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Improving residential construction firm resilience

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Project LR16275

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Executive Summary

What is resilience?

There is very limited research on residential construction firm or sector resilience either in New Zealand or overseas. Most of the literature looks at the construction sector overall, with an emphasis on the sector's role in disaster risk reduction and recovery.

Our key takeaways from the literature is that resilience is the capability to persist in the face of changes in the external environment (Acquah et al., 2011), which is a "function of an organisation's situation awareness, management of keystone vulnerabilities and adaptive capacity" (McManus et al. 2007). It is about a firms ability to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper, and is linked to long-term viability, reputation, and improved competitiveness, and the power of predicting, preparing and putting the necessary procedure in place (Whitehill & Ainsworth, 2018 & Seidu et al., 2022).

Two themes came through the literature when considering resilience at a sector level:

- Managing and surviving boom/bust cycles. It is well known that the construction sector is sensitive to boom/bust cycles, with issues for resilience not only on the downward cycle (slowing markets, less demand) but also on the upward cycle (overstretching for growth).
- Supply chain security & robustness. This theme was increasingly mentioned during and following the COVID19 pandemic, but was also a concern for the sector earlier on due to New Zealand's high reliance on imported materials.

When the literature discusses reasons for firm-level failure, it focuses mostly on financial reasons (as explained by, for example, financial ratios). Failure that can be attributed to organisational and managerial matters is less well-researched, but still noted in the literature as a reason for failure.

Our review found that in general, the factors that impact on building and construction business resilience are the same for businesses overall:

- Importance of leadership and employee well-being and safety
- Cashflow issues and weak balance sheets
- Skill shortages
- External influences, including 'domino-effect' where failure of one business flows through to others
- Inability to manage growth
- Pricing mistakes.

We identified six main themes in the interview responses under which resilience issues and their management were mentioned:

- Business operations and leadership – how firms structured and/or managed themselves.
- Capital – how the firms finance their operations and growth.
- Financials – the day-to-day financial matters such as cashflow, project costing, payments to suppliers, and managing client payments.
- Labour and contractors – this included finding both quantity and quality of staff and contractors.
- Regulations and compliance – covering matters such as consenting but also broader issues such as health and safety requirements.
- Sales and markets – ensuring a pipeline of work and anticipating changes in demand.

The main gap between what firms identified as a weak spot and what they talked about implementing actions to manage their risk around was regulations and compliance. Half of the firms (5 out of 10) identified it as a weak spot, but only one firm raised it when talking about efforts to manage weak spots. This may indicate that regulations and compliance are something difficult to manage as a weak spot, or that other areas were taking priority.

Both financials and labour & contracting were identified by 6 and 5 out of 10 firms as challenges and risks, but 8 and 9 out of 10 firms respectively had mentioned those areas where effort was being put into to manage risks to their firm. This indicates that these weak spot themes are relatively well understood, and while not necessarily solved there are actions or approaches in place at a firm level.

Analysis of liquidations reports highlighted financial issues as a weak spot, with the top 3 reasons listed in liquidation reports relating to finances. The top six reasons mentioned in liquidation reports of residential construction companies were:

- Owed money (appeared in 21.6% of liquidations)
- Tax obligations (21.6%)
- Cash flow issues (20.8%)
- External influences (12.9%)
- Director issues (including health) (11.4%)
- Dispute (not further defined) (10.6%)

Size, scale and age

We initially set out to examine how differences in scale and business model meant for resilience. Liquidation report analysis also showed that age is a factor and led to different drivers for the liquidation of residential construction businesses.

Large builders (those doing more than 30 dwellings a year) increased as a percentage of all builders between 2010 to 2020, going from 0.4% in 2010 to 0.6% in 2015 and 2020. While only a small proportion of total builders, large builders increased their share of total new residential dwellings from 22% in 2010 to 30% in 2020.

Medium builders (between 7 and 30 dwellings) increased slightly as a percentage of all builders, but their share of total new residential dwellings decreased from over 15% in 2010 to 11.5% in 2020. This decrease of new residential dwellings by medium sized firms was picked up by small builders, who increased from 52% of new residential dwellings in 2015 to just below 60% in 2020.

While large and medium builders increased their share of new residential dwellings from 37% in 2010 to 41% in 2020 – indicating a slight improvement in resilience for the sector – the concern is that they peaked at 48% in 2015. The drop from 2015 to 2020 may be a result of COVID19 with medium sized builders being forced to reduce their output.

There were noticeable differences in reasons for liquidation between younger and more mature residential construction companies. Young companies liquidated in their 1st, 2nd or 3rd year had a very wide spread of reasons, with the top 10 reasons all recording association with at least 10% of companies. The oldest companies liquidated in their 6th to 18th year only had five reasons associated with more than 10% of companies – a much narrower set of reasons.

The nature of the reasons also changes based on the age of company being liquidated. Financial, cash, pricing and contractual reasons appeared more often for younger companies than for older companies. However, tax obligations were associated with only 19.1% of liquidations for the youngest companies, potentially reflecting that their youth meant they had not built up significant tax obligations.[1] External influences are also relatively low for the first two quartiles (11.8% each), but then nearly doubles to 23.5% for quartile 3 companies.[2]

Analysis of financial ratios for the residential construction sector indicates that large firms have improved their resilience over the last 10 years,[3] whilst smaller firms have made some improvement but still lag well behind.

For example, while nearly all large and medium sized firms had a current ratio of above 1,[4] more than 50% of the smallest firms had a current ratio of below 1 throughout most of the last decade. All sizes of residential construction firms saw a drop in median liquidity structure measures in the early 2010s,[5] but only large firms recovered to earlier levels (c.20%) by 2022. The smallest firms had much less debt than large firms in the early 2010s, but this fell dramatically and they now have higher debt levels than large firms.

The dominant way of thinking about resilience from our interviews was in terms of being able to survive and navigate tough market conditions. The businesses we interviewed defined or talked about resilience in four ways:

1. Having a strong focus on financials, making sure that their practices meant they had good financial foundations if any downturn occurred. Larger firms had a much more systematic and formal approach to examining their financials than medium-sized firms.
2. Making sure suppliers and subcontractors were sustainable and resilient. Both large and medium firms did this, with larger firms having more resources available to offer support and training, whereas medium-sized firms tended to invest in a relationship-based approach.
3. Being constantly attuned to market direction, mostly through sales but also a focus on competitors. Larger firms used a wider range of information to do this (especially since they operate across multiple-regions or nationally), while medium-sized firms tended to use their networks to read shifts in the local market.
4. People and culture was highlighted by half of interviewees as an important part of resilience. The main difference between large and medium-sized firms was the level of resources they could apply in the people and culture space.

In summary, the differences in approach to resilience by large firms came down to three things – they had the resources to apply a more systematic approach (including investment in software etc), used a wider range of data to inform their business decisions, and benefited from having a wider geographic spread (giving more flexibility to adjust workloads in the face of tough market and/or economic conditions).

In terms of business model, two things stood out. Off-site manufacturers tended to have higher fixed-costs (from having factories etc) which meant they were more reliant on a steady flow of sales to cover these. Their model also emphasised supply chain relationships. Franchise group builder models highlighted the need for not only supporting the franchisees from 'the centre' but also encouraging sharing of information between franchisees. In many cases this model helped achieve lower costs of materials, but the reliance on maintaining and growing market share meant investment in marketing, quality and communication was important.

1 This compares to 26.5% for quartile 2 age companies and 25% for the oldest (quartile 4). Quartile 3 age companies only recorded 16.2% for tax obligations.

2 The oldest companies (quartile 4) have a very low association with external influences as a reason for liquidation (6.6%).

3 Because of the way sizes are classified in the ratio data, 'large' for ratio purposes equates to large & medium for the sizing based on our consent analysis. Medium, small and micro firms in the ratio analysis equate to small under the consent analysis.

4 The current ratio measures the ratio of a firms assets to liabilities and is used to judge whether it is able to pay its obligations in the short-term. A ratio of 1 suggests that a firm is able to meet is short-term obligations without needing to sell fixed assets.

5 Liability structure measures indicate the level of debt vs equity that a firm holds. It is expressed as a percentage of equity, with a low equity percentage indicating high debt.

Table 1. Key resilience factors and mitigation approaches by industry segment

	Segment descriptor	Key factors for segment	Challenges for resilience	Managing resilience
A	Off-site medium-sized national builder	Standardisation from manufacturing approach	Need to keep teams busy/factory moving or else cost per house goes up. Breadth of sales & marketing – can't rely on one or two areas to carry. How to get more standardised – every reduction in time is saving.	Quality as part of brand & marketing – builds trust. Build in a factory means able to be more efficient and control more. Reduce reliance on capital by having shorter production – carry less risk per house.
B	On-site large national developer & builder	Geographic reach gives flexibility	Finance hungry – access to capital biggest limiting factor. Having a very good read of market so have as much time as possible to adjust.	Wide range of information used to identify market shifts and where best to spread development. Reduce reliance on bank funding until later in project. Diversity of projects across regions.
C	On-site medium local independent builder	Stuck between two scales – cost of being medium without benefits of being large	Overheads high at a medium-scale. Ride local economic fortunes. Don't get benefits of large scale (buying power, geographic spread etc).	Use contractors to supplement own crews during busy times, don't lock in until growth steadies. Mix of activity locally – develop, spec, renovations, rentals. Reserves from good times which means can survive tougher times.
D	On-site large franchise national group builder	Leveraging the benefits of scale & spread	Developing leadership of franchisees. Getting clear point of difference for sales & marketing. Maintaining & growing market share.	Constantly working with supply partners to ensure they can respond and are sustainable. Quality as part of brand – leverage marketing scale. Get to see information at a system-level that individual builders wouldn't see till late.
E	On-site medium franchise local builder	Applying benefits of franchise scale at local level	Local market fluctuations. Small team pressures. Client desire for plan changes.	Active assistance from franchisor on business management. Purchasing power of larger group. Cooperate with other franchisees where possible.

Self-assessment tools

We initially intended to co-design a self-assessment tool with industry that could be used by medium and small residential construction firms to improve resilience. This would cover financial and non-financial aspects of resilience and draw on lessons from larger firms.

Our research uncovered work underway in New Zealand on three similar self-assessment tools. One was an update of the BizRate tool in conjunction with the Construction Sector Accord, another was being developed to support Callaghan Innovation's Construction Activator, and a third was being proposed by the Vertical Construction Leaders Group as part of an accreditation/licensing scheme.

Looking at other self-assessment tools available (not just for construction) highlighted two important lessons:

- Need to get a high number of regular users in order to generate valid results and to create a 'smart' tool that learns from the information inputted (rather than comparing to 'ideal' examples). In our view it would be better to have one self-assessment tool that firms are encouraged to use, rather than develop three for the relatively small sector in New Zealand. Mandating is an option, but highly unlikely to occur.
- There is a need to be very clear on the purpose for any self-assessment tool. Each of the 3 self-assessment tools are being designed for different purposes, and this will lead to different and separate design of each (including asking for different information from, and returning different value to, users). While this may be best for the individual purposes of each, it puts pressure on the issue of needing to get a high number of users.

Our view is that New Zealand's residential construction sector only needs one self-assessment tool, and effort should be placed into designing it well so that it can cover the various purposes of different interest groups.

From our review of other self-assessment tools, and based on the interviews and liquidation report analysis, we see an ideal residential construction self-assessment tool as including the following key elements:

- Needs to be web-based and designed to make it as easy as possible for user. This should be taken to the point of automating the input of financial information using APIs or similar to connect to the likes of Xero, HNRY and MYOB.
- Should focus on the 'danger period' through to the end of the 3rd year of operations for a residential construction firm. This means, for example, that it can't wait until financial end-of-year to collect information as that it too late to be useful – it needs to collect information and provide feedback much more regularly (ideally monthly).
- Must cover forward work forecasts so that advice and support can be given to firms for both managing growth as well as downturns. This is particularly critical given the sectors reliance on high debt levels for finance build work (note that this include trade credit).

Extending liquidations research

We found liquidation reports to be a valuable source of information about residential construction firm difficulties. Rather than simply being a headline about 'construction firm liquidations increasing', the reports can be used to examine the reasons for liquidation and the connections between companies and directors.

However, there are a high number of liquidated companies that do not have any industry code associated with them. This is especially the case for older companies, with very low rates of industry codes before 2015. Over time this will improve as new companies almost always have an industry code assigned. Until then, any calculations of the percentage of construction firms being liquidated will always either under or overstate the actual number due to many not having an industry code. It would be possible to solve this by undertaking data matching with other agencies such as Accident Compensation Corporation or Inland Revenue.

It would also be possible to extend the use of liquidation report analysis to understand the nature of any 'domino' effect that may exist. This could be done through more automation of the process (using algorithms to follow the connections between company liquidations) and also extending coverage to non-company failures (such as bankruptcies). Any extension of this method would need to overcome the fact that the first liquidation report is the only one to list creditors. Solving this would require accessing liquidator records (which they are required to keep, but not publish).

Introduction

Purpose

This research was proposed under the 2022 BRANZ Building Levy Research Prospectus and addressed theme 3 relating to understanding system resilience. Our proposal sought to focus on large and medium-sized residential construction firms as the system actors, working with them to answer the following research questions:

- What are the factors of resilience in terms of the residential construction sector? For example, reputational, financial, operational, supply chain, technological, organisational (skills, health and safety, culture, environment).
- Do large and medium-sized firms view resilience and therefore prioritise practice changes to mitigate any identified 'weak spots' differently, and what level of control do they feel they have over these (full control, partial control, no control, etc)?
- Are these differences in view due to the scale of their operations, the business models they employ (i.e. how they structure their business operations), or is it a combination of factors?
- What is the relationship between the scale of firms, the different business models employed, and the factors of resilience?
- Does a particular scale and/or business model approach provide significant benefits to resilience, especially in terms of mitigating identified 'weak spots'?
- Can these benefits be translated to other scales and/or business models, and if so what modifications to the practices are needed to ensure the benefits can be realised?

Work programme and reporting

The project proposal was submitted in early August 2022, and the project contract was signed in November 2022 with the goal of starting the research in January 2023.

The original timeline had the literature review completed by the end of March 2023 and interviews completed by the end of July 2023. This then allowed for a second round of engagement with industry through till the end of 2023 as part of designing a self-assessment tool.

This original timeline had to change as a result of three findings:

- Coming out of COVID19 restrictions businesses were faced with a challenging market environment. This meant a number of them were very busy, lengthening the time it took to get interviews and making the original idea of a second round of engagement unfeasible.
- As part of discussions with industry bodies and other wider sector players we discovered that effort was going into developing at least two other self-assessment tools that would cover residential construction firms (either directly or as part of a wider target group).
- Our review of liquidation reports revealed a valuable source of information about resilience and construction business failure which required more examination than initially proposed.

The project was therefore varied in October 2023 to remove the output of a self-assessment tool (and the associated second round of engagement with industry) and replace this with further analysis of liquidation reports. The end date for the research was also extended to March 2024 to accommodate the additional time taken for interviews and exploring the other proposed self-assessment tools.

Our work was carried out by Tyson Schmidt, Peter Askey, Mark Devery, Sonia Griffin, Isabella Patrick and Jemma Cheer of Third Bearing Limited.

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Disclaimer

What we did

The small scale of the majority of New Zealand's residential construction firms is often seen as a weakness in terms of resilience, implying that large and medium-sized residential construction firms are more resilient.

1. However, there is limited understanding which characteristics of larger residential construction firms matter most for system resilience (as opposed to productivity, for example, which has been studied extensively). Scale definitely plays a part, but business model approach may be equally or more important.
2. Our overall goal was to:
   - Identify aspects of resilience and where they see any 'weak spots'.
   - What the inter-relationships are between 'weak spots' in terms of the different business models employed by these firms.
   - Where improvements in business models can best improve resilience and reduce the impact of any 'weak spots'.
3. We used four main approaches to answer these questions:
   - Literature review that considered what the key factors for resilience were, and what the literature notes are the main reasons for failures of residential construction businesses.
   - Structured Interviews with large and medium-sized residential construction firms (including some which are 'manufacturers'). The firms were selected to provide a range of scale and business model examples.
   - Analysis of a sample of residential construction liquidator reports from between 2011 and 2022 to identify what the liquidator reports noted as the main reasons for failures of residential construction businesses.
   - Analysis of available financial and consenting data to understand resilience of large and medium-sized residential construction firms. Our main goal here is to understand how different sets of data represent scale differently and what this means for our understanding of resilience.
4. We also looked at a range of self-assessment tools both here in New Zealand and overseas, covering the construction industry as well as more general tools. Initially our intention was to build self-assessment tool that would allow residential construction businesses to assess their level of resilience and how they could improve their resilience.

Literature review approach

5. We targeted our literature review toward three main areas:
   - Academic and research publications, including conference papers, journal articles, and research reports.
   - Industry publications and news articles, focusing on key industry journals and newsletters from industry bodies.
   - General media reports on construction and residential building sector failures (limited to online material).
6. In total we accessed 188 news articles and academic papers from both Aotearoa New Zealand and internationally (see Appendix 1 for a list of the articles and papers). Our initial searches used generic terms like 'resilience', 'building failures', as we delved deeper into the literature, we updated our search to a wider breadth of terms that reflected the language used in the academic fields. This included, for example, subsequent searches using terms such as 'boom and bust' and 'contract pricing'.

Interview approach

7. We identified large and medium-sized construction firms from a combination of BCI Central consent data (new residential only) for the last two years and also the 'top ranked builder' information ranked on number of residential builds from Pacifecon. Scale was determined based on the number of consents applied for nationally based on data from BCI and Pacifecon rankings higher than 10 for the large-scale builders and 11 to 100 for the medium scale builders.
8. To ensure that a mix of builder type (e.g. conventional vs prefabrication) and business model (independent vs franchise) we looked at online information about the businesses (their websites, Companies Office information, news articles) to further classify them. We also drew on previous research we had undertaken for the Construction Sector Accord's Building Sector Working Group where we interviewed a number of large builders.
9. We sent requests for interviews to 22 residential building and construction firms. 10 of the firms we sent requests to were large scale builders and 12 were medium scale. Outside of the rankings and included in the medium scale group were 2 transportable home builders, chosen to ensure a mix of business model.

10. Of the 22 residential building and construction firms contacted, 10 agreed to be interviewed (45% return rate). 5 of these were large firms (50% return) and 5 were medium-sized (42%). 4 others responded but were not able to participate due to a mix of availability (2 of the 4) and not seeing the value or benefit of participating (2 of the 4).
11. Interview requests were sent to the first group of firms at the end of March 2023, and were sent reminders in the middle of April (i.e. after the Easter holidays). A second group of firms were contacted in the middle of May 2023. Each of these groups were recontacted by email two weeks after their first request was sent, and phonecalls were then made to those who had not responded (where the phone numbers were publicly available).
12. Emailed requests contained a synopsis of the research proposal, an introduction to Third Bearing Limited, and a consent form that could be completed online or downloaded and sent through. Interview questions were sent to participants prior to the arranged interview.[6] All but one respondent chose to be interviewed by Zoom.[7] Interviews were approximately 1 hour long, and were conducted by two interviewers (allowing for one to always be asking questions, and one to be taking notes). Interviews were not recorded.
13. We also contacted 4 industry professional bodies, of which 3 responded – Master Builders Association of New Zealand, New Zealand Certified Builders, and OffsiteNZ. These interviews aimed to obtain views on resilience in relation to their members, and what activities they undertake to help improve resilience of their members.
14. Interviews were structured around 5 questions, with three to four prompts under each question for interviewers to explore (if the issues were not covered as part of initial responses). Notes from the interviews were taken by hand, and a focus was placed on using the language employed by the interviewee. These notes were then transcribed into an Excel document and categorisation information assigned to each interview (including anonymisation). The Excel document was used in preference to Word as Excel was much better suited to exporting the notes to the Quirkos qualitative data analysis software.
15. For large residential construction firms, we interviewed them to understand their business models, how they viewed resilience, what 'weak spots' they have identified, and what investments in practice changes they are making in response (including a focus on quality management and assurance systems). For medium-sized residential construction firms, we focussed on whether they had similar views of resilience, and whether their scale and business models present any barriers to adopting practice changes similar to those being undertaken by larger firms.

Methodology for liquidator report analysis

16. We undertook four main steps in being able to analyse liquidator reports for residential construction companies:
    - Creating a pool of E301 liquidated companies, which required searching all liquidations and selecting those in the E301 category
    - Fetching liquidator reports relating to the pool of E301 liquidated companies
    - Creating a sample of E301 liquidator reports for analysis
    - Uploading of the sample into Quirkos and then conducting thematic analysis.

Creation of E301 liquidated company pool

17. We downloaded bulk data files from New Zealand Business Number website (which required request and sign-up). The data files were in two formats: CSV and JSON. The CSV files were much simpler in structure and already separated out into various domains (e.g., entities, directors, GST).
18. Unfortunately, the CSV files didn't include any entities registered after 2018 and didn't show company status history. This meant that once an entity had "Removed" status, you could not determine why.
19. The JSON files had more detail – for example, entity status history – but a lot of extraneous information as well. This made them very large in size (5 files, >1.5GB each). A Python script was created to filter through the JSON files and extract only the relevant information into CSV files. These files were loaded into the Python "pandas" package for further statistical analysis.
20. Analysis of this data showed:
    - 80,666 companies that had liquidation/receivership/voluntary administration status between 2008 and 2022
    - Only 9,686 of these had a valid industry code against them (approximately 1/9th).

6 See Appendix Five for interview questions used for residential building and construction firms, and Appendix Four for interview questions used for industry peak bodies.

