLE	CENTRAL SCENARIO	LOWER BOUND	UPPER BOUND
Prevalence of defects	90%	85%	95%
Average cost of defects	6%	3%	9%
Cost factor	2.6%	5.4%	8.6%
Output of the residential construction industry	\$18.43 billion	\$16.46 billion	\$20.39 billion
Estimated cost of construction defects on the New Zealand economy	\$995 million	\$420 million	\$1,744 million

building new houses. Frequent rework weakens the resilience of firms. As profit margins are squeezed, the residential construction business is left with little margin to cope with lulls in business.

For the building industry, the prevalence of quality defects means that rework has become the norm. This means project managers will be incentivised to price in the cost of rework where they can and spread the costs across several projects. As a result, the cost of construction is increased and housing affordability of new homes is affected. The building industry has struggled to improve productivity over time, and issues of defects contributes to this.

Eliminating quality issues would improve the productivity and performance of residential construction in New Zealand and would provide opportunities for additional consumption and economic growth.

Future work

The impact of quality defects on the financial viability of building companies was beyond the scope of this report, but defects should be considered a potential source of financial pressure for individual companies. A case study review would be needed to understand the role that defects play in the resilience and sustainability of residential construction businesses.

Related issues such as alterations and maintenance, non-residential construction, undiscovered defects and earthquake strengthening were not considered in this study and are important areas for future research.

More information

BRANZ External Research Report ER49

The economic cost of quality defects.

BRANZ Study Report SR335 *New house construction quality survey 2014.*

BRANZ Study Report SR355 *Consent documentation quality for new housing.*

BRANZ Study Report SR375 *Building-quality issues: A literature review.*

BRANZ Study Report SR387 *Prioritising quality: Literature review of common residential housing defects.*

BRANZ Study Report SR445 *Procuring for quality.*

MBIE. (2015) *Guide to tolerances, materials and workmanship in new residential construction.* Wellington, New Zealand: Ministry of Business, Innovation and Employment.

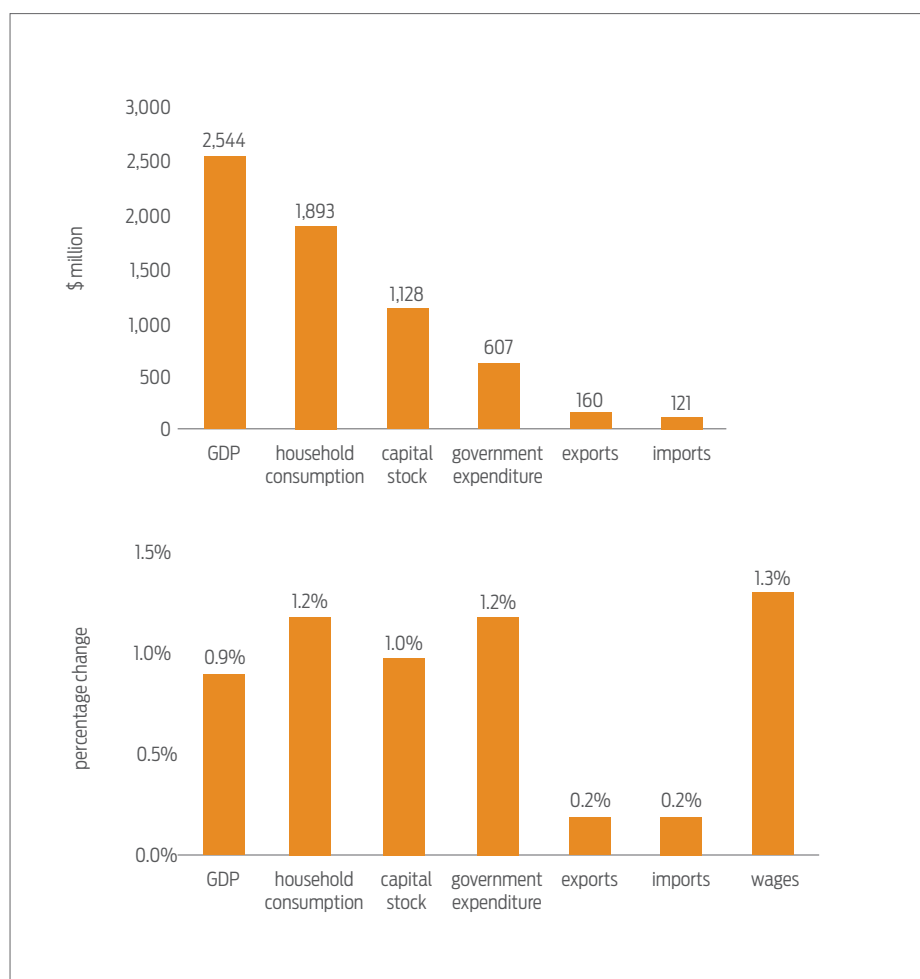


Figure 1. Additional money available to the New Zealand economy following quality improvements in residential construction and services, change from 2018 baseline in millions of dollars (in real terms) using the central modelling scenario. Note that modelling provides percentage change for wages only.