STUDY REPORT

SR 315 (2014)

Small construction firms in New Zealand

MD Curtis

IC Page

The work reported here was funded by BRANZ from the Building Research Levy.

ISSN: 1179-6197

Preface

This is the second of our reports into Small Firms, following on from our Small firms' work types and resources study report in 2013. It investigates time use by small firms their work types, procurement methods, contract and payment methods, where business advice is obtained and productivity/performance measures, compared with medium and large firms.

Acknowledgments

This work was funded by the Building Research Levy.

Note

This report is intended for small construction firms for the use of benchmarking, government entities/research institutions for research into small firms, and anyone interested in this significant segment of the industry.

Small construction firms in New Zealand

BRANZ Study Report SR 315

MD Curtis, IC Page

Abstract

Small firms in the New Zealand construction industry make up about 91% of firms in the industry. We look at them in detail to gain a better understanding of this significant segment of the industry. We identify how they spend their time, what work types they engage in, how they procure clients, what types of contract and payment they use, where they obtain their business advice and what factors they believe have the largest influence on their productivity/performance. We are able to compare these factors with medium and large firms to see how firm size affects behaviour and/or outcomes.

Contents Page

Figures Page

Tables Page

1. INTRODUCTION

Small firms (0-5 employees) make up about 91% of the construction industry. It is not known how efficient they are in use of time or exactly what mix of work they undertake. In order to improve productivity, we need to better understand the work types, contractual arrangements and how work is obtained, for this large segment of the industry.

This report first looks at the shape of the industry. It shows the number of small firms and employment in small firms, as well as births and deaths of firms and firm profits.

It then moves on to presenting the results of the BRANZ Time Use Survey. The survey looked at how individual firms spent their time during a typical week. These 'diaries' act as case studies into the performance of small firms.

Finally, a second survey, the BRANZ Firms' Performance Survey, looked at types of work, procurement types, contract and payment, business advice, loss of tool time and productivity/performance measures for a variety of construction firms. This allows a comparison between small firms and medium/large firms to see where differences exist.

2. SUMMARY

More firms enter the construction industry than leave it when the construction industry is strong. Looking ahead as the industry picks up due largely to Auckland demand and the Canterbury rebuild, we are likely to see many small firms enter the industry. There will also be a number of workers currently in the industry that are not fully employed that have been held onto by their firm at reduced hours that will be able to be used more efficiently.

Smaller construction firms that make a profit seem to be making a higher gross profit margin than larger firms. However, a large proportion of smaller firms do not appear to be making a gross profit at all, highlighting the difficulties that firms face in the industry.

The first of two surveys suggests that employers in small building firms spend about 40% of their time on tool time whereas their employees spend about 66% on tool time. The percentage of an employer's time that is spent on tool time decreases as the number of employees increases. Employers without employees have less time idle and breaks, and spend an extra 6 hours working per week, compared to employers with workers.

The second survey found that small building firms spend the majority of their time working in residential construction. They rely largely on repeat clients and recommendations from previous clients, whereas large firms are far more reliant on tendering. Small firms said having the appropriate level of trade skills, and organising and managing projects effectively, are the two most important factors for their productivity/performance.

3. THE SHAPE OF THE INDUSTRY

The construction industry is characterised by a large proportion of small firms. **Firms with 0-5 employees, i.e. 1 to 6 workers** (including the employer), **make up about 91% of the industry**, and are how we define small firms in this report. Very few large firms exist in the industry (firms with more than 50 workers).

3.1 Firm Size

Figure 1 shows the percentage of small firms trended downwards between 2000 and 2008. Between 2008 and 2011 there was a small increase in the percentage of small firms, but that has decreased since.

The figure below and the following charts use geographic units rather than enterprises. This means that each 'physical site' or 'business location' is counted rather than the legal business entity[1] in our estimates of the number of firms.

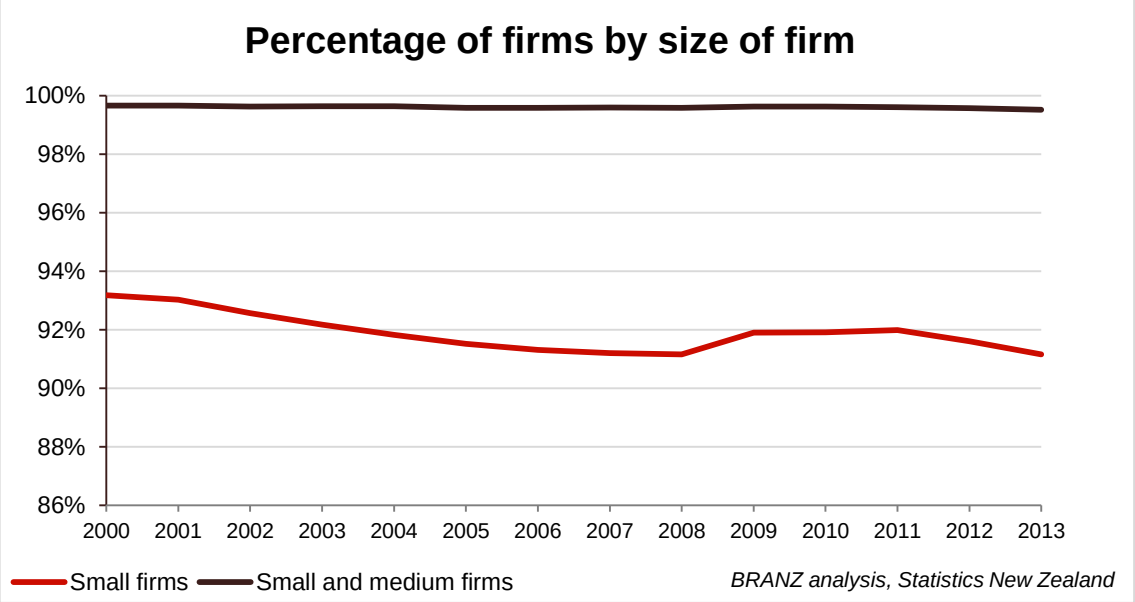

Figure 1. Percentage of firms by size of firm

Looking only at small firms, the boom years between 2003 and 2006 saw not only an increase in the number of small firms along with the number of workers in small firms (see Figure 2), but also an increase in the number of employees per small firm as illustrated by the increase in the distance between the two lines in Figure 2. This was happening at the same time as the percentage of firms that were small firms was decreasing as seen in Figure 1.

[1] See http://www.stats.govt.nz/browse_for_stats/businesses/business_characteristics/BusinessDemographyStatistics_HOTPFeb12/Data%20Quality.aspx
For example, a large firm with 20 offices around New Zealand would be counted as 20 geographical units but 1 enterprise.

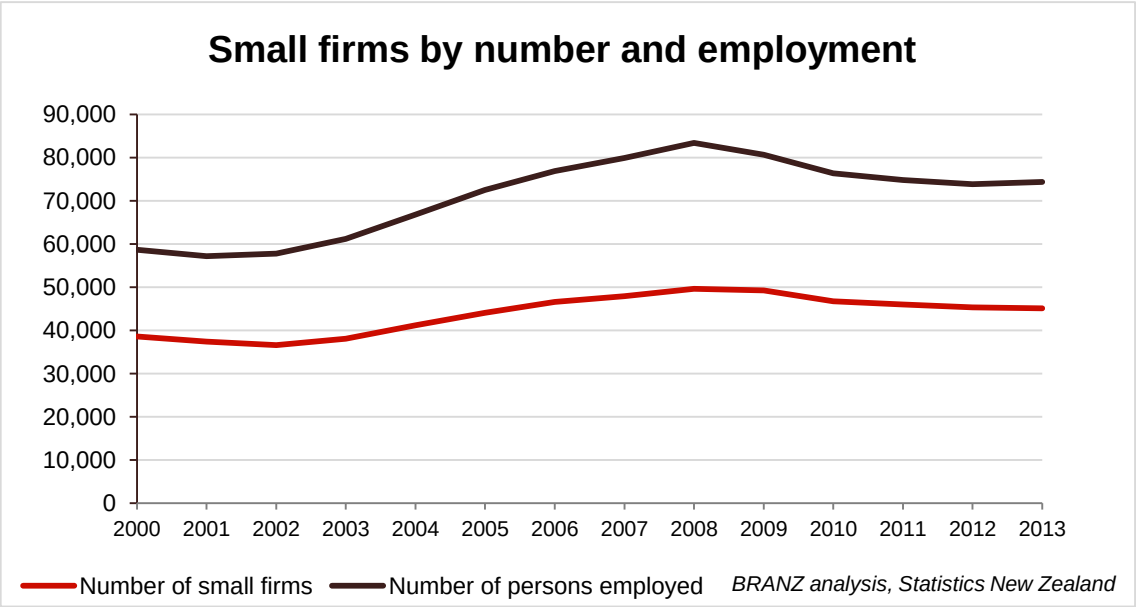

Figure 2. Small firm's number and employment

3.2 Births and Deaths

Figure 3 shows the net births and deaths for firms between 2001 and 2013. In the boom years, more firms were created than were destroyed. The larger percentage change for geographic units over employees suggests that these were small firms entering the market when the construction industry was experiencing strong growth. In the subsequent years, the opposite has happened, where geographic units have decreased at a faster rate than employees suggesting that it was the smaller firms that shut down. Note that geographic units are business locations and not site locations. A small builder may have employees working on more than one site simultaneously but his business is counted as one geographic unit. In contrast franchises are counted as separate geographic units.

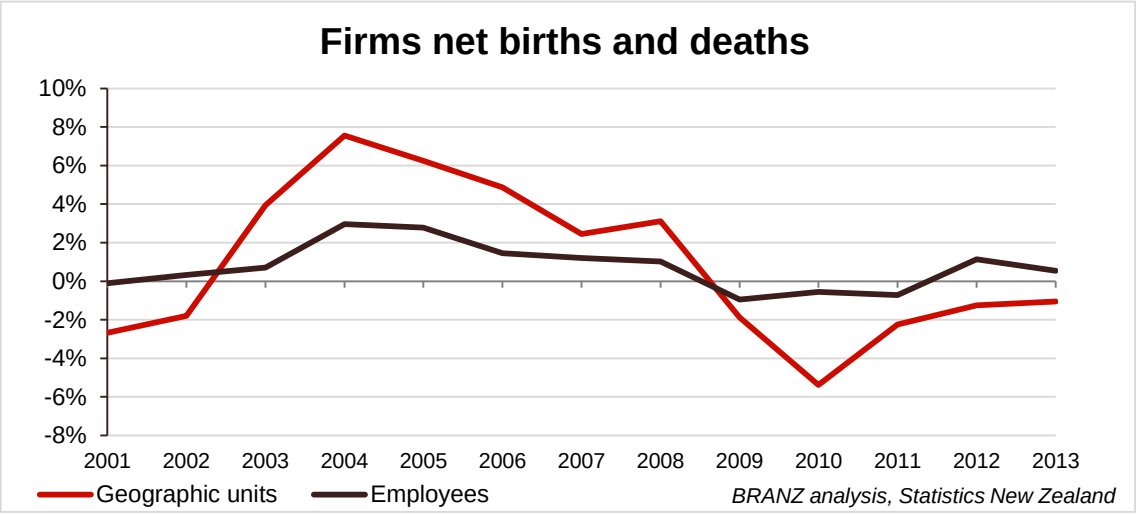

Figure 3. Firms net births and deaths

3.3 Value of Residential Construction

Small firms are largely involved in residential construction[2]. Figure 4 shows the change in the value of residential consents and the change in net births/deaths by geographic units. The net births/deaths appear to lag the residential activity by a year, i.e. **more firms are entering the construction industry than are leaving it when the previous year was strong and *vice versa***.