7 One respondent chose to email responses to the questions.

21. We filtered the latter to just those that had an industry code related to E301, which left 861 companies. This left the following sample across the target years:

Table 2. Number of companies included in sample by year

2008	0 companies
2009	0 companies
2010	0 companies
2011	9 companies
2012	14 companies
2013	22 companies
2014	45 companies
2015	84 companies
2016	86 companies
2017	112 companies
2018	114 companies
2019	105 companies
2020	87 companies
2021	78 companies
2022	120 companies

Fetching of liquidator reports

22. Gazette reports are stored by DigitalNZ. Fetching was once again performed by a Python script. The DigitalNZ API was used to automatically match each of the companies in the E301 liquidation pool, and once matched, the "landing URL" of each company's Gazette page was used to determine the location of their respective liquidation report in PDF form, which was then downloaded.

23. Pruning of the downloaded reports was performed to remove duplicates that were the result of some companies having multiple liquidation statuses. There were various reasons for this; for example, sometimes a company was reinstated to allow them to distribute funds. Sometimes the status was also affected by liquidators being retired, changed, or added.

24. Four entities were also not represented in the downloaded reports due to entering liquidation later in 2022 and not having a liquidator report available yet.

25. After the pruning above and removing some empty folders from false positives, our population size dropped by 29 to 849.

26. This made our ideal sample size 265 (assuming 95% confidence and 5% error). We also tested this sample size against an estimated potential scale of total E301 liquidations,[8] which showed that the sample size of 265 would give a 95% confidence level with 5.81% error.

27. Drawing our ideal sample proportionately across the years that liquidator reports were available to us meant a distribution as shown in the table below:

Table 3. Proportioning to achieve ideal sample size

Year	Number of reports	Sample Proportion	Proportion Rounded
2011	9	2.81	3
2012	14	4.37	4
2013	22	6.87	7
2014	45	14.05	14
2015	82	25.59	26
2016	83	25.91	26
2017	110	34.33	34
2018	112	34.96	35
2019	104	32.46	32
2020	83	25.91	26
2021	76	23.72	24
2022	109	34.02	34
Total	**849**	**265**	**265**

28. In order to select which companies to choose for the sample, we created an Excel spreadsheet with a random sampling macro. The full list of E301 liquidated companies to be selected from and the desired number to be sampled for each year could be entered, and a sample of the correct size was randomly selected from that by the macro.

8 We assumed that E301s would form the same proportion of liquidations as they form of total enterprises in New Zealand. On this assumption we would expect to see E301 residential construction companies make up 3,606 out of the total 80,606 liquidations.

29. We then manually extracted information from the randomly selected sample of liquidated residential construction companies into Excel, and then uploaded key fields into Quirkos for thematic analysis. Selected fields included, for example, the text explaining the reason for the liquidation, the plaintiff, date of birth of the company, and date of first liquidation report. Our thematic analysis focussed on the text fields explaining the reason for the liquidation. Once this thematic analysis was complete, we exported the information to Excel and conducted statistical analysis.
30. Our theming was done in three levels:
    - An initial theming of reasons for failure into 57 categories (see Appendix Three)
    - We then arranged these hierarchically under 29 higher-level categories (see Appendix Four)
    - The initial categories were also assigned to six very high-level groups (non-hierarchical) drawn from the literature review – business ability and leadership, external influences, financial management, labour related, project related and tax obligations.
31. We also analysed the themes based on the age of the business at the time of liquidation (using quartiles), and who the plaintiff was for the liquidation (i.e. who put the company into liquidation).

Liquidation case studies

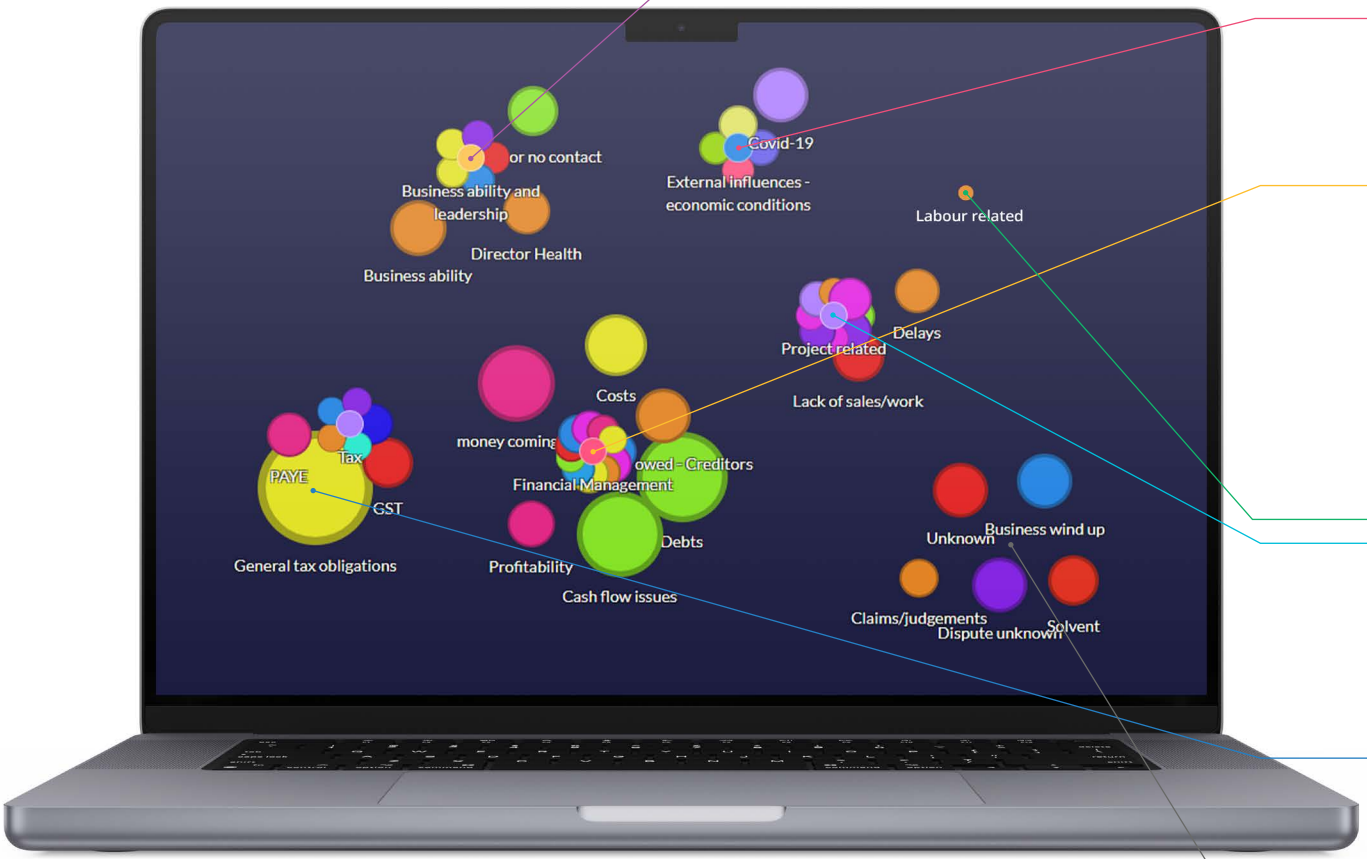
32. Once we had a large group of liquidation reports and had tested the method of obtaining the information, we used this information to test the relationship between liquidated companies. Some of the industry literature talked about a 'domino effect' where the failure of one construction company flowed on to others, creating one failure after another. We chose a small number of large residential building company liquidations and accessed the first and subsequent liquidation reports of the initial and subsequent companies to identify:
    - Who the creditors were, the amounts owed (if identified in the liquidation reports), and whether they were also involved in residential construction (by searching each creditor in the Companies Office).
    - Whether the directors and/or shareholders owned or were directors of any other companies, and whether these were associated with the initial liquidated company.
    - The dates of any liquidation actions and removals for any creditor or related companies.
33. This process was repeated for each company identified as related to the initial liquidation company, and if the related company was also liquidated then the process was extended again until no additional liquidations were identified. We also checked the Personal Property Securities Register (PPSR) where necessary to confirm security status of any creditors.

Analysis approach – interviews and liquidation reports

34. We initially intended to use a deductive approach to analysing the interviews and liquidator reports. The intention was to rely on the findings from the literature review to set the structured framework for the analysis, and then examining interviews and liquidator reports content against this framework. However, the literature was focussed the construction sector generally with few articles drilling into the residential construction sector. If a pure deductive approach was followed then the wider construction sector framework would have been imposed on the residential focus of our research.
35. A mixed deductive and inductive approach was therefore applied. Themes from the literature review were identified in the interviews and liquidation report analysis, but we also allowed new themes – or similar themes but phrased differently – to emerge from the interviews and liquidation reports. This approach also allowed us to identify sub-themes and group these without needing to force them into the wider framework (but still recognise the relationships).
36. Quirkos software was used to help us carry out the thematic analysis of the interviews and liquidation reports. This software was chosen due to its ease of use and ability to visualise the information. Particular strengths of Quirkos are the ability to identify dominant themes visually as topics are highlighted, create associations between topics (hierarchically), and also establish non-hierarchical groups for thematic analysis. One weakness of Quirkos is that you are not able to conduct statistical analysis of themes. We therefore exported the themed data out of Quirkos and analysed this in Excel, particularly for the liquidation reports.

Figure 1

Liquidation explanations



Quirkos onscreen view

Business ability and leadership	Shareholders dispute
	Business ability
	Director
	Company growth
	Director no contact
	Director Health
	Director overseas
	Director bankrupt
	Trading insolvent
External influences	Others going bankrupt
	External influences - economic conditions
	Competitive
	Covid-19
	Downturn/lack of business
	Materials (cost)
	Trading conditions
Financial management	Debts
	Pricing
	Losses
	Overheads
	Costs
	Cash flow issues
	Debtors
	Profitability
	Margins
	Under quoting
	Shareholder drawings
	Working capital
	Accounting
	Creditors
Labour related	Labour
Project related	Lack of sales/work
	Workmanship/faulty work
	Contracts
	Contractor dispute
	Client dispute
	Delays
	Contracts cancelled
	Loss on contract
	Project losses
Tax obligations	Unknown tax obligations
	PAYE
	GST
	Income tax
	Student Loan
	ACC
	Child support payments
	Kiwisaver
Other	Dispute unknown
	Unknown
	Solvent
	Business wind up
	Claims/judgements

Liquidation mapping

37. Once we had collected a large number of liquidation reports and refined our method of obtaining them, we took the opportunity to do a deeper dive into some specific instances. Our literature review noted how there can be a 'domino' effect in the construction where the failure of one construction firm leads to a number of others failing. This effect is often seen by commentators as a sign of a lack of resilience in the sector.

38. We wanted to analyse a small number of liquidated residential construction companies to test whether liquidations could be a useful source of information on resilience. While the findings about the companies and any domino effect would be useful, it was as much about testing the methodology and information sources to see if it should be expanded at a later date.

39. Our approach was to use the publicly available information in liquidation reports to track the creditors to see if any of them also entered liquidation, in receivorship or removed in following years (up to four years after). We also tracked the director(s) and any other companies associated with them to see if they also entered liquidation. If we found a creditor or director-associated company had entered liquidation we repeated the process.

40. The limitations of this approach should be noted. For example, some creditors cannot be tracked due to being sole traders or other entities not subject to liquidation and/or not on the Companies Register. It would be possible to extend the analysis to bankruptcy and debt order registers to try and pick up some of these. This approach also often misses employees and clients as they are not covered by liquidation information disclosure requirements.

41. We mapped 4 businesses using this approach. We chose them from different years and chose varying degrees of financial liability. We decided to chose liquidations prior to 2020 for two reasons – to avoid any COVID-19 impacts, and to also ensure we could get the 4 year post-liquidation period.

42. The four liquidated residential construction businesses we looked at were:

    - Construction Direct – liquidated in 19 February 2014 owing $328,000
    - Stonewood Homes Limited – liquidated in 21 April 2016, owing $17.7m[9]
    - Bella Vista – liquidated 30 November 2017, owing $2.24m
    - Compass Homes (Rodney) Limited – liquidated 6 June 2019 owing $516,000.

43. We also looked at two recent liquidations of property development companies and examined the companies associated with their directors. The first set of companies were Harbour Basin Investment Ltd, Nestling Ltd and Yangtze Industrial Cooperation Ltd who were all linked to director Lin Fang (who also had interests in 37 other companies). The second was Spot X Ltd and its director Cheng Tih Lee (who had interests in 13 other companies). We restricted our efforts to identifying the relationships between the associated companies and any immediate creditor liquidations (not any secondary liquidations) due to the liquidations being so recent so unlikely to show flow-on impacts.

44. In our opinion, any flow-on impact from an initial liquidation also demonstates a web-like pattern of impact rather than just a traditional domino effect. The majority of creditors remained registered following the initial liquidation, with only a small number being subsequently liquidated or removed. We found very little evidence of 'second round' liquidations. From the businesses we looked at, there tended to be as many or more liquidations and removals of companies associated with the director(s), either immediately before or after the initial liquidation.

9 We only tracked the creditors, not director associations for this company due to our time constraints. The amounts listed for these four liquidated companies are from the first liquidators report.

Table 4. Summary of liquidations tracking

Creditor Mapping	Date Liq	Amount owed	# of creditors	% compa-nies	% liq in 2-years prior	% removed in 2 years	% liq or removed post 2-years	% unknown
CONSTRUCTION DIRECT LIMITED (3424774)	19-Feb-14	$328,000	19	57.9%	0.0%	0.0%	0.0%	42.1%
STONEWOOD HOMES LIMITED (370417)	21-Apr-16	$17.7m	299	51.8%	8.4%*	5.0%	13.7%	21.1%
BELLA VISTA HOMES LIMITED (5379301)	30-Nov-17	$2.24m	95	73.7%	2.1%	2.1%	6.3%	15.8%
COMPASS HOMES (RODNEY) LIMITED (5744568)	6-Jun-19	$516,000	43	83.7%	0.0%	7.0%	4.7%	4.7%

*Note There were 14 creditors who were already undergoing liquidation processes when Stonewood Homes liquidated. They have been added to this category.

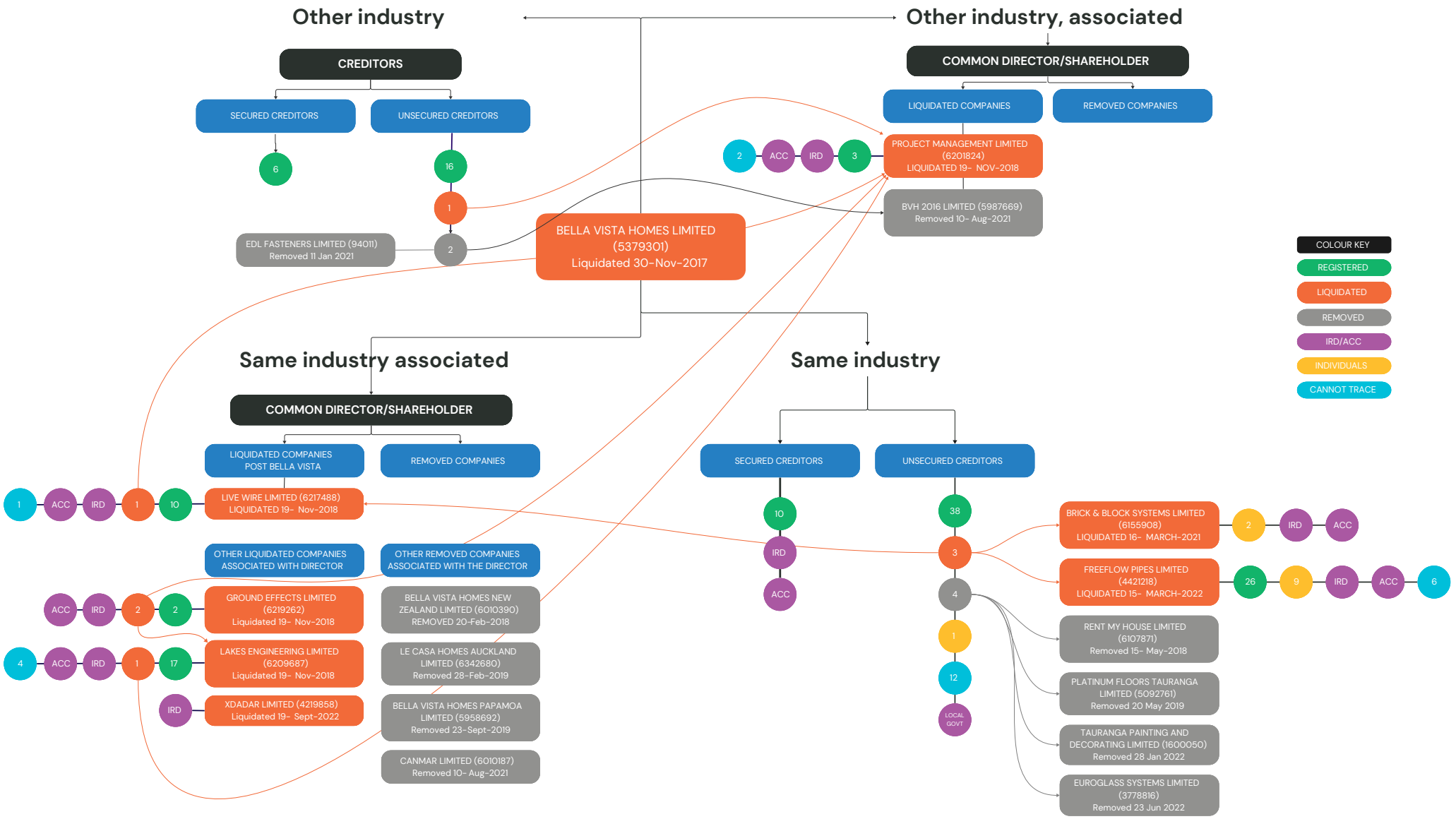
Table 5. Liquidations tracking summary of associated (director or major shareholder) companies

Creditor Mapping	Date of liquidation	Companies associated via director or shareholding)	How many are still registered	How many were liquidated	How many were removed
CONSTRUCTION DIRECT LIMITED (3424774)	19-Feb-14	2	0	2	0
BELLA VISTA HOMES LIMITED (5379301)	30-Nov-17	12	1	6	5
COMPASS HOMES (RODNEY) LIMITED (5744568)	6-Jun-19	17	8	5	4

45. In the case of Bella Vista Homes Limited, while there were a reasonably large number of creditors (95), very few of these ended up in liquidation or being removed within 2 years (2). A further 6 creditor companies were liquidated or removed from two years after the initial liquidation onward. We could not find any subsequent liquidations or removals relating to these 7 creditor companies.

46. We found 12 companies associated with the director of Bella Vista Homes Limited. Only 1 of these remains registered (and no longer associated with the Director), with 6 having been liquidated and 5 removed. We were not able to find any subsequent liquidations or removals from these 11 associated companies. The liqudation and removal of 11 of the 12 companies associated with the director of Bella Vista Limited demonstrates the dynamics of liquidations, where the relationships and financial ties across director associated companies creates more of a web-like network of consequences rather than a straightforward domino effect.

Visual mapping of liqudation tracking (Bella Vista Homes Limited)



47. The liquidation of Stonewood Homes Limited affected the largest number of creditors (299) and had the biggest number of following liquidations within 2 years (25). A number of these (14) were already in liquidation at the time and were listed as creditors of Stonewood Homes Limited and so have been included. A further 41 companies listed as creditors were liquidated or removed between 2 and 5 years after the liquidation of Stonewood Homes Limited. It is difficult to tell whether these later liquidations and removals are a direct result of the creditor impact from Stonewood Homes Limited.