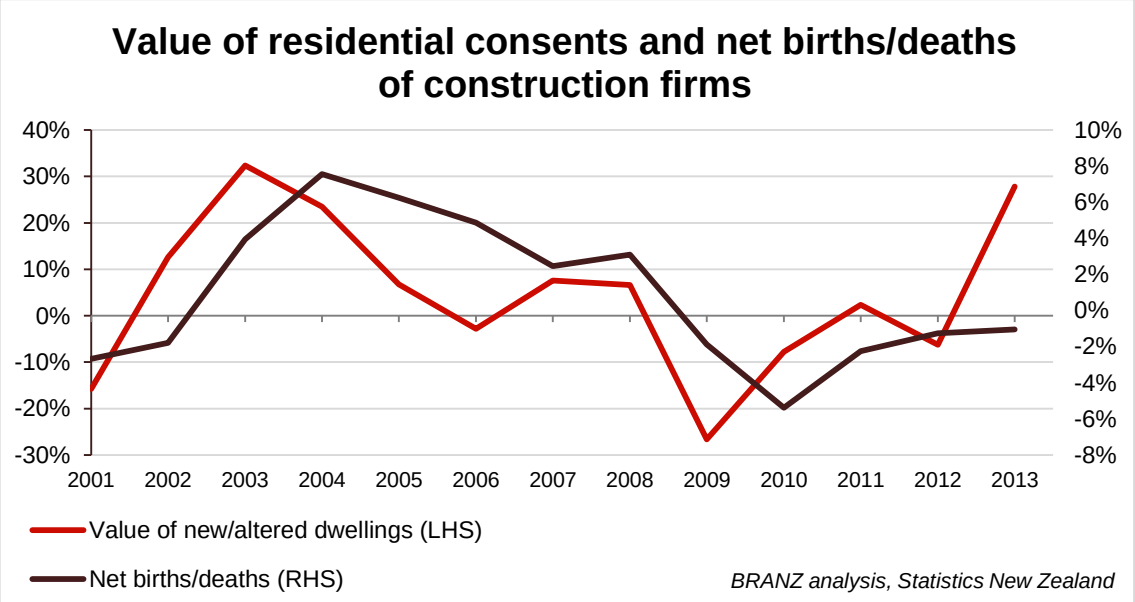

Figure 4. Value of residential consents and net births/deaths of construction firms

Along with the births/deaths of firms in good/bad times, construction firms also react by changing the average number of hours worked (see Figure 5). This indicates **an intention by many firms to hold onto workers when times are tough**, which supports the shape of Figure 3, where the number of firms rises and falls faster than the number of employees. But number of hours worked does not fluctuate as much as the value of work, so **workers are also working more efficiently when workloads are stronger**.

[2] Page, I; and Curtis, C. (2013). *Small firms' work types and resources*.

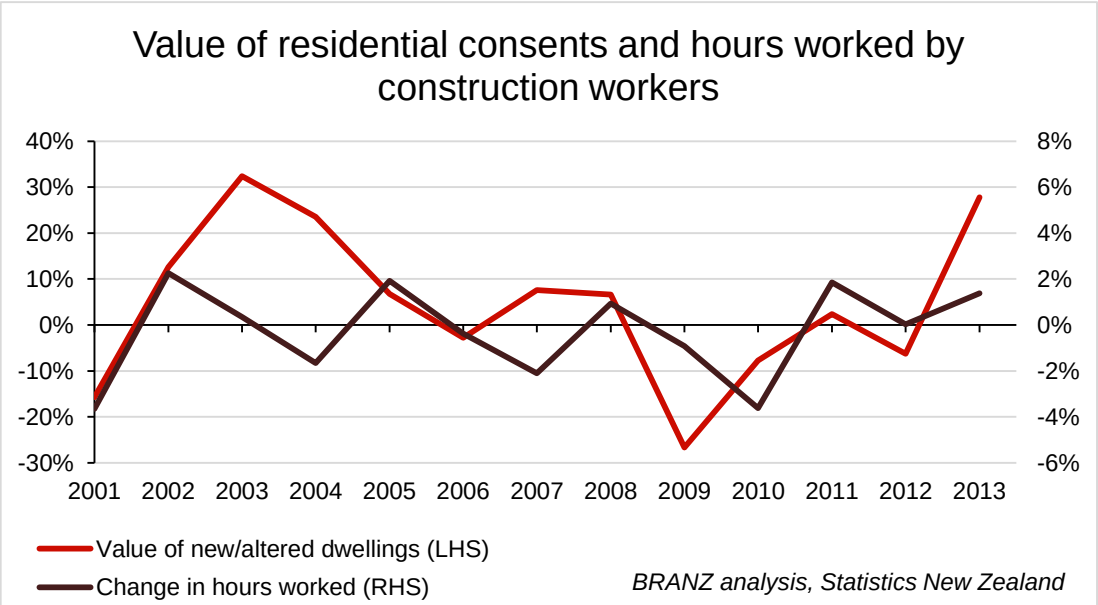

Figure 5. Value of residential consents and hours worked by construction workers

3.4 Firm Profits

Tax-filed financial accounts from Inland Revenue are supplied to Statistics New Zealand for their Longitudinal Business Database. This data is aggregated by Statistics New Zealand to preserve confidentiality and individual returns are not seen by non-Statistics New Zealand persons. The data for 24 sub-industries in the construction group are displayed in Figure 6 and Figure 7.

Average taxable profits as a percentage of sales across all construction industries increased by one percentage-point between March 2011 and March 2012. The majority of industries saw little change in margins. However, 'other residential building construction' (i.e. new construction of apartments or other attached/semi-detached units and alterations/additions/renovations to such buildings[3]) and 'painting and decorating services' had sizable increases.

This figure can be used by firms to compare their profit levels with the average in their sub-industry which can be an incentive to improve performance.

Note that only firms that recorded a taxable profit to sales ratio between 0% and 100% have been included in this figure.

[3] See http://www.stats.govt.nz/~/media/Statistics/surveys-and-methods/methods/class-stnd/industrial-classification/anzsic06-divison-e.pdf

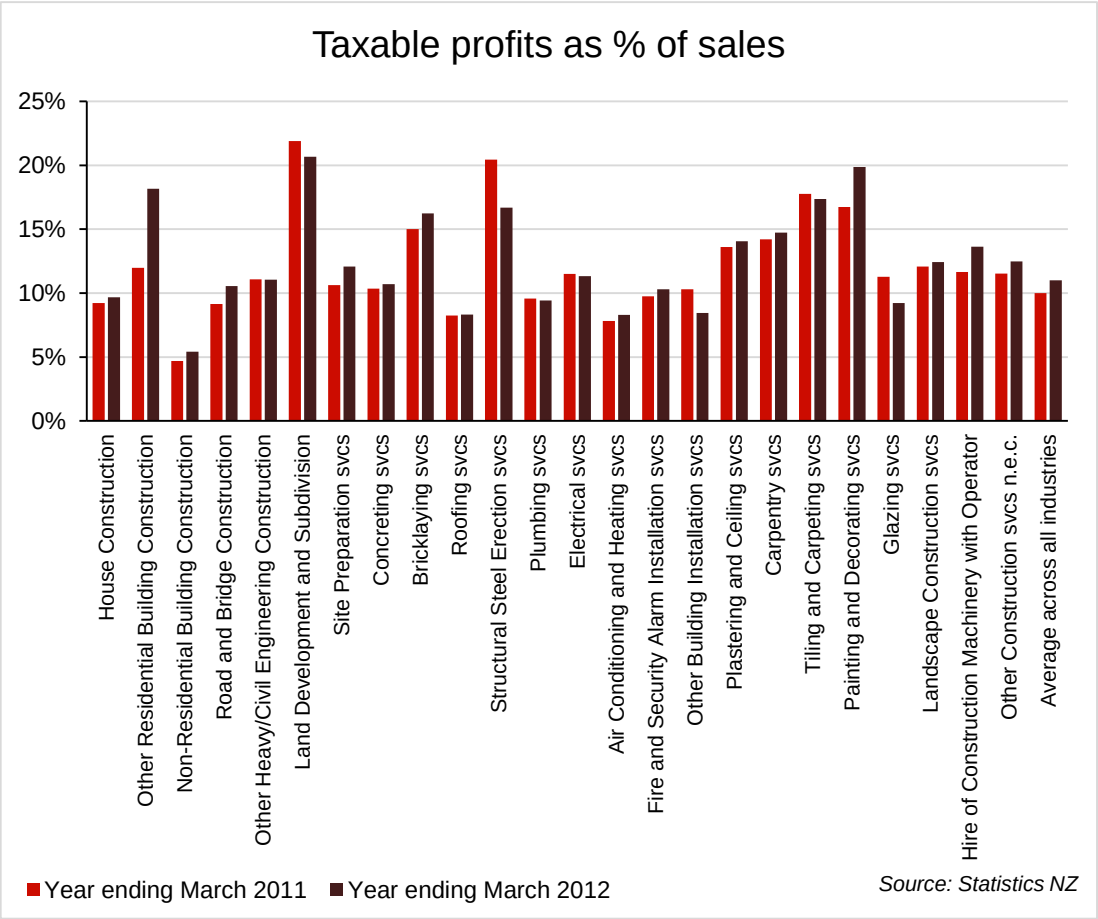

Figure 6. Taxable profits as percentage of sales

Value added per person is mainly profits plus wages and salaries (i.e. the average gross profit per employee). It reflects the market value of skills in wages/salaries, and demand conditions in profit/margins. Construction does not compare well to other industries by this measure[4]. A major reason for this is that construction is a lot more labour intensive than many other industries. This is even evident between the sub-industries in Figure 7 where some of the more 'plant-intensive' sub-industries have higher value added per person (labour productivity) than the other sub-industries.

Value added per person in the construction industry increased by a nominal 3% in the year ending March 2012.

[4] Page, I; and Curtis, C. (2011). *Firm productivity variations*.

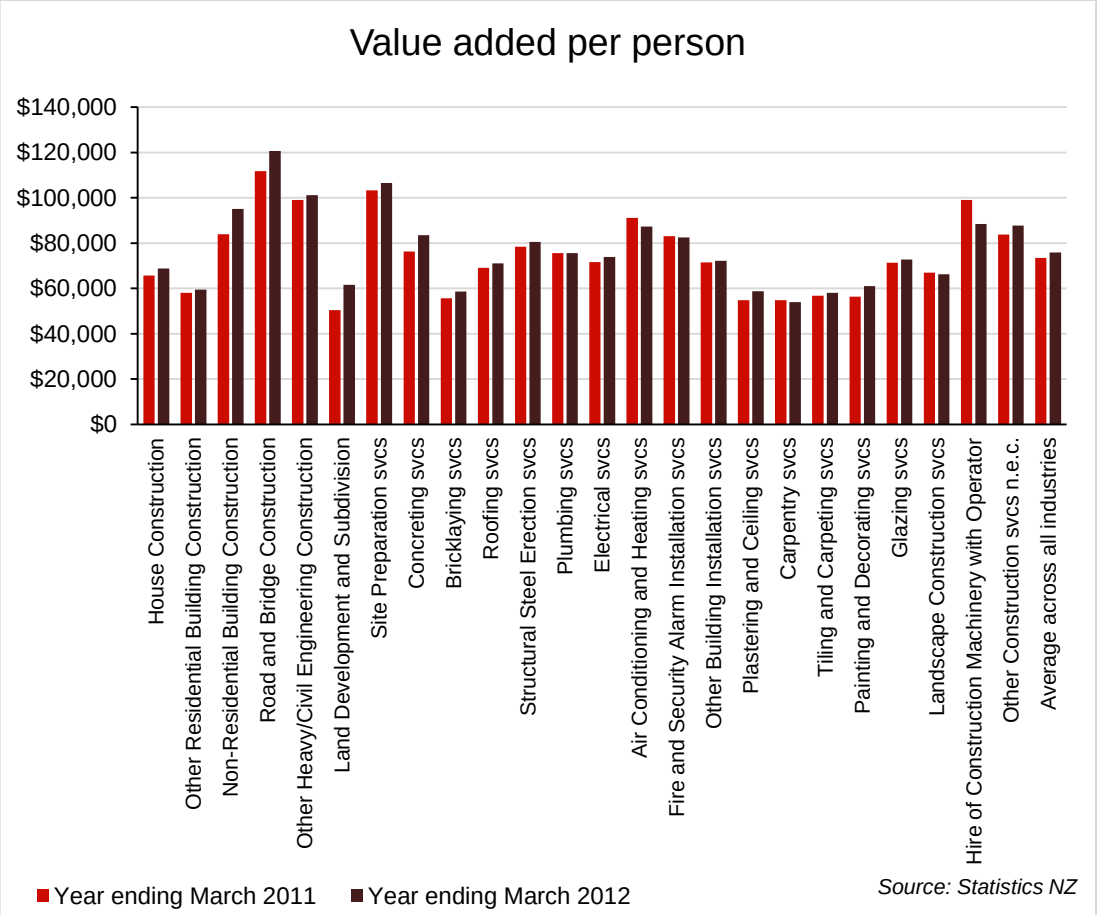

Figure 7. Value added per person

Figure 8 allows us to drill down into the information a little deeper. The charts are for the years 2009-2012.

Of profit making residential construction firms, smaller firms seem to be making a higher gross profit margin than larger firms. However, on the right hand side of the figure, we see that **a large proportion (55%) of residential construction firms with no employees (i.e. a sole proprietor) made a loss**. 25% of firms with 1-5 employees and 30% of firms with 6 or more employees also made a loss. These losses are not captured on the left hand side of the figure, as the left hand side only includes profit making firms.

Reasons for this are varied. One could be that a number of firms have completed a spec built house (for example) but are yet to sell it so have incurred all of the costs but are yet to receive any revenue. Another could be that smaller owner-operated firms use any gross profits as personal income for the period, and the business runs at a small loss.

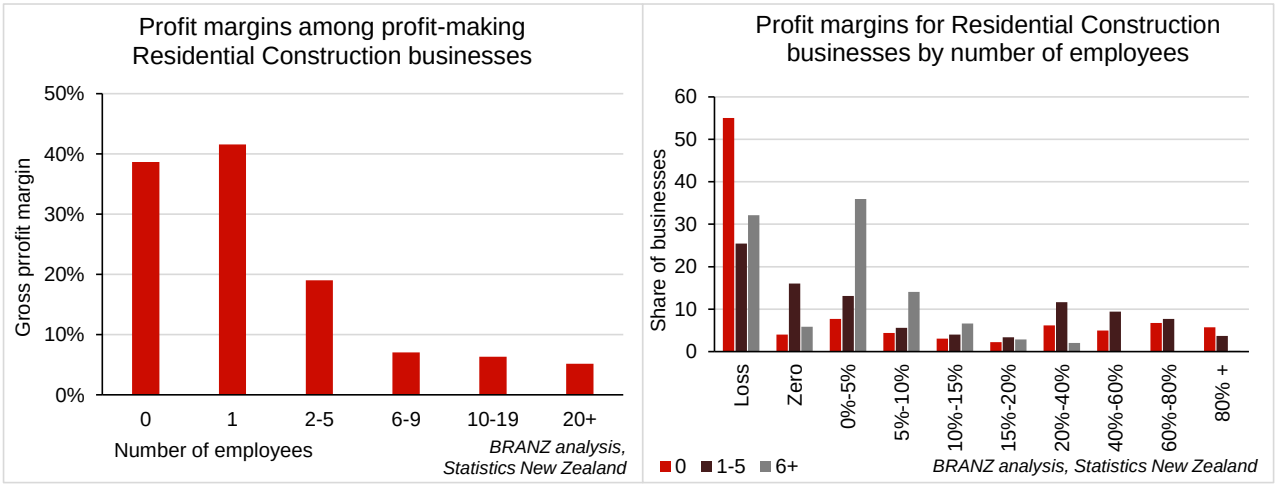

Figure 8. Residential construction profits

Small businesses have similarly high profit margins (of profit making firms) in non-residential construction. One in two small firms made a loss however. It is unlikely that this is due to spec built buildings as with residential construction. Because commercial projects tend to be larger, it could be that they are not effectively covering costs, or that the nature of tendering for projects is leading to negligible/non-existent profit margins.

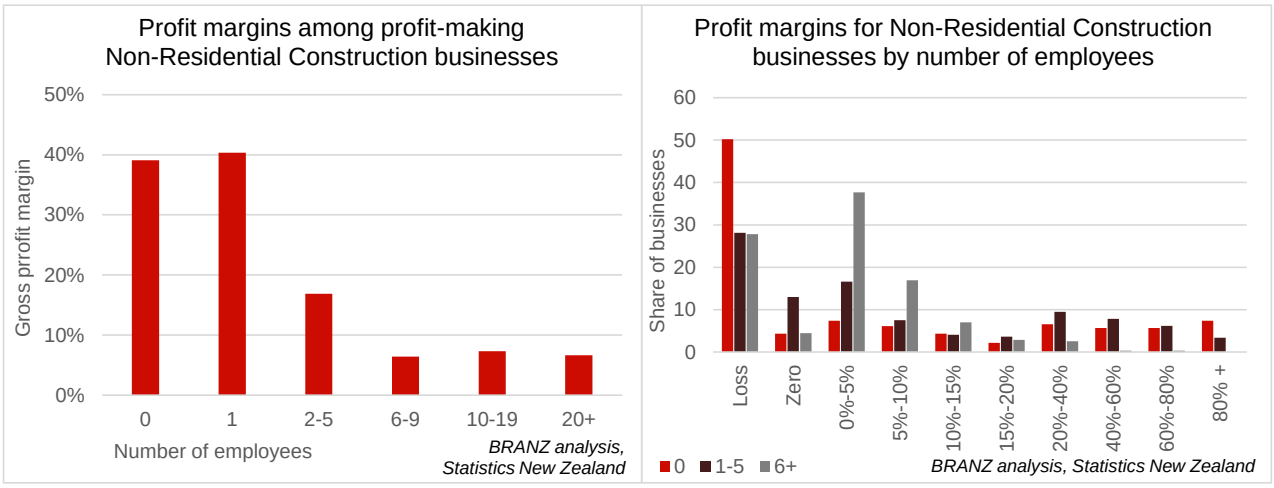

Figure 9. Non-residential construction profits

Construction trade services include plumbers, electricians, plasterers, roofers, carpenters and brick/block layers. As with the previous two figures, small businesses have high profit margins (for those making profit at all). Yet a large proportion of firms are making a loss. This could again be due to the nature of tendering for projects and fine profit margins that come from this process. Other possibilities include those listed for residential construction firms (i.e. the owners pay themselves with what would otherwise be deemed profit) and losses incurred from construction firms falling over and being unable to pay their debts.

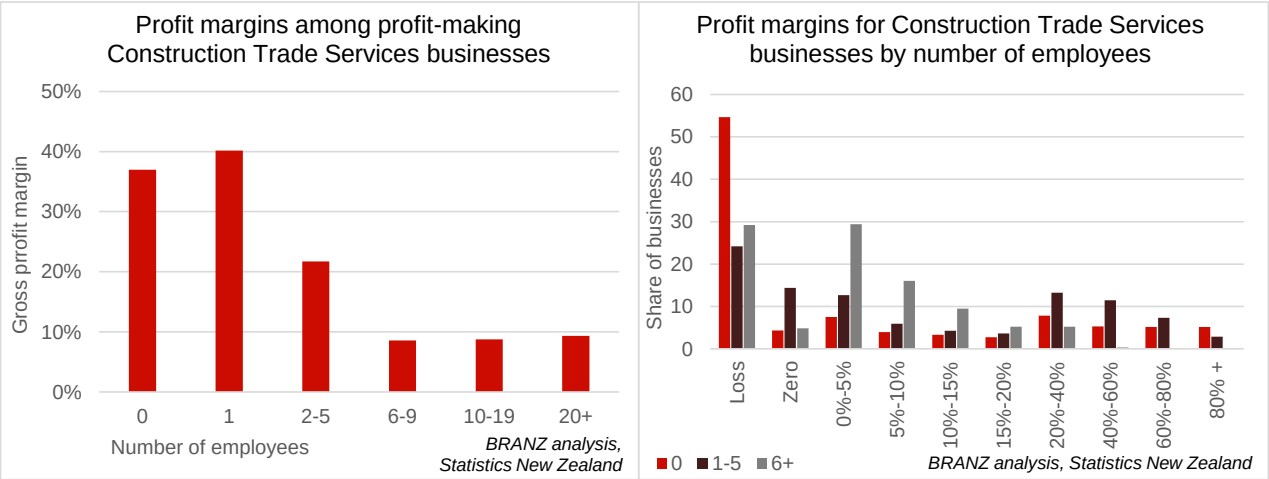

Figure 10. Construction trade services profits

Further work needs to be done to look into why so many construction firms are making losses and whether these losses are sustainable.

4. TIME USE SURVEY OF SMALL FIRMS

This section summarises the results of a survey of small firms on their time use for a week. **Only builders and their sub-contractors were surveyed – civil engineering works are not included.** The survey was designed to collect information on how many hours each day the builder, the builder's spouse and the builder's employees spent on various tasks. It aimed to identify areas where small firms could improve and where time use may differ from larger firms.

A total of 103 builders were contacted and asked to fill in a form detailing how they spent their time over the last week. Incentives were offered for the return of the form. Fifteen forms were returned.

The survey was designed to provide case studies of how firms are using their time and how much time is wasted. The week's data provides a snapshot into time use of small firms.

It was initially thought that on site monitoring by BRANZ personnel would be necessary to get reliable data. In the event it was decided to trial the use of diaries provided to builders and ask them to fill them out daily. In view of the onerous amount of work involved a substantial incentive was offered ($100 of vouchers), but the numbers returned were less than expected despite repeated requests. However, examining the returns received, the respondents have done a conscientious job and it is believed the survey returns are an accurate reflection of time use for this limited sample. Averages are provided in Figure 11 and Figure 12 but as the sample is small they need to be use with caution. The five case studies, in Figure 13 to Figure 19 provide further information on variations between builders. Most returns were obtained as a result of personal contact by the researchers, emphasising the value of the information, promising confidentiality, and stating that we wanted "warts-and-all" data.

4.1 Results

Figure 11 shows how both the employer and employees reported using their time during a typical week. The employers on average worked about 53 hours during the week compared to about 40 hours for employees (including tea breaks and lunch).

The majority of time was spent on tool time, with employers spending 22.4 hours on average on tool time compared to 28.9 hours for employees.

On average, employers spent slightly more time idle than employees, but much more time dealing with materials, meeting clients, and doing quotes and invoicing.