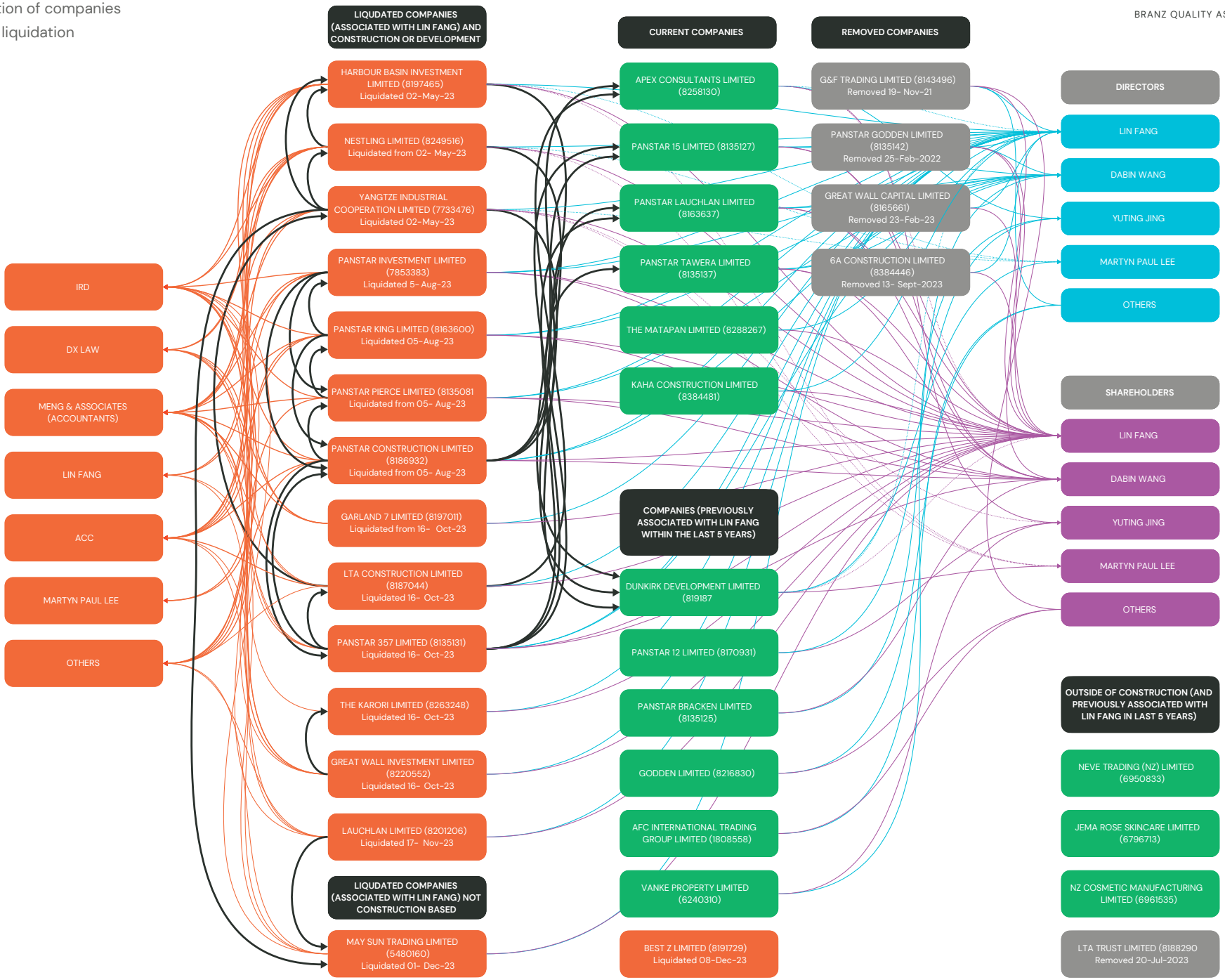
48. Compass Homes (Rodney) Limited and Construction Direct Limited further highlights the relative resilience of creditors. For Construction Direct Limited, all creditors remaining registered within the 2 year period. However, there were a higher number of 'unknowns' in the first liquidation reports, indicated as being employees. An associated company Scaffold Direct Limited was liquidated 7 months later (it was not a creditor of Construction Direct Limited, however). The shareholding control of the company was transferred during the same time as the liquidation of Construction Direct Limited.

49. For Compass Homes (Rodney) Limited, there were no creditor liquidations within the 2-year period but 7% were removed from the register. All companies associated with the director in the creditor list are still registered (although one company hasn't filed since 2021 and is under threat of removal). Of the other companies associated with the director (but not creditors), there were 6 companies removed from the register two-years prior to the liquidation of Compass Homes (Rodney) Limited and another in 2021. Two further companies were liquidated in 2023 and 2024.

50. The example of Harbour Basin Investment Ltd, Nestling Ltd and Yangtze Industrial Cooperation Ltd and their director, Lin Fang, demonstrates how a high number of liquidations can occur when there are many associated companies. We were unable to find any creditor liquidations, with all liquidations occurring in the associated companies, but due to the recent date of liquidation, the effect may not yet be apparent. Most of these were other property development and also construction businesses, and a number were creditors of the other liquidated companies. There was also a number of creditors common to each liquidated company, such as accountants and lawyers. Figure 3 shows the relationship between the liquidated companies, multiple company failures and their relationship to each other.

51. A similar, but less extensive pattern occurs with Spot X and its director Cheng Tih Lee. In total there were 10 companies associated with the director that were either liquidated and/or removed. Cheng Tih Lee was a director of Delorme SE24 Limited when it was liquidated, with Spot X Limited listed as a 60% shareholder. When Spot X subsequently went into liquidation, Delmorme SE24 Limited was listed as a creditor. A further 8 companies associated with Cheng Tih Lee followed these initial two liquidations. Most of these were property development or construction companies, although two were not affiliated with the construction industry. As with the companies associated with Lin Fang, we found limited liquidations of creditor companies that were not associated with Cheng Tih Lee.

Figure 3. Illustration of companies associated with liquidation



What is resilience?

Resilience from the literature review

52. A large proportion of the literature on resilience and the building and construction sector focuses on disaster risk reduction and recovery. This highlights the role that the sector has in how effectively an economy can mitigate and also respond to natural disasters such as earthquakes and tsunami or a pandemic.

53. There is less written about resilience of building and construction businesses themselves, and very little in relation to these businesses in New Zealand. There is more focus on the resilience of large construction firms, with very limited literature on residential construction firm or sector resilience either in New Zealand or overseas.

54. Resilience was originally presented in ecology by Holling (1973) as "a measure of the persistence of capacity of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling, 1973). For construction it has been described as "the capability of firms to persist in the face of substantial changes in the business and economic environment and the ability to withstand disruptions and catastrophic events using various strategies" (Acquah et al., 2011).

55. Crises faced by businesses generally fall into two types: abrupt and cumulative (Hwang & Lichtenthal, 2000). Generally speaking, natural disasters are abrupt crises, whereas cumulative crises are the result of complex relationships and the cascading effects of any of the participants in those relationships failing, are less well explored in the literature (Hwang & Lichtenthal, 2000).

56. There has also been some studies done about managing risk in a networked economy – a structure perhaps especially pertinent to the construction industry. Starr et al. (2003) state that managing such risk requires adaptivity and recognition of interdependency risks, and that it is a good idea to perform "enterprise risk" audits to identify these risks as "an initial step to building enterprise resilience".

57. McManus et al. (2007) outline that "Resilience is a function of an organisation's: situation awareness, management of keystone vulnerabilities and adaptive capacity in a complex, dynamic and interconnected environment". Situational awareness and the ability to monitor, measure (and manage) business performance assists with pricing, procurement and workflow strategies and can act as an early warning signal on projects.

58. Organisational resilience has also been described as "the ability of an organisation to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper" (Whitehill & Ainsworth, 2018, p.8). It is linked to long-term viability, reputation, and improved competitiveness (Whitehill & Ainsworth, 2018), and the power of predicting, preparing and putting the necessary procedure in place to ameliorate or reduce any unforeseen disruption or shock and continue in business (Seidu et al., 2022). It is not about a sole technique or business tactic investment, rather it is an active process that relies on new information, research and learnings (Torrel, 2022).

59. A common these is that there is a direct relationship between long-term community resilience and the construction sector. When construction sectors demonstrate resilience both in the organisational and supply chain, the entire community benefits and rises up in times of crisis, disaster and uncertainty (Haigh & Amaratunga, 2010; M Reynolds, 2023; Servile et al., 2007; Wilkinson et al., 2016). This is because both pre- and post-disaster construction sector are crucial to the long-term recovery of communities. Furthermore, the construction sector is crucial to deliver infrastructure to societies in a forward way that delivers for future needs – growing population, climate change, changes in transportation etc (Reynolds, 2023). Wilkinson et al., (2016) notes that "Improving the resilience of construction organisations minimises the negative consequences of disasters to the organisation, and also helps to improve long-term community resilience" (p.182).

Resilience from the interviews

60. The overwhelming majority of interviewees saw resilience in terms of being able to survive tough market conditions. Resilience was talked about in four main ways:

- Financial resilience – having a strong focus on financials, making sure that their practices meant they had good financial foundations if any downturn occurred.
- People and culture – the skills and wellbeing of their own staff, but also making sure their suppliers and subcontractors were sustainable and resilient (4 businesses mentioned supporting their suppliers in some way such as training or mentoring). People and culture was highlighted by half of interviewees as an important part of resilience.
- Market share and development – being constantly attuned to market direction, mostly through sales but also a focus on competitors.
- Processes and systems – most often around financial matters but also extending into communication with clients, supporting sales, and wellbeing (especially mental health).

61. The main difference in how large and medium businesses we talked to thought about resilience was around how structured their approach was. Larger businesses tended to have a more structured way of expressing and managing resilience, for example through formal strategies or approaches. One business told us they had plans and goals in the four key strategic areas, and when those plans are achieved then they know they are improving their resilience (Business 8, large volume design & build franchisor). Another large firm mentioned the efforts and systems they had for collecting, tracking and communicating key metrics – these are mostly financial but also systems for tracking hazards and risks (Business 6, large volume developer, design & build franchisor).

62. Responses from the medium-sized businesses tended to have more of a 'we know it' feel, rather than being able to describe it with reference to a particular strategy or systematic approach. For example, while market direction tended to be highlighted more due to medium sized firms being less geographically diversified, it was more about being driven by 'market feel' and informal sharing of information with peers (Business 2, medium developer, design & build and Business 7, medium design & build franchisee).

Resilience from liquidation reports

63. Information from the liquidation reports primarily related to the reasons for why the businesses failed or were failing, rather than offering insights into how businesses viewed resilience itself. Some findings support the focus on financial resilience from interviews, and the influence of external influences on resilience noted in the literature review – both of these were the top reasons for liquidation. External influences encompassed changes in economic conditions, difficult trading conditions and competition, and flow-on impacts of other businesses failing.

64. Another insight that the liquidation reports gave us about how resilience is defined was in relation to the age of the companies at liquidation. Younger residential construction companies (who were liquidated before the end of their 3rd year) had the widest range of reasons influencing their failure, and were much more likely to be a result of financial matters and external influences. Older residential construction companies (those that went into liquidation from their 6th year onward) had a much narrow set of reasons for liquidation, and were much more likely to be a business wind-up process or solvent liquidation instigated by the owners.

65. This age split suggests that it takes at least 3 years of operation for a residential construction firm to be able to have the resilience characteristics noted in the literature review (e.g. situational awareness, ability to anticipate, prepare for, respond and adapt, and have the capability to persist). It also suggests that despite the differences in systematic approach between the large & medium-sized firms interviewed, it is potentially more important that the range of risks are recognised by the firm rather than the systematised manner of addressing them.

Figure 4

What we've got and how it's grouped

Where are the weak spots?

66. In this section we highlight what the literature, interviews and liquidation reports note as being the resilience weak spots for residential construction firms. This is done in three ways:

> Identifying from the literature review and liquidation reports what the factors of resilience (primarily in terms of the main reasons for firm failure).

> Identifying where the interviewed firms are putting their efforts into ensuring that they are resilient.

> Whether there are any gaps between the first two bullet points – basically are there any factors of resilience that the firms are not focussing on.

Weak spots from the literature review

We found that the literature tends to address resilience at two levels:

> Resilience at a sector level – internal and external issues that impact the sector as a whole.

> Resilience at a firm level – research and commentary on the key factors that lead to failure.

Resilience at a sector level

67. At a sector level there are three main issues that dominate discussion of construction sector resilience:

> Managing and surviving boom/bust cycles

> Supply chain security & robustness

> Technology

68. The volatility of boom/bust cycles in the construction sector deters organisations from long-term investment and planning, reducing organisational resilience by impacting overall business performance, profitability and productivity. The growth phase is highlighted as much of a risk as a downturn, with the pace of growth challenging management when "on the up phase of the cycle, resource issues, spiralling costs, supervision and quality, tend to dominate. One manager admitted that this had resulted in less diligent pricing and scoping of future projects." (Allan et al., 2008, McDonald Vague, 2021, BDO, 2021)

69. Wilkinson and Pontangaroa (2022) note that there is a need to "accept that the industry will be in a constant state of change and plan accordingly", echoing comments from across academic and industry literature. Studies suggest that construction firms' resilience during volatile cyclical change can be enhanced by improving business practices including: implementing business performance measures, investing in labour capability and strengthening supply chain relationships.

70. The robustness of supply networks and relationship to organisational resilience features frequently through literature. Pascua & Chang-Richards (2018) suggest that key to the resilience and coping capacity of civil contractors is that supply chains and social capital are robust and can operate during crises, which can be achieved through partnerships that integrate skills and resources to create solutions together.

71. According to Fulford & Standing (2014) when a supply chain is fragmented this can lead to poor productivity. This is backed by Parke & Warren (n.d.) in that when clients and suppliers have a long-term relationship that understands the strategic drivers can lead to more resilient supply chains.

72. The COVID-19 pandemic accelerated the emphasis on resilience in the construction industry as it increased the compounded risk (Liberty Mutual Insurance, 2020). It's impact reverberated through the construction industry through creditors, owners and employees, and its influenced economic and social perforance of the economy as an entirety (Mahamid, 2012), and revealed structural weaknesses in the construction industry (Seidu et al., 2022). Mid-pandemic in October 2021 Australia and Aotearoa New Zealand alike saw an increase in the price of construction materials as well as supply chain issues and COVID-19 staffing issues impacting the profitability of SMEs and large firms leading to company failure, red tape and poor quality outcomes for companies and consumers (Master Builders, 2021; Stephens, 2021; Sutrisna et al., 2022).

73. Technology and its role in resilience is a minor theme in the literature. It is seen as an issue to be navigated – for example the rise of Industry 4.0 puts increasing pressure on the sector to keep up with modern technology (Morisse & Prigge, 2017). On the flip side, technology is also seen as a potential avenue for improving resilience – for example how productivity and business continuity management can be approved through increased adoption of artificial intelligence and neural networks. Earlier work also noted that the lack of access to technology and digital connectivity can affect the sector's ability to pursue diversification (Starr et al., 2003).

74. In addition to the above issues, other factors noted that impact on resilience at a sector level are rising construction costs, businesses working for discounted rates, reduced availability of skilled migrant workers due to border restrictions, concerns about the quality of work and negative wellbeing impact on workers (du Plessis & Simpson, 2021; MBIE, 2021; New Zealand Infrastructure Commission (Te Waihanga), 2021).

75. Our review found that in general, the factors that impact on building and construction business resilience are the same for businesses overall:
    - Importance of leadership and employee well-being and safety
    - Cashflow issues and weak balance sheets
    - Skill shortages
    - Use of lead indicators rather than lag indicators to help guide and position the business and encourage longer-term thinking around resilience.
    - External influences, including 'domino-effect' where failure of one business flows through to others
    - Inability to manage growth
    - Pricing mistakes.
76. One of the trends that arose from the construction industry reports and academic literature was the importance of leadership and employee well-being and safety for organisational resilience. Leadership is a crucial aspect of resilience as it allows for overcoming external shocks (Seidu et al., 2022) as well as increased well-being and safety of employees. Prior to COVID-19, BRANZ conducted research into the building sector's well-being, they found that alleviating the stress of construction SMEs is crucial to overall organisational resilience.
77. Construction sector SMEs are best placed to navigate uncertainty in the market when they have strengths in: cashflow management, allocation of resources, strategic planning, overhead management, project management, human resource management, and increased use of technology to facilitate process improvements listed above, including cloud-based technology (BRANZ, 2021, p. 2).
78. When discussing reasons for failure, most often it is in terms of financial reasons (as explained by, for example, financial ratios). Failure that can be attributed to organisational and managerial matters is less well-researched, but still noted in the literature as a reason for failure.
79. A fairly typical example of failure reasons can be found in *Business Failures in the Construction Industry* (Arditi et al., 2000) which have budgetary and macroeconomic issues as the main reasons for construction company failure. In their analysis, over 80% of the failures were caused by five factors, namely: insufficient profits (27%), industry weakness (23%), heavy operating expenses (18%), insufficient capital (8%) and burdensome institutional debt (6%).

Weak spots from interviews

80. One record of how and why a company failed is contained in liquidation reports. Liquidation is a formal process where a licensed insolvency expert (usually a chartered accountant) is appointed to recover funds from a business.[10] It usually applies to a business that is unable to pay its debts or meet future financial obligations, and generally ends with the company's assets being sold (liquidated) and the company removed from the Companies Register. In some cases a solvent company can be liquidated as part of it being wound up.
81. We approached the identification of where firms are putting their resilience efforts from two angles:
    - What they see as the challenges and risks to their firms (and in some cases the sector overall).
    - What areas the firms are working on improving (how they are managing risks) to ensure that they are more resilient.
82. Analysing interview responses from these two angles helped us to identify if there are any potential differences between what the firms see as weak spots and what they are actively putting effort into. This was intended to show any gap between the idea of resilience and the actions that are invested in.
83. We identified six main themes in the interview responses under which resilience issues and their management were mentioned:
    - Business operations and leadership – how firms structured and/or managed themselves.
    - Capital – this theme covered how the firms finance their operations and growth.
    - Financials – the day-to-day financial matters such as cashflow, project costing, payments to suppliers, and managing client payments.
    - Labour and contractors – this included finding both quantity and quality of staff and contractors.
    - Regulations and compliance – covering matters such as consenting but also broader issues such as health and safety requirements.
    - Sales and markets – ensuring a pipeline of work and anticipating changes in demand.

10 Liquidation only applies to registered companies, with sole traders subject to bankruptcy. Other forms of action can include receivership (where a creditor seeks to recover a specific asset, and the company can continue to operate) or voluntary administration where a professional advisor is appointed to organise the business in an attempt to avoid liquidation.

84. We also considered whether these six themes were viewed differently by firms depending on their size (large or medium), spread of geographic operation (national or local), and type of build (on-site or off-site).

85. The main gap between what firms identified as a weak spot and what they talked about implementing actions to manage their risk was around regulations and compliance. Half of the firms (5 out of 10) identified it as a weak spot, but only 1 firm raised it when talking about efforts to manage weak spots. This may indicate that regulations and compliance are something difficult to manage as a weak spot, or that other areas were taking priority.

86. Both financials and labour & contracting were identified by 6 and 5 out of 10 firms as challenges and risks, but 8 and 9 out of 10 firms respectively had mentioned those areas where effort was being put into to manage risks to their firm. This indicates that these weak spot themes are relatively well understood, and while not necessarily solved there are actions or approaches in place at a firm level.

Weak spots expressed as challenges & risks

87. All 10 businesses commented on where they saw their weak spots, particularly in terms of challenges and risks.

88. The most common area of challenges & risks was business operations and leadership, with 7 out of the 10 interviewees raising issues under this theme. Labour and contracting was the next most common weak spot, with 6 out of 10 raising this as an issue. Capital was mentioned the least by firms as a weak spot, with only 4 out of 10 mentioning it.

Table 6. Resilience theme identification by each business – managing weak spots

	Resilience theme					
	Business	Capital	Labour	Compliance	Sales	Financials
Business 1	■	■		■	■	
Business 2		■		■	■	
Business 3	■	■	■		■	
Business 4			■		■	■
Business 5	■		■		■	■
Business 6	■	■	■			■
Business 7	■		■	■	■	■
Business 8	■			■		
Business 9	■					■
Business 10			■	■	■	
	7	4	6	5	7	5

89. When looked at in terms of large and medium residential construction firms, there were no large divergency in terms of theme. Large firms raised regulations and compliance as a weak spot more often than medium sized firms, whilst nearly all medium sized firms raised business operations and leadership and sales and markets as weak spots.

90. Greater differences in view can be seen when looking at the geographic areas of operations for each firm. It should be noted that only 2 firms operated locally, versus 8 at a national level, making it less reliable to identify differences.

91. Both locally operating firms raised regulations and compliance, and sales and markets as weak spots. Only 3 out of 8 nationally operating firms saw regulations and compliance as a weak spot, with the same number also highlighting capital.

92. No off-site residential construction firms identified regulations and compliance as a weak spot, compared to most of the on-site firms (5 out of 7). All of the off-site firms mentioned business operations and leadership a weak spot, compared to just over half of on-site firms.

Table 7. Resilience theme identification by each business – managing weak spots

Resilience theme	Large	Medium
Business operations/leadership	3/5	4/5
Capital	2/5	2/5
Financials	2/5	3/5
Labour/contractors	3/5	3/5
Regulations/compliance	3/5	2/5
Sales/markets	3/5	4/5

Table 8. Weak spots framed as managing risks by geographic operation

Resilience theme	National	Local
Business operations/leadership	5/8	1/2
Capital	3/8	1/2
Financials	4/8	1/2
Labour/contractors	5/8	1/2
Regulations/compliance	3/8	2/2
Sales/markets	5/8	2/2

Table 9. Weak spots framed as challenges and risks by type of build

Resilience theme	On-site	Off-site
Business operations/leadership	4/7	3/3
Capital	3/7	1/3
Financials	3/7	2/3
Labour/contractors	4/7	2/3
Regulations/compliance	5/7	0/3
Sales/markets	5/7	2/3

"To us, the weak spots of note are Councils and compliance, and the required process that comes with this, has intensified significantly over the last 10 years, often causing debilitating delays. Small companies struggle to navigate all the red tape and cope with the financial implications these delays inflict on their P&Ls, seriously impacting forecasted cashflow. Larger companies can weather these delays for longer, but they still have a serious impact…"

Business 8, large national group on-site builder

"Small trades and suppliers don't have the people, process and systems to capture data in the first place, let alone the time or analysts to be able to interpret the information and capitalise on it."

Business 8, large national group on-site builder

"Biggest challenge is growth and an aggressive market – it is not worth growing at the rate of market to meet demand. You can make slightly less money but have less stress."

Business 1, large national developer and on-site volume builder

"Our biggest challenge is leadership – franchises are either 50% from carpenter backgrounds or 50% from commercial backgrounds. The carpenters tend to default to getting on site when they're busy and they notice the local leadership was sacrificed during busy periods – they are practical people who try to fix things instead of spending time driving new business."

Business 6, large national on-site group builder

"As a business we are not particularly structured, under-resourced and under-capitalised. You have to be a jack-of-all-trades."

Business 7, medium local franchise builder

"Boom/bust cycle makes it a struggle to retain the market share – in 2017 there were only 7-8% of consents being done by "other" builders, in 2021 it was around 40%. "Other" builders are small guys operating out of a ute. They are reliant on the security of the big guys."

Business 10, large national group on-site builder

"Trades are late to the gunfight when it comes to matching inflation."

Business 4, large national group on-site builder

Weak spots framed as managing risks

93. While half of firms interviewed identified regulations and compliance as a weak spot in terms of challenges and risks, only one of the firms mentioned this in terms of the efforts and actions they were taking to manage risks.