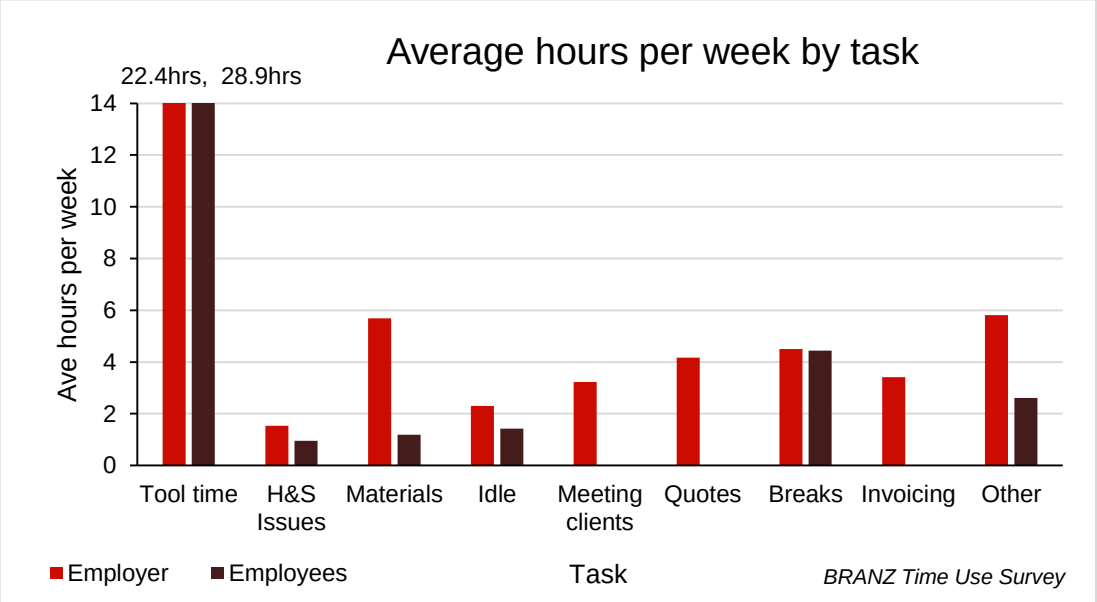

Figure 11. Average hours per week by task

The following table shows how the items from the survey form have been categorised for the figures in this section.

Item on survey form	Category in following figures
Preparing quotes	Quotes
Meeting with potential clients	Meeting clients
Invoicing, bills and tax returns	Invoicing
Visiting council	Other
Visiting suppliers (e.g. materials)	Materials
Clarifying or getting design details	Other
Addressing health and safety issues	H&S issues
Tool time	Tool time
Collecting materials from off-site	Materials
Moving materials around site	Materials
Idle – waiting for consent	Idle
Idle – waiting for materials	Idle
Idle – waiting for instructions	Idle
Idle – weather delays	Idle
Idle – visits/waiting for inspector	Idle
Idle – insufficient work	Idle
Doing rework – defect in work	Other
Doing rework – client/designer changes	Other
LBP paperwork and training	Other
Socialising	Breaks
Teabreaks and lunch	Breaks
Other time use	Other

Table 1. Categorisation of time use

Tool time is the optimal use of time for employees. However, this may not be the case for employers as they have additional project and financial management tasks to take care of. **Employers spent on average 42% of their time on tool time and employees spent 66% of their time on tool time**. However, we are still seeing low labour productivity growth[5] suggesting that we have not seen improvements in efficiency of tool time.

The average percentage of tool time for employees is 66% but as stated earlier the sample size is small and there is some variation between firms. The 95% confidence interval for the sample is ±11% so the true average for tool time is likely to lie between 55% and 77%.

A percentage of 66% is quite high compared to some overseas studies. In Canada a number of case studies, mainly of large civil engineering projects[6] found a median of only 47% productive hours. A meta-analysis[7] for all types of construction across a number of countries found an average of 49.6% of time in construction is devoted to wasteful activity. The high percentage locally is mainly due to the survey only covering house builders, where the tasks are quite repetitive, the work is small in scope and is easily monitored compared to the larger projects in the overseas studies where labour is

[5] Page, I; and Norman, D. (2014). *Measuring construction industry productivity and performance*.
[6] Silva L et al (2010) Realtime information integration via i-Booth. Proceedings of the Construction Research Congress 2010: Innovation for reshaping construction practice. American Society Civil Engineers.
[7] Horman, M. & Kenley, R. (2005) Quantifying levels of wasted time in construction with meta-analysis. *Journal of Construction Engineering and Management, ASCE*. 131, Issue 1, 52-61.

dispersed across the site and material handlings and giving instructions can be quite complex.

Figure 12 looks at the employers' time use and the difference between having employees or not. The biggest difference is that where the employer does not have employees, they spent almost double the amount of time on tool time as an employer with employees. **Employers without employees also spent less time idle and taking breaks, whilst working 6 hours longer**.

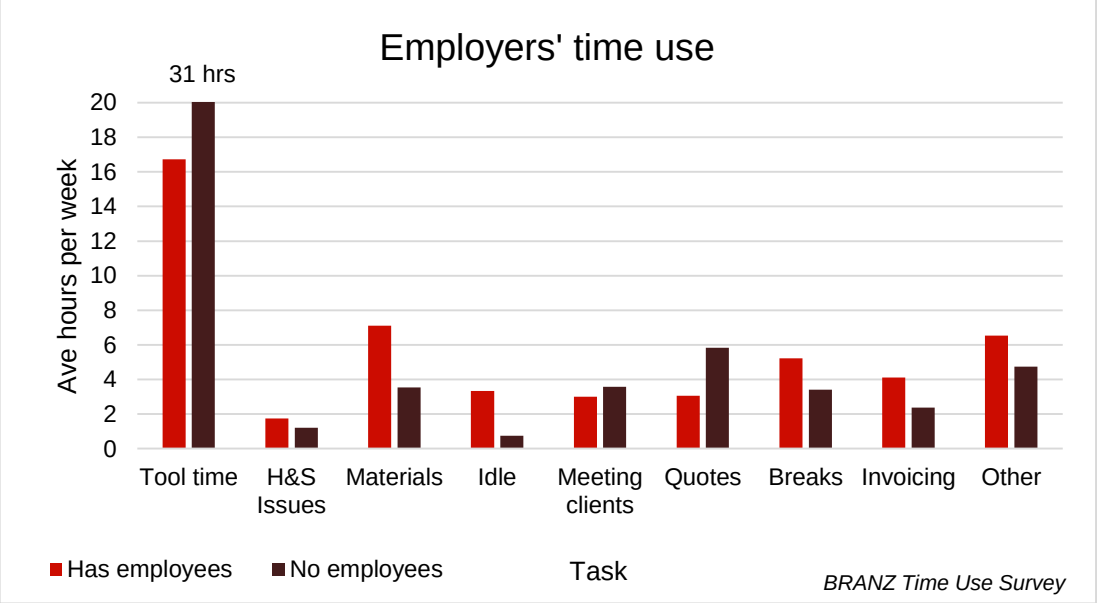

Figure 12. Employers' time use

The following two figures show what percentage of the employer/employees time is spent on tool time by the number of employees. Each marker on the chart shows an individual firm.

Figure 13 shows that **the percentage of an employer's time that is spent on tool time decreases as the number of employees increases**. This trade-off allows the employer to spend more time addressing health and safety issues, meeting clients and visiting suppliers, collecting materials and moving materials around site.

Figure 14 similarly shows the percentage of the employee's time that is spent on tool time. The 66% tool time average does not seem to be affected by the number of employees. Note that there are fewer data points on this figure as the firms that do not have any employees are not shown.

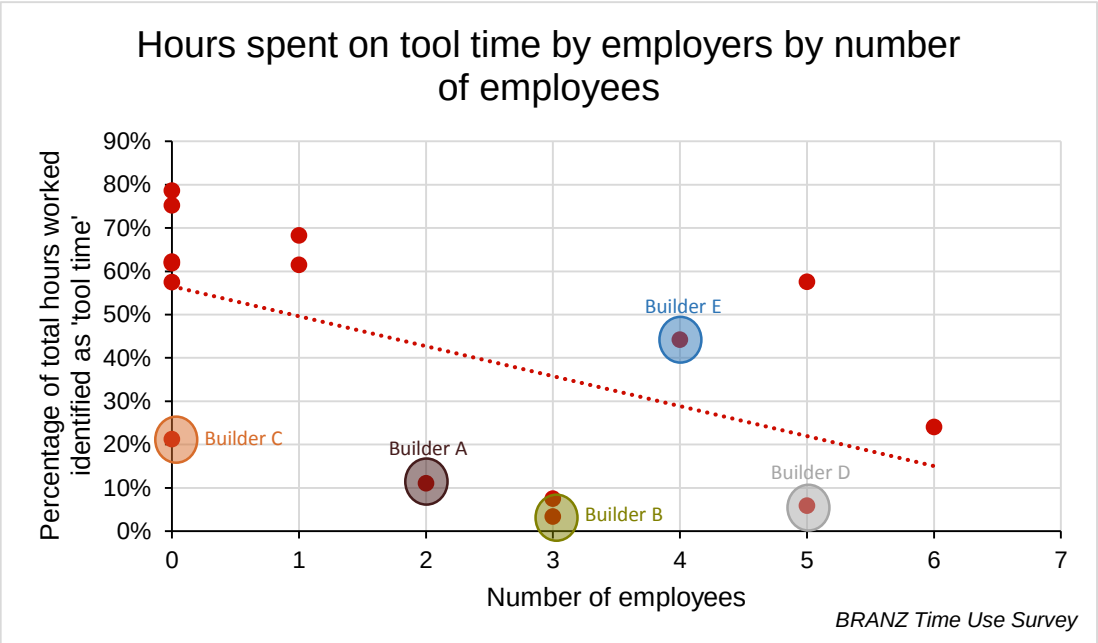

Figure 13. Employer hours spent on tool time

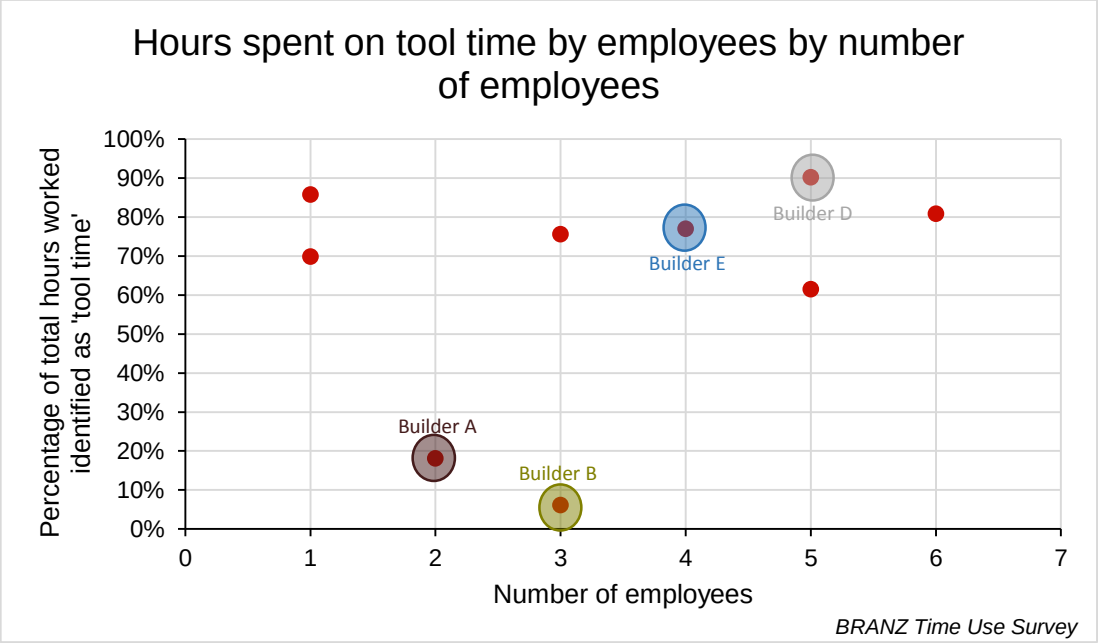

Figure 14. Employee hours spent on tool time

We now consider the results of some of these case study builders in greater detail.