94. Nearly all firms highlighted business operations & leadership, labour & contracting, sales & markets and financials as areas where they were putting effort into managing their risks. Both financials and labour & contracting were identified by 6 and 5 out of 10 firms as challenges and risks, but 8 and 9 out of 10 firms respectively had mentioned those areas where effort was being put into to manage risks to their firm.

Table 10. Resilience theme identification by each business – managing weak spots

	Resilience theme					
	Business	Capital	Labour	Compliance	Sales	Financials
Business 1	■	■	■		■	■
Business 2			■	■	■	■
Business 3	■		■		■	■
Business 4	■		■		■	■
Business 5	■		■		■	■
Business 6	■		■		■	■
Business 7					■	■
Business 8	■				■	■
Business 9	■		■		■	
Business 10	■	■	■		■	■
	8/10	2/10	8/10	1/10	10/10	9/10

95. Most resilience themes received similar focus in terms of actions to manage risk across both large and medium-sized firms, with the only noticeable differences being around business operations & leadership (where only 3 out of 5 medium sized firms had actions compared to 5 out of 5 large firms), and capital where only 2 out of 5 large firms had actions underway (compared to no medium-sized firms).

96. The main differences in view between national and local firms relate to business operations & leadership and capital. While only 2 out of 10 firms mentioned managing their capital risks, both of these 2 are operating at a national level. None of the locally operating firms mentioned actions in the business operations & leadership theme, whilst all nationally operating firms did.

97. Both of the firms that mentioned managing their capital risks were on-site builders. Otherwise there was not a lot of difference across the other themes in terms of on-site and off-site builders. There was a slight difference in terms of business operations & leadership, with 5 out of 7 on-site builders mentioning actions under this theme, whilst all 3 off-site firms did.

Table 11. Weak spots framed as managing risks by firm size

Resilience theme	Large	Medium
Business operations/leadership	5/5	3/5
Capital	2/5	0/5
Financials	5/5	4/5
Labour/contractors	4/5	4/5
Regulations/compliance	0/5	0/5
Sales/markets	5/5	5/5

Table 12. Weak spots framed as managing risks by geographic operation

Resilience theme	National	Local
Business operations/leadership	8/8	0/2
Capital	2/8	0/2
Financials	7/8	2/2
Labour/contractors	7/8	1/2
Regulations/compliance	0/8	0/2
Sales/markets	8/8	2/2

Table 13. Weak spots framed as challenges and risks by type of build

Resilience theme	On-site	Off-site
Business operations/leadership	5/7	3/3
Capital	2/7	0/3
Financials	7/7	2/3
Labour/contractors	5/7	2/3
Regulations/compliance	0/7	0/3
Sales/markets	7/7	3/3

"Do not take on work you do not have control over."
Business 1, large national developer and on-site volume builder

"Last year our CEO started working with all our franchisees to start to prepare for 'what's coming' and pull all the people who want to get through."
Business 4, large national group on-site builder

"We are as systematised as we can be, we can hibernate if we have to. You have to have the right size for the downside for the market but you can only get so far with flat tyres, you have to be ready to pump up the tyres when opportunity comes."
Business 4, large national group on-site builder

"We now offer products and services right across the industry's value chain and intend to expand this further. But knowing when to pivot requires you to be extremely close to your businesses data. Being able to make informed decisions based on live, accurate data that influences cashflow and illustrates risk and opportunity is critical to success."
Business 8, large national group on-site builder

"The public were more accepting of delays during COVID but not so much now. We have trained our supervisors in communication to address this."
Business 10, large national group on-site builder

"We might pull workers to complete pre-sold jobs first to generate cash if needed."
Business 2, medium local developer and on-site builder

"We always hold stock for immediate sales."
Business 9, medium national off-site builder

"Our advantage during the past few years was to maintain the offer of fixed price contracts as we were mostly unaffected by supplier shortages, and offer clients streamlined timeframes. This offered confidence to the market which helped keep sales up."
Business 3, medium national off-site builder

"We have large overheads with the factory – maintenance and upkeep are the biggest 'nail in the coffin' if sales were to drop off. As a positive though, this space enable us to store timber when it was essentially 'money in the bank'."
Business 3, medium national off-site builder

"We aren't competing as a large scale company but have the asset backing characteristic of a large scale competitor."
Business 3, medium national off-site builder

Weak spots from liquidations analysis

98. Appointed liquidators are required under the Companies Act 1993 to file reports to the Companies Office for each company that enters into a liquidation. Generally there is an initial report, followed by 6 monthly interim reports, and then a final report. Each report builds on the previous one as more information about the company, its creditors, and the financial position are discovered by the liquidator. The reports hold the following information:
    - Company name, company number, and New Zealand Business Number
    - Date and time that the company entered liquidation
    - Who appointed the liquidator (generally a creditor, shareholder, director, administrator, or a Court)
    - Brief summary of the reasons for the liquidation
    - List of known creditors, and a summary of amounts paid to each class of creditors
    - Summary of any recoveries from creditors, shareholders or directors
    - Any pending proceedings that the Company is party to
    - Summary of the company's assets and estimated value
    - Summary of all amount received and paid since the commencement of the liquidation
    - Total amount of fees paid to the liquidator
    - Details of any debt or liability that has not been satisfied in full as part of the liquidation and why.
99. While the Companies Act 1993 does not require the liquidator reports to specify the industry classification of the Company, or when the Company was started, we were able to use the New Zealand Business Number information to capture this from the Companies Register.
100. It is important to note that:
    - Only companies are subject to liquidation[11]
    - Liquidations are only one way that a company can end, and generally only represent those companies that end under financial duress
    - While the Companies Act 1993 sets out the requirements for information in liquidator reports, the consistency and quality of this information is by no means perfect. For example, a liquidator will usually state the reasons for failure provided by the company Director, even if this is not necessarily the 'true' reason indicated by other findings.
    - Only 11% of all liquidations have a valid industry classification code associated with them (9,686 out of 80,666).
101. Despite these provisos, liquidator reports still provide one of the best records of reasons for company failure and ending that can be identified by industry classification over a reasonable length of time.
102. Our key findings from the analysis of liquidator reports are that:
    - The curve for construction business failure by age for liquidations is similar to that of construction business failure overall, and business failure overall.
    - Shareholders are the most likely plaintiff to put residential construction businesses into liquidation, followed by Te Tari Taake Inland Revenue Department (IRD). There were very few creditors as plaintiffs.[12]
    - The top 3 reasons for liquidation were financial-related (owed money, tax obligations, and cash flow issues), followed by external influences, director issues and disputes.
    - Residential construction companies that went into liquidation before the end of their 3rd year had the widest range of reasons influencing their failure.
    - Residential construction companies that went into liquidation from their 6th year onward were more likely to be due to business wind-up actions and/or solvent liquidations.
    - Financial management themes occurred in nearly 50% of liquidations (49.2%), followed by project related issues (25.8%) and tax obligations (21.6%).
    - Business leadership and ability was a more prominent theme for residential constructions businesses that were liquidated by their 3rd year (25%), but was much lower for those that were liquidated from year 6 onward (8.1%).
    - Tax obligations were less prominent for the 1st and 3rd quartiles by age, but higher for the 2nd the 4th quartiles. This also matched the prevalence of IRD as plaintiff in those quartiles.
    - As a residential construction business gets older, it is much more likely that a shareholder will be the plaintiff for any liquidation (70% of the time for businesses that liquidator after year 6).

11 Statistics New Zealand's Business Demography statistics show that in 2022 companies made up nearly 75% of all residential construction enterprises.

12 This perhaps indicates a preference by creditors to pursue receivership approach to recovery of money owed.

Age of liquidation for residential construction businesses

103. Kale & Arditi (1999) state that the curve for construction business failures by age is similar to that of businesses in general in that it typically peaks around the 3 or 4 year mark, and tails off once past the "adolescent" period. We saw the same pattern from our sample of residential construction company liquidations:

    > 65% were liquidated within 5 years of starting business

    > 78% were liquidated within 8 years of starting business

    > residential construction business liquidations peak in year 4, with a long tail out to 18 years

    > the average was 53 months (4 years and 4 months), and the median was 45 months (3 years and 9 months).

104. The number of residential construction business liquidations dropped in 2019, and then fell further in the COVID-19 affected years of 2020 and 2021. By 2022 the number of liquidations had increased again back in line to previous trend levels. Interestingly, the number of E301 business deaths (geographic units) did not decrease over this COVID-19 period.

Figure 5. Number of E301 residential construction business liquidated by age of business

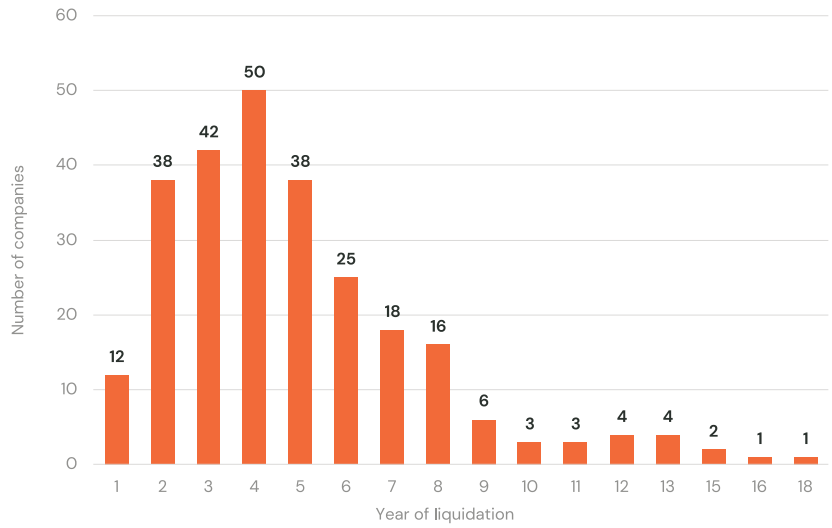


Figure 6. Number of E301 business deaths (left hand axis) and E301 liquidations (right hand)

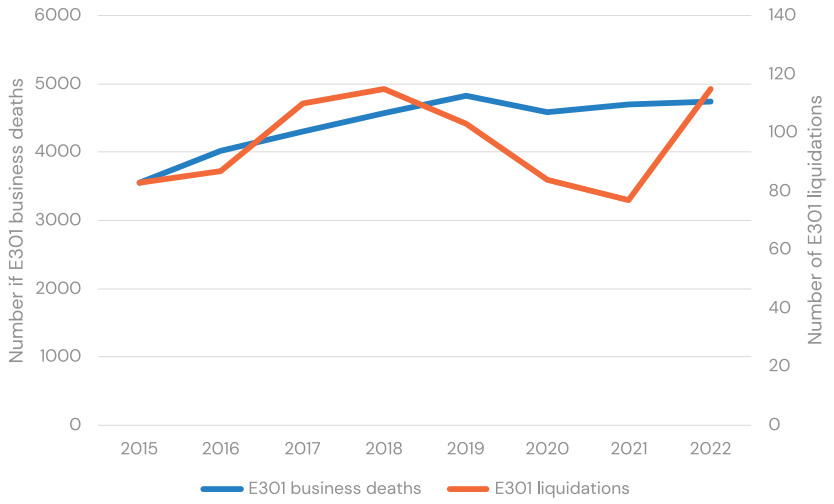


Figure 7. Plaintiff in residential construction liquidations by liquidation age quartile

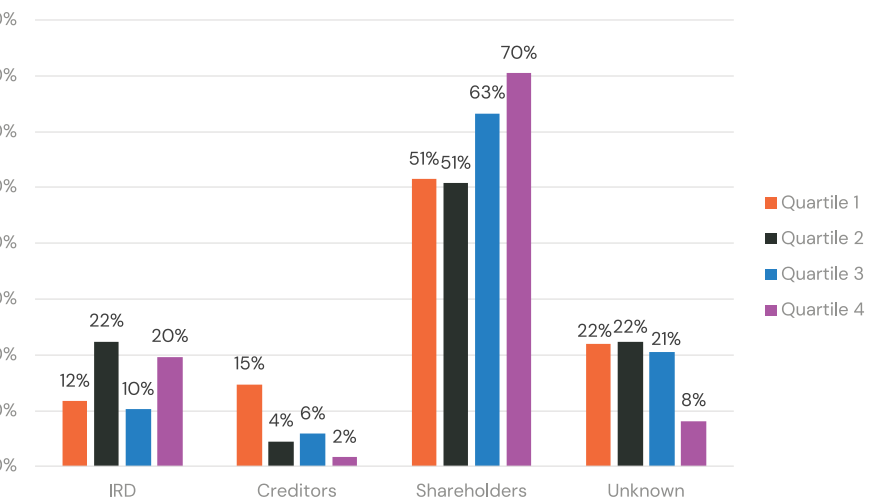
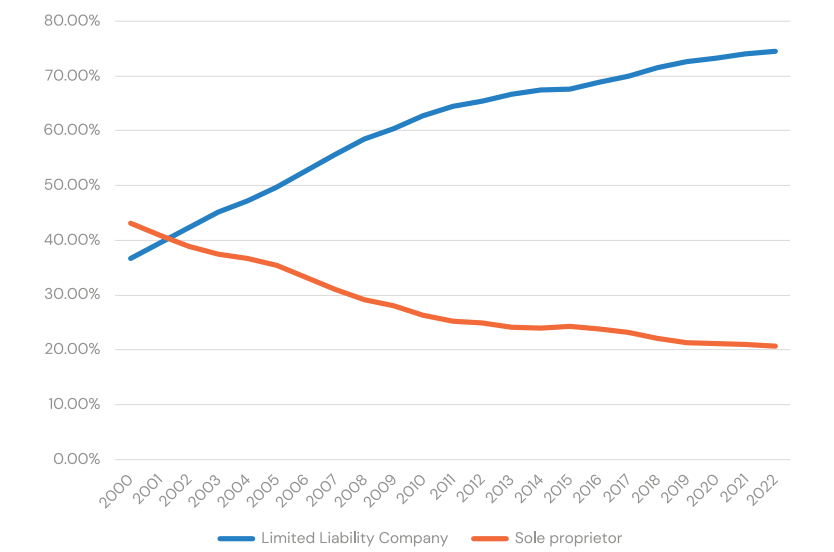


Figure 8. Company and sole proprietorships as percentage of total construction enterprises



Reasons for liquidation of residential construction businesses

105. In line with the literature review, the top three reasons for liquidation of residential construction businesses were related to being owed money, tax obligations, and cash flow issues. External influences (primarily economic conditions), director issues (including poor health of a director), and disputes were the next three reasons. Note that these reasons are not mutually exclusive – one company could have two or three of these reasons listed in their liquidator reports.

Table 14. Reasons for failure by theme

Reason for failure	Percentage of Companies
Owed money	21.6%
Tax obligations	21.6%
Cash flow issues	20.8%
External influences	12.9%
Director issues	11.4%
Dispute unknown	10.6%
Costs	8.0%
Contracts	6.8%
Business wind up	6.4%
Unknown	6.4%

106. Financial management is the grouped theme that most residential construction company liquidations have a reason associated with, with 49.2% of businesses. Project related issues, tax obligations, and business ability and leadership are the next grouped themes of reasons that are most prominent, followed by external influences. Labour related issues do not feature strongly as a reason for liquidation.

Table 15. Reasons for failure by grouped theme

Group	Overall	Percentage
Business ability and leadership	52	19.7%
External Influences	36	13.6%
Financial management	130	49.2%
Labour related	12	4.5%
Project related	68	25.8%
Tax obligations	57	21.6%

107. When we look at the overlaps between these grouped themes (i.e. where one theme most often appears in association with another theme), the strongest relationships are between:

> financial management was most closely associated with project related issues (52 issues noted for those businesses that also had financial management issues)

> for business ability and leadership, external influence, and tax obligation issues it was financial management that was the next most frequent association.

108. Shareholders were the most likely plaintiff, with 59% of residential construction companies put into liquidation by their shareholders. The next highest identified group of plaintiffs were IRD, who were the plaintiffs in 16% of liquidations. Creditors were a surprisingly small proportion of plaintiffs, accounting for only 7% of liquidations. Despite being required under the Companies Act 1993 to list who the plaintiff was for a liquidation, nearly 20% of liquidation reports did not record who the plaintiff was.

Table 16. Plaintiffs for residential construction company liquidations

Plaintiff	IRD	Creditors	Share-holders	Unknown
Sample size:	42	18	155	49
% Com-panies:	16%	7%	59%	19%

109. Overall, these findings support the literature review in that cashflow and financial management issues are some of the leading reasons for business failure. This is especially the case if tax obligations are included as a financial management issue. Project related issues – which include pricing issues, cost escalations, and contract disputes – are also noted in the literature review and are prominent in liquidation reports.

110. The low association of labour related issues as a reason for failure potentially reflects that these issues are not the presenting issue, but are an underlying or earlier issue that then leads to other reasons for failure.

111. Similarly, the relatively low level of external influences as a

reason for failure is potentially due to the sample size not covering 2023 where other evidence suggests liquidations in the residential construction industry are increasing. The time period for the sample – 2011 through to 2022 – was generally a period of growth for the construction sector (even through the COVID-19 years), which again suggests that external influences would be of lower prominence.

Reasons for liquidation of residential construction businesses by age quartile

112. We analysed the reasons for liquidations by the age of the residential construction company at the time of liquidation, and used a quartile split. This showed the following differences in reasons for liquidations as a residential construction company aged:

- Young companies (1st quartile, liquidated in their 1st through to 3rd year) had a very wide spread of reasons, with the top 10 reasons all recording association with at least 10% of companies.
- Financial, cash, pricing and contractual reasons appeared more often for younger companies.
- The range of reasons narrowed as the quartiles progressed, with the oldest companies (4th quartile, liquidated in their 6th to 18th year) only having fives reasons recoding association with more than 10% of companies.
- Solvent liquidations and business wind up appeared more prominently for the oldest companies (top 4th & 5th reasons), but were largely absent from the top 10 reasons for other quartiles.[13]

113. Similar findings came through analysis of grouped theme by age quartile, with older companies being associated less with business ability and leadership issues, project related issues, and external influences.

114. Two things standout from the grouped theme analysis by age quartile:

- Tax obligations are associated with only 19.1% of liquidations for the youngest companies, which then increases to 26.5% for quartile 2, drops well down to 16.2% for quartile 3, and then increases again to nearly 25% for the oldest of companies (quartile 4).
- External influences are relatively low for the first two quartiles (11.8% each), but then nearly doubles to 23.5% for quartile 3 companies. The oldest companies have a very low association with external influences as a reason for liquidation (6.6%).

115. Further analysis is needed to identify why these variations occur across the age profiles. Tax obligations are likely to be low for the youngest of companies as they are unlikely to have built up a significant tax obligation in their short time of operation, and also because of the wide range of liquidation reasons (i.e. tax obligations are 'drowned out' by other financial issues). The increase of tax obligations as an issue for quartile 3 businesses could potentially be related to the increased prevalence of external influences as an issue. These external influences could become an issue as quartile 3 companies mature and try to grow, although you would expect to see project related issues increase at that point as well (but they actually go down).

13 Business wind up appeared as 8th equal alongside six other reasons for Quartile 2 companies, but this was less than 6%.

Table 17. Reasons for failure by theme

	Quartile 1 (1st-3rd year, 68 companies)		Quartile 2 (3rd-4th year, 67 companies)		
	Reason	**% Companies**	**Reason**	**% Companies**	
1	Owed money	22.1%	Tax obligations	26.5%	1
2	Cash flow issues	20.6%	Owed money	25.0%	2
3	Tax obligations	19.1%	Cash flow issues	17.6%	3
4	Dispute unknown	16.2%	Director	11.8%	4
5	Director	14.7%	Costs	10.3%	5
6	Costs	13.2%	External influences	10.3%	6
7=	External influences	11.8%	Contracts	7.4%	7
	Contracts	11.8%	Dispute unknown	5.9%	8=
9=	Lack of sales/work	10.3%	Unknown	5.9%	
	Pricing	10.3%	Business ability	5.9%	
			Delays	5.9%	
			Profitability	5.9%	
			Business wind up	5.9%	

	Quartile 3 (4th to 6th year, 68 companies)		Quartile 4 (6th to 18th year, 61 companies)		
	Reason	**% Companies**	**Reason**	**% Companies**	
1	Cash flow issues	27.9%	Tax obligations	24.6%	1
2	Owed money	22.1%	Cash flow issues	16.4%	2
3	External influences	22.1%	Owed money	16.4%	3
4	Tax obligations	16.2%	Business wind up	14.8%	4
5	Director	13.2%	Solvent	13.1%	5
6	Dispute unknown	13.2%	External influences	6.6%	6=
7	Business ability	7.4%	Dispute unknown	6.6%	
8	Labour	7.4%	Unknown	6.6%	
9=	Contracts	5.9%	Accounting	6.6%	
	Unknown	5.9%	Director	4.9%	10=
	Delays	5.9%	Business ability	4.9%	
	Profitability	5.9%			

Table 18. Reasons for failure by grouped theme by age quartile

	Percentage by Age Quartiles			
Group	**Quartile 1**	**Quartile 2**	**Quartile 3**	**Quartile 4**
Tax obligations	19.1%	26.5%	16.2%	24.6%
Financial management	52.9%	48.5%	52.9%	41.0%
Business ability and leadership	25.0%	20.6%	23.5%	8.2%
Project related	33.8%	27.9%	23.5%	16.4%
External Influences	11.8%	11.8%	23.5%	6.6%
Labour related	2.9%	2.9%	10.3%	1.6%

Role of scale & business model

Persona of large, medium and small firms

116. In our 2018 BRANZ research report *ER29 Evidencing quality issues: what can industry data tell us? (2018)*[14] we used building consent data and information from StatsNZ's Annual Enterprise Survey to build persona of large, medium and small residential construction firms in 2015. This was designed to make a connection between the number of builds being completed by each segment (new information) and the financial information for these firms (previously available, but not connected to the number of builds). Previous research had used either turnover or employee numbers to segment construction firms by size, rather than number of builds.