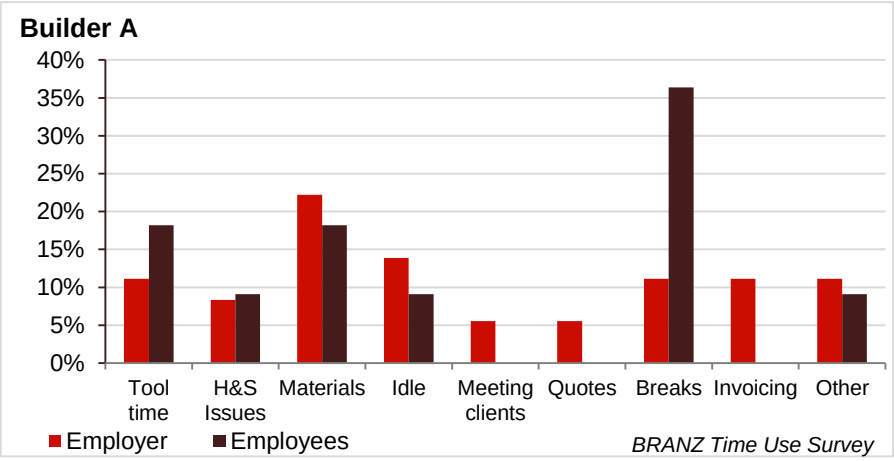

Figure 15. Builder A – Case Study

Builder A was selected as the employees spent a small percentage of their time on tool time. Builder A has two employees who worked on average 5.5 hours during the week.

The employer spent 18 hours working during the week. 11% of this time was spent on tool time. The most common category that the employer spent time on was materials, having spent 3 hours visiting suppliers and 1 hour moving materials.

15% of the employer's time was spent idle. This was largely due to waiting for materials but also weather delays.

The employer's spouse worked 9 hours during the week. This time was spent preparing quotes, LBP paperwork and socialising.

The employer's two employees spent just 18% of their time on tool time. Breaks took up 35% of their time.

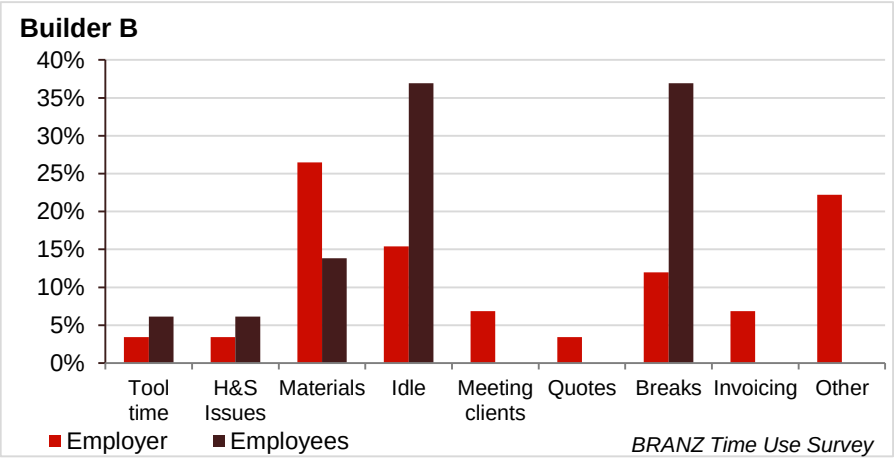

Figure 16. Builder B

Builder B was selected for the same reason as Builder A. Both the employer and employees spent very little time on tool time.

The employer worked 58.5 hours during the week, of which 3% was tool time. A quarter of the employer's time was spent on materials (mainly visiting suppliers) and 15% of the employer's time was spent idle.

The employer's spouse worked 2 hours during the week. This time was spent preparing quotes.

The employees spent 6% of the 16.25 hours worked during the week on tool time. Approximately 35% of their time was spent idle (largely due to weather delays or waiting for instructions) and another 35% on breaks.

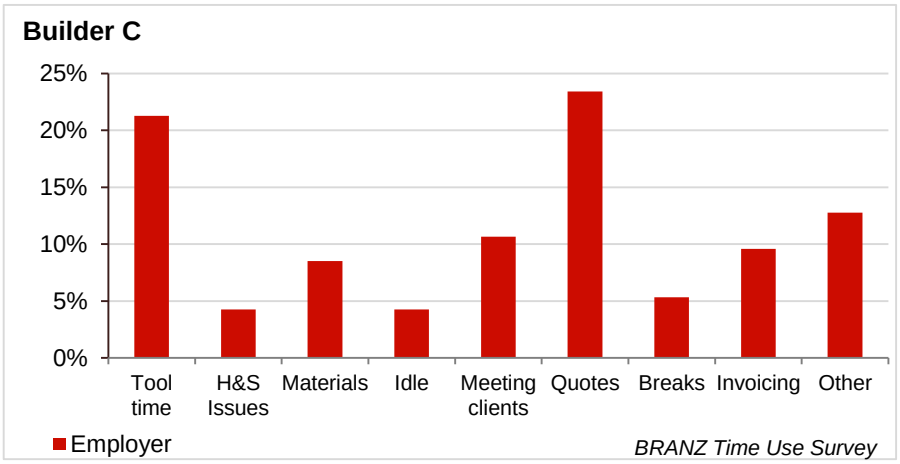

Figure 17. Builder C

Builder C was selected due to having no employees, yet only spending 21% of their time on tool time. A quarter of the builder's time was spent preparing quotes, 10% dealing with materials, 10% invoicing and 10% meeting with potential clients.

Builder C's spouse worked 30 hours during this week. Most of this time was spent invoicing.

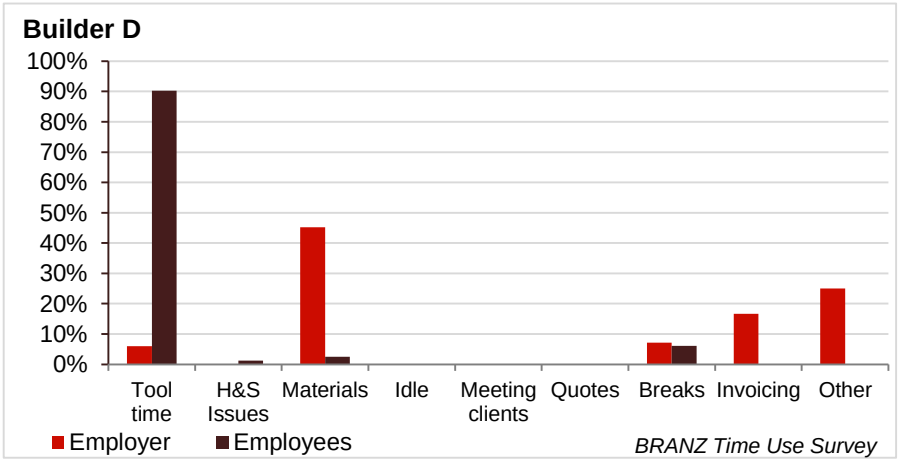

Figure 18. Builder D

Builder D was chosen as the time use is more along the lines of what we were expecting.

Builder D employed 5 employees. The employer spent just 6% of the 42 hours worked during the week on tool time. 45% of the employer's time was spent dealing with materials, the majority of this was collecting materials from off-site. Other large uses of time for the employer were invoicing, bills and tax returns, and clarifying or getting design details.

The employer's spouse spent 4 hours working during the week. This time was spent doing invoicing, bills and tax returns.

The employees spent 90% of their 41 hours worked on average on tool time. The rest of their time was split between addressing health and safety issues, dealing with materials, and breaks.

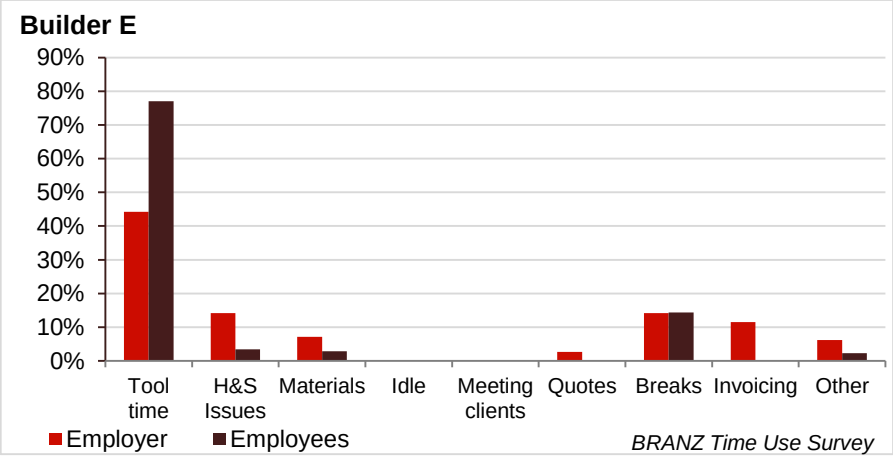

Figure 19. Builder E

As with Builder D, Builder E was chosen as a good example of time use.

Builder E employed 4 employees. The employer spent just over 40% of the 56.5 hours worked on tool time, with the rest of the time spread out between addressing health and safety issues, dealing with materials, quotes, breaks, invoicing, bills and tax returns, rework due to client changes and LBP paperwork.

The employer's spouse did not spend any time working for Builder E during this week.

The employees spent 75% of their 46.2 hour work week on tool time.

These case studies show the trade-off that many small builders face. **As the number of employees increases, the amount of time that the employer is able to spend on tool time seems to decrease**. This is largely due to having to do more organisation/project management tasks. It does not seem to have decreased the number of hours that the employer is working on average, nor does it seem to negate the use of a spouse to help deal with preparing quotes or invoicing, bills and tax returns.

Of 15 responses, two builders with employees seemed to have very little work. The sample is too small to say 13% (i.e. 2 out of 15) of the industry is short of work but it is indicative of why some firms are making losses.

4.2 Limitations

There are a number of limitations with the data presented in section 4.1. These limitations include:

- This is just a one week snapshot of time use of firms. The week may not have been a typical week for some firms.
- Survey responses were self-reported time use and therefore respondents may have inflated some of the more positive uses of time and stated that less time was wasted.
- The sample size is small.

- We assume that the two employees that the form has been filled in for are representative of all employees.

5. FIRMS' PERFORMANCE SURVEY

An additional survey was carried out on work types, client procurement, contract and payment, loss of tool time and productivity/performance measures. This survey adds to the Time Use Survey of Small Firms as it has a larger sample including small, medium and large firms, as well as surveying many of the sub-trades involved in construction such as roofers and joiners. As before civil engineering firms are not included.

Table 2 shows the number of responses received for each sub-trade split up into small, and medium and large firm sizes. 115 responses were received for the survey. The survey form is attached in the appendix.

Small firms are defined as firms with 0-5 employees, i.e. 1 to 6 workers.

Number of responses Firms' Performance Survey 2013			
	Small	Medium and large	Total
Certified builder	46	9	55
Master builder	16	8	24
Roofer	3	5	8
Electrician	4	2	6
Flooring	0	3	3
Joiner	2	4	6
Mason	3	4	7
Painter	2	0	2
Plasterer	3	1	4
Total	**79**	**36**	**115**

Table 2. Number of responses

5.1 Work Types

The following figure reaffirms last year's result that **small firms are mainly involved in residential construction**. Over 35% of work done by small firms in the building industry is in new housing. 33% is housing additions and alterations and a further 15% is housing repairs and maintenance.

In comparison, just 65% of medium and large firms' time was spent on these areas, with 30% of their time spent on non-residential work. These results are similar to earlier findings[8].

[8] Page, I; and Curtis, C. (2013). *Small firms' work types and resources*.