117. This work showed that 96% of builders were small in terms of building up to 6 new residential dwellings a year, and they accounted for 51% of new residential dwellings. Large builders who constructed 30 or more new residential dwellings a year made up less than 1% of builders overall, but delivered 37% of dwellings in 2015. 80% of these large builders have 6 or more employees and spend 50% or more of their expenses on subcontracting.

118. We have updated our previous work by obtaining the same information for 2010 and 2020. We wanted to see if large residential builders were growing their share of new residential dwellings, which would indicate increased sector resilience (on the basis that medium and large firms are more financially secure and sustainable).

119. Large builders (those doing more than 30 dwellings a year) increased as a percentage of all builders between 2010 to 2020, going from 0.4% in 2010 to 0.6% in 2015 and 2020. While only a small proportion of total builders, large builders increased their share of total new residential dwellings from 22% in 2010 to 30% in 2020.

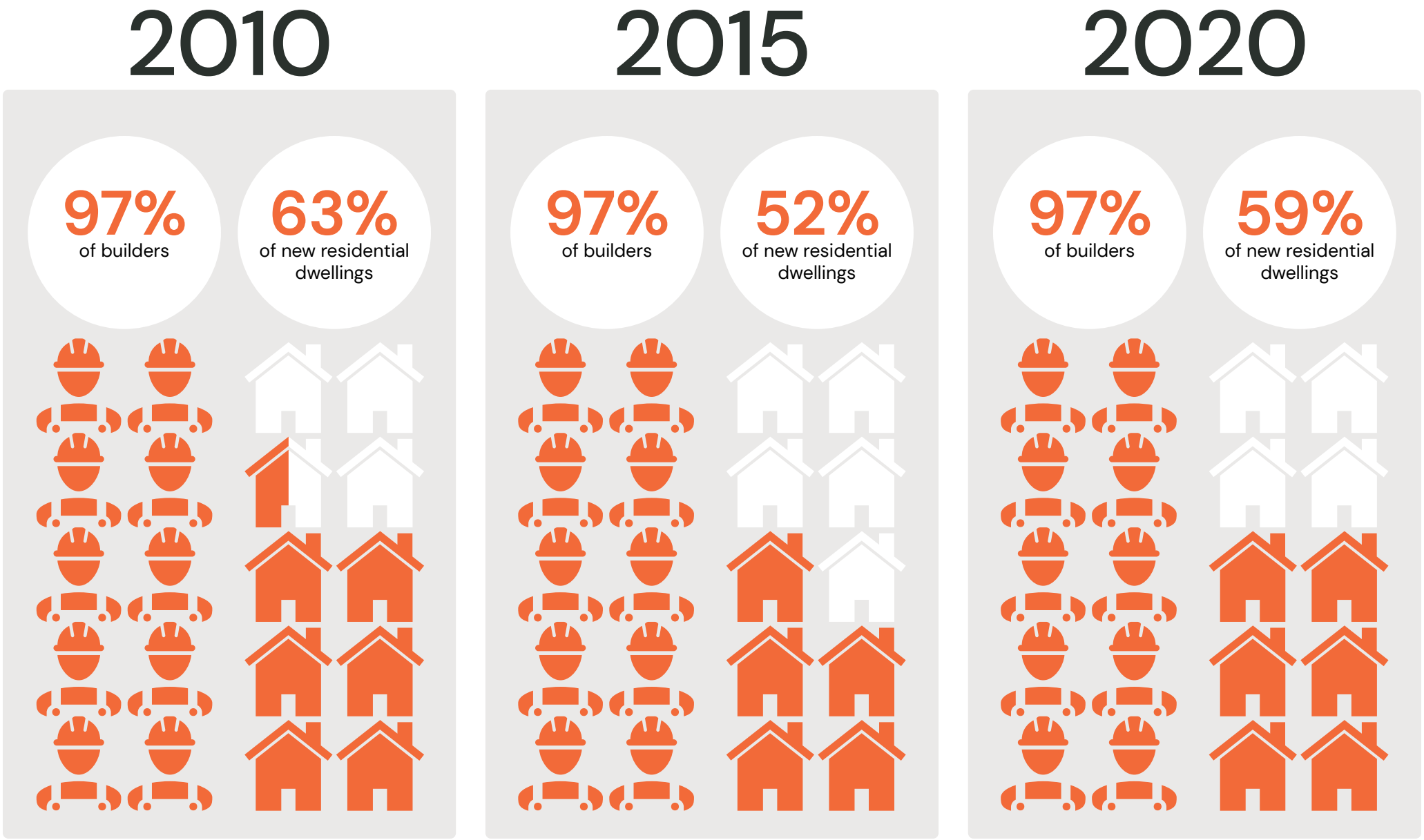
120. Medium builders (between 7 and 30 dwellings) also increased slightly – from 2.2% of builders in 2010 to 2.3% in 2020. Their share of total new residential dwellings decreased from over 15% in 2010 to 11.5% in 2020. This decrease of new residential dwellings by medium sized firms was picked up by small builders, who remained at 97% of all builders but accounted for 63% of new residential dwellings in 2010, dropping to 52% in 2015, and increasing to just below 60% in 2020.

121. While large and medium builders increased their share of new residential dwellings from 37% in 2010 to 41% in 2020 – indicating a slight improvement in resilience for the sector – the concern is that the 48% in 2015 was not able to be improved on through to 2020. This may be a result of COVID19 with medium sized builders being forced to reduce their output (and effectively becoming small).

122. It may be worth running this exercise annually or every two years to get a better understanding of whether the sector overall is consolidating (and therefore becoming more resilient) or not. Ideally we would want to see large and medium sized firms return to 2015 levels of new residential dwellings, and push beyond 50% from there. Testing 2023 and 2025 consents and Annual Enterprise Survey data would give us a sense of whether COVID19 was the cause of the reduction in 2020, or if there is a continuing trend of reduced sector resilience.

14 https://www.branz.co.nz/pubs/research-reports/er29/

Small building firms over time at a glance



Small building firm comparison over time

2010

Low volume 1–3 | Medium volume up to 6

new residential dwellings a year

Income of **up to $2m** a year

96% of enterprises

98% have 6 or less employees

64% have no employees

7% spend 50%+ of expenses on subcontracting

Low volume = high value per dwelling

Medium volume = low to medium value per dwelling

2015

Low volume 1–3 | Medium volume up to 6

new residential dwellings a year

Income of **up to $2m** a year

95% of enterprises

97% have 6 or less employees

67% have no employees

10% spend 50%+ of expenses on subcontracting

2020

Low volume 1–3 | Medium volume up to 6

new residential dwellings a year

Income of **up to $2m** a year

92% of enterprises

97% have 6 or less employees

67% have no employees

9% spend 50%+ of expenses on subcontracting

Medium building firms over time at a glance

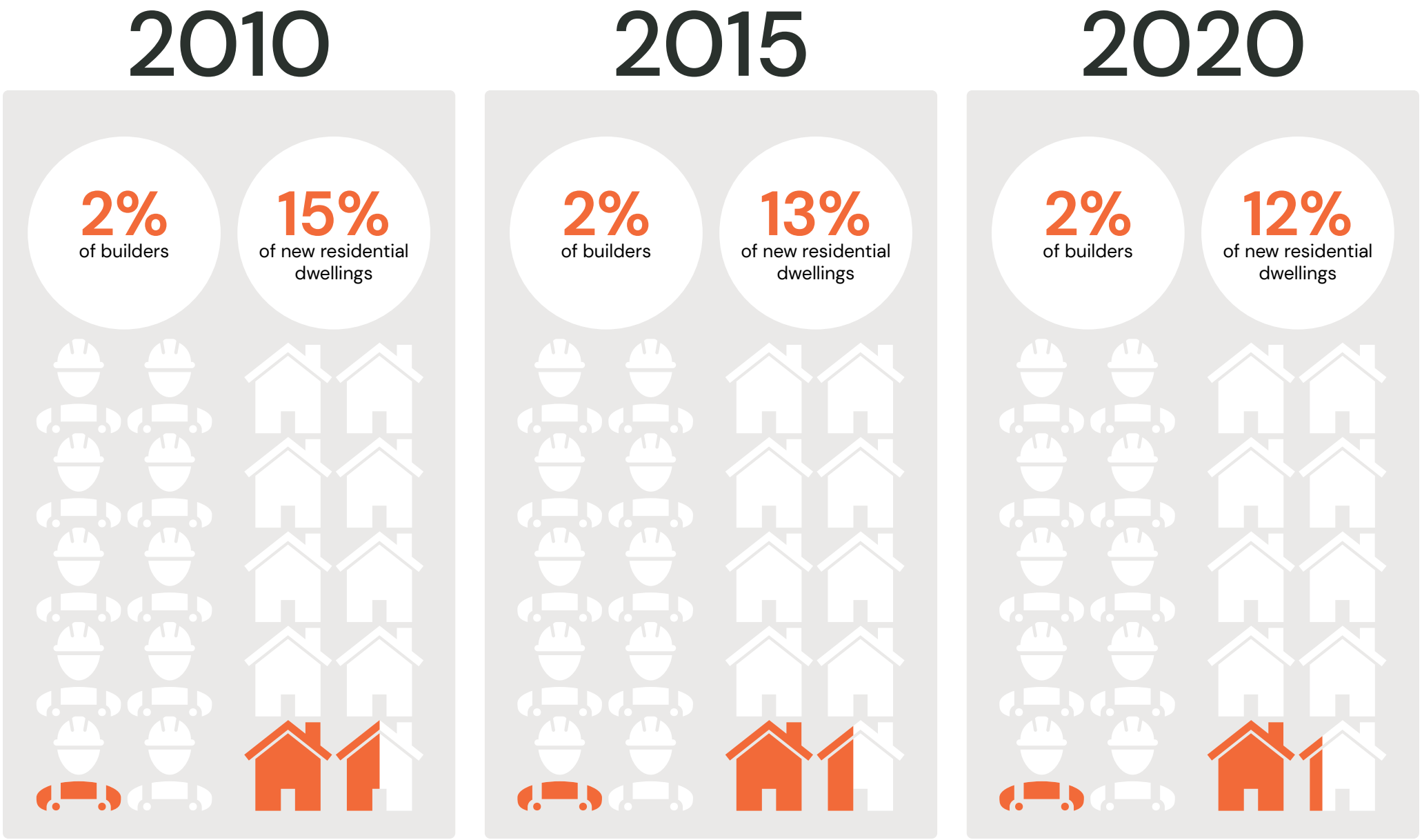


Figure 12

Medium building firm comparison over time

2010

7–30 new residential dwellings a year

Income of **$2m–$10m** a year

3% of enterprises

48% have 6 or less employees

7% have no employees

60% spend
50%+ of expenses on subcontracting

2015

7–30 new residential dwellings a year

Income of **$2m–$10m** a year

5% of enterprises

55% have 6 or less employees

20% have no employees

58% spend
50%+ of expenses on subcontracting

2020

7–30 new residential dwellings a year

Income of **$2m–$10m** a year

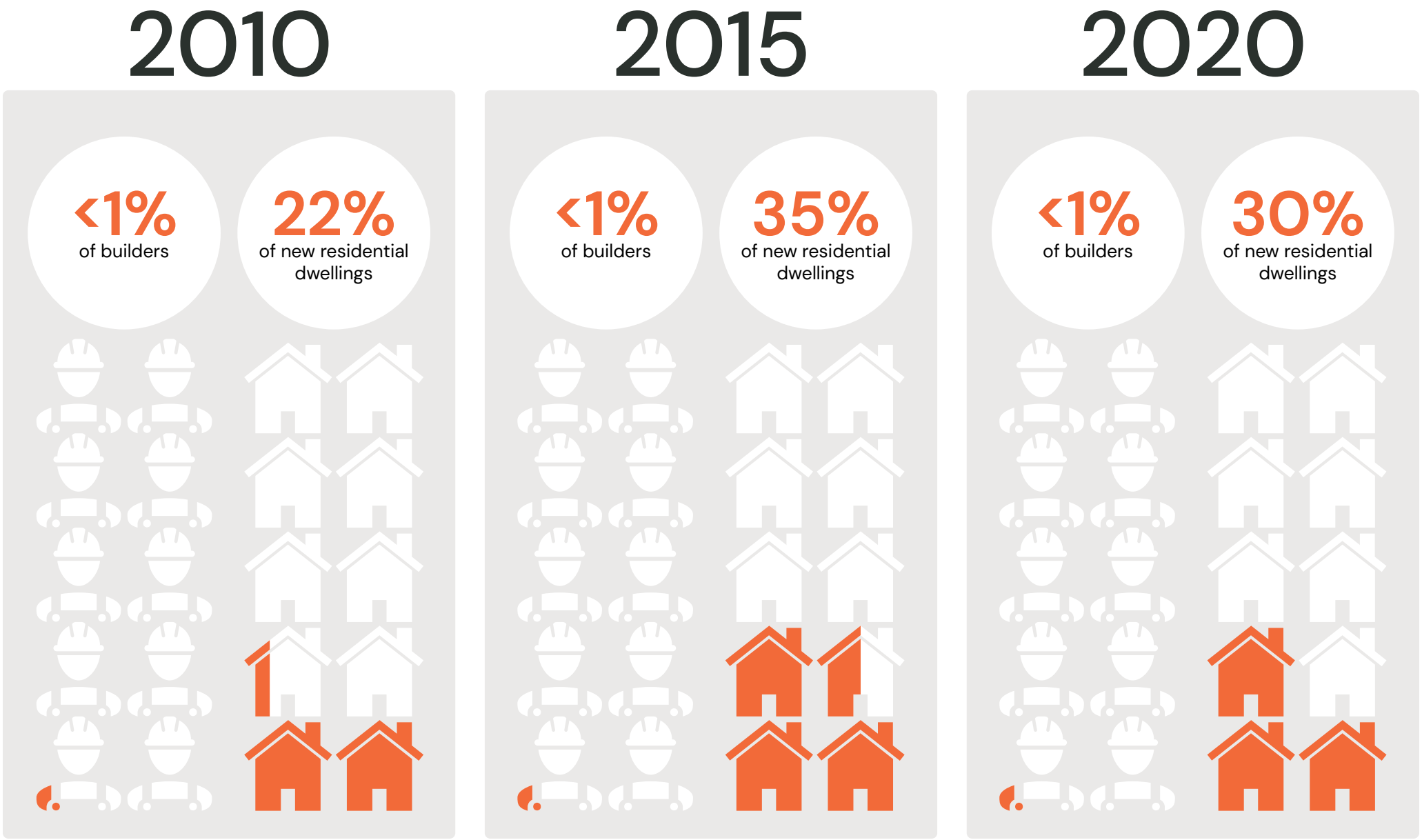
7% of enterprises

47% have 6 or less employees

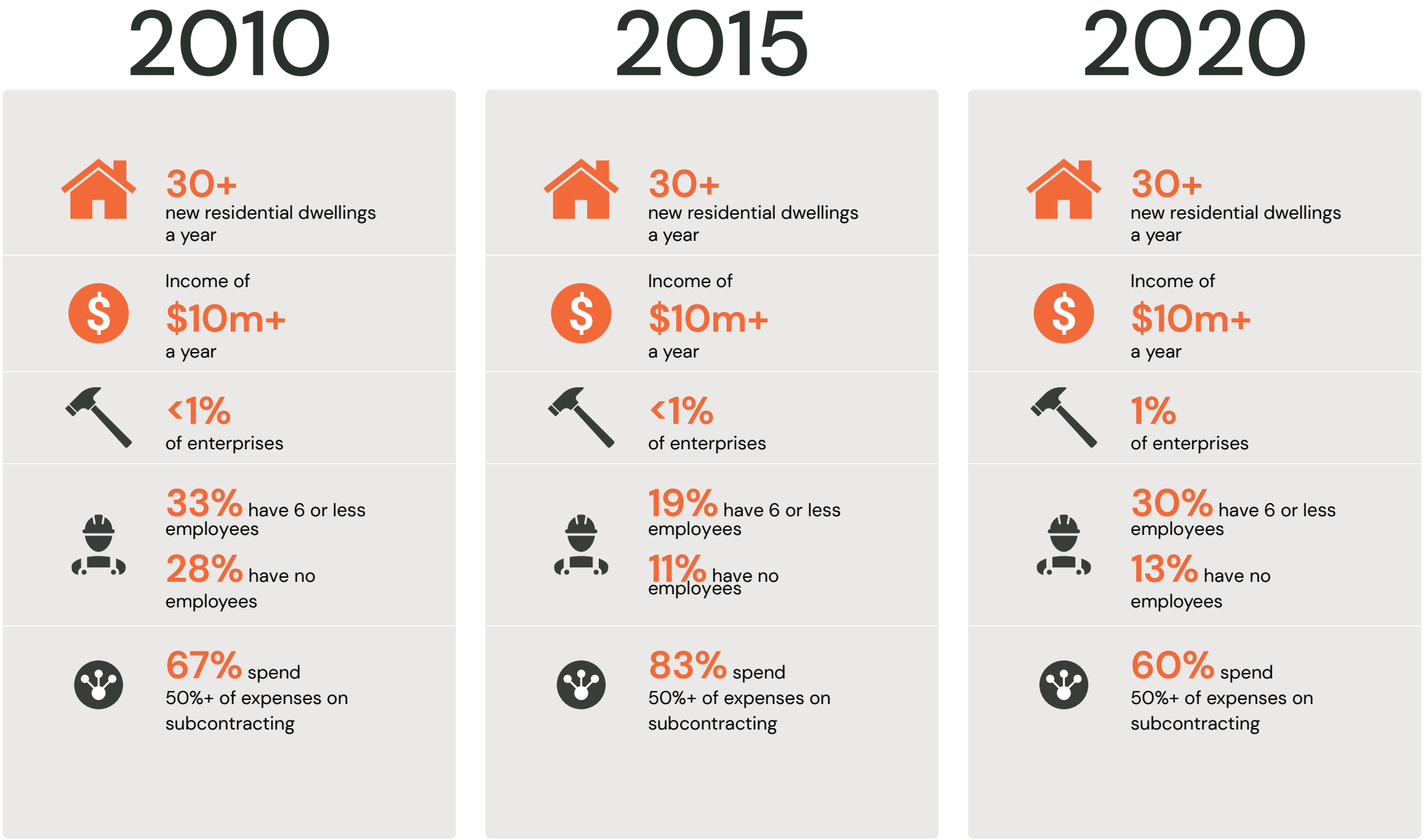
9% have no employees

45% spend
50%+ of expenses on subcontracting

Large building firms over time at a glance



Large building firm comparison over time



Financial ratio analysis

123. We also explored whether financial ratio information from the StatsNZ's Business Performance Benchmarker could provide additional insights into residential construction firm resilience. Information on the median values for each ratio is readily available, and in 2019 StatsNZ also published median values for four size categories of construction firms (based on turnover).

124. An improving median at a sector level is not necessarily a good indicator of improving resilience – the median can increase at the same time that the 50% of firms below the median get substantially worse. Having information on the maximum and minimum values gives a better picture of resilience as it can tell us whether the minimum is getting further away from the median (which would indicate lower resilience) or is getting closer (resilience is improving).

125. Ideally an even fuller dataset would be obtained so that the distribution of firms from the median could be determined, helping to provide a better picture of whether firm resilience is improving.

126. We obtained data from StatsNZ on the maximum, median and minimum for six financial ratios:

- Current ratio – current assets divided by current liabilities, giving an indication of a firms ability to pay its short-term liabilities.
- Quick ratio – similar to the current ratio but only counts the assets that can be quickly turned into cash, giving an indication of how immediately a firm could pay its short-term liabilities. If the current ratio is much higher than the quick ratio this indicates that a firm's current assets are less liquid.
- Liability structure – shows equity as a proportion of equity plus liabilities. A low liability structure ratio means the firm has low equity, which indicates higher risk to debt holders.
- Return on equity – ratio of net income to equity, with a higher ratio indicating a firm is generating good levels of income for the amount of equity.
- Return on total assets – ratio of net income to total assets, with a higher ratio indicating a firm is more efficient at using its assets to generate income.
- Salaries and wages/turnover ratio – the percentage of turnover income that is spent on labour costs. Best used to compare with others to tell whether a firm is spending more or less on labour to generate its sales and other income.

127. StatsNZ was able to provide these ratios for large, medium, small and micro businesses for the residential construction sector (E301 ANZSIC code), non-residential construction (E302), and construction services (E32). The size levels are quartile levels based on turnover, meaning that the cut-off point for each level changes slightly each year in recognition of the shift in firms included in the quartiles. The levels are also different for each of the sectors, as the turnover levels for a large construction services firm is different to a large residential construction firm.

128. These size bands are different to how we have categorised sizes in the previous section. The largest residential builders comprised 1% of total builders in the previous section, while the large size band in the section comprises the top 25% of residential construction firms. This means that in this section it is best to think of 'large' to mean the majority of large and medium sized builders as described in the earlier section, and 'medium' to mean the remainder of medium sized builders and the top 10–15% of small residential builders.

Table 19. Comparison of size definitions between sections

	Previous section	This section
Large builders	Top 1%	Top 25%
Medium builders	Top 35%	Those between 50% and the top 25%
Small builders	0% to 64% of builders	Those between 25% and 50%
Micro builders	N/A (included as part of small)	0% to 25%

129. We focussed our analysis on the current ratio, liability structure, and return on total assets. Our initial look did not suggest that quick ratios were telling a significantly different story to the current ratios, and the salaries and wages/turnover ratio demonstrated significant variation across years and size of firm (making it difficult to draw any conclusions from the data without further examination which was beyond the resources available for this project).

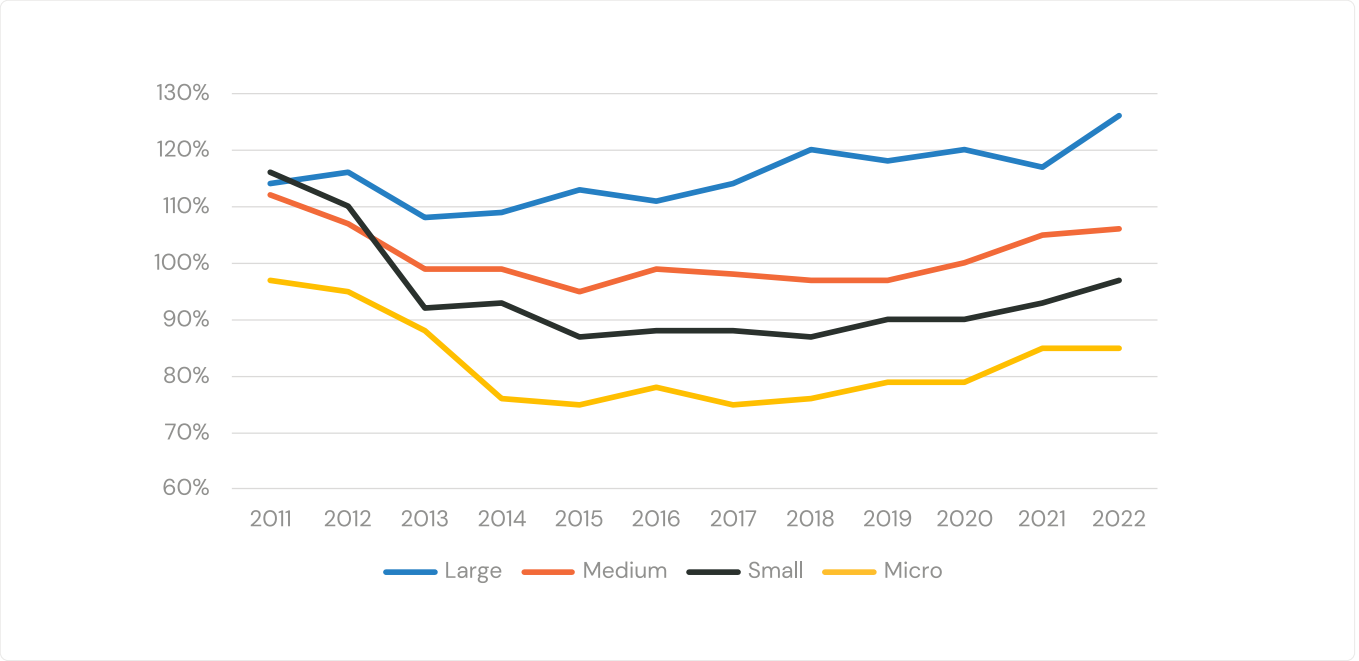
Current ratio

130. Current ratio medians for large residential firms dropped between 2011 and 2013, and slowly improved from 2013 to 2022. Over this time the minimum current ratio value for large residential construction firms has improved from 70% to 92% – meaning nearly all large residential construction firms had a current ratio above 100%.

131. A similar improvement in minimum current ratio values is also noticeable for medium-sized residential construction firms (from 50% in 2011 to 67% in 2022). However, the median current ratio value for medium-sized residential construction firms has hovered around the 100% mark throughout the 2011-2022 period, and was below 100% for 7 of 12 of those years. Median current ratios for small and micro residential construction firms spent 10 and 12 out of 12 years below 100% respectively, although the maximum current ratio values for small and micro residential construction firms were higher than for large and medium. The minimum current ratio values for small and micro residential construction firms did improve over this time period, but only marginally (from 17% to 24% for micro, and from 36% to 46% for small).

132. To have more than 50% of small and micro residential construction firms with a current ratio below 100%, and only minimal improvement in the median and minimum values over the last decade, suggests that this is an issue in terms of resilience. The majority of small and micro residential construction firms are effectively reliant on forms of financing to cover their short-term obligations (wages, materials, tax), making them vulnerable to changes in the market or other external shocks.

Figure 15. Median current ratios for residential construction firms



133. It would be valuable to identify the age of these small and micro residential construction firms to identify if the majority of them are less than 3 years old (i.e. the high-risk age for construction firms to be liquidated). This could show that these early years are when these firms build up sufficient assets to survive market downturns, but in the meantime are exposed to shocks. This data should be available from the Inland Revenue information, or would otherwise require matching the data from Inland Revenue to Companies Office records.

Liability structure

134. The current ratio (and quick ratio) suggests that residential construction firms carry high levels of debt, with small and micro firms likely to have very high levels of debt. However, in 2022 medium, small and micro firms had very similar liability structure ratios of between 10% and 20%, with large residential construction firms at 22%.

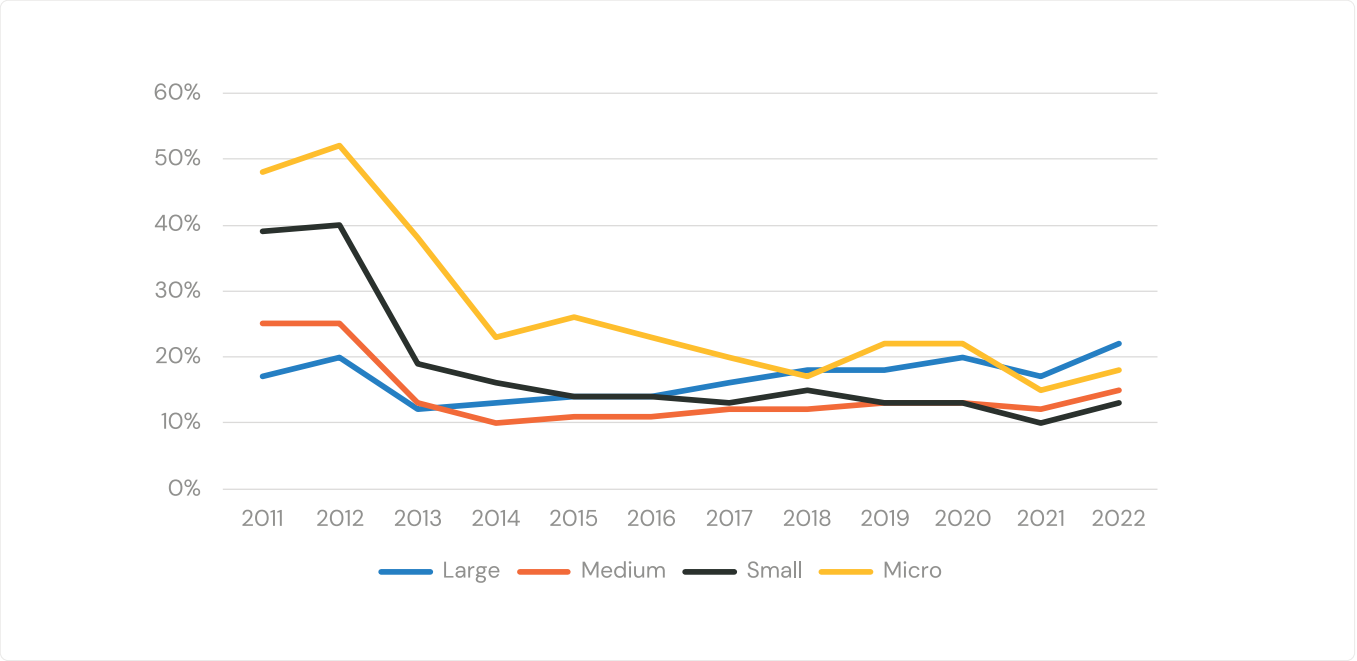
135. However, this has been a significant drop for micro, small and medium residential construction firms who in 2012 had liability structure ratios of 52%, 40% and 25% respectively. These ratios dropped sharply through till 2014.

136. Large residential construction firms also saw their liability structure ratios drop between 2012 and 2013 (from 20% to 13%), but have steadily improved through to 22% by 2022.

137. The maximum values have decreased for all four sizes of residential construction firms, with the maximum value for small firms decreasing the most from 80% to 63%. The minimum values for large and medium firms have improved slightly (from -7% to 2% for large firms, and from -6% to 0% for medium), with small and micro firms seeing no improvement in their minimum liability structure value.

138. In terms of resilience, the shift over the last decade for residential construction firms to have much lower levels of equity (as measured by the liability structure ratio) means that the sector is less resilient. Creditors are less likely to receive payment on wind-up if a firm relies more on debt (with debt holders taking priority in any payouts). The improvement in minimum values for large and medium sized firms have helped to lift the medians for those firms, but not to the point that they are significant less reliant on debt than small and micro firms.

Figure 16. Median liability structure ratios for residential construction firms



Return on total assets

139. While a low liability structure indicates increased risk for creditors if any liquidation or wind-up occurs, it can have benefits for owners as long as they are able to achieve a return on assets that is greater than the interest rate paid to creditors.

140. The majority of creditors for most residential construction firms tends to be material suppliers, who only charge interest on outstanding payments. Vehicle lease costs, overdraft costs and any land holding costs (if the firm undertakes developments such as speculative builds) would represent the main interest-bearing creditor costs.

141. The median return on total assets for large residential construction firms has steadily increased from 3% in 2011 to 12% in 2022. This improvement has occurred alongside improvements to current ratio and liability structure medians.

142. By increasing return on total assets at the same time as liability structure indicates lower risk for creditors (due to more equity in these firms) and also higher returns for owners. The top 50% of large residential construction firms have also improved returns, lifting the maximum return from 20% to 31% over this period. This suggests improved resilience on a number of financial fronts, rather than just one financial area.

143. The picture is less rosy for medium and small residential construction firms, who struggled to lift above their median return on assets above 5%, and ended 2022 at approximately the same level as in 2011 (3% in 2022 and 0% in 2011 for medium, 1% in 2022 and 0% in 2011). The maximum return on assets for small residential construction firms fell from 73% in 2011 (and peak of 88% in 2016) to 43% in 2022 – a much higher maximum than for large firms but more variable. The maximum for medium sized firms has been much steadier – moving between 21% and 27% over the same period.

144. The median return on assets for micro residential construction businesses has been much more volatile than for other sizes over the 2011 to 2022 period. From 3% in 2011 it peaked at 26% in 2016 before falling back to 6% in 2021 (and up to 11% in 2022). This volatility is even more pronounced in the maximum value for micro firms, ranging from 177% to 260% over this time period. This likely represents the very low level of assets for many of these micro firms, meaning that the return on total assets can be high with quite low net profits.

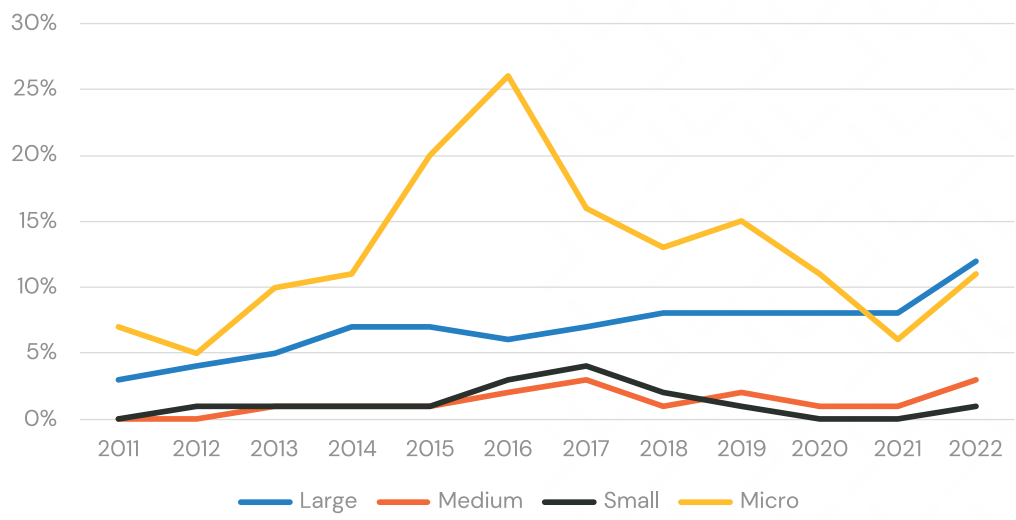
145. The low levels of median returns on total assets for medium and small, taken alongside low liability structure ratios, suggests that these firms have not improved resilience over the last decade (and are arguably less resilient). Creditors are more exposed due to the lower levels of equity than a decade ago, and at least more than 50% of these firms are not achieving returns much higher than the interest payable to creditors.

Case study segmentation based on interviews

146. Our proposal for LR16275 noted that the intended audience for the research was small, medium and large residential construction businesses. They are after practical, easy-to-digest guidance that they can relate to their specific circumstance and business model, rather than generic guidance.

147. To meet this need, we proposed using case studies alongside the self-assessment tool as part of communicating our work. The case studies would help illustrate how the various business model segments and scales relate to key system resilience issues. This will help industry understand how the findings relate to their specific model and scale, and also serve to communicate lessons.

Figure 17. Median return on total assets ratios for residential construction firms



Persona categorisation

148. We have categorised our interviewee persona on five categories:

- Build approach – On-site conventional timber framed, On-site 'other', Off-site full build transported, and Off-site prefabricated (built on-site).
- Span of operation – Develop land & do build, Speculative build (purchase developed section and build house for later sale), Design & build for client, build only.
- Legal entity – Company, non-company.
- Size of builder – Micro, Small, Medium, and Large. (align to our ER29 categories)
- Association – Independent, Franchisee, Franchisor, Subcontractor.
- Geographic reach – National, multiple-regions, local.

149. Each of these categories was set prior to identifying interview participants and then the detail within each category refined following interviews. Our initial requests were designed to ensure we heard from residential construction businesses across the categories, and as responses for interviews came in we recontacted those we had not heard from in an effort to achieve a good category mix. Our goal was to achieve responses from:

- Both a franchisee and franchisor (who are predominantly on-site builders – very few off-site residential builders are structured as franchise businesses at this stage).
- Mix of national and local, and medium and large across these.
- Representation of off-site and on-site builders.

150. Table 20 below sets out the segmentation mix achieved from the interviews. This mix is used as our case studies to highlight the issues relevant to the different types of residential construction businesses.

Table 20. Outline of interview segmentation

	A	B	C	D	E
Build approach	Off-site, transported	On-site, conventional	On-site, conventional	On-site, conventional	On-site, conventional
Size of builder	Medium	Large	Medium	Large	Medium/Large
Association	Independent	Independent	Independent	Franchisor	Franchisee
Legal entity	Company	Company	Company	Company	Company
Span of operation	Build only	Land & build	Spec build + Design & build	Design & build	Design & build
Geographic reach	National	National	Local	National	Local
N	n=2	n=1	n=2	n=3	n=2

151. It was not possible to match each of the interview categories to the liquidations analysis and literature review. There was limited segmentation discussion in the literature, with most simply noting the differences between large and small construction firms. While it would be possible to associate liquidated companies with most of the categories, this would take significant manual work which was beyond the scope of our research.[15]

152. One area of crossover between the businesses we interviewed and the liquidator analysis was the age of the business. Liquidation analysis showed that 65% of residential construction businesses were liquidated within 5 years. All of the businesses we interviewed had been operating in one form or another for at least 4 years.[16] Liquidation analysis indicates that younger residential companies face different resilience pressures to older ones, with IRD and creditors being more likely to a younger company into liquidation.

15 The Companies Office and liquidation reports do not hold most of the information required for the categories, so each liquidated company would have to be researched through other sources (consent records, media reports etc) to identify the information needed.

16 This also includes previous forms of the business – for example, some had changed name (but remained the same company), and others had used a variety of companies for developments but had consistent directors and shareholders across the variations.

Common resilience concerns

153. The dominant way of thinking about resilience was in terms of being able to survive and navigate tough market conditions. The businesses we interviewed defined or talked about resilience in four ways:

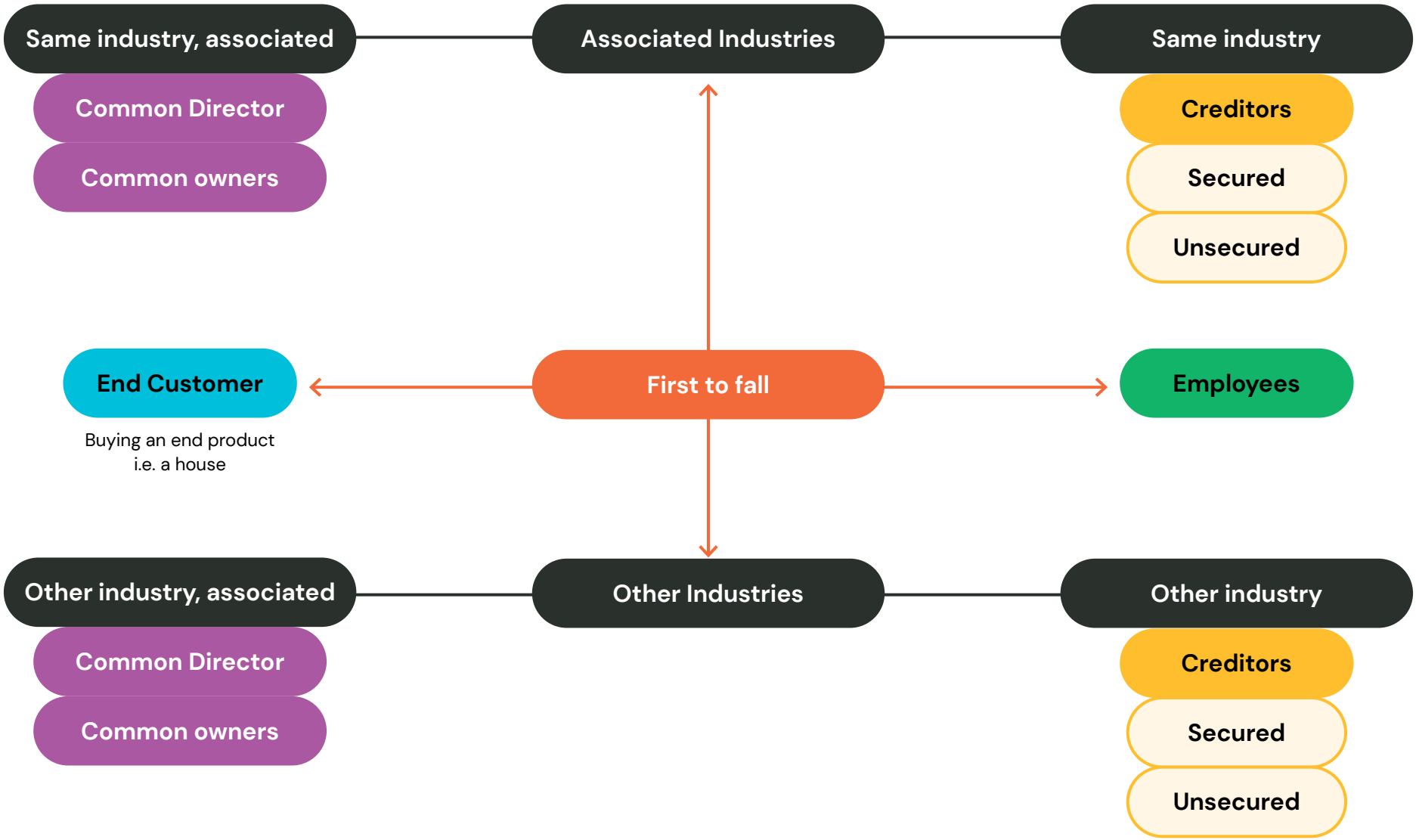
1. Having a strong focus on financials, making sure that their practices meant they had good financial foundations if any downturn occurred.
2. Making sure their suppliers and subcontractors were sustainable and resilient (with 4 businesses mentioned supporting their suppliers in some way such as training or mentoring).
3. Being constantly attuned to market direction, mostly through sales but also a focus on competitors.
4. People and culture was highlighted by half of interviewees as an important part of resilience.

154. While these were common across the businesses, there were differences in terms of how they responded and prepared for each of these. These differences related to the particular business model approach and also the scale of their operation. In general, larger businesses were more structured in their approach to resilience aspects, and particular business models highlighted factors more than for others.

Table 21. What matters to which segment?

	Key factors for segment	Challenges for resilience	Managing resilience
A	Standardisation from manufacturing approach	Need to keep teams busy/factory moving or else cost per house goes up. Breadth of sales & marketing – can't rely on one or two areas to carry. How to get more standardised – every reduction in time is saving.	Quality as part of brand & marketing – builds trust. Build in a factory means able to be more efficient and control more. Reduce reliance on capital by having shorter production – carry less risk per house.
B	Geographic reach gives flexibility	Finance hungry – access to capital biggest limiting factor. Having a very good read of market so have as much time as possible to adjust.	Wide range of information used to identify market shifts and where best to spread development. Reduce reliance on bank funding until later in project. Diversity of projects across regions.
C	Stuck between two scales – cost of being medium without benefits of being large	Overheads high at a medium-scale. Ride local economic fortunes. Don't get benefits of large scale (buying power, geographic spread etc).	Use contractors to supplement own crews during busy times, don't lock in until growth steadies. Mix of activity locally – develop, spec, renovations, rentals. Reserves from good times which means can survive tougher times.
D	Leveraging the benefits of scale & spread	Developing leadership of franchisees. Getting clear point of difference for sales & marketing. Maintaining & growing market share.	Constantly working with supply partners to ensure they can respond and are sustainable. Quality as part of brand – leverage marketing scale. Get to see information at a system-level that individual builders wouldn't see till late.
E	Applying benefits of franchise scale at local level	Local market fluctuations. Small team pressures. Client desire for plan changes.	Active assistance from franchisor on business management. Purchasing power of larger group. Cooperate with other franchisees where possible.