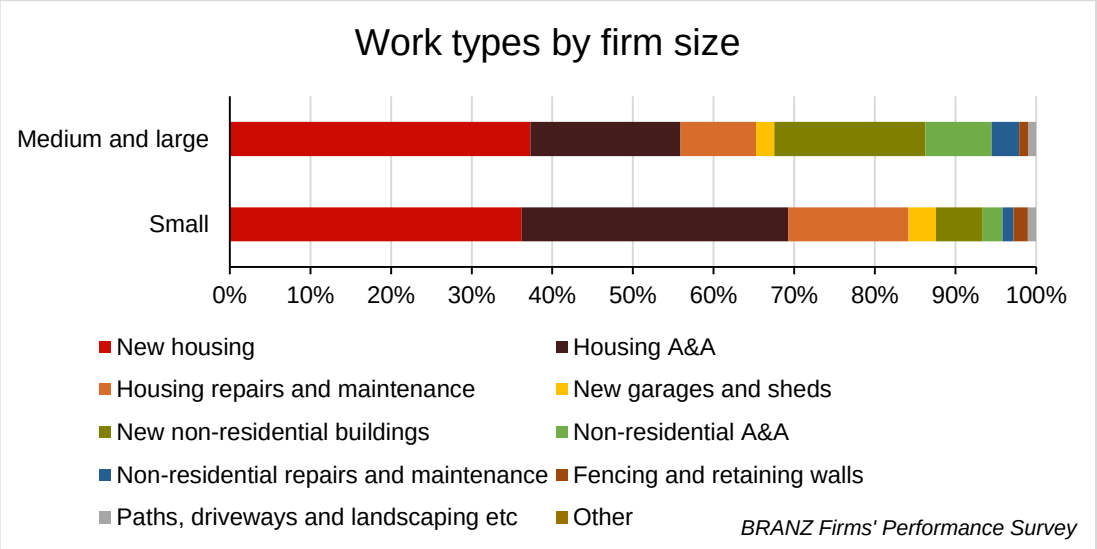

Figure 20. Work types by firm size

The amount of time spent on the different work types varies by occupation. Plasterers seem to spend the majority of their time on new housing. Masons seem to spend the majority of their time on new buildings (both housing and non-residential).

UK research[9] indicates about 65% of all work in the housing sector is on repairs and maintenance. The proportions in Figure 20 suggest about 50% of housing work in New Zealand is repairs and maintenance, counting housing A&A as mainly repairs and maintenance. It is likely that the NZ percentage is lower than the UK percentage due to the younger age of the local housing stock.

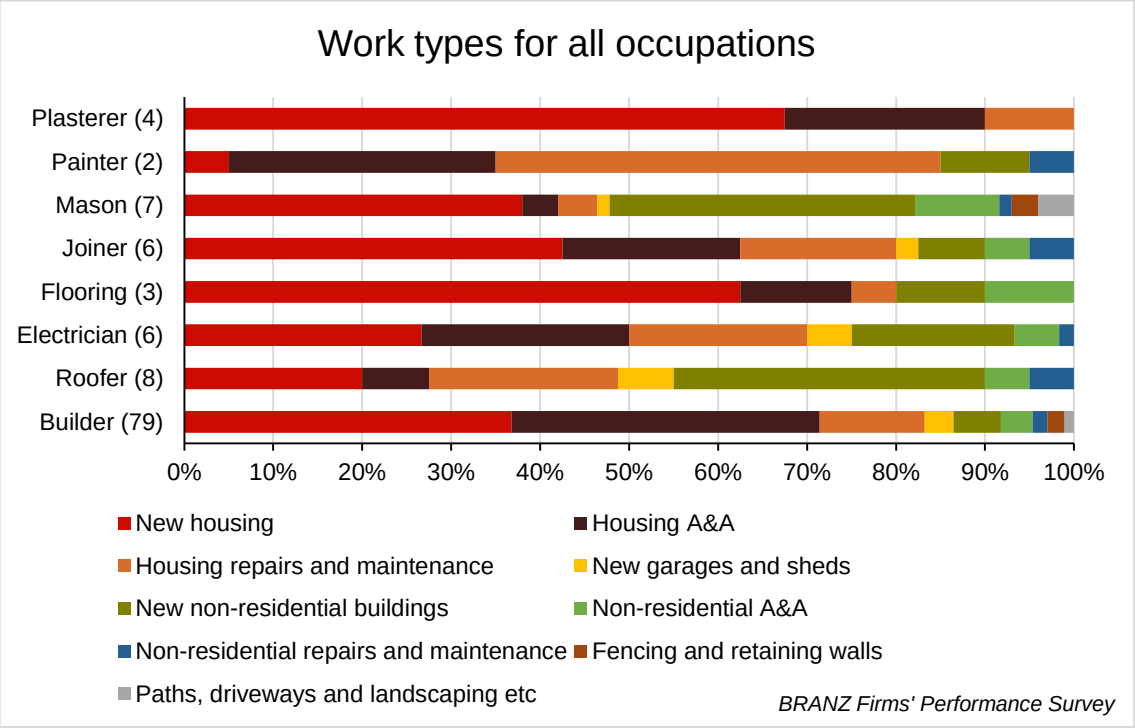

Figure 21. Work types for all occupations

[9] Leather P, Rolfe S (1997) Fit for the task: the future of the small scale domestic repair and maintenance industry in the UK. Construction Management and Economics 15, 201-212.

5.2 Loss of Tool Time

Medium and large firms tend to run more jobs simultaneously or get through more jobs per month, so the owners spend more time waiting for inspectors, waiting for the owner or waiting for design details. Seeing as medium and large firms have more workers to instruct, it is logical that they spend much more time giving instructions than small firms.

Small firms are also more likely to have the owner on site, explaining why they are losing more tool time due to weather delays than owners of medium and large firms.

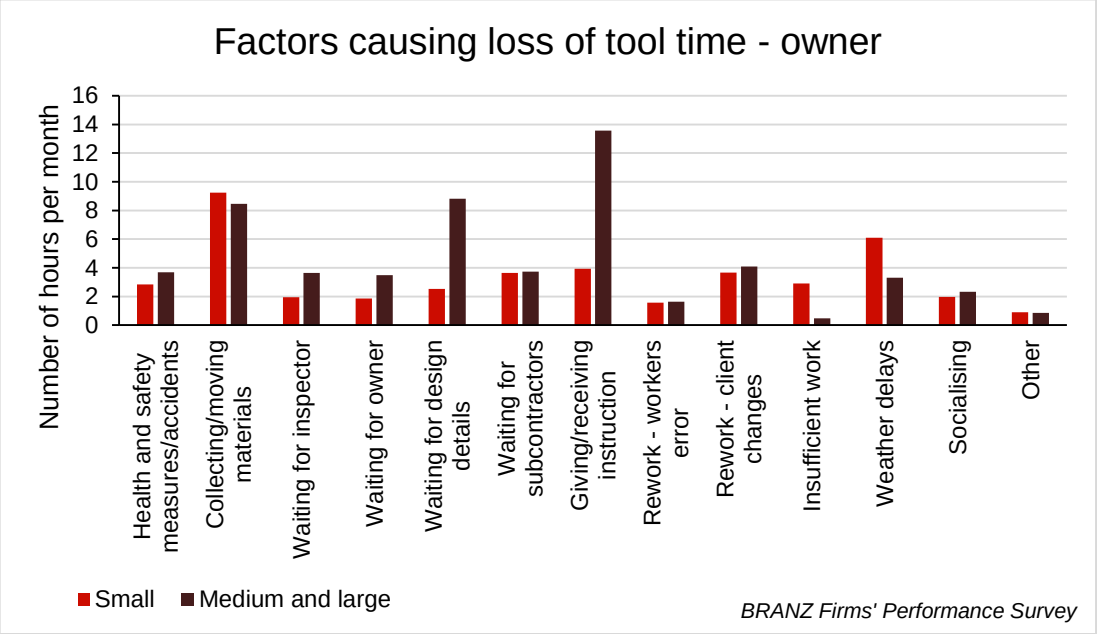

Figure 22. Factors causing loss of tool time for the owner

Some of the results in Figure 22 seem counter-intuitive. Items such as waiting for inspector, waiting for owner or rework due to client changes do not seem like something that would be more onerous for medium and large firms than smaller firms. Other items such as collecting/moving materials, waiting for design details, and waiting for subcontractors or rework due to client errors look like difficulties with project management due to running multiple jobs at the same time.

It could be that the owners of medium and large sized firms are more conscious of any lost time and therefore overstate the number of lost hours. The alternative could be that small firms are not monitoring their lost hours as much as larger firms, or that due to the boss and workers working so closely together in small firms, less time is wasted.

Figure 23 shows employee wasted time by type. Collecting and moving materials is a significant waste factor and weather delays also feature.

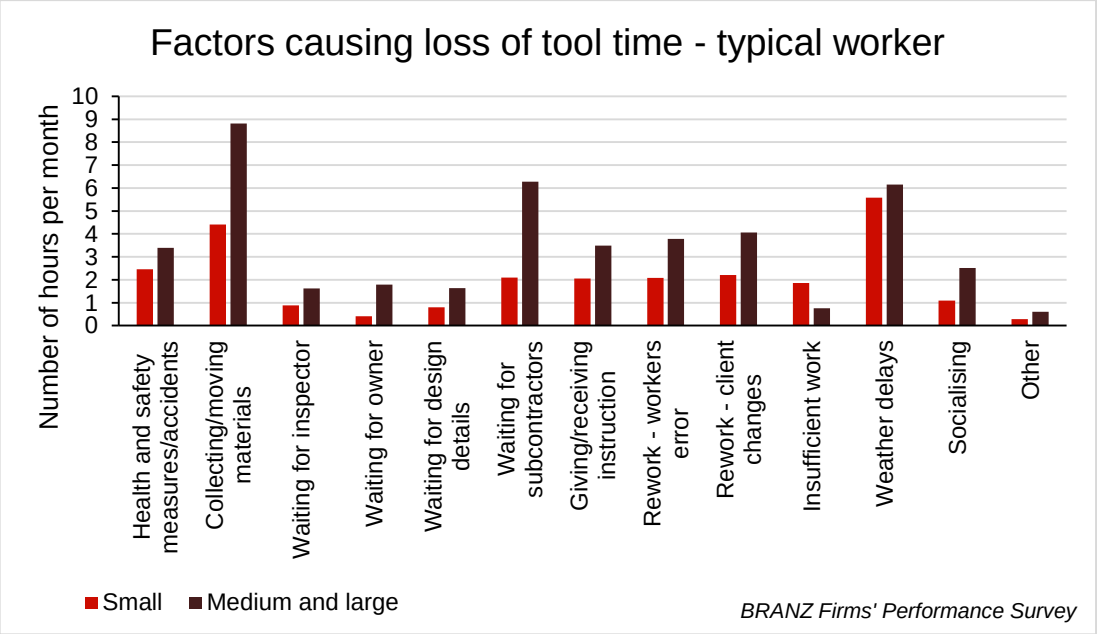

Figure 23. Factors causing loss of tool time for typical workers

The results for employees are approximately similar to those obtained from the diary keeping sample of fifteen builders in section 4. In that survey the lost tool time average 10 hours per week per employee. In Figure 23 the lost time for employees in small firms averages about 6 hours per week, and about 11 hours per week in medium and large firms.

5.3 Client Procurement

The size of firm has a large impact on the methods used to procure clients. **Small firms rely largely on repeat clients and recommendations from previous clients**. This indicates the need to ensure their clients have minimal issues throughout the process and the need for the firm and client to maintain a good relationship. It may also suggest there are difficulties for small firms to gain new work as they are reliant on their previous clients.

Larger firms rely more on tendering (as they do more commercial work), but repeat clients, an ongoing arrangement with main contractor, responding to advertising and recommendations from previous clients are also responsible for more than 10% of their work.