Liquidation analysis – domino or web effect?



A self-assessment tool for resilience

155. Our initial intention for this research was to develop a resilience self-assessment tool that could be used by residential construction firm over time. The goal for the tool would be to provide feedback relevant to the scale and maturity of the residential firm based on their inputs.

156. We undertook a review of available self-assessment tools to identify the different approaches taken – including the format of the tools (web, PDF, etc), the nature of inputs used, how outputs were presented. Our literature review also captured research publications related to failure prediction for construction businesses – these were primarily focussed on financial ratio analysis.

157. When interviewing industry bodies we became aware of three New Zealand self-assessment tools focussing on the construction sector. Two were still in development, and one has been operating for a number of years but is in the process of being redeveloped.

Failure prediction from the literature review findings

158. We found in our analysis that a large proportion of the academic work on construction business failure is about failure prediction (usually failure by bankruptcy) (Abidali & Harris, 1995; Punsalan, 1989). General and construction businesses alike also share the same methods for failure prediction, from simple, easy to theorise methods to more complicated ones. The most common and easiest to understand is financial ratio analysis. Broadly speaking, these involve values that can be obtained from financial statements, that are then used to create ratios that fall into one of several categories, for example: liquidity, liability, and profitability. An example of a specific ratio is the "current ratio", which is obtained by dividing current assets by current liabilities. This is a measure of how well a business can meet its short-term liabilities.

159. A more complex method is to use multivariate discriminate analysis (MDA), which combines multiple characteristics (often financial ratios) into one analysis. Often they are combined into single value, the most common of which is termed the "Z-Score" (Abidali & Harris, 1995). Even more complex methods exist, for example, in the statistical analysis field there is Logit (standard logistic distribution) and Probit (standard normal distribution) analysis, and in the artificial intelligence and machine learning fields there is the use of support vector machines (SVM), classification and regression trees (CART), and big data analytics via neural networks (Alaka, 2017; Bal et al., 2013; Karas & Režňáková, n.d.; Thanh-Long et al., 2022). Interestingly, out of all of these methods Alaka (2017) concluded that the ratio analysis made the better predictions.

160. A good overview of the history of prediction methods can be found in *Company Failure in the Construction Industry: A Critical Review and a Future Research Agenda* (Horta & Camanho, 2013) and *Financial Cash Flow Determinants of Company Failure in the Construction Industry* (Ismail, 2014). Ismail (2014) found that the problem with financial ratios and MDA models (to name but two) is that they are classifying, rather than predicting. It follows that a firm in bad financial shape is likely to fail, but that doesn't require any special analyses. They then go onto propose a cash flow model for a better prediction method (Ismail, 2014).

161. Sousa et al. (2022) suggest that the usefulness of certain ratios for bankruptcy prediction are time dependent; while cash flow/total assets ratios are useful for short- or medium-term prediction, current liabilities/total assets ratios are only useful for medium-term prediction. They also describe the use of different predictive values at different economic levels. For example, at the microeconomic level, there are the usual financial ratios around solvency, cash flow, total assets, and liabilities and at the macroeconomic level there are larger-scale values such as gross domestic product and enterprise birth rate that can predict business failures (Sousa et al., 2022).

Review of self-assessment tool approaches

162. Our online review of self-assessment tools focussed primarily on tools that assess business resilience, but to get an idea of the full possibilities of format, input, and output, we widened our search to include business self-assessment tools of all types.

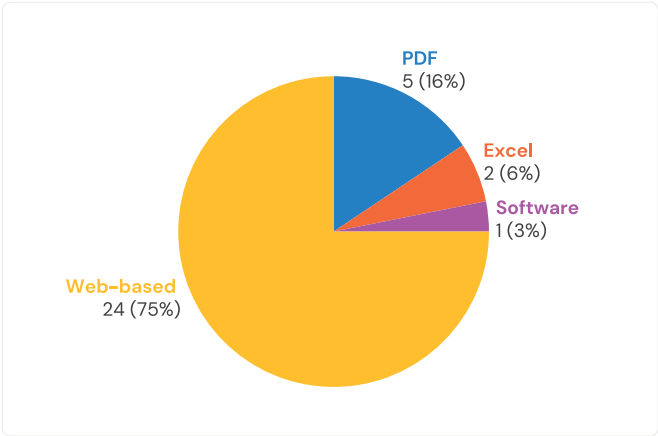
163. We examined 33 self-assessment tools were examined, with 10 of these deemed of "High" relevance as they were targeted to business resilience specifically. Most of the others were highly specialised resilience assessment tools for specific industries, for example:

- farming business resilience
- food business resilience
- non-profit resilience
- pandemic resilience
- hazard resilience.

Self-assessment tool formats

164. Most of the tools were web-based (75%), with the remainder being PDF questionnaires or Excel spreadsheets, and one example of a software package. Of the 33 tools, 9 either became inaccessible during the review, required some sort of special membership for access, or required a relatively expensive purchase. Taking away those that we could not directly examine, the mix was similar, with the majority (70%) still being web-based and the remainder being PDF or Excel.

Figure 19 - Self-assessment tool platforms



165. The preference for web-based formats is most likely due to the ease of collating responses from multiple users and for the ease of updating over time. While the formats have the benefit of being able to be used offline, they are much less conducive to collation from a large number of users.

Self-assessment tool inputs

166. The surveyed tool inputs could be generally divided into two categories: quantitative and qualitative.

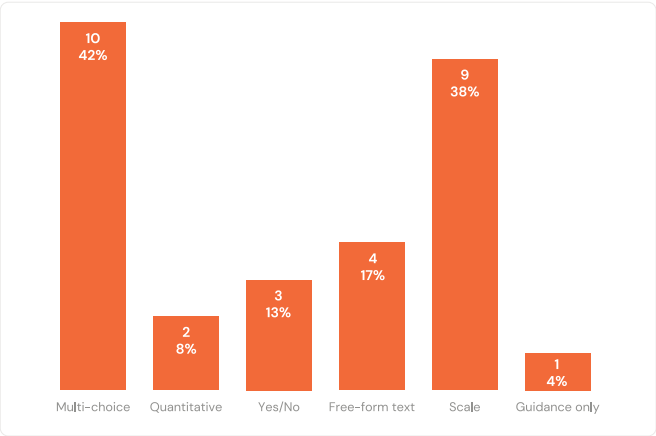
167. Quantitative inputs included values such as the worth of assets, liabilities, and revenue. Only two of the assessment tools (9% of the sample) relied solely on quantitative inputs. The rest relied on qualitative inputs such as free-form text or multi-choice questions, and one was guidance-only. The multi-choice questions were of the following form:

> Yes/No questions - 3 tools (13%).

> a scale representing the degree of agreement, priority, or some other rating – 9 tools (39%).

> general multi-choice questions – 10 tools (43%).

Figure 20 - Input types of reviewed self-assessment tools



168. One tool was strictly "guidance only". It was a tool in that it detailed a method of business analysis, but it did not apply an automated assessment. All four tools that had the ability to enter free-form text also had multi-choice questions. Only one qualitative tool had a mix of multi-choice question types: agreement scales and general multi-choice.

169. We did not find any self-assessment tools that relied on an automatic or on-demand draw of information from other systems, such as accounting of financial information systems. Financial values were required to be inputted manually by the user. When matched to the need to provide qualitative information (whether free-form or multiple choice), this manual input requirement lifts the level of effort required by the user.

Self-assessment tool outputs

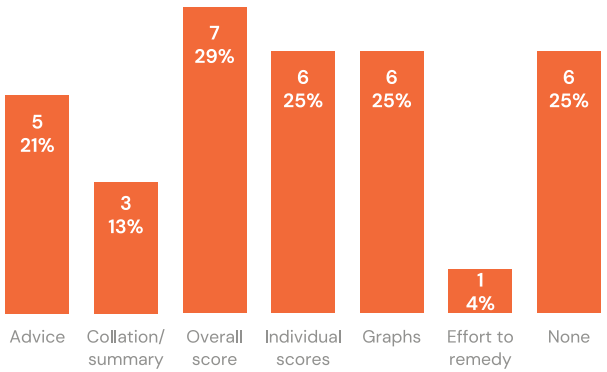
170. Of the 24 accessible tools, 6 (25%) had no outputs. These were almost all PDFs, where the tool was a list of multi-choice questions to be used as a checklist. Essentially, the input was the output.

171. Almost half of the remainder (7 tools, 29% of the total) generated an overall assessment score. In the case of those that relied on multi-choice questions (almost all) this was generated by a weighted formula based on the choices made.

172. Three tools provided some sort of summary of responses at the end. This was usually a simple collation of the choices made.

173. One of the main purposes of using a self-assessment tool is to get an idea of what you can do to improve, so it is a surprise that only 5 (21%) of the tools supplied some sort of advice in their assessment. Of these, 3 provided advice per response, based on the choice made, and 2 gave some overall advice at the end. Only one tool, the Protiviti Resilience Navigator, gave feedback on the amount of effort required (in terms of weeks), though this is based on user input during a priority setting exercise rather than some sort of software "smarts". Only 6 (25%) used graphs to visually illustrate the assessment results.

Figure 21 – Output types of reviewed self-assessment tools



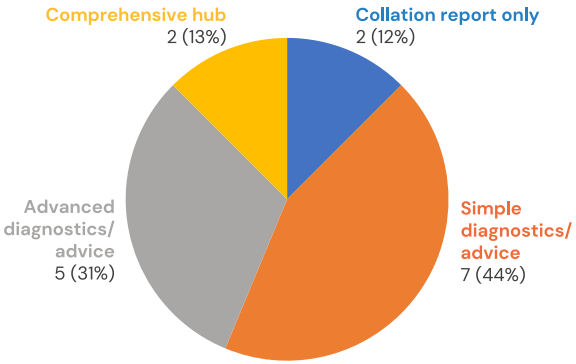
174. Of the 24 accessible tools, 6 were PDFs and had no output (as mentioned above – these tended to be more 'compliance-like' where the input was the output). Of the remaining 18, one promised to "compile the results of your survey" and respond by email (no response was received) and one was withdrawn from service during the time of our review.

175. The richness (the variety, breadth, and comprehensiveness) of output varied widely across the remaining examples. Two of the tools supplied a collation of responses only. These were both safety-based assessment tools and are probably more intended as a safety adherence checklist.

176. Most of the tools supplied diagnostics and advice of varying degrees of complexity. These can be divided into "simple" and "advanced". At the simple end, tools provide only one or two outputs: for example, one piece of simple advice per question, or a score per question and an overall score. At the advanced end, these are enhanced with graphical outputs and combining advice, scores, and summaries together.

177. Two of the tools, the "Global Business Services Maturity Assessment" and the "B Impact Assessment" provided more of a comprehensive online hub for respondents. This allowed features such as saving and updating of results, report generation, dashboards, access to historical input and outputs, and comparison with peers. This range of features makes the self-assessment tool much more usable – for example, having a 'save' function makes the task of manually inputting information slightly more achievable for time-constrained business owners. Being able to generate reports with comparisons to peers also lifts the potential insights that the self-assessment tool can provide.

Figure 22 - Richness of output of reviewed self-assessment tools



Range of assessment areas

178. A number of the self-assessment tools reviewed were relatively narrow in their focus in terms of covering only a small number of business aspects (financial, people & culture, leadership etc). This made the tools easy to complete and likely to appeal to users that needed quick feedback and the option of following-up with further detail. Many of the self-assessment tools were provided by companies who offer the follow-up services (effectively serving as an introduction to the services, giving users the chance to check if they needed the service).

179. A small number of the self-assessment tools provided more comprehensive assessments. These were often in support of ongoing software or other solutions that would help the business track their particular resilience risks and improvements.

Figure 23. Range of assessment areas covered by self-assessment tools

Categorisation questions (captured once)

For example:

- Type of entity (company, sole trader, partnership, trust)
- Size of business (by employees, by turnover)
- Geographic area of operations
- Industry classification (at various levels)

Financials

For example:

- Cash ratios
- Cashflow tracking
- Asset & liability ratios
- Debt & equity
- Expected forward revenue (and prior sales)

People & culture

Supply chain

Leadership and strategy

Sales and marketing

- Assessment of demand
- Range of work being targeted
- Plans in place
- Targets (channels, clients etc)
- Tracking against targets

Organisational design

- Systems and processes
- Management layers and approach
- Compliance

Stakeholders

- Customer information
- Client recruitment

Compliance and risk management

Information technology

New Zealand construction sector self-assessment tools

180. BizRate was developed by New Zealand Construction Industry Council and Construction Sector Accord in partnership with a number of trade associations.[17] Businesses purchase BizRate for a $190 one-off payment and enter their financial, commercial and operational performance data. They are then able to receive a report based on their information that measures how well their business is performing and if there are any areas for improvement. This report also benchmarks the business against others in their industry. An anonymised industry-level report is provided to partner associations so that they can understand sector trends and identify focus areas. There is a strong focus on identifying 'what good looks like' and helping industry and businesses improve.

181. The BizRate tool categorises trades in three main groups:

- Lead/principal contractors – larger scale contractors where business engages directly with end buyer, with labour costs being 50% or more from subcontractors. Includes civil contractors, residential builders and commercial fitouts/interiors.
- Applied services/manufacturing – business involves a greater proportion of manufacturing or larger asset bases combined with labour in the delivery of their goods/services. Includes steel fabrication, HVAC/climate control manufacturing and installation, scaffolding, concrete – precast and pumping, window and joinery manufacturing and installation, excavations and commercial drainage.
- Specialist services – businesses providing services and materials purchased from wholesaler, and labour costs are less than 50% from subcontractors. Includes plumbing, drainage and gas fitting, electrical, roofing, glazing, painting, carpentry, HVAC/climate control servicing, and concrete placing.

182. Businesses are then also categorised by size, with number of employees used as the defining factor. Large businesses are defined as those with over 50 employees, medium size having 10 to 50 employees, and small with less than 10.

183. When we talked to the Construction Sector Accord representative they were in the process of reviewing BizRate and scoping improvements. One of the difficulties they had faced when it was initially developed was achieving the number of users to enable valid comparisons across industry, especially when comparing to other businesses within one of the three categories and also by size (especially for large and medium businesses). Finding ways to increase usage – including making it easier to enter information – was a focus for any improvement of BizRate.

184. We also talked to an industry body and Callaghan Innovation who were both developing their own self-assessment tools. Callaghan Innovation had partnered with the Construction Sector Accord to develop the Construction Activator – a service designed to support construction businesses to improve and grow.[18] It would include a self-assessment tool that would help identify the type of services that could be subsequently offered to and accessed by the construction business. When we used the tool it was quite high-level (almost a 'triage' approach), and not designed for benchmarking or ongoing use. More detailed analysis would be undertaken for the business at later stages of the Activator. The self-assessment tool and the Activator were not targeted toward any particular segment of the construction industry or size of business.

185. The industry body we talked to had also been exploring the development of an assessment tool, and potentially a self-assessment tool. They were also involved with the other self-assessment tool developments occurring in the industry and were considering how their tool would fit. We understand their tool would be specific to their members and focus mostly on financial matters in order to determine risk factors relating to one of their membership products. The industry body was open to having some type of improvement feedback as part of their tool, and to link with other tools for non-financial assessments if possible.

186. We also became aware of a planned initiative by the Vertical Construction Leaders Group.[19] The group has proposed the development of a self-assessment tool that would support an accreditation and/or licensing scheme, helping clients to identify whether a construction business is credible and sustainable – 'what good looks like'. It supports a vision for the New Zealand construction industry expressed by the Vertical Construction Leaders Group Chair Rick Herd in a BRANZ Build article – one where large, financially stable national head contractors work with smaller regional building contractors and accredited subcontractors to deliver high quality work.[20] It was unclear whether the proposed self-assessment tool would be purely for accreditation and/or licensing or would also provide individual businesses with personalised feedback on how to improve performance and subsequent tracking.

17 Including Master Plumbers, Master Electricians, Roofing Association of New Zealand, Climate Control Companies Association of New Zealand, and Steel Construction New Zealand. See https://bizrate.nzcic.co.nz/.

18 See https://www.callaghaninnovation.govt.nz/stories/construction-sector-accord-and-callaghan-innovation-team-up/.

19 See https://www.verticalleaders.co.nz/, and Nicholas Pointon, Construction accreditation scheme to weed out 'piss-poor' firms, National Business Review, 23 August 2023 (https://www.nbr.co.nz/business/new-scheme-looks-to-weed-out-piss-poor-construction-firms/ - subscription needed to access).

20 See https://www.buildmagazine.org.nz/index.php/articles/show/vision-for-our-construction-industry (1 August 2022).

Defining the focus of any self-assessment tool

187. Our project was based on any self-assessment tool being used by individual businesses to improve their resilience. This would require covering financial as well as non-financial aspects of resilience, providing some form of regular engagement and tracking to encourage improvement over time. It also places the individual business at the core user, with any broader sub-sector or industry needs as secondary. Our intended self-assessment tool focus assumed:

> The outcome is focussed mostly on providing individual users with information that they can use to improve their business.

> Any comparison to other business or 'system-wide' views are derived from individual information sets (which may not collect information that is relevant at a system level, as the focus is on individual).

188. If self-assessment information is still a goal, but not the primary one, then this will change the type of information collected and potentially the way it is collected. Two other focuses could include accreditation (collecting information to assess a business against predefined criteria) and system-picture (information that helps assess the health of the system overall).

Table 22. Three possible focusses for a self-assessment tool

Accreditation	Only information related to the criteria for assessment, which ideally would include resilience. The Vertical Construction Leaders Group's proposed tool is an example of an accreditation tool.
System picture	Information about the resilience of the system as a whole, which would likely require information beyond just the sum total of individual business resilience.
Self-assessment	Only information relevant to the assessment of resilience of an individual business, with the ability to compare to peers, and to aggregate up to at least sub-sector level and ideally industry-wide.

Table 23. Interactions between primary and secondary focusses for a self-assessment tool

		Primary purpose		
		Self-assessment	**System picture**	**Accreditation**
Secondary purpose	**Self-assessment**		Capture wider information in return for providing individual self-assessment. Would need clear disclose on how wider information is to be used to avoid any trust issues.	Would allow feedback on where business sits compared to other accreditation applicants, but unlikely to cover all aspects of resilience.
	System picture	Works if system picture is sum of total individual business responses. May be able to ask for additional information for system purposes if disclose/ allow opt-in.		Would give system picture across accreditation aspects only. Difficult to seek wider information due to trust around if it is being used as part of accreditation.
	Accreditation	Unlikely to cover all aspects of accreditation. Would need to be clear distinction of outputs if both are to be provided to business.	Likely to be tension between breadth of information required for system picture and that needed for specific accreditation purpose, raising trust issues.	

189. While it is positive that the industry is looking at self-assessment tools as one way of improving the resilience of the sector, we were concerned about the number of tools being developed and the different purposes and segments being targeted. Given one of the lessons from the initial development of BizRate was the need for high numbers of users, it seemed to us that a smaller number of self-assessment tools that can cover the range of needs is preferable. This could be achieved through making an accreditation tool mandatory, otherwise it may miss important groups of construction companies that are not focussed on the type of work being accredited for. We also felt that providing users with personalised feedback that is contextualised to their part of the industry and where they can improve themselves would be an important part of ensuring a continual improvement focus for industry.

An 'ideal' self-assessment tool

190. We have assumed that the primary purpose of the self-assessment tool is to assist the construction business with improving their resilience and sustainability, with a secondary purpose of obtaining industry and system-wide insights from aggregated data.

191. A web application is the best format for achieving the primary and secondary purposes. Since few small and medium-sized construction businesses spend significant time at a desktop computer, the web application should also be configured for high user experience on a mobile device (most likely a smartphone).

192. Outputs should favour visual, illustrative display (using graphs or interactive controls) in order to make the results as easily digestible and understandable as possible for users. Complex dashboards should be avoided – step throughs in bite-sized section would likely be preferred and should be tested with users.

193. Ideally, there should be some sort of rating/scoring applied for each theme of the self-assessment tool. Some of these themes may be entirely financial in nature (for example, a score based for solvency), some may be entirely based on survey input (for example, for resilience planning), and some may be a combination of both (for example, a score on R&D). Additionally, there should be some sort of overall score or rating, including indicating direction of travel.

Both quantitative and qualitative

194. In terms of measuring business health and resilience, quantitative inputs include standard accounting information items like income, expenditure, assets and liabilities, and also ideally also some information on expected forward sales. These figures are often used to calculate a quantitative, reproducible score, such as an overall 'Z-score' or a range of basic ratios used in financial analysis.

195. Financial analysis by itself does not give the full picture about resilience. Financial stability is a core feature of resilience, but there are other non-financial qualities of resilience that are best expressed qualitatively. To assess these qualities, the best method seems to be the use of multi-choice questions. These can be in the form of general choices, Yes/No, numerical scales, or any other multi-choice method, the combination of which would give an overview of the qualities we want to measure.

196. The prime advantage of multi-choice is that they are quantifiable, regardless of their potentially qualitative expression. That is, it is easy to draw statistics from them. Additionally, from the answers we can easily determine what feedback should be presented to the user.

197. In theory we can get similar data from free-form text answers, but this would require either textual analysis by human beings (aided by qualitative analysis software such as Quirkos) or developing a trained AI to do so – both of which would require significant time and/or expertise. The benefit of the latter approach is that it may be able to pick up other contextual or thematic issues from the freeform text inputted by users, helping to identify issues beyond the specific question being asked.

Past, present and future

198. Most measures of business health and resilience give only a snapshot of where a particular business is at. By itself this can be an indicator of whether a company is likely to face liquidation in the future, but only because companies that aren't very healthy (e.g., nearly insolvent) are more likely to be in danger. This does not require any special data science or predictive capability, it simply requires comparative statistical analysis.

199. If a company has planned for future work that is likely to change a company's circumstances, a snapshot is unlikely reflect this. Likewise, a snapshot may be of the company in an unusually good or bad position, compared to the normal period-to-period trend. Therefore, an ideal self-assessment tool would cover:

> Historical financial data to support any trend and/or pattern analysis.

> A snapshot of the current company health (usually through traditional ratio analysis).

> Future predicted financials; perhaps with an indicated degree of likelihood.

200. As our liquidations analysis showed, the companies that are likely to benefit most from a self-assessment tool are those within the 3-year 'danger period' since being formed. This means that historical data for that specific business may not be that useful, and the use of a comparison set from other similar companies is more useful to determine any risk factors.

201. For the majority of small construction businesses it is unlikely that they will have any financial forecasts, let alone ones that extend to 2 or 3 years. It may be preferable to have an easy option for users (asking whether they expect the next 12 months to be better, the same, or worse than the last year), a middle-ground option allowing users to identify how far ahead they have work booked for, and a 'expert' option for those that have financial forecasts.

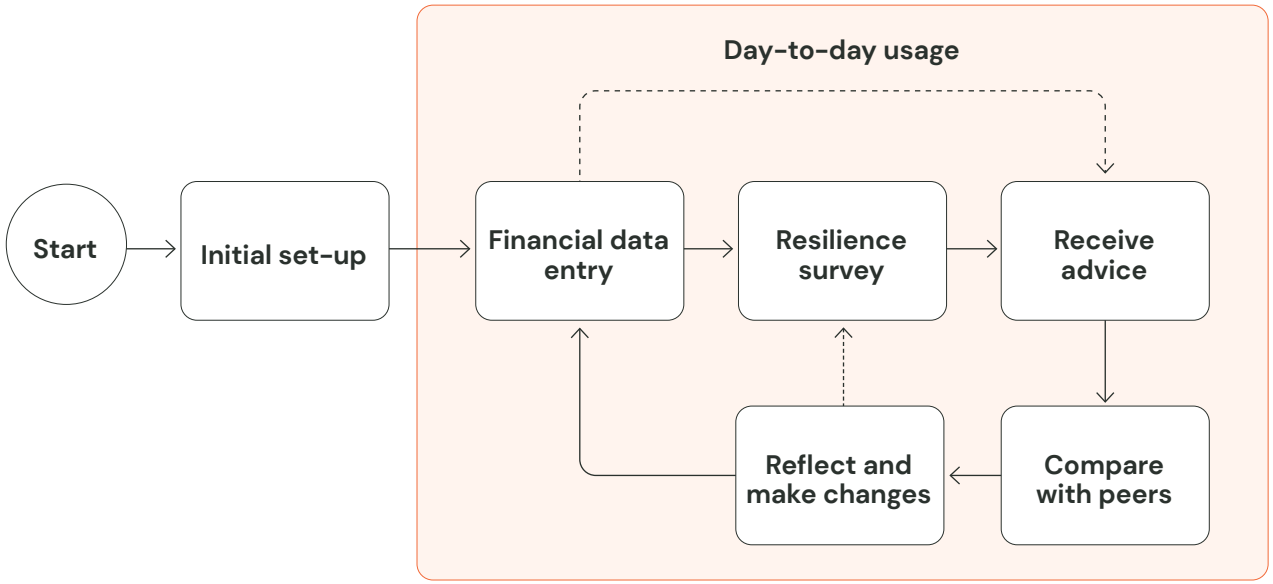
202. Identifying when to pursue growth and expand is arguably more important (or equally important) as predicting potential failure. Our view is that a self-assessment tool needs to help a construction business know if any projected growth is feasible given other financial and non-financial factors (such as existing asset and/or equity strength), rather than simply highlighting financial risks. Again, this is likely to rely on comparison to the positions that similar business grew successfully from.

Workflow

203. Data entry for a business will likely be in four phases:

1. Initial business description set-up.
2. Financial data entry.
3. Resilience survey entry.
4. Results received: Comparison, advisement, and reflection.

Figure 24. High level schematic flow of self assessment tool



Initial set-up

204. The NZBN (New Zealand Business Number) registry is a good repository for non-financial business metadata. NZBNs are an ideal way of identifying businesses individually and can be used to automatically import some business data.

205. This data includes:

- Business type.
- Industry classification (ANZSIC code and description).
- Trading name(s).
- Registration date.
- Location data (generally the office address or address for service).

206. This data can be fetched from the NZBN using a public API, assuming the NZBN of the business is known. If the business does not have an NZBN then there should be the option of manual input. In some cases, this could be grabbed from the accounting system, or if there is IRD integration, from the IRD (note that IRD BIC codes can be easily mapped to ANZSIC codes).

207. Another benefit of using the NZBN is that it can be used to collect linked data from the likes of Accident Compensation Corporation and the Companies Office and its associated registers. This would require prior approval of the user, but would open up the potential for understanding wider context issues.

208. The user should be prompted to enter their business's NZBN (if available). If they don't have one, they should be prompted to set one up. This would direct them to the NZBN website. If not available, these can be entered manually, with set fields such as business type and industry classification being selected from a controlled list.

209. Additional set-up information may include:

- A contact email (if different from the login email).
- 3rd party login credentials, if needed.
- Notes about the business (e.g., a general business description allowing reference to industry descriptions).
- Additional company data, such as employees/FTEs, areas of operation.
- Setting up multi-factor authentication or other suitable security layer.

Financial data input

210. Manual input of financial data should be avoided due to its time-consuming nature and opportunity for mistakes – no-one wants to spend hours finding and then typing in financial information. As BizRate experience showed, few small and medium construction firms will find the effort required to manually input information worthwhile, resulting in low uptake.

211. Ideally, we would draw from accounting systems being used (for example, Xero, HNRY, or MYOB). This could be done via available APIs (requiring 3rd party authentication) or at worst, import of a structured export from the accounting system (for example, CSV or Excel).

212. Automated import of data would allow us to go beyond merely analysing a snapshot of a business's financial health, and instead analyse data en masse. This would allow the easier creation of historical snapshots, which in turn would help with determining trends and making predictions around resilience. Ideally a regular automated feed would be allowed for, either actioned with a prompt by the user (potentially as an opt-out reminder) or if prior approval is obtained then an automatic feed at specified intervals.

213. Another source of automated data import could be from Inland Revenue. However, there is a long time-lag on this information, and the IR10/IR4 information is standardised for IRD's purposes rather than shaped for ratio analysis or resilience analysis. There would also be significant privacy requirements to overcome. Again, given the 3-year 'danger period' for new businesses, any delay of around 6 months to 1 year for administrative data from the likes of Inland Revenue would reduce the effectiveness of any improvement feedback.

Survey data input

214. Survey input will always be a manual process and therefore requires close user experience design to ensure it is not seen as an onerous task. Applying techniques such as gamification should be applied if the investment is available so that users are drawn in and incentivised to keep filling the survey information out. Simply relying on the lure of the self-assessment feedback is not enough – high usage rates require smart design.

215. Frequency of survey input needs to take into account the need for sufficient time to have passed for the business to have changed measurably. The initial survey input may be quite lengthy (i.e. the whole survey), but then each period may only deal with part of the survey. For example, the survey may be broken into four parts with one part updated each quarter. This would reduce the input load on users whilst also maintaining regular engagement.

216. Ideally some sort scoring algorithm will be applied to the choices made, so that scores per section or theme and an overall score can be accumulated. These scores would be shown at the end of the survey, and ideally throughout the survey input (as part of keeping the user engaged). They should also be easily accessible after survey input.

217. Survey history should be stored and be able to be referred to at any time. Ideally, previous answers to questions would be referenced as part of subsequent input. This could occur as a prompt where survey design practice allows, or as an immediate comparison (this could also include comparison to other industry players).

218. A number of the self-assessment tools we reviewed were designed to direct users to subsequent improvement tools. For example, a user may get feedback that a marketing plan is recommended. Ideally the survey tool would remember this improvement suggestion and prompt the user in future periods whether progress has been made on the plan (and potentially when this is planned for). Much like business mentoring, this addition to the survey would increase user accountability for improvement actions.

Comparison and advisement

Comparison

219. As well as being able to view their own history and compare their own results at various points in time, businesses should be able to anonymously compare themselves with their peers. This can either be at summary levels using medians, or a more complex option is to have the tool construct a 'benchmark persona' firm using information from other similar businesses.

220. If there are enough users, this comparison should be available at increasing levels of granularity – such as by region or area of operation, number of employees or level of turnover, and by user selected priority of key metrics (i.e. user can select current ratio and comparisons are shown across businesses with similar current ratios). For example:
    - By industry (the likely default) – this could be done using ANZSIC codes (various levels should be able to be compared with, started from 6-digit ANZSIC, all the way up to the root letter code) or using more colloquial definitions that resonates more easily with the user (but which can still be referenced to ANZSIC codes for system-level analysis).
    - Business size in terms of income or net profit (using preset income bands).
    - Business size in terms of number of employees/FTEs.
    - Businesses in their region and/or areas of operation.
    - Combinations of the above.
221. Comparison groups that do not have enough data will not be able to be compared with their peer businesses (a minimum sample size will have to be set within the system). Other self assessment tools have shown that uptake needs to be high enough to make the tool useful, including at an overall sector level.

Advisement

222. Ideally advice would also be given based on the current and predicted financial health of the business, and the answers given in the survey. Both BizRate and the Callaghan Innovation Construction Activator had this function, with reference either to existing online material or other services such as business mentors. This advice needs to be tailored to the age of the business and its specific context, rather than being generic.
223. In some cases this advice may be "pre-canned" – for example, if a question asks if they have a "Resilience Plan" and they say "No", then one of the more obvious pieces of advice will be "You should make a Resilience Plan". Ideally it will be dependent on more complex logic, perhaps involving a combination of financial analysis and survey answers. While this will be much more complex to implement, it would allow for much more tailored application to the specific users situation.
224. Some overall advice should be given at the end. At the simplest level this could just be a summary of advice given per question and any advice generated from financial inputs. At the more complex level, it is likely that some overall advice can be generated based on certain combinations of survey questions and financial indicators.
225. Ideally, the business will reflect on the results and advice and make changes to improve their business. At a future data they can return with new financial values (automatically synced or not), re-take the survey, and see how they have progressed.

Engagement and notifications

226. The system should be capable of notifications and reminders about the status of the assessment(s). If an assessment is only partly filled, a business could be reminded about it at a later date. If some advice is practical in nature, a business could be asked about it later (e.g., 'have you completed that risk plan?').
227. Keeping businesses engaged in the process will require careful consideration. Some businesses will not want to be pestered, while some will be enthusiastic about the process and want to keep on top of it. Some sensible notification defaults will need to be set within the system, but businesses should be able to configure the frequency or even if they want to opt out. Additionally, they should have control over the means of communication. In most cases email would be used, but we should consider extra layers of communications. For example, a business may want text (or push) notifications for tasks or reminders that they consider especially important.
228. Web application notifications should not require permission but should be unobtrusive and automatically disappear from immediate view within a set time. Unacknowledged notifications should be stacked in an "unread" queue and either read or cleared manually from a messages section of the UI.
229. An important part of engagement should be the production of a periodical showing trends within each industry. It should be even possible to produce statistics tailored for a specific sub-industry as an appendix for each report, so that each business gets a semi-tailored version that is pertinent to their specific industry (for practical reasons, this may be limited to 3-digit ANZSIC level, or the lowest level that will still produce a valid sample size).
230. This could even have specific data around how they compare, trends within their peers, and so on. The format could be PDF, email, or a link to a dynamic web page.
231. Such regular reports on trends within their industry will be an incentive for them to participate, as without their assessment input they will not know how they stack up against the competition.

Persistence

232. All data should be persisted in some form so that businesses can view past results and compare their results with that of their peers. This indicates the necessity of some sort of hub with an account-based login. Logins can be made easier by use of authentication protocols such as OpenID. Through this a user can use a trusted 3rd party account, such as Google or Microsoft, to provide a streamlined login process. RealMe is also an option, although is less likely to be in widespread use across construction firms than the other ones mentioned above.

Security and privacy

233. In order that businesses can be compared to their peers, anonymised data must be used. This would require some sort of opt-in permission. There is nothing to say that a business would not get value without sharing their information, but a major indicator of how well they're doing requires comparison with others that have shared their data – so it may be a carrot for their cooperation if they cannot make comparisons with those that have shared without doing so themselves.

234. The nature of the data could conceivably be of commercial sensitivity, therefore the current state-of the-art internet and database security methods, protocols, and technologies should be utilised. This may include encryption of specific business information "at rest" (i.e., when stored in the database), with it being decrypted before being used in anonymised or aggregated results. There will be no requirement to store anonymised or aggregated results in an encrypted form.

Data storage

235. Assessment results will be deterministic in nature – repeating the assessment using the exact same information should produce the same output and advice. There are some caveats with this.

236. Over time, the content and scoring algorithm of the assessment tool will be adjusted as knowledge, advice, and best practice are adjusted. There may be a desire to re-assess historical data in light of this. Given that questions, and even financial inputs, may change, this may not be feasible, or may require re-input or new inputs of some information.

237. It might be that question flows, financial input arrays, and scoring algorithms will need to be versioned, so that we know the means by which any historical assessment was arrived at. This transparency will be important in reducing confusion when similar inputs result in slightly different outcomes when taken a significant time apart.

238. The above will influence the strategy used to store historical assessment data:

    1. Store static historical end product only – for example, an assessment report in PDF format. Results in this fashion would be unalterable. Historical assessments would not be able to be regenerated using new scoring algorithms or even new formatting. This would also impact the ability to view historical data in various graphical displays to show trends over time.
    2. Store static historical inputs and outputs – instead of (or as well as[21]) storing static historical reports, the actual inputs and outputs are stored in a database. Additionally, metadata such as the questions asked will need to be stored, though storing of survey versions and linking to those versions may reduce the amount of data redundancy involved. Reports on historical data can be regenerated at any time, using the stored questions, answers, and financial parameters of the particular point in time that the assessment was undertaken, but possibly with updated formatting (e.g., a new report template).
    3. Stored dynamic historical inputs, outputs, and scoring algorithms – as per above, but with the option of regenerating historical assessments using newer scoring algorithms. This may be quite difficult if the survey has changed significantly, but it may be possible to re-take the survey with only the changed or added questions not pre-filled. In some cases, this may not be feasible, perhaps because the survey structure is too different. An assessment version compatibility system should be devised to guide the system.

Database types

239. Most of what is being stored could be structured as field-value pairs, in a format such as JSON. This would suit the use of document or NoSQL databases (for example, MongoDB), which perform well at caching and fetching document-oriented data such as assessments and their results.

240. However, analysis (e.g., summarising and slicing) of very large amounts of data favours the use of enterprise-level relational data warehouses. Examples of this include Google's BigQuery and Amazon's Redshift. It is quite possible to integrate with both types of databases in the one application, with each supporting the functionality they are most adept at facilitating.

21 Storing static historical reports would reduce computational/processor impact but increase storage utilisation.

Risks

241. Several risks are associated with the use of a centralised, internet-facing application that could hold potentially commercially sensitive information.

Security breaches

242. Regardless of the measures taken, security breaches will always be a concern in an internet application. Industry standard measures will be taken to mitigate this. This will likely include the use of multi-factor authentication (MFA).

Legal action

243. Advice that affects commercial decisions may lead to exposure to legal action if that advice is later deemed 'bad'. Standard disclaimers and caveats should be provided, but this does not remove responsibility for providing information and conclusions that are as accurate as possible.

Sample size

244. A small sample size will lead to inaccurate assessments of industries (and other groups) as a whole. This is easily mitigated by only showing comparisons and conclusions when the data sample being compared against is of a sufficient size.

Table 24 – Features vs tool type

	Type	Question form - non-interactive	Calculator, single page	Choices, single page	Choices and/or calculator, multi-page	Hub
Format	PDF					
	Excel					
	Web-based					
Assessment Type	Choices					
	Quantitative					
	Free-form text					
Entry Type	Manual entry					
	Bulk import					
	Automated import					
Flow	Linear - simple					
	Linear - complex					
	Branched					
Output	Immediate advice					
	Summary advice					
	Scores					
	Graphs					
	Comparison with others					
Persistence	None or none required					
	Session - temporary					
	Session - recoverable					
	Account based					

Key?

Table 25 - Features vs tool format

	Format	PDF	Excel	Web-based
Assessment Type	Choices			
	Quantitative			
	Free-form text			
Entry Type	Manual entry			
	Bulk import			
	Automated import			
Flow	Linear - simple			
	Linear - complex			
	Branched			
Output	Immediate advice			
	Summary advice			
	Scores			
	Graphs			
	Comparison with others			
Persistence	None or none required			
	Session - temporary			
	Session - recoverable			
	Account based			

Key?

Appendix One – Literature Review References

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Appendix Two – List of Self-assessment Tools Reviewed

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Appendix Three – List of initial theming categories for liquidator reports

Reasons	Occurrences
Tax obligations	53
Debts	37
Cash flow issues	35
Money coming in	29
Costs	21
Business wind up	17
Dispute unknown	17
Covid-19	17
Creditors (general)	17
Unknown	17
Business ability	16
Lack of sales/work	15
Director no contact	14
Solvent	14
GST	14
Director Health	12
Delays	11
Profitability	11
PAYE	11
Contracts	10
Labour	10
Income tax	9
Pricing	8

Reasons	Occurrences
Claims/judgements	7
Trading conditions	7
Losses	7
Margins	7
Working capital	7
Accounting	6
Contracts cancelled	6
Client dispute	6
Competitive	6
Overheads	6
Workmanship/faulty work	5
Company growth	4
Director overseas	4
Materials (cost)	4
Suppliers	4
Under quoting	4
Project losses	4
Director bankrupt	3
Shareholders dispute	3
Downturn/lack of business	3
Trading insolvent	3
Loss on contract	2
Contractor dispute	2

Reasons	Occurrences
External influences - economic conditions	2
Others going bankrupt	2
Shareholder drawings	2
Kiwisaver	2
Employees owed	1
ACC	1
Child support payments	1
Student Loan	1
Director	0
Loans and other debts	0
Owed money	0

Appendix Four – List of higher-level theming categories for liquidator reports

Reasons	Occurrences
Accounting	6
Business ability	16
Business wind up	17
Cash flow issues	55
Claims/judgements	7
Dispute unknown	28
Company growth	4
External influences - economic conditions	34
Contracts	18
Costs	21
Money owed	57
Delays	11
Director	30
Labour	10
Lack of sales/work	15
Losses	7
Margins	7
Others going bankrupt	2
Overheads	6
Pricing	12
Profitability	11
Project losses	4
Shareholder drawings	2

Reasons	Occurrences
Solvent	14
Tax obligations	57
Trading insolvent	3
Unknown	17
Working capital	7
Workmanship/faulty work	5

Appendix Five – Questions for residential construction business interviews

Can you walk us through your company's business model and structure?

- Explore roles and responsibilities (internally), how they work together plus (relationship to franchisees, contractors)

What is your philosophy and approach to pricing and project management?

- Technology & systems (what technology is used, systems in place to control quality). Tools used to track progress and manage timelines
- Identify approach to working with clients and levels of transparency to clients during the project
- How they determine their rates, calculate project costs
- How they determine their rates, calculate project costs

Can you describe how you anticipate, prepare and respond to market conditions?

- Company's approach to market analysis (do they follow national and international trends), forecasting of trends or anticipate challenges
- Changes in operations like resource allocation, how they enable growth of the business
- Understand ability to pivot operations, how did they do this and how fast, how does this affect the customer

Can you please share how you monitor and test the resilience of your organisation? If so, how and what were the results and how did you use these to improve operations.

- How they identify potential risks, strategies used to mitigate the risks
- Previous challenges or disruptions to operations and how they were overcome

How does your company's focus on QM and assurance systems influence your overall market positioning strategy?

- Identify approach to quality management
- Identify their competitive strengths, how they differ from other providers
- Do they choose to compete on factors such as price, speed of delivery or quality of build
- What strategies do you use to ensure employees are invested in improving the resilience of the organisation?

Appendix Six – Questions for industry body interviews

What data do you monitor to gain insights into future trends in residential construction and how do you use that to inform your members?

- Identify data they monitor and use to shed light on industry trends
- How do they communicate with members, how it operates and how it sees its role in the industry

In your experience, what do you believe are the most common or consistent failures of residential building firms that lead to their inability to meet their financial obligations?

- Identify common or consistent failures
- Are those common or consistent failures similar to other industries, key differences?
- What other forms of assistance do they provide members?

What role do you see for emerging technologies in helping to increase resilience and quality management in the sector?

- Identify any tools or technologies that could be used to improve resilience in the sector

Are there any gaps in the current regulatory framework that need to be addressed to ensure building companies are more resilient?

Can you see any innovative solutions or best practices that could be implemented successfully to help with this?

- Identify weaknesses in the regulatory framework, what challenges are being identified (eg building warranties). How can industry be better supported
- Identify any examples of successful approaches (within or out of sector) that could be implemented
- Does your organisation actively advocate for any amendments or revisions to the NZ Building Act to promote a more resilient sector?

Improving residential construction firm resilience

JULY 2024

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