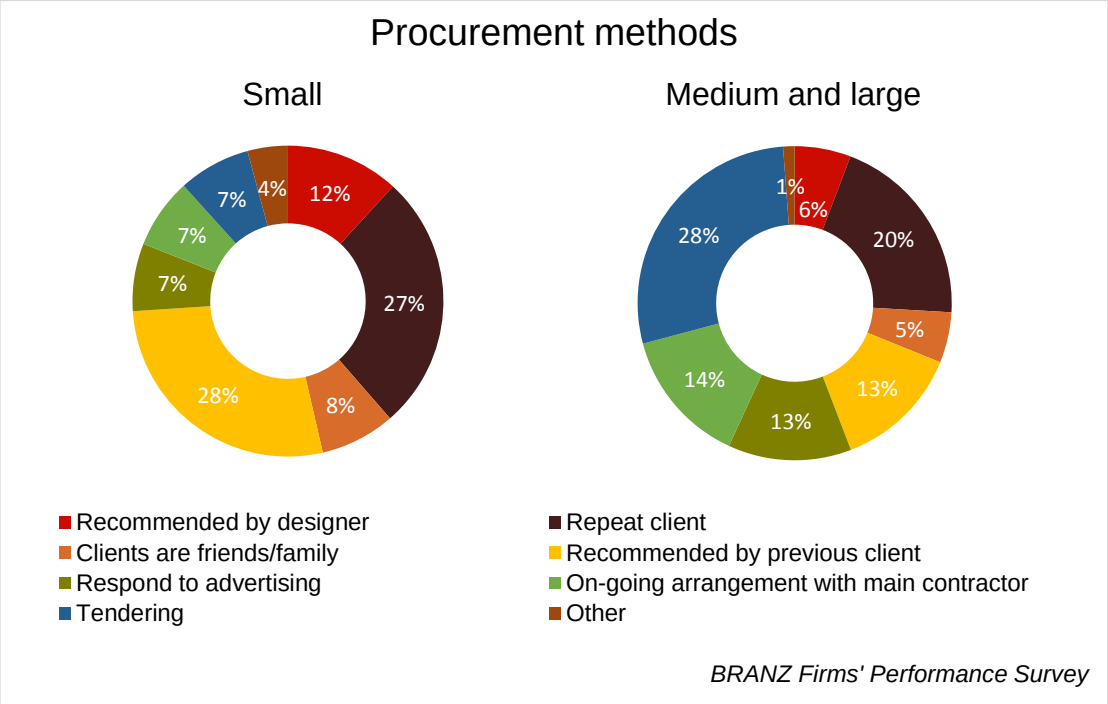

Figure 24. Procurement methods

5.4 Contract and Payment

Both smaller and larger firms mainly use quoted price with progress payments as their main type of contract and payment system. However, smaller firms are more likely to charge an hourly rate for the project duration and cost-plus (which is the majority of the 'other' category).

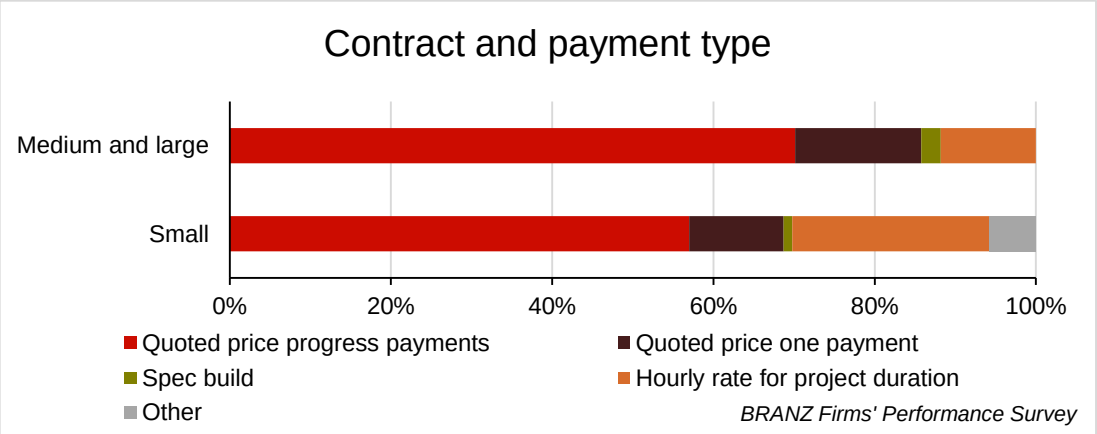

Figure 25. Contract and payment type

5.5 Business Advice

Small firms get their business advice from a variety of sources. The most common source of business advice was their trade association. An accountant, builder colleague or in-house advice are also common sources of business advice.

Medium and large builders used an accountant and in-house sources of business advice more often than small builders. They were less likely to ask a builder colleague or their trade association.

For small firms, sources of advice such as an accountant and trade association we assume would be reliable. This only accounts for 43% of their advice. Over half of the advice received by these firms may be misinformed.

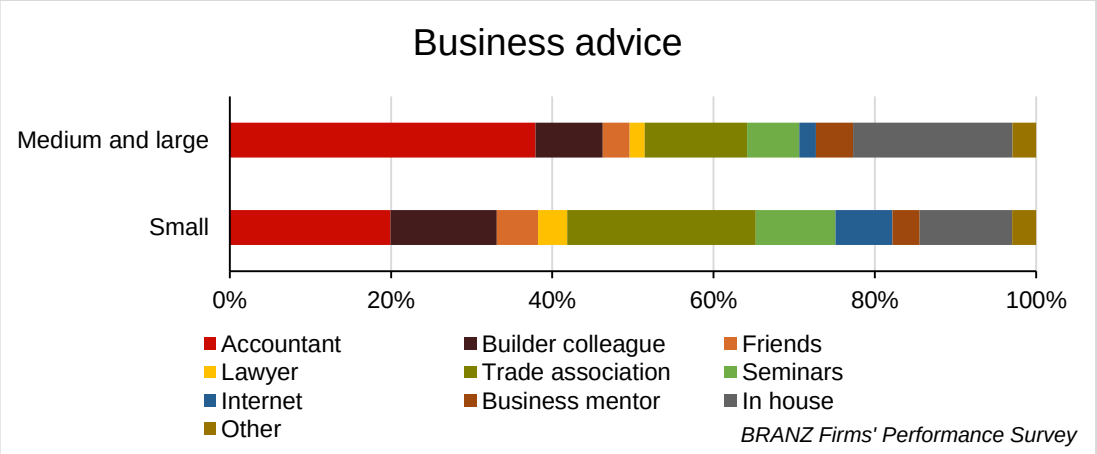

Figure 26. Business advice

5.6 Boosting Productivity/Performance

Surveyed firms were asked to rank their five most important productivity/performance factors from the following list: appropriate level of trade skills, over-regulation, consistent workloads, minimising worker down time, organising and managing projects effectively, use of financial and project management tools, clear design requirements, ease of winning new work, increasing firm size, standardisation of design and materials, prefabrication and modularisation, innovation, comparing performance with similar firms, measuring and reducing material waste, fit for purpose equipment and plant, and effective communication between managers, designers and site personnel.

Small firms rated appropriate level of trade skills, and organising and managing projects effectively as the two most important factors (see Figure 27). Consistent workloads and effective communication between managers, designers and site personnel were also rated as important.

Medium and large firms rated the appropriate level of trade skills as being the most important productivity/performance factor. Organising and managing projects effectively and effective communication between managers, designers and site personnel was rated close behind.

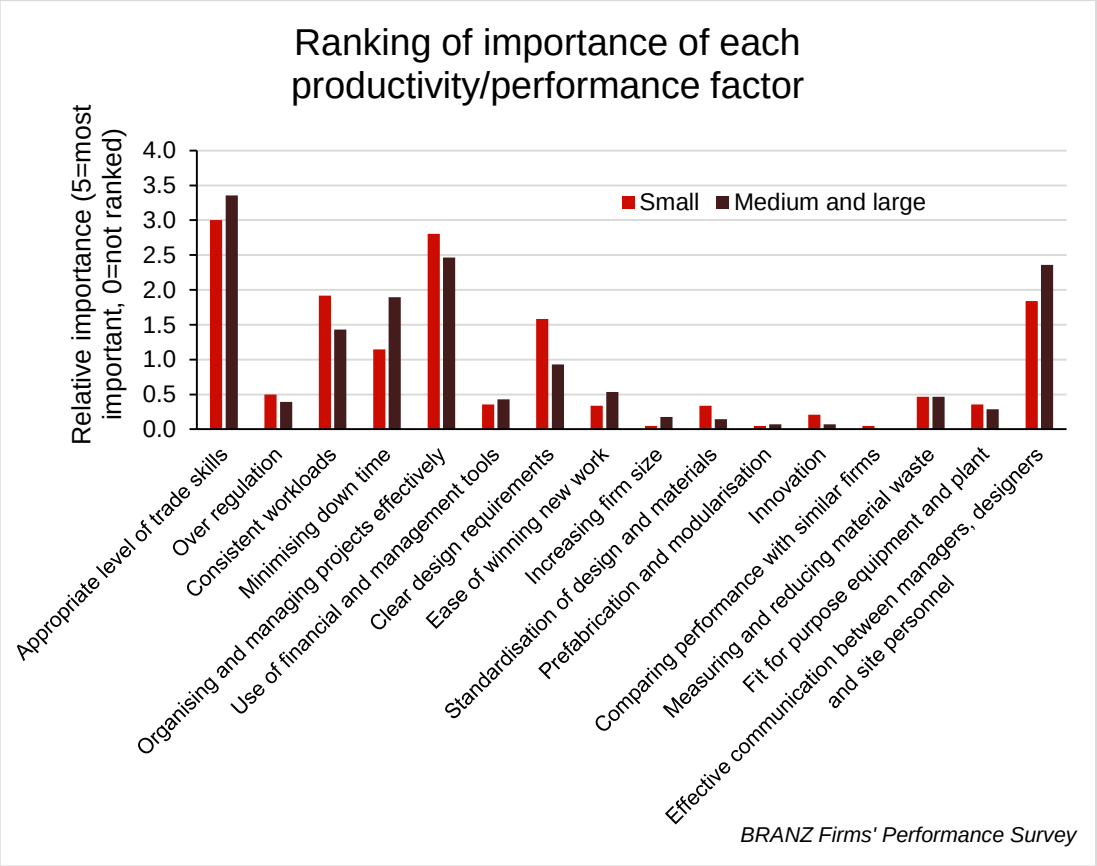

Figure 27. Ranking of importance of productivity/performance factors

The following equation shows how labour affects production, where different levels of skills provides varying levels and types of output.[10] Where there has been a need for the level of production to change, it has typically been met by a change in the number of firms (and therefore workers) and/or hours worked (see Figure 4 and Figure 5), rather than an improvement in technology or capital.

$$Output = f(labour, capital, technology)$$

The number of workers and hours worked are fairly easy to measure. However, capital and technology are a lot more difficult. Technology in particular is a key variable to increasing productivity. It includes management skills, and planning and control systems.

We can see from Figure 27 that having the appropriate level of trade skills is seen as being important to employers in the construction industry. But perhaps due to the boom-bust nature of the industry, there is a reluctance to invest in up-skilling workers, meaning we are not maximising the quality part of the output.

Given how important an appropriate level of trade skills was deemed by construction firms, it is surprising that formal procedures are not used regularly to monitor it. Medium and large firms monitor the majority of the factors listed more regularly than small firms, see Figure 28.

However, small firms monitor both innovation and standardisation of design and materials more often. This is likely due to smaller firms being more flexible and having small enough scale that minor changes are easier to adopt.

[10] New developments in productivity analysis (2006) – National Bureau of Economic Research. See http://www.nber.org/chapters/c10128

One industry observer commenting on the results of this question was surprised at the reported frequency of monitoring for most factors. The commentator believes in practice monitoring is seldom done on a formal basis. Respondents may be reporting on how they informally keep track of events in the industry as a whole, but it is likely they rarely consider which of these measures they could apply to their business. It was suggested this question could be better worded to obtain more useful information in the future.

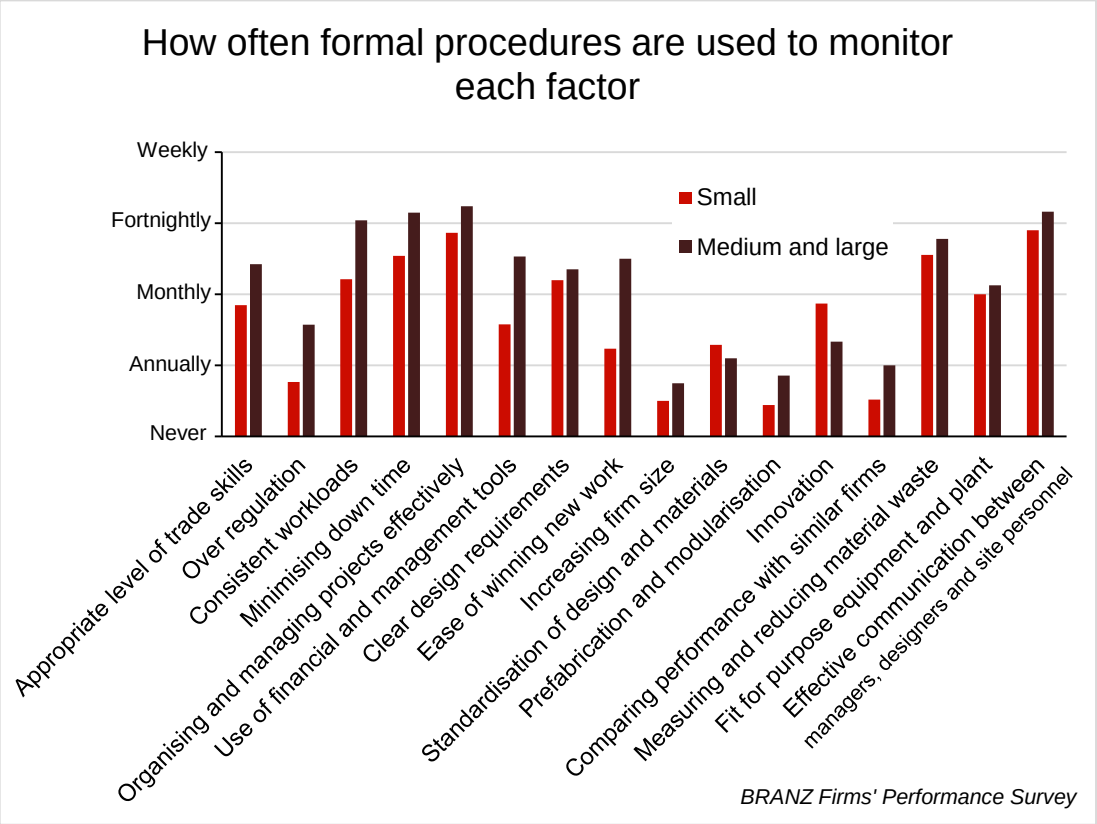

Figure 28. Formal procedures to monitor each factor

Performance and innovation are often linked and some UK research has investigated innovation in small firms. Their research[11] notes that while larger companies can take a longer term view and experiment with new technologies, smaller companies need ready-to-use technologies with immediate benefits. Recommendations include setting up regional centres of technology transfer involving material suppliers, and to establish demonstration projects focused on technology transfer occurring on small companies. This is now happening in New Zealand with some material suppliers having demonstration centres, and increased prefabrication also has a role[12]. Despite this innovation did not rank high in Figure 28 for either large or small firms.

In contrast, Australian work[13] suggests that small firms can be initiators of innovation with the key drivers being on-going and close relationships with forward-looking clients, and ownership of intellectual property. For example, a post-tensioned steel truss roof for a

[11] Sexton M, Barrett P, Aouad G (2006) Motivating small construction companies to adopt new technology. Building Research and Information, 34:1, 11-22

[12] Page I, Norman D (2014) Measuring performance and productivity in construction. Study Report 310, Building Research Association of New Zealand.

[13] Manley K (2008) Against the odds: small firms successfully introducing new technology on construction projects. Research Policy, 37(10) 1751-1764.

sports stadium was patented by a design firm of 6 persons. However, the other case studies used related to the roading and building services sectors.

US research[14] on the characteristics of innovative home builders noted the importance of firm size in innovation. Large companies have greater leverage to form partnerships with manufacturers increasing the benefits and reducing the risks of innovation. Innovation is important for quality and customer satisfaction rather than costs or profit. The same conclusion is likely to apply in New Zealand, although Figure 28 indicates increased firm size is not seen as a driver for better innovation.

One factor that did rank high in Figure 27 was skills and some UK research in small firms has described this as a crisis in their country[15]. The issues the paper identifies are similar to those in New Zealand, namely difficulty in obtaining skills despite plenty of work, difficulty for small firms to afford training, quality of skills is poor in part due to Government and family emphasis on university training, an aging workforce, and the reluctance of the industry to take its share of responsibility for training. The solution is to bring together employers, trainers, regulatory bodies and Government to assess demand and set training goals including the number of persons by skill set. In New Zealand significant work has been done on this in Canterbury and Auckland, but less elsewhere.

6. CONCLUSION

The main purpose of this project was to collect data that will assist in improving the performance of firms in the industry and to identify information gaps. These include:

- Charts of profits margins by sub-sector and firm size which can be used by firms to benchmark their performance.
- The high number of zero or loss making firms needs further investigation.
- Data on average downtime is a yardstick for improvement.
- Sources of business mentoring is mixed and there is scope for improvement and advice to builders and sub-contractors.
- Factors affecting firm performance receives recognition in the surveys but even the higher ranked factors (e.g. worker skills, communication, management skills) are not rated particularly high in importance by builders. These factors need promotion by industry groups.

Further work by BRANZ is intended in 2014 to 2016 on preparation of material for builders on KPIs to improve their performance. BRANZ will be working with industry bodies to increase the uptake of these tools.

[14] Koebel C, Cavell M (2006) Characteristics of innovative production home builders. US Department of Housing and Urban Development.

[15] Dainty A, Ison S, Briscoe G (2005) The construction labour market skills crisis: the perspective of small=medium-sized firms. Construction management and Economics, 23:4, 387-398.

7. APPENDIX

7.1 Time Use Survey

Dear Builder.

At BRANZ we want to understand the barriers you face for efficient use of your time.

All completed and returned forms will receive a $100 Paper Plus voucher.

Please record your use of time daily for one week in the next month. It should cover a number of different jobs if you do more than one job in the week.

If your partner does the books please record her/his time.

Write the number of hours for each activity each day. Use quarter hours as necessary.

	Monday		**Tuesday**		**Wednesday**		**Thursday**		**Friday**		**Saturday**		**example**
	Boss	Spouse	Boss	Spouse	Boss	Spouse	Boss	Spouse	Boss	Spouse	Boss	Spouse	Boss
Preparing quotes													
Meeting with potential clients													1
Invoicing, bills and tax returns													
Visiting council													1/2
Visiting suppliers (eg materials)													
Clarifying or getting design details													
Addressing Health and Safety issues													
Tool time													5 3/4
Collecting materials from off-site													1
Moving materials around site													
Idle - waiting for consent													
Idle - waiting for materials													
Idle - waiting for instructions													
Idle - waiting for sub-contractors													1/4
Idle - weather delays													
Idle - visits/ waiting for owner													
Idle - waiting for council inspector													1/2
Idle - insufficient work													
Doing rework - defect in work													
Doing rework - client/ designer changes													
LBP paperwork and training													
Socialising													1/4
Teabreaks and lunch													1/4
Other time use (describe)													
.....													
.....													
TOTAL HOURS													9 1/2

Do you employee workers? Y/N (circle one) If yes, how many employees? ____

Please fill out the second form below for your workers (for no more than two persons). Also - fill out your details below for sending of the vouchers.

Write the number of hours for each activity each day.

	Monday		**Tuesday**		**Wednesday**		**Thursday**		**Friday**		**Saturday**	
	Worker 1	Worker 2	Worker 1	Worker 2	Worker 1	Worker 2	Worker 1	Worker 2	Worker 1	Worker 2	Worker 1	Worker 2
Addressing Health and Safety issues												
Tool time												
Collecting materials from off-site												
Moving materials around site												
Idle - waiting for consent												
Idle - waiting for materials												
Idle - waiting for instructions												
Idle - waiting for sub-contractors												
Idle - weather delays												
Idle - visits/ waiting for owner												
Idle - waiting for council inspector												
Idle - insufficient work												
Doing rework - defect in work												
Doing rework - client/ designer changes												
LBP paperwork and training												
Socialising												
Teabreaks and lunch												
Other time use (describe)												
.....												
.....												
TOTAL HOURS												

Briefly describe the type of building work done in the week .....

(e.g. new house, additional bedroom, new kitchen, replace cladding, etc,etc) .....

.....

Your Name: .....

Postal address: .....

Phone number : .....

(we may have a query on your hours-used details):

7.2 Firms' Performance Survey

1. How many employees does your firm have?
(Please put an 'X' in one box)

0 employees	1 to 2 employees	3 to 5 employees	6 to 9 employees	10 to 19 employees	20 to 49 employees	50+ employees

2. What types of work does your firm do? *(Please enter the percentage for each work type. The boxes should add up to 100%)*

New housing	Housing additions & alterations	Housing repairs & maintenance	New garages and sheds	New non-residential buildings	Non-residential additions & alterations	Non-residential repairs & maintenance	Fencing and retaining walls	Paths, driveways, landscaping etc

Other *(Please describe)* : .....

3. Which methods do you use to procure clients during a typical year? *(Please enter the percentage for each method. The boxes should add up to 100%)*

Designer recommends me	Repeat client	Clients are friends/family	Recommended by previous client	Respond to advertising	On-going arrangement with main contractor	Tendering	Spec building

Other *(Please describe)* : .....

4. Types of contract and payment during a typical year *(Please enter the percentage for each type. The boxes should add up to 100%)*

Quoted price and progress payments	Quoted price and one payment at the end	Spec build	Hourly rate for project duration

Other *(Please describe)* : .....

5. Where do you get business advice? *(Please enter the percentage for each type. The boxes should add up to 100%)*

Accountant	Builder colleague	Friends	Lawyer	Trade association	Seminars	Internet	Business mentor	In house

Other *(Please describe)* : .....

6. What factors cause loss of tool time? *(Please enter the number of hours lost in a **typical month** on a typical job in the last year for yourself and a worker)*

	Boss		Typical worker	
Health and safety measures/ accidents		**hrs lost per month**		**hrs lost per month**
Collecting/ moving materials		hrs		hrs
Waiting for inspector		hrs		hrs
Waiting for owner		hrs		hrs
Waiting for design details		hrs		hrs
Waiting for sub-contractors		hrs		hrs
Giving/ receiving instruction		hrs		hrs
Rework - workers error		hrs		hrs
Rework - client changes		hrs		hrs
Insufficient work		hrs		hrs
Weather delays		hrs		hrs
Socialising with fellow workers or client		hrs		hrs
Other (state)		hrs		hrs Other (state) .....

7. In your opinion, how important are the following factors on your productivity/performance?

*(Please rank the **FIVE MOST IMPORTANT** factors, with 1 being the most important)*

How often do you use **FORMAL PROCEDURES** to monitor each factor?

Ranking		Never	Annually	Monthly	Fortnightly	Weekly
	Appropriate level of trade skills					
	Over-regulation					
	Consistent workloads					
	Minimising worker down time					
	Organising and managing projects effectively					
	Use of financial and project management tools					
	Clear design requirements					
	Ease of winning new work					
	Increasing firm size					
	Standardisation of design and materials					
	Prefabrication and modularisation					
	Innovation					
	Comparing performance with similar firms					
	Measuring and reducing material waste					
	Fit for purpose equipment and plant					
	Effective communication between managers, designers and site personnel					

8. Prefabrication *(Please select the prefabricated items that you use. Tick all that apply)*

Precast foundations	Wall frames	Roof trusses	Precast floor beams	Exterior wall panels	Timber portal frames	Steel portal frames	Tilt slab walls

Other *(Please state)* : .....

Thank you. Please fold this form and freepost it in the return envelope **Jan-14**